CHENNAI INSTITUTE OF TECHNOLOGY

SUSTAINABLE DEVELOPMENT GOALS

Annual Report 2022-23

SUSTAINABLE DEVELOPMENT GOALS

1. No Poverty

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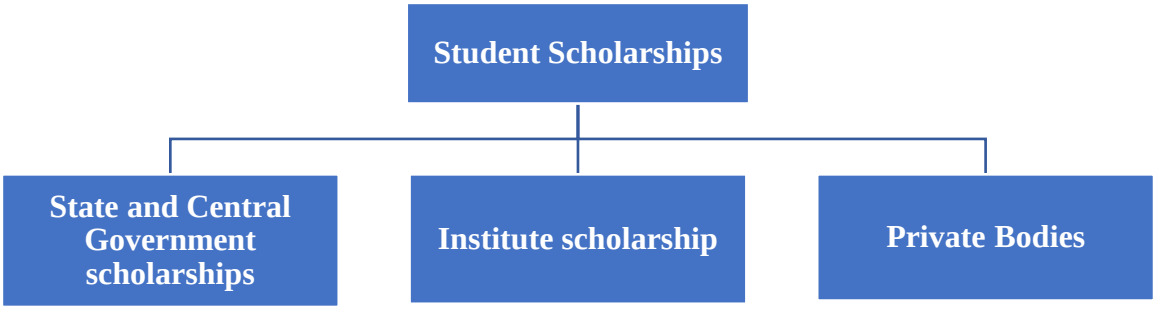
1.2 Proportion of students receiving financial aid

Students from Chennai Institute of Technology are facilitated to avail the scholarship from any of the provision available as displayed below



The Chennai Institute of Technology, provides several scholarships to students through various funding sources. These scholarships aimed to support students financially for Tuition fee and boarding lodging which enable them to pursue their education and professional development without significant financial strain. The total student strength at the institution was 3,608 out of which 595 students receives fund support from the **State and Central Government scholarships** which covers the full tuition fee, the institute facilitate them to apply for scholarship and ensure proper supporting documents are submitted on time.

Apart from the government scholarships, the **institute provides scholarship** to the students from economically and socially challenged background under various heads tuition fee. Hostel fee and transportation fee and **1,573** students benefitted out of it.

Additionally, scholarships from **Private Bodies** to cover the full tuition fee, hostel fee and transport fee also arranged from various private bodies through their CSR activities and **41** students are benefitted out of it.

1.2.1 Low-income students receiving financial aid

The Chennai Institute of Technology, during the academic year 2022-23, had a total student population of 3,608. Out of this, 636 students, are from low income category receiving the scholarship from Government, institute and Private bodies

1.3 University anti-poverty programmes

1.3.1 Bottom financial quintile admission

As per the government-mandated reservation policy, our institution follows the allotted quotas for reserved categories (Bottom financial quintile) as below:

- BC (Backward Class): 30%
- MBC (Most Backward Class): 20%
- SC (Scheduled Caste): 18%
- ST (Scheduled Tribe): 1%

In the academic year 2022-23, Chennai Institute of Technology allocated seats for various categories in accordance with government regulations. The total number of reserved category seats was as follows: 194 for SC (Scheduled Caste), 10 for ST (Scheduled Tribe), and 541 for OBC (Other Backward Class) in total 745 students from bottom financial quintile were admitted during 2022-23 admission

1.3.2 Bottom financial quintile student success

310 students out of 719 are admitted under bottom financial quintile during 2019-20 (Graduated in 2022-23), and 306 students are graduated successfully. 98 percentage of bottom financial quintile students are graduated and they are placed well in MNCs

1.3.3 Low-income student support

Apart from the scholarship for Tuition fee and boarding and lodging, the students from low-income group are entitled to undergo other training such us placement, higher studies and foreign language courses provided in campus. A separate scholarship office is there to facilitate the students to apply for various government, institute and private scholarship

A book bank also created to support them.

Details	**Total Count/ Beneficiaries**
Total Students in campus during 2022- 23	3608
Low income students receiving financial aid	636

Bottom financial Quintile – receiving financial aid	1573
Total number of students admitted during 2022-23 admission (From bottom financial quintile)	745
Percentage of graduation from low income quintile	98%

Scholarship Policy

Policy and Process for Merit Scholarship

Chennai Institute of Technology under Parthasarathy Seeniammal Educational Trust feels conceited to provide Merit Scholarship to the students, throughout their course of study to support their Education, based on the following criteria:

- Students who have completed their H.Sc with an aggregate mark in Mathematics, Chemistry and Physics will be considered eligible to acquire the merit scholarship.
- CITSET- CIT Scholarship Test mark and H.Sc mark will be given equal weightage for the scholarship process.
- **Scholarship – Low-income category**

  Aggregate mark accounting to 140 and above are eligible to get full tuition fee and hostel fee waiver and students who have got an aggregate mark between 135 and 139 are eligible to get 50% tuition fee and hostel fee waiver.

- **Scholarship – Bottom financial quintile**

  Aggregate mark accounting to 160 and above are eligible to get full tuition fee and hostel fee waiver and students who have got an aggregate mark between 155 and 159 are eligible to get 50% tuition fee and hostel fee waiver.

- **Scholarship – Merit**

  Aggregate mark accounting to 190 and above are eligible to get full tuition fee waiver and students who have got an aggregate mark between 185 and 189 are eligible to get 50% tuition fee waiver.

- Students who are single parented, underprivileged background possessing a very low income regardless of their aggregate marks.

Institutions follows the procedure detailed below to award Merit Scholarship

- The students who are eligible to avail to avail scholarship have to fill an application from and the same has to be submitted to the Administrative Office.

- The Scholarship committee will verify the authenticity of the certificates through a transparent approach and subsequently recommend the students to the trust for providing the eligible scholarship.
- A certificate denoting their Scholarship value throughout their course of study will be provided to the availed students.

Policy History

Policy created on	08-03-2017
Policy reviewed on	18-04-2022

Student Project Contributing to SDG 1

S.No	Name of the Project	Abstract
1	Personal Finance Management System	Managing personal finances can be a challenging task, but with the help of a personal finance tracking website, it can become much easier. A website that tracks expenses and incomes, sends warnings if users are spending above their set limit, and allows them to export financial data to other apps can prove to be a powerful tool for managing personal finances. The website can offer a simple and intuitive interface that allows users to easily enter their expenses and incomes. Users can set spending limits for different categories, and the website can send alerts when they are close to reaching those limits. Furthermore, the website can allow users to export their financial data to other apps, such as spreadsheets or accounting software. This can provide users with greater flexibility and enable them to analyze their financial data in different ways. The website can also generate reports and charts that provide users with insights into their spending habits and areas where they can save money. Users can analyze their spending patterns and make adjustments accordingly to achieve their financial goals. Overall, a personal finance tracking website that tracks expenses and incomes, sends warnings if users are spending above their set limit, and allows them to export financial data to other apps can help individuals manage their finances more.

Publications Contributing to SDG-1

S.No	Title
1	A Novel Approach to Design Secured and Privacy Enabled Health Data Linkage System based on Cyber Security Principles
2	Nourishing Indian Economy-through Curriculum Change in Rural Schools

Events Contributing to SDG 1

The event "Career Compass," organized annually by the Chennai Institute of Technology, aims to educate students about the various career opportunities available across different industries. The primary purpose of the event is to provide valuable insights that help students make informed decisions about their future, ultimately contributing to poverty alleviation by opening pathways to better job prospects and financial stability.


CHENNAI INSTITUTE OF TECHNOLOGY
CAREER
COMPASS 7.0
PREMIER


CHENNAI INSTITUTE OF TECHNOLOGY
Transforming Lives
CHENNAI
INSTITUTE OF TECHNOLOGY
2 Position in Tamilnadu
nirf
201-250 Band
3 Position in Tamilnadu
Navigates your CAREER
CAREER
COMPASS 5.0
Session: Entrepreneurship
INSTITUTION'S INNOVATION COUNCIL
Entrepreneurship & Startups
Advanced Manufacturing
Fintech & Meta Verse
Innovation & Research
IT Emerging Technologies
Mr.C.Yuvaresh
Fuinn Tech Pvt. Ltd. (Student start-up)
Ms.Akshita
Quazr Motors Pvt. Ltd (Student start-up)
Mr.S.M.Ruban
Quazr Motors Pvt. Ltd (Student start-up)
Mr.K.V.Surendar
Techiegen Ventures PVT.
Media Partner
THE TIMES OF INDIA
06th May 2022
www.citchennai.edu.in

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SUSTAINABLE DEVELOPMENT GOALS

2. ZERO HUNGER

Other details

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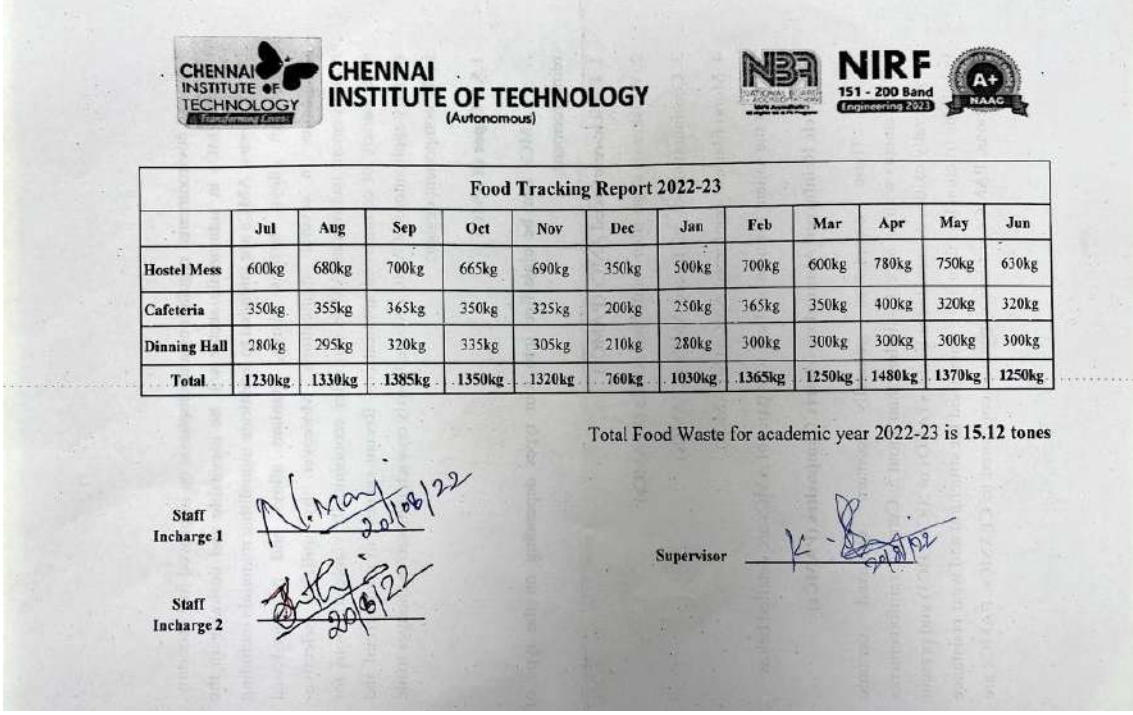
Campus Food Waste Tracking

In Chennai Institute of Technology, Food waste tracking system are implemented in a comprehensive approach to monitor and manage food waste from key areas, including the hostel mess, dining hall, and cafeteria. This system helps to improve inventory management, minimize food waste, and ensure food quality and safety. It supports a range of activities including tracking food orders, inventory levels, meal production, consumption rates, and waste management. By integrating data from various campus dining outlets, it enables better decision-making and promotes sustainable practices.

Each day, collected waste food from different sources is gathered at the designated facility and sorted. Once sorted, the waste is carefully weighed to determine its mass, and this weight is documented meticulously. The quantity is recorded both in the system software and in physical logbooks as a backup. This dual approach ensures data accuracy and preserves a record even in case of system failures. After weighing, calculations are performed to track daily, weekly, and monthly totals, enabling better waste management planning and resource allocation. Specific details, such as the type of waste and its origin, are also noted to analyze patterns over time. These records are then used to generate reports that highlight trends and support future projections, which are critical for decision-making in waste reduction strategies. Additionally, any deviations in weight or consistency of the waste are flagged, allowing for immediate follow-up. Ensuring data integrity across both digital and

paper records plays a vital role in streamlining operations and achieving sustainability goals effectively.

This report provides a comprehensive overview of food waste data collected from July 2022 to June 2023 .



CHENNAI INSTITUTE OF TECHNOLOGY
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NIRF 151 - 200 Band Engineering 2023

Food Tracking Report 2022-23

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Hostel Mess	600kg	680kg	700kg	665kg	690kg	350kg	500kg	700kg	600kg	780kg	750kg	630kg
Cafeteria	350kg	355kg	365kg	350kg	325kg	200kg	250kg	365kg	350kg	400kg	320kg	320kg
Dinning Hall	280kg	295kg	320kg	335kg	305kg	210kg	280kg	300kg	300kg	300kg	300kg	300kg
Total	1230kg	1330kg	1385kg	1350kg	1320kg	760kg	1030kg	1365kg	1250kg	1480kg	1370kg	1250kg

Total Food Waste for academic year 2022-23 is **15.12 tones**

Staff Incharge 1 20/06/22

Staff Incharge 2 20/6/22

Supervisor 20/6/22

Sample Month-Wise Records Maintained in the System

Aug-22

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
Hostel Mess	22	21	21	21	21	20	21	22	23	23	21	22	24	22	23	22	21	23	21	22	24	22	21	23	20	21	22	24	22	23	22	680
Cafeteria	13	12	13	13	12	12	7	11	12	13	12	10	11	8	12	11	12	11	13	12	7	13	12	12	12	11	13	6	12	13	14	355
Dining Hall	10	11	10	11	11	10	2	9	9	8	9	8	9	3	12	11	10	12	10	11	2	12	11	12	11	12	12	3	12	10	12	295
Total	**45**	**44**	**44**	**45**	**44**	**42**	**30**	**42**	**44**	**44**	**42**	**40**	**44**	**33**	**47**	**44**	**43**	**46**	**44**	**45**	**33**	**47**	**44**	**47**	**43**	**44**	**47**	**33**	**46**	**46**	**48**	**1330**

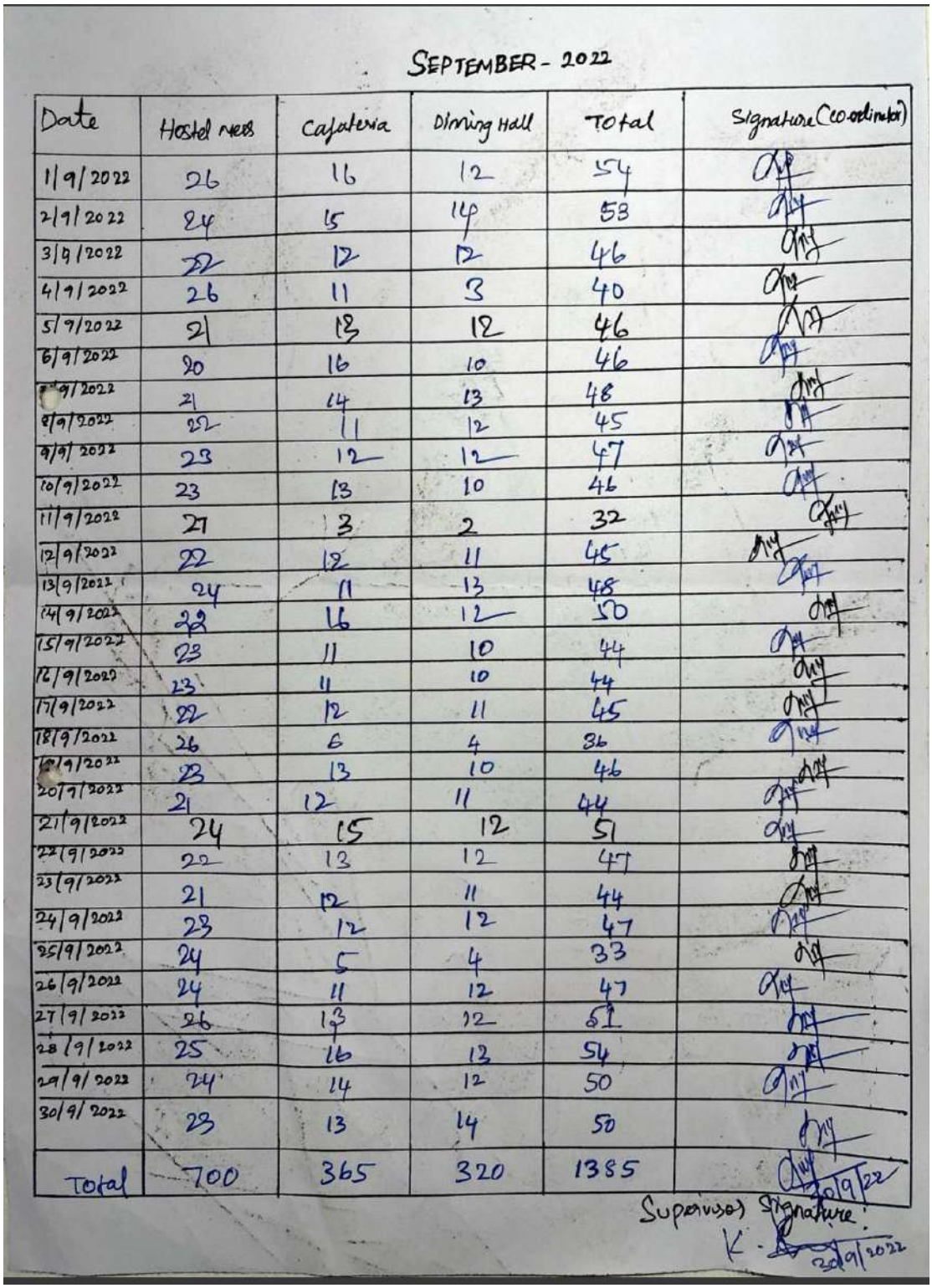
Sep-22

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Hostel Mess	26	24	22	26	21	20	21	22	23	23	27	22	24	22	26	23	22	26	23	21	24	22	21	23	24	24	26	25	24	23	700
Cafeteria	16	15	12	11	13	16	14	11	12	13	3	12	11	16	12	11	12	6	13	12	15	13	12	12	5	11	13	16	14	13	365
Dining Hall	12	14	12	3	12	10	13	12	12	10	2	11	13	12	12	10	11	4	10	11	12	12	11	12	4	12	12	13	12	14	320
Total	**54**	**53**	**46**	**40**	**46**	**46**	**48**	**45**	**47**	**46**	**32**	**45**	**48**	**50**	**50**	**44**	**45**	**36**	**46**	**44**	**51**	**47**	**44**	**47**	**33**	**47**	**51**	**54**	**50**	**50**	**1385**

Oct-22

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
Hostel Mess	21	20	20	20	21	20	19	21	21	22	21	21	21	22	23	22	21	23	21	22	23	22	21	23	20	21	22	24	22	23	22	665
Cafeteria	13	5	13	13	12	12	13	11	6	13	12	10	11	12	12	5	12	11	13	14	12	13	7	12	14	11	13	13	12	6	14	350
Dining Hall	10	3	14	13	13	12	13	12	4	10	12	11	14	12	12	6	10	12	10	11	12	12	5	12	11	12	12	13	12	6	14	335
Total	**44**	**28**	**47**	**46**	**46**	**44**	**45**	**44**	**31**	**45**	**45**	**42**	**46**	**46**	**47**	**33**	**43**	**46**	**44**	**47**	**47**	**47**	**33**	**47**	**45**	**44**	**47**	**50**	**46**	**35**	**50**	**1350**

Sample Month-Wise records maintained in the Log book



SEPTEMBER - 2022

Date	Hostel mess	Cafeteria	Dining Hall	Total	Signature (Co-ordinator)
1/9/2022	26	16	12	54	
2/9/2022	24	15	14	53	
3/9/2022	22	12	12	46	
4/9/2022	26	11	3	40	
5/9/2022	21	13	12	46	
6/9/2022	20	16	10	46	
7/9/2022	21	14	13	48	
8/9/2022	22	11	12	45	
9/9/2022	23	12	12	47	
10/9/2022	23	13	10	46	
11/9/2022	27	3	2	32	
12/9/2022	22	12	11	45	
13/9/2022	24	11	13	48	
14/9/2022	23	16	12	50	
15/9/2022	23	11	10	44	
16/9/2022	23	11	10	44	
17/9/2022	22	12	11	45	
18/9/2022	26	6	4	36	
19/9/2022	23	13	10	46	
20/9/2022	21	12	11	44	
21/9/2022	24	15	12	51	
22/9/2022	22	13	12	47	
23/9/2022	21	12	11	44	
24/9/2022	23	12	12	47	
25/9/2022	24	5	4	33	
26/9/2022	24	11	12	47	
27/9/2022	26	13	12	51	
28/9/2022	25	16	13	54	
29/9/2022	24	14	12	50	
30/9/2022	23	13	14	50	
Total	700	365	320	1385	

Supervisor Signature:
30/9/22

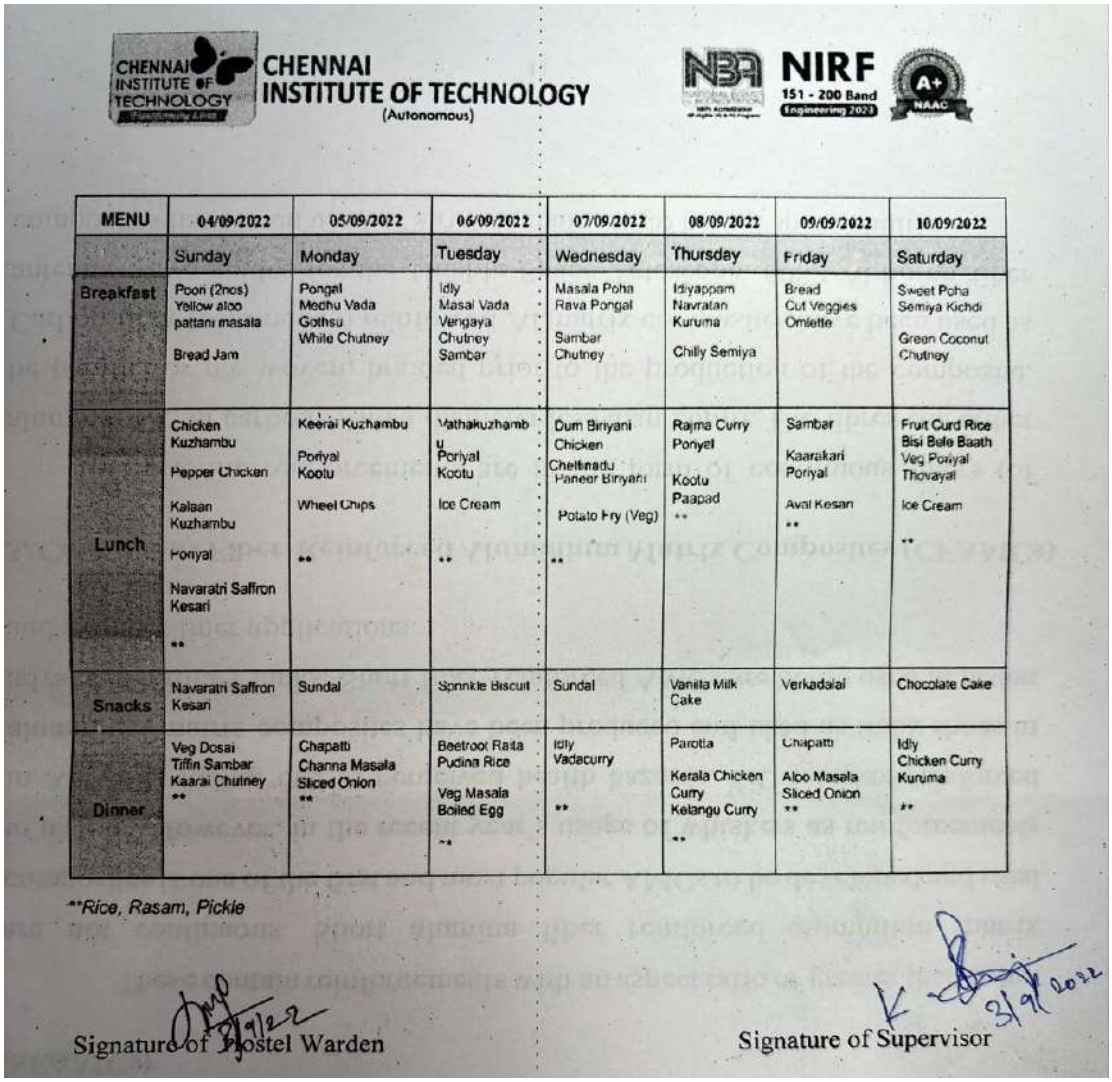
Total Campus Population

In the academic year 2022-23, the total population on our campus is **4032** including students, faculty, and staff. This population count reflects the growing size of our community, contributing to a vibrant and dynamic academic environment. The diverse range of individuals within this total number supports a wide variety of academic, cultural, and social activities on campus, fostering a collaborative atmosphere for learning and personal growth. This population data also helps in planning resources, facilities, and services to better accommodate the needs of everyone on campus and ensure a positive and well-supported campus experience.

Student Hunger

As part of our commitment to Sustainable Development Goal 2 (SDG-2): Zero Hunger, our campus is taking proactive steps to combat hunger and malnutrition by providing students with access to **organic, nutrient-rich foods**. We understand that a healthy, balanced diet is essential for academic success, mental focus, and overall well-being.

Serving only organic foods in the campus mess aligns by ensuring that students consume food free from harmful pesticides, chemicals, and genetically modified organisms, fostering better overall health. Organic farming practices are typically more sustainable, conserving water, preserving soil health, and reducing carbon emissions compared to conventional agriculture. This commitment to organic food helps reduce the campus's environmental footprint while promoting awareness of sustainable food sourcing. In addition to supporting health and sustainability, sourcing organic food from local farms or ethical suppliers also helps boost local economies, making it a community-driven initiative. By integrating organic foods into the daily meals served in the mess, students can experience the benefits of nutritious, sustainably grown food, while also learning about food security, environmental responsibility, and ethical consumption.



CHENNAI INSTITUTE OF TECHNOLOGY
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NIRF 151 - 200 Band Engineering 2023

MENU	04/09/2022	05/09/2022	06/09/2022	07/09/2022	08/09/2022	09/09/2022	10/09/2022
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Breakfast	Poori (2nos) Yellow aloo pattani masala Bread Jam	Pongal Medhu Vada Gothsu White Chutney	Idly Masal Vada Vengaya Chutney Sambar	Masala Poha Rava Pongal Sambar Chutney	Idiyappam Navratan Kuruma Chilly Semiya	Bread Cut Veggies Omlette	Sweet Poha Semiya Kichdi Green Coconut Chutney
Lunch	Chicken Kuzhambu Pepper Chicken Kalaan Kuzhambu Poriyal Navaratri Saffron Kesari **	Keerai Kuzhambu Poriyal Kootu Wheel Chips **	Vathakuzhambu Poriyal Kootu Ice Cream **	Dum Biriyani Chicken Chettinadu Paneer Biriyani Potato Fry (Veg) **	Rajma Curry Poriyal Kootu Paapad **	Sambar Kaarakari Poriyal Aval Kesari **	Fruit Curd Rice Bisi Bele Baath Veg Poriyal Thovayal Ice Cream **
Snacks	Navaratri Saffron Kesari	Sundal	Sprinkle Biscuit	Sundal	Vanilla Milk Cake	Verkadalai	Chocolate Cake
Dinner	Veg Dosai Tiffin Sambar Kaarai Chutney **	Chapatti Channa Masala Sliced Onion **	Beetroot Raita Pudina Rice Veg Masala Boiled Egg **	Idly Vadacurry **	Parotta Kerala Chicken Curry Kelangu Curry **	Chapatti Aloo Masala Sliced Onion **	Idly Chicken Curry Kuruma **

**Rice, Rasam, Pickle

Signature of Hostel Warden

Signature of Supervisor

Sample of Week-wise Mess menu

In our hostel, a student council meeting is conducted once a month to discuss and finalize the monthly menu, ensuring that the food choices align with the preferences and needs of the residents. we believe in offering more than just regular meals—we want to surprise and delight our residents with nutrient-packed meals that are both healthy and delicious. To make dining more engaging and to minimize food wastage, a **surprise menu** is introduced once a week. By involving students in menu planning and offering creative meal options, we aim to provide a satisfying dining experience while promoting sustainability.

Student Projects Contributing in SDG-2

S.No	Name of the Project	Abstract
1	Cook Buddy	Cook Buddy is a comprehensive recipe app designed to revolutionize the culinary experience for users of all skill levels. With an intuitive interface and an extensive database of diverse recipes, this app serves as a digital companion for aspiring home chefs, seasoned cooks, and anyone eager to explore the realm of gastronomy. Our app boasts a diverse collection of recipes ranging from quick and easy weekday meals to elaborate gourmet creations. Users can explore recipes from various cuisines, dietary preferences, and cooking techniques. Each recipe is accompanied by detailed instructions, cook lists, and step-by-step tutorials, empowering users to recreate dishes with ease. Users can also engage with interactive features such as timers, conversion tools, and cooking tips for a seamless cooking experience. Users can add their own recipes to the community which makes the scope and the resources of the app wider. This can be achieved after the user becomes culmination by sending culmination request. Moreover users can save the recipes which they like for future reference. The admin have all the access for the recipes in the system, the admin can add, edit, delete and edit an recipe, he can also make can recipe active and inactive and the recipes accepted the admin alone will be displayed in the application.
2	Intelligent Plant Health	Plant disease detection is a crucial task in agriculture, as it can help prevent significant crop losses caused by diseases. Machine learning has emerged as a promising solution for this problem. In this paper, we present an abstract of the state-of-the-art techniques for plant disease detection using machine learning. We start by introducing the challenges associated with plant disease detection, including the high dimensionality of image data, the need for large datasets, and the requirement for accurate labelling. Overall, this abstract highlight the potential of machine learning in plant disease detection and its importance for sustainable agriculture., we present the results of recent studies

		that have used machine learning for plant disease detection and discuss their limitations and potential future directions. Next, we discuss the various machine learning algorithms used for plant disease detection, including convolutional neural networks (CNNs), support vector machines (SVMs), and decision trees. We then discuss the importance of data augmentation and transfer the potential of machine learning in plant disease detection and its importance for sustainable agriculture. Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product.
3	Experimental study of performance improvement of solar bubble dryer for agricultural products	The project "Experimental Study of Performance Improvement of Solar Bubble Dryer for Agricultural Products" aims to revolutionize solar drying technology in agriculture. Our goal is to enhance both efficiency and affordability. Through innovative redesign and optimization strategies, we aim to boost drying efficiency by 30% while cutting costs compared to current market options. We prioritize reducing power consumption, measured in watt- hours, for sustainability and cost-effectiveness. Using interdisciplinary methods and rigorous experimentation, we seek to develop a cost-effective solution for efficient agricultural product preservation. This initiative has the potential to positively impact sustainable food processing practices, reducing food loss and improving access to high- quality preserved agricultural products. Through collaboration and knowledge sharing, we aim to encourage the wider adoption of solar drying technology, contributing to a more sustainable agricultural sector. We are excited about the prospect of leading this innovative project. By leveraging our knowledge and skills, we aim to overcome technical challenges and achieve significant advancements in solar drying technology. Through collaboration with industry partners and stakeholders, we plan to gain valuable insights and ensure the practical applicability of our solutions. By disseminating our findings through publications and presentations, we hope to inspire future research and foster continued innovation in sustainable agricultural practices.
4	Plant Disease Detection	Agriculture field has a high impact on our life. Agriculture is the most important sector of our Economy. Proper management leads to a profit in agricultural products. Farmers do not expertise in leaf disease so they produce less production. Plant

		leaf diseases detection is the important because profit and loss are depending on production. CNN is the solution for leaf disease detection and classification. Main aim of this research is to detect the apple, grape, corn, potato and tomato plants leaf diseases. Plant leaf diseases are monitoring of large fields of crops disease detection, and thus automatically detected some feature of diseases as per that provide medical treatment. Proposed Deep CNN model has been compared with popular transfer learning approach such as VGG16. Plant leaf disease detection is the one of the required research topic as it may prove benefits in monitoring large fields of crops, and thus automatically detect the symptoms of diseases as soon as they appear on plant leaves. In this project we focus on providing a quick and effective solution to every farmer who is affected with crop damaging pests.
5	Farm Management System	This report describes the development and implementation of a farm management system project that enables farmers to directly sell their products to customers. The project aims to eliminate intermediaries in the farm-to-market supply chain, thereby providing farmers with a more profitable and efficient means of selling their products. The system includes features such as product listings, inventory management, and online ordering, which allows customers to purchase farm products directly from the website. The report outlines the project's objectives, methodology, and outcomes, highlighting the system's benefits to farmers and customers alike. Overall, the farm management system project offers a practical solution to the challenges faced by small-scale farmers in accessing markets and generating income.
6	Orchard management in open fields with deep learning-based fruit monitoring	Mango is an important agricultural produce with high export value as it is being consumed internationally. This work presents a method for detection and counting of mangoes in RGB images for further yield estimation. The RGB images are acquired in open field conditions from a mango orchard in the pre-harvest stage. The proposed method uses, deep convolutional neural network based architecture for mango detection using semantic segmentation. Further, mango objects are detected in the semantic segmented output using contour based connected object detection. Results are analysed using the precision, recall, F1

		parameters derived from contingency matrix. Results demonstrate the robustness of detection for a multitude of factors such as scale, occlusion, distance and illumination conditions, characteristic to open field conditions. Further mango fruit size also determined for the estimation of fruit maturation and size distribution, for further decision making to harvest and marketing. To detect fruit, cascade detection with histogram of oriented gradients (HOG) feature is applied. Finally, fruit lineal dimensions were calculated using the RGB-D depth information, fruit image size and the thin lens formula. We believe this work represents the first practical implementation of machine vision fruit sizing in field, with practicality gauged in terms of cost and simplicity of operation.
7	Mango leaf disease prediction	The Convolutional Neural Network CNN works by obtaining a picture and designating it with some weightage supported by the various objects of the image, to distinguish them from one another. CNN needs little or no pre-processing information as compared to different deep learning algorithms. Early diagnosis and correct identification of mango plant disease prediction will manage the unfolding of the diseases Mango leaf diseases damage mango quality and yield. This research uses deep learning to automatically identify leaf diseases in different mango plant kinds. The planned work is Associated with the Nursing correct identification approach for the mango plant disease prediction exploitation of the Convolutional Neural Network. It includes generating comfortable method pathological pictures Associate in nursing coming up with a model and a design of the Convolutional Neural Network to discover mango leaf diseases. The image augmentation method is employed to extend the number of images. completely different information augmentation techniques square measure applied to stop overfitting and improve generalization.
8	NutriDetect: ML-Powered Analyzer for freshness and nutrition in Fruits and vegetables	This research presents an innovative approach to classify fruits and vegetables and provide detailed nutritional analysis and freshness assessment. Leveraging OpenCV for image processing and Convolutional Neural Networks (CNN) for machine learning, our system accurately identifies and categorizes produce from images. It also extracts essential nutrient information from a CSV dataset. Integrated with a freshness detection

		model, it empowers consumers to make informed decisions when selecting fresh and nutritious produce.
9	HealthHub: Food Item Recognition with Calorie Estimation and HealthConscious Product Suggestions	Accurately measuring the calorie content of food is essential for promoting healthy eating habits and managing dietary intake. However, calorie estimation poses challenges due to the diverse composition of ingredients and variations in cooking methods. This paper presents a novel approach for estimating food calorie content based on ingredient recognition and thermal information. The proposed method utilizes convolutional neural networks (CNN) for image classification to identify food items and extract their corresponding ingredients from a comprehensive database enriched with nutritional knowledge. Additionally, thermal imaging is employed to analyze the heat patterns of food ingredients, aiding in the segmentation and classification process. Fuzzy logic techniques are applied to classify ingredient boundaries based on their thermal signatures and intensity levels. The classified ingredients are then aggregated, and their calorie content is calculated using established nutrition knowledge and area ratios. Comparative analysis against conventional methods demonstrates the efficacy of the proposed approach in accurately estimating food calories. Furthermore, the HealthHub Food Item Recognition system integrates this calorie estimation functionality with health-conscious product suggestions, enhancing its utility for promoting balanced nutrition and facilitating informed dietary choices.

Patents Contributing in SDG-2

S.no	Application	Topics
1	202341073935 A	AGRICULTURAL INNOVATION: IOT-ENHANCED SMART IRRIGATION SYSTEM WITH CROP PROTECTION
2	202341067795	INTENSIFICATION OF OIL YIELD FROM KOKUM SEEDS; AN ENERGY-EFFICIENT EXTRACTION USING ULTRASONICATION TECHNIQUE
3	202241075331 A	AGRICULTURE CROP INSURANCE POLICY USING BLOCK CHAIN TECHNOLOGY

S.No	Publications Contributing to SDG-2
1	A Multitask Learning-Based Vision Transformer for Plant Disease Localization and Classification
2	Multi-scale characteristics of drought propagation from meteorological to hydrological phases: variability and impact in the Upper Mekong Delta,
3	Revolutionizing UAV: Experimental Evaluation of IoT-Enabled Unmanned Aerial Vehicle-Based Agricultural Field Monitoring Using Remote Sensing Strategy
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15	Role of irrigation tank rehabilitation and related off-farm activities in achieving sustainable rural development
16	Statistical study of water users association for sustainable agriculture in rural development

Events to raise awareness for SDG-2

It is essential to mobilize support, foster understanding, and inspire actions towards ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. Here are some impactful event ideas for raising awareness around SDG-2:

1. World Food Safety Day, observed on June 7 each year, aims to raise awareness about the importance of safe food practices to protect public health and prevent food borne illnesses. Established by the United Nations in collaboration with the World Health Organization (WHO) and the Food and Agriculture Organization (FAO), the day highlights the need for a comprehensive approach to food safety along the entire supply chain, from production to consumption. Food safety involves proper handling, storage, and preparation of food to avoid contamination from bacteria, viruses, parasites, and chemicals that can lead to foodborne diseases. The theme of World Food Safety Day varies each year, often focusing on areas such as hygiene, safe farming practices, food industry accountability, and consumer awareness. Key messages include the importance of governmental regulations, food industry responsibility, and individual actions to ensure that food is safe and nutritious.

2. National Nutrition Week is an annual campaign dedicated to raising awareness about the importance of nutrition, healthy eating, and lifestyle choices. Celebrated in many countries, including India and the United States, this week is an opportunity to educate people of all ages about balanced diets, the role of nutrition in preventing diseases, and the long-term benefits of a healthy lifestyle.This campaign not only highlights the value of proper nutrition but also supports efforts to reduce malnutrition, boost immunity, and improve mental and physical well-being. By empowering individuals with knowledge about balanced diets and healthy habits, National Nutrition Week contributes to building healthier communities and supporting long-term public health goals.

3. World Food Day, celebrated annually on October 16, is a global day of action dedicated to tackling hunger, promoting healthy diets, and achieving food security for all. Each year, World Food Day brings attention to critical food-related issues, including malnutrition, climate change, agricultural innovation, and the need for greater equity in food access.The theme of World Food Day changes annually, focusing on pressing global challenges. Past themes have included calls to "grow, nourish, sustain together," emphasizing the need for collaboration across governments, organizations, communities, and individuals to transform food systems and make them more equitable and sustainable. Events around the world mark this day with activities such as community gardens, food donations, educational workshops, and policy discussions that aim to address hunger and promote solutions that foster sustainable development.

4. Happy Farmers' Day! let’s take a moment to honor the hard work, dedication, and resilience of farmers who tirelessly provide the food on our tables. Behind every grain of rice, every vegetable, and every meal we enjoy lies the effort of farmers who work through tough weather, long hours, and unpredictable conditions to feed the world.As we celebrate, let's also remember a simple but powerful way to show gratitude: think of a farmer before wasting food. Each time we leave food uneaten or let groceries go to waste, we overlook the labor, time, and resources that went into producing it. Reducing food waste not only respects the farmer’s efforts but also conserves water, energy, and the land used in food production.Today, and every day, let's honor our farmers by being mindful of our food. Serve yourself what you can finish, use leftovers creatively, and help spread awareness about food waste. Every small step counts in showing appreciation for the hands that feed us and in creating a sustainable world for future generations.

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CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

SUSTAINABLE DEVELOPMENT GOALS – 3

Good Health and Well Being

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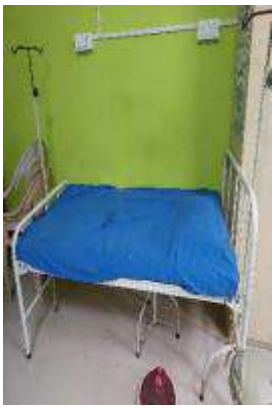
CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

The Health Centre here at Chennai Institute of Technology is well equipped. It has separate inpatient facility for male and female students The health centre provides quality health care in a comfortable and confidential environment. The health centre is manned by a medical officer and a healthcare assistant to provide excellent medical care to all the students. The Medical Officer Dr. Balachander. M.B,B.S manages the various aspects of the facility.

1. Chennai Institute of Technology provides health services with support for the entire academic and surrounding community.
2. Ambulance services available for emergency purpose.
3. First aid, an emergency room, and medical oxygen cylinders are available at Chennai Institute of Technology.

Health Centre (Chennai Institute of Technology)

Ambulance (Chennai Institute of Technology)



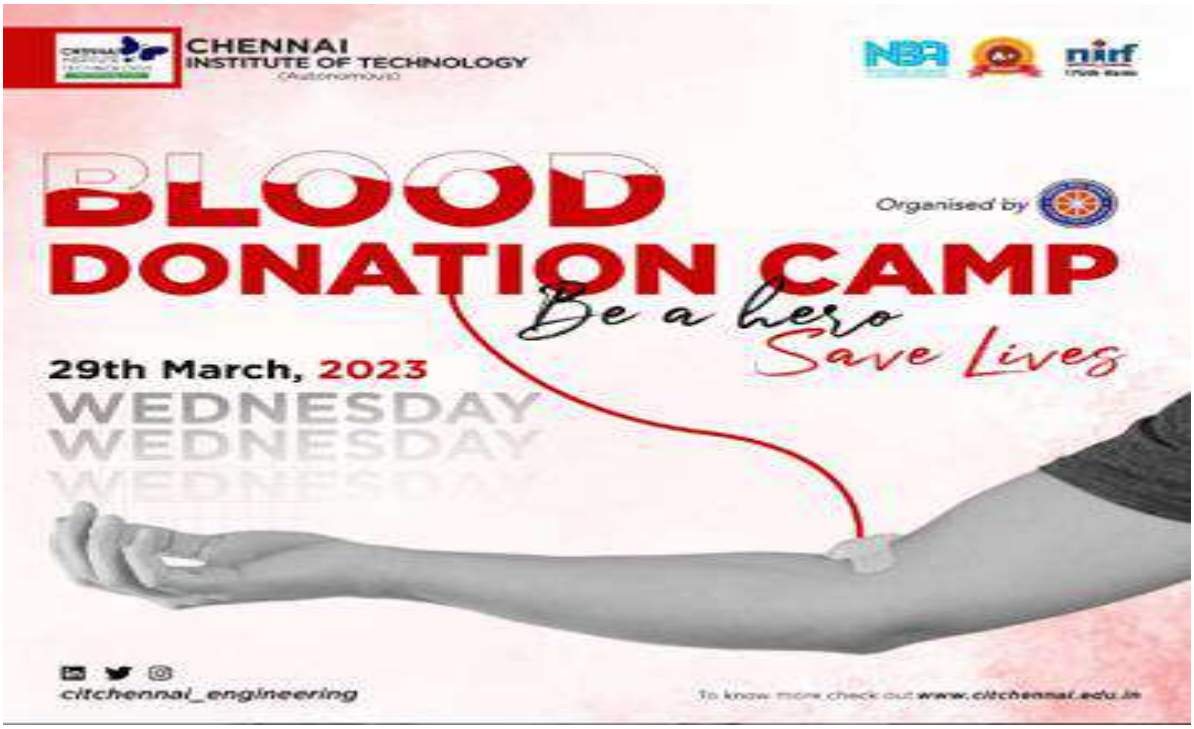
First aid, Emergency room and Medical oxygen cylinder


Blood Donation Camp

The Chennai Institute of Technology (CIT) organizing a blood donation camp is a meaningful and impactful event. Blood donation camps like these can save countless lives, providing a critical supply of blood for hospitals and patients in need. CIT often collaborates with local hospitals or blood banks to ensure the blood is safely collected, stored, and distributed to those in urgent need.

Donors will undergo a preliminary health check-up to ensure they're eligible to donate. This typically includes checking hemoglobin levels, blood pressure, and general fitness. Once cleared, donors are guided through the donation process, which usually takes around 10-15

minutes per person. The blood is collected in sterile, sealed bags, and donors are closely monitored. After donating, participants are provided with refreshments and encouraged to rest briefly to regain energy. There may also be a waiting area with water, snacks, and sometimes fruits to help boost blood sugar levels. Many blood camps give donors a certificate or small token of appreciation, acknowledging their contribution.



Eye Check-Up

The Chennai Institute of Technology (CIT) occasionally organizes eye check-up camps for students and faculty as part of its health and wellness initiatives. These check-ups often include basic screenings for vision clarity, eye strain, and potential eye health issues.

Student Project:

Title: DESIGN AND DEVELOPMENT OF WEARABLE ANTENNA FOR PROACTIVE TUMOR DETECTION

Abstract:

In recent years, wearable electronics have gained opportunities and the past decade has become evidence of this growth in Wireless Body Area Network (WBAN). They fulfil the

requirements of personalizing healthcare, communication, patient monitoring, tracking, and rescue operations. The major challenge for the WBAN is to handle the coupling of the radiator with the human body. To increase the performance of a microstrip patch antenna, it has been blended and truncated on the diagonal sides to make up the suggested antenna design. Flexible electronics have paved the way for Wireless Body Area Networks (WBAN). This allows for optimal performance. The square patch, measuring 50 × 50 mm, resonates at the 2.4 GHz ISM band, which is frequently utilized in wireless communication applications. The FR-4 substrate, which has a relative permittivity of 4.3, was selected for the antenna. It is a lossy material with a thickness of 1.6 mm and dimensions that match those of the ground plane (50 x 50 mm). Perfect Electric Conductor (PEC) is the material used for the patch. Its dimensions are 30 × 30 mm, or half the wavelength at the resonance frequency to further improves performance, a slot is added to the patch's center. A secondary ground plane measuring 90 x 90 mm and 2 mm thick is placed beneath the primary ground plane in addition to the main ground plane to improve radiation efficiency and antenna stability. In order to maximize signal strength and coverage, the coaxial feed in the design is carefully calibrated to improve gain. The design seeks to improve impedance matching, radiation pattern, and overall antenna performance by truncating and blending the square patch antenna in addition to adding a slot and an extra ground plane. In order to maximize efficiency and reliability and satisfy the criteria of the 2.4 GHz ISM band, much consideration is given to the choice of materials and dimensions. The proposed antenna is designed and simulated using CST Microwave Studio software. The proposed antenna is an efficient antenna with realized gain of 2.88dBi, low VSWR and wide bandwidth.

Title: AUGMENTATION OF EMOTIONS - A RESERVOIR COMPUTING BASED EEG ANALYSIS

Abstract:

Emotion classification based on Electroencephalogram (EEG) signals holds significant potential for enhancing affective computing applications. The proposed work developed an effective emotion classification system utilizing EEG signals and addressed the need for robust methods capable of accurately capturing temporal aspects of EEG data to discern distinct emotional states. Leveraging the capabilities of GRU reservoir computing, the machine learning model was trained and evaluated to classify EEG signals into distinct emotional categories. Through rigorous experimentation and evaluation, the performance of the proposed methodology was assessed using standard metrics such as accuracy, precision, recall, and F1-score. The findings demonstrate a higher classification accuracy of 97.344% with the effectiveness in addressing the challenges associated with the temporal dynamics and non- stationary of EEG data.

Title: DETECTION OF LUNG DISEASE USING BREATHE RATE ANALYSIS

Abstract:

This work presented a new approach for the early detection of lung diseases using respiratory rate. The real-time monitoring system is developed using a comprehensive sensor system that includes GSR and heart rate sensors, Node MCU and Internet of Things (IoT) technology. The GSR sensor records physiological changes in skin conductance, while the heart rate sensor measures heart rate variability, providing valuable information about breathing patterns. This data is seamlessly integrated and transmitted in real time via the Node MCU, enabling remote monitoring. The proposed system provides a non-invasive, real-time monitoring, cost-effective and efficient way for early detection, facilitating timely treatment. IoT integration ensures accessibility and immediate response with a help of Machine learning model to get an accuracy of 94%, And also, the detection of lung diseases using X-ray images, CT scan images, and CNN technology is a much costlier and time-consuming complex procedure. To avoid these methods, we use a novel and multisensory approach to detect lung diseases easily and cost-effectively. This method helps increase the potential to develop preventive health strategies in the field of various lung diseases such as asthma, pneumonia, chronic obstructive pulmonary disease, and pulmonary fibrosis.

Title: DESIGN AND DEVELOPMENT OF AN E-NOSE FOR THE DIAGNOSIS OF PULMONARY DISEASES

Abstract:

The Electronic Nose model introduced a new machine for the diagnosis of lung diseases that changed the field with its approach. The model used artificial intelligence technology, machine learning technology, and the integration of unique medical data to provide a solution to the real and counterintuitive lung problem. By combining the nasal cavity with standard measurements, biochemical markers, and patient-specific clinical parameters, the model provided a comprehensive assessment of lung health, helping to support early diagnosis and self-treatment strategies. Rigorous clinical studies and quality control ensured the reliability and validity of the models in real-world clinical settings, promising to increase accuracy and improve patient outcomes. The integration of the system with existing treatments and its focus on personalized treatments further increased the effectiveness and efficiency of the treatment. The e-nose service represented a significant advance in lung diagnostics and revolutionized the challenges faced by doctors and patients. The model had the ability to increase the accuracy of diagnosis, improve treatment strategies, and improve overall patient care, making it a useful tool in the fight against lung diseases. Through continued research, implementation, and effort, the e-nose program had the potential to revolutionize the field of pulmonary medicine and make a positive impact on the lives of countless people affected by these diseases.

Title: SPEAK-EASY CLOUD BASED STAMMERING ASSISTANT WITH FREQUENCY MATCHING

Abstract:

Stuttering, also known as stammering or childhood-onset fluency disorder, presents significant challenges to individuals, affecting the fluency and flow of speech. While it is common among young children as they develop their language skills, it can persist into adulthood for some individuals, impacting their self-esteem and social interactions. This project focuses on the development of a speech therapy device tailored specifically for individuals who stutter. The device aims to improve fluency and communication skills by providing real-time feedback and assistance during speech. By utilizing innovative technologies, including speech recognition and artificial intelligence, the device detects instances of stuttering and offers interventions such as delayed auditory feedback or visual cues to help individuals overcome speech disruptions. Moreover, the device incorporates personalized learning algorithms to adapt to the user's unique speech patterns, maximizing effectiveness. Through rigorous testing and refinement, this speech therapy device holds promise in alleviating the challenges associated with stuttering, empowering individuals to communicate confidently and effectively.

Title: NEURAL NEXUS: PROGNOSTICATION OF ANESTHESIA THROUGH MACHINE LEARNING MASTERY

Abstract:

This proposed work explored the application of machine learning to personalize and optimize anaesthesia administration, addressing the challenge of patient variability in response to anaesthesia. Machine learning algorithms were employed to analyse extensive datasets encompassing patient information, medical history, and surgical details. These analyses were used to develop personalized anaesthesia prediction models, tailoring medication regimens to individual patient characteristics. The work aimed to minimize risks associated with unpredictable patient responses. By understanding individual nuances through trained algorithms, safer and more effective anaesthesia regimens could be achieved, potentially leading to improved patient outcomes and recovery. Systems continuously analysed data during surgery, adjusting predictions based on evolving conditions. This enhanced patient safety and provided dynamic decision support for healthcare professionals throughout the procedure. Seamless integration with existing healthcare Information systems and electronic health records was crucial. User-friendly interfaces facilitated widespread adoption among healthcare professionals. Integrating machine learning in anaesthesia prediction had the potential to revolutionize patient care. Personalized predictions, improved response to variability, real-time adaptation, and interoperability all contributed to safer procedures, potentially reduced healthcare costs, and an overall higher quality of care.

Title: DRIVER DROWSINESS DETECTION SYSTEM

Abstract:

The Driver Drowsiness Monitoring System (DDMS) is an essential automotive safety innovation designed to combat drowsy driving accidents. It utilizes a combination of sensors

and advanced algorithms to continuously monitor the driver's condition, detecting signs of drowsiness in real-time. Key components include infrared cameras, facial recognition technology, steering angle sensors, and biometric sensors like heart rate monitors. These sensors provide a comprehensive view of the driver's behavior and physiological state. The DDMS software analyzes data from these sensors, assessing parameters like eye movement, blink frequency, facial expressions, and steering behavior. When signs of drowsiness are detected, the system issues audible and visual alerts, preventing accidents caused by driver fatigue. This system is adaptable to various vehicles and driving conditions, making it a vital tool for enhancing road safety by reducing drowsy driving-related accidents.

Title: IMPLEMENTING IOT MONITORING SYSTEM FOR NEONATAL CARE: COMBATING RETERM BIRTH CHALLENGES

Abstract:

Premature infants face significant challenges in regulating their body temperature, often leading to serious health complications. In developing countries, where medical resources are limited, addressing this issue effectively while keeping costs low is crucial. This proposed work approach to incubator design aimed at providing essential monitoring and control functions for premature infants at an affordable price point. The proposed system incorporates various sensors such as temperature, humidity, light intensity, CO2 levels, galvanic skin response (GSR), heart rate, and oxygen saturation (SPO2), allowing for comprehensive monitoring of the infant's environment and vital signs. Reducing infant mortality rates associated with prematurity-related complications, which currently account for a significant portion of global infant deaths. The proposed infant incubator system integrates various sensors to monitor vital parameters such as temperature, humidity, oxygen saturation, and skin conductance. These sensors, coupled with an Arduino microcontroller, facilitate real-time monitoring and control of the incubator environment. Additionally, the inclusion of a Bluetooth module enables seamless communication with caregivers, providing timely alerts in case of any abnormalities. This proposed work prioritizes usability and cost-effectiveness without compromising on the quality of care provided to premature infants. By harnessing the power of innovation and collaboration, we aim to make life-saving medical equipment accessible to all, regardless of economic constraints.

Title: SKIN CANCER CLASSIFICATION AND SEGMENTATION USING ARTIFICIAL INTELLIGENCE TECHNIQUES

Abstract:

Skin cancer is one of the most prevalent types of cancer worldwide, and early detection plays a crucial role in improving patient outcomes. Artificial intelligence (AI) techniques have shown promising results in skin cancer classification and segmentation tasks, providing automated and accurate solutions. This proposed work presents an overview of skin cancer classification and segmentation using AI techniques. The classification aspect focuses on

distinguishing between benign and malignant skin lesions. Various AI algorithms, including machine learning and deep learning models, are explored for this task. The segmentation aspect addresses the precise delineation of skin lesions from surrounding healthy tissue. AI techniques such as convolutional neural networks (CNNs) and image processing algorithms are utilized for accurate lesion segmentation. The integration of classification and segmentation techniques is explored, and it allowed for a comprehensive analysis of skin cancer. Combined approaches enable accurate identification of cancerous regions within an image, aiding in precise diagnosis and treatment decisions. This paper provides an overview of skin cancer classification and segmentation using AI techniques. It highlighted the potential of AI in improving skin cancer diagnosis and treatment, and discusses the challenges and future directions in the field. Convolutional Neural Networks (CNNs) excel in extracting features from raw data like images, enabling automated learning of hierarchical representations. Their spatial hierarchy and shared weights make them powerful for tasks such as image classification, object detection, and even natural language processing tasks involving sequential data. With the help like semantic segmentation or instance segmentation, CNNs can accurately partition and identify specific areas of interest within complex visual data. CNNs sometimes referred to as convnets use principles from linear algebra, particularly convolution operations, to extract features and identify patterns within images.

Title: DIABETES PREDICTION WITH MICROVASCULAR IMAGING AND MULTIMODAL BIOMARKERS

Abstract:

Addressing the global health challenge of diabetes necessitated overcoming limitations in conventional blood tests, which often deterred regular testing due to their invasive nature and discomfort. To enhance diabetes detection accuracy, this study proposed a two-stage Machine Learning (ML) system. In the initial stage, various ML models, including Logistic Regression, Random Forest, Decision Tree, and K-Nearest Neighbors, analyzed user-provided health data such as pregnancies and glucose levels. These models discerned patterns and relationships to predict diabetes risk, achieving notable accuracy rates ranging from 74.25% to 99%. However, further investigation was warranted to tackle potential overfitting observed in the KNN model. Subsequently, Stage 2 offered a non-invasive confirmation process. Users flagged at high risk in Stage 1 could opt for retinal image capture, processed using OpenCV to classify diabetic retinopathy features. Integrating both stages furnished a holistic risk assessment, promising earlier and more accurate diabetes detection. By capturing a broader array of relevant features beyond blood tests, this approach enabled improved preventative strategies and personalized treatment, ultimately alleviating the burden of diabetes on individuals and healthcare systems alike.

Title: APPLYING DEEP LEARNING TO ACCESS HEART ARRYTHMIA BY ANALYZING ECG

Abstract:

Arrhythmia classification plays a pivotal role in the early detection and management of heart disease, a leading cause of mortality worldwide. Electrocardiogram (ECG) data, being a widely adopted physiological measurement, serves as the cornerstone for classification endeavors in this domain. Deep learning models have emerged as powerful tools for categorizing arrhythmia classes, exhibiting promising results in automated diagnosis. However, the efficacy of these models is often gauged solely based on performance metrics, which may not fully account for the intricacies of real-world data distributions. The distribution of records within each dataset category profoundly influences the validation of these metrics, especially in scenarios where imbalanced data is prevalent. The disparity between balanced and imbalanced data can significantly impact the assessment of deep learning model performance, potentially leading to skewed outcomes. In light of these challenges, it gives a thorough analysis of various architectures of deep learning models for arrhythmia classification, with a keen focus on elucidating pre-processing methods tailored to mitigate the effects of imbalanced data. By delving into the intricacies of Convolutional Neural Networks (CNN), Artificial Neura Networks (ANN), Deep Neural Networks (DNN), AlexNet, ResNet, k-Fold Cross-Validation, VGG-16, Long Short-Term Memory (LSTM), and LeNet, this aims to provide insights into optimizing model performance and assist data imbalances.

Title: ENHANCED PATIENT HEALTHCARE SOLUTION

Abstract:

This proposed work aimed to revolutionize healthcare delivery, particularly catering to elderly individuals and those with mobility impairments. The work integrated both software and hardware components to provide a seamless and efficient healthcare experience. On the software front, the work utilized a modern web stack comprising HTML, CSS, and React for frontend development, Firebase for robust database management, and Node.js for flexible backend operations. This software infrastructure powered a user- friendly website, “Unified Surgical Telehealth”, which served as the central hub for all healthcare interactions. The hardware aspect of the work involved the creation of a wearable device utilizing advanced components such as microcontroller, AD8232, MLX90614, and MAX30102. These components enabled the device to monitor vital physiological parameters, including heart rate and body temperature, essential for comprehensive health assessment. Central to the work's functionality is its ability to facilitate remote consultations between patients and healthcare providers. Through live video consultations, patients could connect with their doctors in real-time, eliminating the need for physical travel and ensuring timely access to medical assistance. This feature is particularly beneficial for individuals with limited mobility or those undergoing post-operative care. During remote check-ups, the wearable device can collect crucial health data from the patient, which is securely stored in the

Firebase database. Healthcare providers could access this data through the website, enabling them to monitor patient's health status remotely and make informed medical decisions.

Title: MACHINE LEARNING ENABLED CARDIAC STROKE ALERT

Abstract:

The Heart Stroke Alert System emerges as a revolutionary advancement in healthcare technology, poised to redefine the landscape of cardiac care with its proactive approach. Through the seamless integration of Internet of Things (IoT) technology, healthcare providers gain unprecedented insights into patient health statuses, facilitating rapid response to critical alerts. Central to this system are wearable sensors that continuously monitor temperature and heart rate fluctuations, providing vital streams of data for analysis. These data undergo meticulous scrutiny by machine learning models, trained extensively on relevant datasets, to not only identify cardiac events but also to delve into patient-specific attributes such as age, gender, medical history, and physiological markers. By synthesizing this multifaceted information, the system offers personalized care strategies tailored to individual cardiovascular health profiles. The primary objective of this innovative approach is to optimize patient outcomes through early detection and preemptive intervention, transcending traditional reactive models in favor of proactive patient management. Moreover, the Heart Stroke Alert System extends its utility beyond acute event detection, offering a comprehensive solution for continuous remote patient monitoring. Through the integration of sensor technologies, machine learning algorithms, and IoT connectivity, it establishes a robust framework for delivering holistic cardiac care.

Title: REAL TIME ANALYSIS OF PARKINSON TREMOR USING DATA DRIVEN TECHNIQUES

Abstract:

Parkinson's disease (PD) is characterized by motor symptoms such as tremors, rigidity, and gait difficulty, which can significantly impact patients' quality of life. Traditional methods of evaluating these symptoms rely heavily on subjective patient self-assessment, often resulting in incomplete or inaccurate data. To address this limitation, we proposed a novel approach utilizing wearable accelerometers integrated into a watch for continuous monitoring of PD motor symptoms. This project proposes a monitoring system for Parkinson's disease (PD) that integrates accelerometers and machine learning. Machine learning algorithms, particularly Support Vector Machine (SVM), analyze this data to classify symptom severity accurately. It provides a more objective and quantitative assessment of PD symptoms, improving diagnostic accuracy and treatment planning.

Machine learning enables personalized treatment strategies tailored to individual patients' symptom profiles, optimizing therapeutic outcomes.

Title: CYPHER FEEL A SENTIMENTAL COMPANION

Abstract:

The pervasive integration of technology into our daily lives has led to an unprecedented surge in the generation and storage of personal data, exposing individuals to risks of unauthorized access and breaches. To address this concern, this project introduces "Cipher Feel," a web application designed not only to provide robust data storage through end-to-end encryption but also to understand user's current emotional states. Unlike conventional diary applications, Cipher Feel integrates sentimental analysis to comprehend users' emotions, offering personalized suggestions based on their previous inputs for enhancing well-being. Sentiment analysis refers to identifying as well as classifying the sentiments that are expressed in the text source. The user's previous text data are useful in generating a vast amount of sentiment data upon the analysis. These data are used to understand the current user's emotional state and helps to provide the better suggestions for the user. This project report outlines Cipher Feel's development process, features, security considerations, and the integration of emotional analysis, emphasizing the importance of secure data storage practices in today's digital landscape. Readers will gain a comprehensive understanding of Cipher Feel and its role in promoting secure data storage practices in our technologically advanced era.

Title: SKIN DISEASE PREDICTON USING IMAGE PROCESSING

Abstract:

Skin diseases are most common among the globe, as people get skin disease due to inheritance, environmental factors. In many cases people ignore the impact of skin disease at the early stage. In the existing system, the skin disease is identified using biopsy process which is analyzed and medicinal prescribed manually by the physicians. To overcome this manual inspection and provide promising results in short period of time, we propose a machine learning technique. For this the input images would be microscopic images i.e., histopathological from which features like color, shape and texture are extracted and given to convolutional neural network (CNN) for classification and disease identification. Our objective of the project is to detect the type of skin disease easily with accuracy and recommend the best and global medical suggestions. This paper proposes a skin disease detection method based on image processing and machine learning techniques. In existing approach, the increased skin diseases identified at the later stage using biopsy only. Thus, this process is performed manually which can lead to human errors and takes 1-2 days for

the results. Also, the physician finds it difficult to identify the type of skin disease andthe stage of disease at the analysis stage. Thus, making the medicine prescription difficult. This concern can be addressed by usage of machine learning and deep learning techniques by analyzing the microscope image. This approach can provide a promising result by combining computer vision and machine learning techniques. The proposed methodology system is highly beneficial in rural areas where access to dermatologists is limited. For this system, we use PyCharm based python script for experimental results. These results suggest that the proposed system can help effectively diagnose the type of skin disease, thereby reducing further complications. The HAM10000 dataset is used and the proposed method has outperformed other methods with more than 85% accuracy.

Title: HEALTHCARE AND MEDICINE RECOMMENDATION SYSTEM USING NLP

Abstract:

In the era of data-driven healthcare, the demand for personalized medical recommendations is paramount. Since corona virus has shown up, inaccessibility of legitimate clinical resources is at its peak, like the shortage of specialists and healthcare workers, lack of proper equipment and medicines etc. The entire medical fraternity is in distress, which results in numerous individual's demise. Due to unavailability, individuals started taking medication independently without appropriate consultation, making the health condition worse than usual. As of late, machine learning has been valuable in numerous applications, and there is an increase in innovative work for automation. This paper intends to present a drug recommender system that can drastically reduce specialist heap. In this research, we build a medicine recommendation system that uses patient reviews to predict the sentiment using various vectorization processes like Bow, TF-IDF, Word2Vec, and Manual Feature Analysis, which can help recommend the top drug for a given disease by different classification algorithms. The predicted sentiments were evaluated by precision, recall, accuracy and AUC score. The results show that classifier Linear SVC using TF-IDF vectorization outperforms all other models with 93% accuracy. Through extensive experimentation and evaluation, our system demonstrates significant improvements in patient outcomes, fostering a more efficient and effective healthcare delivery model.

Title: CHRONIC KIDNEY DISEASE PREDICTION USING MACHINE LEARNING

Abstract:

Chronic Kidney Disease (CKD) is a severe condition affecting millions worldwide, with significant mortality rates. Early detection is crucial for effective treatment and prevention of complications. In this study, we propose a machine learning-based approach to predict CKD, aiming to improve early diagnosis and reduce mortality rates. We employ preprocessing techniques to handle missing data and compare the performance of several machine learning algorithms, including K-Nearest Neighbour, Decision Tree, Gaussian

Naïve Bayes, Logical Regression, and Artificial Neural Network. Through dataset selection, preprocessing, algorithm execution, and classification of control metrics, we aim to determine the most effective algorithm for CKD prediction. Our objective is to raise awareness, promote early diagnosis, and ultimately mitigate the impact of CKD through early prediction and proper treatment. In this study, we propose to use a dataset containing a wide range of clinical and demographic variables to train and evaluate machine learning models for CKD prediction. We will employ preprocessing techniques to handle missing data and normalize features to ensure the models' accuracy and reliability. By comparing the performance of various machine learning algorithms, including K-Nearest Neighbour, Decision Tree, Gaussian Naïve Bayes, Logical Regression, and Artificial Neural Network, we aim to determine the most effective approach for predicting CKD.

Title: MENTAL HEALTH MANAGEMENT

Abstract:

Mental health issues are a growing concern worldwide, with limited access to professional help creating a significant barrier to well-being. This project explores the potential of web app technology integrated with machine learning (ML) to address this challenge. We propose the development of a novel mental health wellbeing app, "Ally - Wellness Companion". Ally - Wellness Companion leverages ML algorithms to personalize user experience and provide targeted support. Through features like mood tracking, journaling, and interactive exercises, the app aims to promote self-awareness and equip users with coping mechanisms. The ML component analyses user data to identify patterns and suggest relevant resources, personalized recommendations for mindfulness practices, and potential early detection of mental health concerns. Ally - Wellness Companion incorporates an AI-powered chat feature that provides personalized support and insights based on the user's journal entries. Through natural language processing (NLP) techniques, the AI analyses the user's journaling patterns and emotional tone. This analysis allows the AI to tailor conversation topics and responses to the user's specific needs. For instance, if the user frequently expresses feelings of anxiety in their journal, the AI might initiate conversations about relaxation techniques or recommend relevant exercises within the app. The AI can also identify positive entries and offer encouragement, fostering a sense of accomplishment and progress. This personalized interaction fosters a safe space for users to express themselves and receive non-judgmental support, enhancing the overall user experience and potentially leading to a deeper understanding of their own emotions and thought patterns.

Title: BRAIN TUMOR DETECTION USING DEEP NETWORKS

Abstract:

Brain tumor detection plays a crucial role in early diagnosis and treatment planning, significantly impacting patient outcomes. With the advancements in deep learning techniques, automated detection systems have shown promise in enhancing the accuracy and

efficiency of tumor diagnosis. This paper proposes a novel approach for brain tumor detection utilizing deep neural networks (DNNs). The proposed system leverages convolutional neural networks (CNNs) to extract relevant features from magnetic resonance imaging (MRI) scans. Furthermore, a multi- layer perceptron (MLP) is employed to classify the extracted features into tumor and non-tumor classes. Experimental results demonstrate the effectiveness of the proposed method in accurately detecting brain tumors, showcasing competitive performance compared to existing approaches. The proposed system not only provides reliable detection but also offers potential for integration into clinical workflows to aid healthcare professionals in making informed decisions for patient care.

Title: AUTOMATIC ACCELERATION CONTROL SYSTEM

Abstract:

Car accident is the major cause of death in which around 1.3 million people die every year. Majority of these accidents are caused because of distraction or the drowsiness of driver. Construction of high-speed highway roads had diminished the margin of error for the driver. The countless number of people drives for long distance every day and night on the highway. Lack of sleep may lead to an accident. Drowsiness and Fatigue of drivers are amongst the significant causes of road accidents. Every year, they increase the amounts of deaths and fatalities injuries globally. To prevent such accidents, we propose a system which alerts the driver if the driver feels drowsy. Facial landmarks detection is used with help of image processing of images of the face captured using the camera, for detection of drowsiness. In this project, a module for Advanced Driver Assistance System is presented to reduce the number of accidents due to drivers' fatigue and hence increase the transportation safety; this system deals with automatic driver drowsiness detection based on visual information and Artificial Intelligence. This project proposes an algorithm to locate, track, and analyze both the drivers face and eyes to measure EAR (Eye Aspect Ratio), a scientifically supported measure of drowsiness associated with slow eye closure.

Title: DISEASE ANALYSIS AND PREDICTIONS SYSTEM USING MACHINE LEARNING

Abstract:

The Disease Analysis and Predictions System (DAPS) represents a groundbreaking solution at the intersection of data analytics and public health. By amalgamating diverse data streams, including electronic health records, environmental indicators, demographic data, and social media activity, DAPS offers a comprehensive platform for disease surveillance and analysis. Through the application of advanced machine learning algorithms, DAPS not only identifies historical trends but also predicts future disease outbreaks with remarkable accuracy. Real-time monitoring capabilities enable prompt response to emerging health threats, while intuitive visualization tools facilitate the interpretation of complex data sets. DAPS stands poised to revolutionize public health practice by empowering stakeholders with actionable

insights, facilitating proactive interventions, and ultimately contributing to the advancement of population health outcomes.

Publications:

1	Biomedical applications of terbium oxide nanoparticles by Couroupita guianensis aubl leaves extract: A greener approach
2	Synthesis and characterization of copper(II) complex derived from newly synthesized acenaphthene quinone thiosemicarbazone ligands: Computational studies, in vitro binding with DNA/BSA and anticancer studies
3	Combustion enhancement and emission reduction in RCCI engine using green synthesized CuO nanoparticles with Cymbopogon martinii methyl ester and phytol blends
4	Multifaceted exploration of acylthiourea compounds: In vitro cytotoxicity, DFT calculations, molecular docking and dynamics simulation studies
5	Biomolecular Interactions and Anticancer Mechanisms of Ru(II)-Arene Complexes of Cinnamaldehyde-Derived Thiosemicarbazone Ligands: Analysis Combining In Silico and In Vitro Approaches
6	Brain tumor classification and segmentation using deep learning approach
7	Effect of coordination mode of thiosemicarbazone on the biological activities of its Ru(II)-benzene complexes: Biomolecular interactions and anticancer activity via ROS-mediated mitochondrial apoptosis
8	Copper-mediated cyclization of thiosemicarbazones leading to 1,3,4-thiadiazoles: Structural elucidation, DFT calculations, in vitro biological evaluation and in silico evaluation studies
9	Green Synthesis of Metal-Doped ZnO Nanoparticles Using Bauhinia racemosa Lam. Extract and Evaluation of Their Photocatalysis and Biomedical Applications
10	Platinum group metal (PGM) complexes having acylthiourea ligand system as catalysts or anticancer agents
11	Deep learning aided prostate cancer detection for early diagnosis & treatment using MR with TRUS images
12	Bis(acylthiourea) compounds as enzyme inhibitors: Synthesis, characterization, crystal structures and in silico molecular docking studies

13	The Development of Inference in Healthcare System using FEFL System
14	Fog Computing Integrated with and Blockchain Technology for Accurate Disease Prediction
15	Lung Cancer Classification based on Auxiliary Classifier (WGAN) Optimised with HOA from CT Images
16	Assessment of the environmental impacts of gold mining activities at Gankombol (Adamawa-Cameroon) using Leopold matrix, Fecteau grid and remote sensing approach
17	Advanced Liver Tumor Detection: Cascaded Fully Convolutional Neural Networks for Enhanced Precision
18	Predictive Modeling for Air Quality: A Machine Learning System
19	Transforming Healthcare with MedInsight: A Guide to Intelligent Decision Support
20	Hyper Triglycerides Prognosis Using Machine Learning and Data Science
21	IoT Applications in Marine Monitoring: Protecting Ocean Health and Biodiversity
22	A Detailed Analysis of Air Pollution Monitoring System and Prediction Using Machine Learning Methods
23	Synthesis, Computational and cytotoxicity studies of aryl hydrazones of βdiketones: Selective Ni metal Responsive fluorescent chemosens
24	Investigation on SAR in Hexagonal Shape Monopole Ultra-Wideband Antenna to Identify Female Breast Cancer
25	Detection of diabetes mellitus using machine learning algorithm

Patents:

202341079508 A	A Pipeline Approach for Automatic Segmentation of Free - Text Medical Reports
202341070569 A	Touch Sheild Multi-Protection Locker for Blind People
202341070626 A	Tremor Detection for Parkinson's Patient

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

202341034532 A	IOT Based Breath Analyzer for Non-Invasive Diagnosis of Diseases
Design No. 379280-001	Blood Oxygen Saturation Meter
202341002573 A	Pyrrolo Pyrimidine Amines as Complement Inhibitors

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SUSTAINABLE DEVELOPMENT GOALS

4. QUALITY EDUCATION

Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities For All

4.1 Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities For All.

In the absence of further action, an estimated 300 million pupils will not have the fundamental literacy and numeracy skills needed for success in life, and an estimated 84 million children and youth will remain out of school by 2030.In addition to free primary and secondary schooling for all boys and girls by 2030, the aim is to provide equal access to affordable vocational training, eliminate gender and wealth disparities, and achieve universal access to quality higher education. Education is the key that will allow many other Sustainable Development Goals (SDGs) to be achieved. When people are able to get quality education they can break from the cycle of poverty. Education helps to reduce inequalities and to reach gender equality. It also empowers people everywhere to live more healthy and sustainable lives. Education is also crucial to fostering tolerance between people and contributes to more peaceful societies. To deliver on Goal 4, education financing must become a national investment priority. Furthermore, measures such as making education free and compulsory, increasing the number of teachers, improving basic school infrastructure and embracing digital transformation are essential.

The SDG4 goal is a pivotal driver for positive change, emphasizing the transformative power of education in fostering a sustainable and equitable world. The objective of SDG 4, which focuses on ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all, is geared towards achieving various targets by 2030. For college-level education specifically, this includes ensuring that all students have access to affordable and quality higher education, vocational training, and opportunities for lifelong learning. This means advocating for policies that promote equal access to education and addressing barriers that marginalize certain groups.

4.2 Policy on Quality Education

The **Chennai Institute of Technology (CIT)** has made a distinct mark in the field of education and research. It imparts and follows an educational system which not only provides for a living but for an improved quality of life.

The various departments are headed by Heads and Teachers with high profile educational qualifications who impart value-based education which aids a person to put into use what he has learnt from the institution and thereby lead a good life.

The teachers not only teach pure academics but also imparts life skills. They understand the needs of different types of students, such as slow learners, some more oriented towards sports and cultural activities, some more interested in research.

The CIT strives to coordinate these students and take them forward as a one big group. It also aims at inclusive education in the sense that students from different economic, social, geographical and cultural differences are admitted in one campus and treated alike.

Every effort has been made by the **CIT** to accommodate people from the local community. The **CIT** partakes in different activities organized by the local community and goes out to spread awareness on various issues related to the development of the local community as a whole.

The various departments conduct awareness campaigns on the necessity of educating the children. A great emphasis is laid on the early years of education, the formative stage of a person's life, which determines his personality at a later stage.

The CIT campus supports the primary, kindergarten and lower primary classes and standard education is imparted to the children to enable them to become better citizens of tomorrow.

The economic growth of a country depends on a well-planned and well-organized class of citizens who by their wise and well-informed financial decisions helps to promote the growth of our country.

In order to make this wise and well-informed decisions, the students should be given a class of education which helps them to not alone analyze the economy and plan accordingly but also pay their taxes regularly. Each student is educated about his duty towards the country and how responsible citizenry would reflect on the growth of the country.

There is no discrimination or inequality in the system of education imparted by us and all the classes of students are given the privileges and preferences which are owed to them under the Constitution and various. other legislations.

CIT tries to build a fair and sustainable world where every person is provided with equal opportunity to realise his potential to the fullest. CIT has a placement cell which enables the students who have successfully completed their courses to find employment.

This provides job security to students as the employers come in through the CIT so their credentials are checked before the students get employed. The Placement Cell consists of a team which thoroughly investigates into the goodwill of the employer.

CIT takes great pride in making the world know that the resources of the CIT can be used even by persons who are not studying in the campus. The facility is open to all irrespective of any discrimination.

Therefore, the CIT envisages promotion of not only its students but whoever is interested in educating themselves. The aim is, precisely, the welfare of the society as a whole. For the same reason, it provides huge access not alone to the library but also to the online courses, video lecture materials and other facilities which a student wants to access.

Any student who is endowed with intellectual ability is promoted and encouraged to navigate his skills and achieve great success.

CIT is well equipped with modern technological devices with its IT enabled and smart classrooms which have LCD projectors, white boards, audio facilities for the speakers and every student has an easy access to computer.

CIT also has computer labs and every library is endowed with adequate computers to enable the students to have access for their research and learning.

CIT also provides for Learning Management System, MOODLE, TCS, etc., the most sophisticated process for teaching learning management. All the departments have been successfully conducting online classes and it is ensured that each student participates effectively. This has been a great success during the pandemic times.

CIT has been organizing events in the public domain by conducting public lectures, various events, educational events and ensure maximum public participation.

CIT also offers vocational training to the public, free of cost and this has enabled many persons to secure jobs and earn their livelihood. Many families are benefitted by this and in this way the CIT ensures that it is always in the service of the community.

The various departments of the CIT have also organized many extension activities beyond the campus which has benefitted the students in the nearby schools, the people of small hamlets in the vicinity of the CIT, the small towns and the city areas which is appreciated by the people who are the beneficiaries of such activities.

CIT is a student friendly campus and each student is important to the institution. For the better benefit of the students, the CIT has founded the Students Grievance Cell so that they can address their concerns. Then an Anti-Ragging Cell is created for the benefit of the students. Another Committee, that is the Internal Complaints Committee was formed relating to the prevention, prohibition and redressal of sexual harassment at workplace to the female employees and students. A Caste Discrimination Control Room is also created to solve the differences arising out of the caste discrimination.

CIT takes pride that it provides access to education to all, those who seek knowledge and wisdom, regardless of their ethnicity, religion, community, gender or disability.

Policy History

Policy created on	22-05-2019
Policy reviewed on	25-11-2022

4.3 Policy on Lifelong Learning Process

The institute promotes lifelong learning opportunities for all the individuals of the society. The institution supports education and information through various information resources which are user friendly. It enhances knowledge and skills through the learning materials offered in the website, and the skill development modules both online and offline. It aims to make learning flexible, easily accessible, through clear, reliable information and advice. CIT has policies, processes and necessary infrastructure for integrating the resources within the institution and ensure free access to the resources through its website. To Provide

and support various stakeholders such as student community, faculty and staff, public, to access the various learning resources and utilize the knowledge to improve quality of lifelong learning. The objectives are to promote lifelong learning practices by accessing relevant, high-quality, evidence based learning resources, integrating information and communication technology.

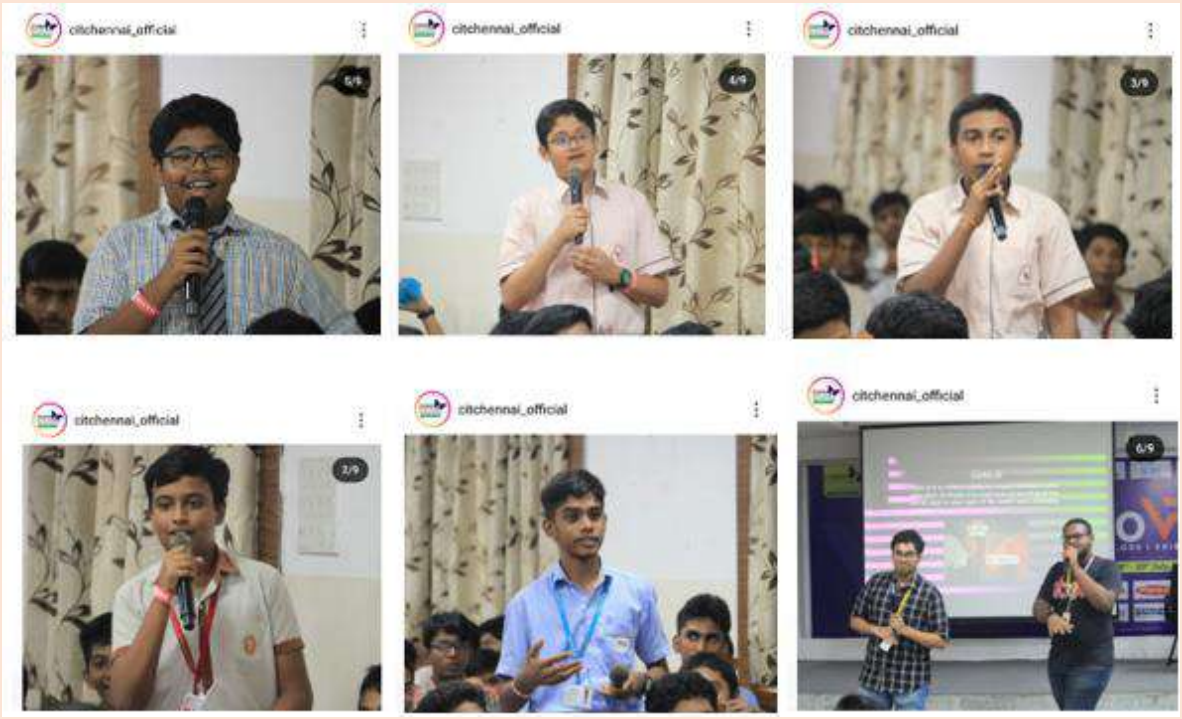
Policy History

Policy created on	22-05-2019
Policy reviewed on	25-11-2022

4.4 Provide access to educational resources for those not studying at the university

Public Access to resources

Chennai Institute of Technology (CIT) resources are freely accessible by the public thrice in a year who are willing to expand their knowledge by visiting centre of excellence laboratories. To keep student mind vibrant various events and activities are conducted. The students from various schools come to deepen their knowledge and technical skills across various engineering fields. Known for its rigorous curriculum and high standards.



Access to School Students

Awareness and Encourage Programme on Education

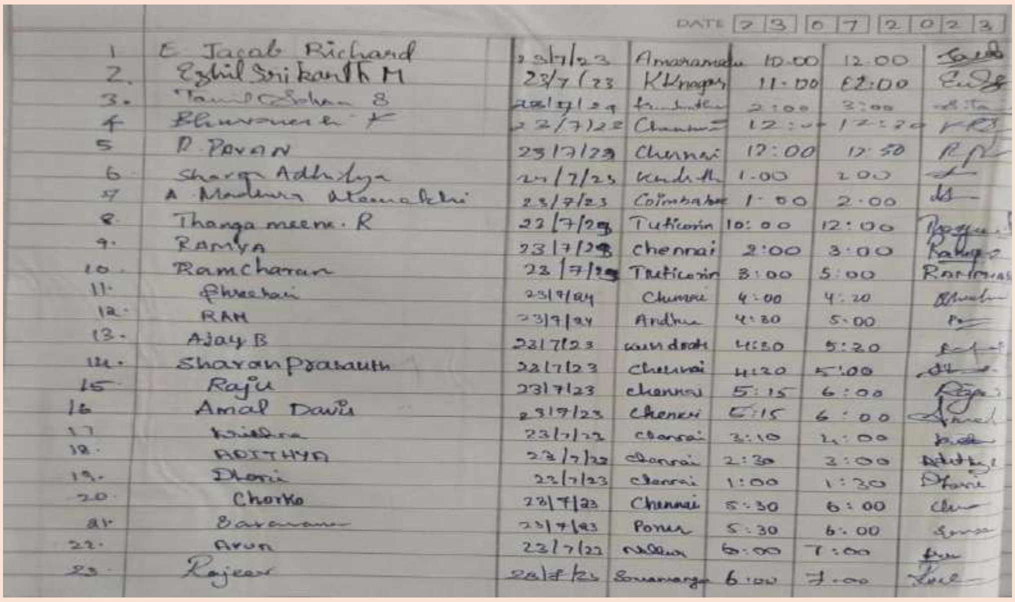
School Students accessing Institute Laboratories

School Students accessing the Institute for the event Innovest – Technical Exhibition

The Chennai Institute of Technology (CIT) library is freely accessible for public, students, faculty, and researchers with a comprehensive collection of resources. The library is accessible from 8.00 AM to 8.00 PM every day. This helps the public to visit the library at It meets international standards, housing over 25,000 books across fields in Literature, Engineering, Technology, Science, and Humanities.

Library Infrastructure

Digital Library



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16	Amal Davis	23/7/23	Chennai	5:15	6:00	[illegible]
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21.	Saravanan	23/7/23	Ponur	5:30	6:00	[illegible]
22.	Arun	23/7/23	[illegible]	6:00	7:00	[illegible]
23.	Rajeev	23/7/23	[illegible]	6:00	7:00	[illegible]

Evidence - Public Access to Library

4.5 Lifelong Learning Measures

A workshop on Entrepreneurship and Innovation as Career opportunity was conducted by CIT Innovation labs as a part of the Self-Reliant Bharat Movement on September 15, 2023 at Chennai Institute of Technology. The event featured prominent speakers, including Mr. M.K. Anand, Mr. R. Ram Kumar, Mr. Arivazhagan Arul, and Mr. S. Shyam Sekar, who shared invaluable insights. From conceptualization to implementation, participants were equipped with essential strategies and encouraged to cultivate an entrepreneurial mindset. The event served as a platform for attendees to ignite their path to success, fostering a spirit of innovation and learning within the academic community.

Workshop on Entrepreneurship and Innovation as Career Option

International Conference On Electrical Engineering & Multidisciplinary Research - ICEEMR 2022 organised by Center for New Energy Research (Solar and Wind), Chennai Institute of Technology on 23rd and 24th June 2022

4.6 Education outreach activities beyond campus

Outreach activities include visiting schools, giving talks at assemblies, discussions with students, or participation in events such as career fairs and science and technology camps. The institution conducts educational and publicity activities outside of campus (school and communities). Students may travel to the community or nearby schools to provide traffic safety knowledge, anti-drug knowledge or art, musical instruments, morality, life education, and other teaching services.

Collaborative Art Installation

We engaged the participants of the rally made for the awareness on water(SDG-6) and land(SDG-15) in a creative activity. A large chart was displayed at the playground entrance gate, where each participant made their handprints on the chart. We then drew branches extending from a central trunk, and the thumbprints of participants acted as leaves, transforming the handprints into a beautiful,

symbolic tree. This artwork now stands as a reminder of our collective efforts toward sustainability and education.

Innovation Series in the Institute

The Institute organises Innovative sessions some highlighted here adhereing towards the triggering and making students and faculties think much creative and innovations. CIT was proud to host a session on angel investment and venture capital funding, guiding aspiring entrepreneurs on securing early-stage investments. The Campus welcomed Dr. Fazalur Rahman, who shared insights on funding opportunities, enriching Chennai Institute of Technology's commitment to empowering young innovators. Chennai Institute of Technology held a workshop on entrepreneurship in ultrasound technology, featuring Mr. K.R.M. Niranjan Kumar and Mr. Nasarudheen from KPI Healthcare. CIT was transformed into a space for exploring career opportunities in healthcare innovation, inspiring students toward impactful careers. The Campus at CIT hosted an inspiring IIC seminar with Ms. Vani Pradeep, life transformation author and coach, as chief guest. Encouraging everyone to think, talk, and implement, this session sparked ideas on how to weave innovation into daily life—classic Chennai Institute of Technology style. Through the event against innovative ideas, students and faculties are encouraged to work with various challenges and extend their work towards publications and patents that can be contributing to respective Sustainable Development Goals.

Technical Series in the Institute

CIT teamed up with ACMA for an industrial training on robotics, giving students a chance to dive deep into the world of automation. The Campus was alive with curiosity as future engineers explored the latest robotic innovations, taking Chennai Institute of Technology one step closer to the tech frontier. A day packed with hands-on learning, CIT students got up close with problem-solving robotics at Kuka Industry. It was all about real-world skills as participants tackled robotics challenges head-on, showing why Chennai Institute of Technology is a leader in practical tech

education. CIT held a one-day seminar on IC Design Technology, featuring experts Dr. R.S. Suriavel Rao and Mr. E.T.B. Samuel Jigme Harrison. The Campus was charged with energy as students learned about the latest advancements, solidifying Chennai Institute of Technology's role in cutting-edge tech education. In partnership with Bio Vision Medical Systems, CIT conducted an intense 30-hour training on maintaining and troubleshooting medical devices. The Campus saw future biomedical experts gaining hands-on experience, adding to Chennai Institute of Technology's robust lineup of practical tech training.

4.7 RESEARCH ACTIVITIES

Following are the research projects carried out in the department which has the relevance to SDG 4 goals.

1. ATTENDANCE TRACKING WITH FACIAL RECOGNITION

This project explores the development and implementation of a face recognition attendance system for improved efficiency and accuracy in attendance tracking. The system leverages facial recognition technology, a form of biometric identification, to automatically identify and mark attendance of

individuals. This approach eliminates the need for manual attendance processes, which are susceptible to time consumption and human error. The system functions by capturing facial images upon entry to designated attendance zones. These captured images are then compared against a pre-registered database of authorized individuals. Upon successful recognition, the system marks the individual as present and records the corresponding time stamp within a designated storage mechanism, such as an Excel spreadsheet. The core advantages of this system lie in its ability to streamline the attendance tracking process and enhance data integrity. By automating attendance recording, the system eliminates the time required for manual processes and mitigates the risk of errors associated with them. In conclusion, this face recognition attendance system offers a convenient, reliable, and efficient solution for attendance tracking across various settings. It streamlines processes, minimizes errors, and empowers informed decision-making through detailed attendance reports.

2. DOCUMENT VISUALIZATION

This is a review report on the research performed and a project built- in the field of Information Technology to develop a system We introduce the Document visualization, a new visualization and information retrieval technique aimed at text documents. A word tree is a graphical version of the traditional “keyword-in-context” method, and enables rapid querying and exploration of bodies of text. In this paper we describe the implementation of Google chart word tree from google static into our website. which provides a window onto the ways in which users obtain value from the visualization. In This digital age, managing vast document datasets demands a solution that transcends traditional methods. This document visualization project addresses this imperative need by seamlessly transforming unstructured data into interactive visual representations. Leveraging web technology and visualization techniques, our system enhances document accessibility, allowing users to intuitively explore complex information. This project aspires to redefine how knowledge is extracted, providing a user-centric approach to uncover hidden insights and empower informed decision-making in diverse domains.

3. COLLEGE XPLORER

College Xplorer is a revolutionary mobile application tailored to enhance the student experience within college campuses. Designed to streamline access to essential services, the app digitalizes stationery shops and food stalls, offering students a convenient platform to order food and purchase stationery products with ease. One of the standout features of College Xplorer is its note-sharing facility, which facilitates seamless collaboration between teachers and students. Teachers can create accounts and upload lecture notes and study materials, empowering students to access these resources at their convenience. Furthermore, students can create accounts to post attendance, ensuring accurate and

efficient record-keeping. The integration of stationery shops and food stalls into the app revolutionizes the way students interact with campus amenities. No longer constrained by physical queues or limited opening hours, students can easily browse through a diverse range of products and place orders from anywhere on campus. This not only saves valuable time but also enhances overall convenience and accessibility.

4. ULTIMATE Q& A LARGE LANGUAGE MODEL CHAT APPLICATION

The Ultimate Q&A LLM chat app represents a novel approach to interacting with PDF documents through a chat interface. Leveraging natural language processing and machine learning technologies, this application allows users to query multiple PDFs simultaneously, obtaining relevant information and responses based on the content of the documents. This paper outlines the development, functionality, and potential applications of the Ultimate Q&A LLM chat app, emphasizing its significance in enhancing document interaction and information retrieval.

5. ADAPTIVE LEARNING FOR AUTISTIC CHILDREN: MOOD-BASED MUSIC THERAPY INTEGRATION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that involves difficulties in social communication. Previous research has demonstrated that these difficulties are apparent in the way ASD children speak, indicating that it may be possible to estimate ASD severity using quantitative features of speech. Here, we extracted a variety of prosodic, acoustic, and conversational features from speech recordings of Hebrew speaking children who completed an Autism Diagnostic Observation Schedule (ADOS) assessment. Sixty features were extracted from the recordings of 72 children and 21 of the features were significantly correlated with the children's ADOS scores. Positive correlations were found with pitch variability and Zero Crossing Rate (ZCR), while negative correlations were found with the speed and number of vocal responses to the clinician, and the overall number of vocalizations. Using these features, we built several Deep Neural Network (DNN) algorithms to estimate ADOS scores and compared their performance with Linear Regression and Support Vector Regression (SVR) models. We found that a Convolutional Neural Network (CNN) yielded the best results. This algorithm predicted ADOS scores with a mean RMSE of 4.65 and a mean correlation of 0.72 with the true ADOS scores when trained and tested on different sub- samples of the available data. Automated algorithms with the ability to predict ASD severity in a reliable and sensitive manner have the potential of revolutionizing early ASD identification, quantification of symptom severity, and assessment of treatment efficacy.

6. STUDENT ATTENDANCE SYSTEM USING FACE RECOGNITION USING MACHINE LEARNING

This Project presents a novel, real-time student attendance system leveraging face recognition technology and machine learning algorithms. Traditional attendance tracking methods in educational institutions are plagued by inefficiencies like manual calling, potential for errors, and administrative burdens. To address these shortcomings, the proposed system automates attendance monitoring through advanced face recognition techniques. By integrating machine learning algorithms, the system continuously improves its accuracy and reliability for optimal performance. The system offers a user-friendly interface and integrates seamlessly with existing infrastructure, promoting convenience for both students and staff. It features automatic attendance marking, real-time data updates, and comprehensive reporting, fostering efficiency and transparency in attendance management. Additionally, its scalability allows for effortless deployment across diverse educational settings. This project aims to revolutionize student attendance management by providing a robust, efficient, and technologically advanced solution tailored to modern educational environments. Furthermore, the system eliminates the need for physical attendance registers or ID cards, mitigating potential fraud. It utilizes deep learning models for robust identification even in challenging lighting conditions, ensuring reliable attendance tracking across various scenarios. Prioritizing data privacy and security, the system implements encryption protocols and access controls to effectively safeguard sensitive student information. By generating comprehensive attendance reports and analytics, the system empowers educational institutions to make informed decisions based on data driven insights into student attendance patterns, further enhancing operational efficiency and strategic planning. Overall, this work signifies a significant advancement in attendance management, offering a seamless, accurate, and secure solution that caters to the evolving needs of modern educational institutions while upholding the integrity and confidentiality of student data.

7. ENHANCED GESTURE CONFERRAL PROCESSING LEVERAGING OPENCV

In recent years, there has been an increase in the use of IoT devices for home automation, shopping malls, and other public places. However, for individuals who are mute or bedridden, accessing these devices can be difficult, especially when they are voice-activated. To address this issue, hand gesture recognition technology has been developed to allow individuals to control these devices through simple hand movements. Image processing and pattern recognition are crucial for accurately detecting these hand gestures, and platforms such as Open CV, Python, PyCharm, and Media Pipe are commonly used in software development to achieve this. This technology has the potential to help people with physical, sensory, or intellectual disabilities to participate fully in all activities in society and enjoy equal opportunities. By using hand gestures to communicate with IoT devices, individuals who are deaf can also benefit from this technology. Ultimately, this technology has the potential to create a human-computer interaction that is accessible to all, making it a valuable addition to the field of assistive technology. Furthermore, hand gesture recognition technology is an excellent example of the potential

of IoT devices to facilitate a more connected and automated world. However, it is important to note that with any new technology, there are also concerns around data privacy and security. As such, it is essential that developers prioritize ethical considerations and robust security protocols when designing these systems. Moreover, hand gesture recognition technology can be further improved through the use of artificial intelligence and machine learning. These technologies can help improve the accuracy of the recognition system and provide a more personalized experience for users. This system is highly reliable and user-friendly, and does not require any physical contact, which makes it highly suitable for disabled people. Furthermore, the development of new sensor technologies can also help increase the reliability and efficiency of the hand gesture recognition system. Overall, the development of hand gesture recognition technology is an exciting and innovative area of research that has the potential to improve the lives of many individuals, particularly those with physical or sensory disabilities. With continued advancements in technology, it can expect to see more sophisticated and accessible hand gesture recognition systems that will help create a more inclusive and accessible society.

8. SUBJECTIVE ANSWER EVALUATION USING MACHINE LEARNING AND NATURAL LANGUAGE PROCESSING

This Project presents an innovative approach for the automated evaluation of subjective answers leveraging the power of machine learning (ML) and natural language processing (NLP) techniques. Traditional methods of assessing subjective responses often rely on manual grading, which can be time-consuming and prone to subjectivity. Our proposed system aims to streamline this process by employing advanced ML algorithms and NLP models to objectively evaluate and score subjective answers. We explore various methodologies for feature extraction, sentiment analysis, semantic understanding, and contextual comprehension to develop a robust evaluation framework. Furthermore, we discuss the integration of these techniques into an end- to-end system capable of handling diverse types of subjective responses. Experimental results demonstrate the effectiveness and efficiency of our approach, showcasing its potential to revolutionize the evaluation of subjective answers in various educational and professional settings.

9. E-LEARNING PLATFORM FOR FULL STACK WEB DEVELOPMENT

This Project details the development of an e-learning platform tailored specifically for full-stack developers. The platform integrates features such as YouTube video tutorials, interactive coding exercises, a playground IDE, and a user contribution interface. A login/sign- up system is also implemented for user authentication and personalized experiences. The report outlines the platform's architecture, functionality, user interaction, and concludes with its potential impact on software development education.

10. ACADEMIC PROGRESS FORECASTING USING MACHINE LEARNING IN PYTHON

This Project proposes a machine learning based approach for forecasting academic progress, aiming to assist educators in identifying students at risk of underperformance. Leveraging data from student demographics, educational background, and classroom engagement metrics, our methodology employs various supervised learning algorithms, including decision trees, random forests, perceptron, logistic regression, and neural networks. We evaluate the performance of these models using real-world student performance data, comparing their accuracy in predicting academic outcomes. The results demonstrate the effectiveness of the proposed approach in accurately forecasting student progress, thereby enabling proactive interventions to support at-risk students and improve overall educational outcomes.

4.8 Research Publications

Following are the Research Publications carried out in the department which has the relevance to SDG 4 goals.

1. Arjun, S., E. Bhuvaneshwari, Sundara Rajulu Navaneethakrishnan, and R. Surendran. "Smart Detection Framework for Rapid Emergency Response." In *2024 2nd International Conference on Sustainable Computing and Smart Systems (ICSCSS)*, pp. 544-548. IEEE, 2024.
2. Chakravarthi, Viswanathan, Arumugam Santhana Santhanavelu, Karthikeyan Palaniappan, and Vijayalakshmi Kuppan. "A novel framework for inspection management system using cloud computing." In *AIP Conference Proceedings*, vol. 2523, no. 1. AIP Publishing, 2023.
3. Saranya, K., and Veeramalai Sankaradass. "Hyper personalization of Educational Content Through Multimodal Deep Learning and Gamification." In *2023 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI)*, pp. 1-5. IEEE, 2023.
4. Ramachandran, K. K., Sakshi Sandeep Phatak, Shaik Vaseem Akram, Vijay Patidar, Adusupalle Muni Raju, and R. Ponnusamy. "Integration of machine learning algorithms for E-Learning System course recommendation based on Data Science." In *2023 International Conference on Artificial Intelligence and Smart Communication (AISC)*, pp. 634-638. IEEE, 2023.
5. Ramachandran, K. K., M. Ravichand, Kapil Joshi, Vipul Vekariya, Dimple Saini, and R. Ponnusamy. "Investigation of the educational performance on the revolutionary philosophical electoral online learning platform centred on Deep learning." In *2023 International Conference on Artificial Intelligence and Smart Communication (AISC)*, pp. 639-642. IEEE, 2023.

6. Janarthanan, R., P. Partheeban, K. Somasundaram, and P. Navin Elamparithi. *A deep learning approach for prediction of air quality index in a metropolitan city. Sustain Cities Soc 67: 102720*. 2021.
7. Dhanalakshmi, B., R. Dhanagopal, D. Raguraman, and T. Thamdapani. "Improving cognitive learning of children with dyspraxia using selection based mid-air gestures in athynos game." In *2020 3rd International Conference on Intelligent Sustainable Systems (ICISS)*, pp. 231-237. IEEE, 2020.
8. Dhinakaran, V., P. Partheeban, R. Ramesh, R. Balamurali, and R. Dhanagopal. "Behavior and characteristic changes of generation z engineering students." In *2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS)*, pp. 1434-1437. IEEE, 2020.
9. Dhinakaran, V., P. Partheeban, D. Raguraman, M. Varsha Shree, and M. Swapna Sai. "Powering Sustainable Development Through the Integration of Teaching and Research in Engineering Education." In *2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS)*, pp. 1400-1402. IEEE, 2020.
10. Venkatesh, K., S. Parthiban, P. Santhosh Kumar, and CNS Vinoth Kumar. "IoT based Unified approach for Women safety alert using GSM." In *2021 Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV)*, pp. 388-392. IEEE, 2021.

SUSTAINABLE DEVELOPMENT GOALS

5. GENDER EQUALITY

5.2. Proportion of first-generation female students

5.2.1 Proportion of women first-generation

In the academic year 2022-23, Chennai Institute of Technology admitted a total of 1,122 students. Among these, 359 were women starting their degree programs, with 31 of them being first-generation learners pursuing higher education.

5.3 Student access measures

5.3.3 Women's access schemes

The institution ensures that several measures are taken to promote the gender equity by providing the following services and facilities on the campus apart from the audit courses introduced in the curriculum.

- A professional Counsellor is extending counselling & Mental Wellness services to CIT students. Psychological problems, family counselling, maladjustment, deviations, interpersonal relationship, stress related problems are dealt with. How to promote mental health, the significance of yoga and meditation, effective ways to memorize, healthy habits and positive thinking and trends in the lifestyle etc. are addressed.
- The Gym and Yoga room is available for female student/staff with separate timings.
- Ladies common rooms are provided in every block and floor.
- A forum by the name WISE (Women in Science and Engineering) has been function at the campus with office bearers with female staff and female students.

Support for working women and empowerment:

- Leadership capacity building programs are regularly conducted to nurture the leadership qualities among the women
- International Women's Day celebrated on March 8th in every year

5.4 Proportion of senior female academics

5.4.1 Proportion of senior female academics

The Chennai Institute of Technology, during the academic year 2022-23, had a total female academic staff of 113, including 18 female senior academic staff members, who held

key positions such as Dean, Professor, and Head of the Department, out of a total of 37 senior academic staff.

5.5 Proportion of women receiving degrees

5.5.1 Proportion of female degrees awarded

In the academic year 2022-23, Chennai Institute of Technology had a total of 719 graduates, of which 173 were female, with 171 female students successfully completed their programs.

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Policy of non-discrimination against women

Policy Statement

The Institute is dedicated to creating a welcoming, equal, and encouraging atmosphere where women are treated fairly, with dignity, and with respect. The organization does not accept harassment, discrimination, or unfair treatment based on a person's gender. At Chennai Institute of Technology, we work to guarantee that women have equal access to all extracurricular, educational, and employment opportunities.

Policy for non-discrimination against women

- Women will have equal access to leadership roles, professional development opportunities, extracurricular activities, and academic programs.
- Any unwanted or inappropriate sexual behavior that makes women feel uncomfortable, threatened, or angry will not be accepted. This include, but is not restricted to, harassment that is visual, verbal, or physical.
- Pregnancy, delivery, and associated medical issues are not grounds for discrimination against women. For women who are pregnant or just gave birth, the institution will make suitable arrangements.
- In addition to receiving equal compensation for equal effort, female employees including academics and staff will also have equal access to tenure, promotion, and career progression possibilities.
- Sexual violence of any kind, including coercion, exploitation, or assault, will be taken very seriously.
- guarantees equal access to educational opportunities for women. Regardless of gender, admissions choices will be made on the basis of qualifications and merit. No applicant will be turned away or subjected to gender discrimination during the admissions process.
- Equal access to all academic programs and courses will be granted to women. They will not be excluded from any research or study area because of presumptions or stereotypes based on gender.

- Decisions about recruiting, promotion, training, and pay will all be based on performance and qualifications rather than gender. Women won't experience discrimination when trying to rise in their careers or take on leadership positions.
- All extracurricular activities, including leadership roles in student organizations and athletics, will be equally accessible to women.
- Periodically, training on gender equality, how to prevent harassment and discrimination based on gender, and the value of creating a welcoming and respectful campus culture will be provided to all staff, professors, and students.

Policy History

Policy created on	08-03-2019
Policy reviewed on	10-06-2022

Non-discrimination policies for transgender

- Ensure legal recognition of gender identity based on self-identification without requiring medical or legal procedures.
- Provide equitable access to gender-affirming healthcare services and mental health support without prejudice.
- Conduct awareness programs and training programs for educators, employers, and healthcare providers to foster transgender inclusion.
- Strengthen laws and mechanisms to address violence, harassment, and hate crimes targeting transgender individuals.
- Implement policies ensuring equal opportunities and protections for transgender individuals in hiring, retention, and promotion.
- Create safe and inclusive environments in schools, workplaces, and public spaces to uphold their dignity.
- Offer community support programs for transgender individuals, including housing, legal aid, and vocational training.
- Enact laws explicitly prohibiting discrimination against transgender individuals in education, employment, healthcare, and public services.

Policy History

Policy created on	23-10-2019
Policy reviewed on	04-08-2022

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Maternity Policy

- If the faculty has completed a minimum of 5 years of satisfactory service, then they are eligible for Maternity leave of six months with salary.
- The faculty should give an undertaking that they will work for two years after rejoining duty and to forego the vacation to the extent of 30 days in the succeeding vacation.
- The faculties with less than five years of experience can avail six months of leave for their maternity without salary compensation.
- Protect pregnant employees from discrimination, termination, or unfair treatment at work.
- Subject to approval, workers may request more leave under other policies, such as vacation days, personal leave, or unpaid leave, if more time is required.
- According to labour laws and institutional norms, workers on maternity leave will be promised a similar job upon their return, or a comparable position with equivalent salary and benefits.
- No employee will face discrimination or retaliation for taking maternity leave.

Policy History

Policy created on	23-10-2018
Policy reviewed on	04-08-2022

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Paternity Policy

- A two-week paid paternity leave is granted for eligible employees.
- Paternity leave is available to all male employees who have worked for Chennai Institute of Technology for at least three years.
- The leave may be taken in a single block or in sporadic days, depending on the department's operational requirements and prior clearance.
- Subject to approval, workers may request more leave under other policies, such as vacation days, personal leave, or unpaid leave, if more time is required.
- According to labour laws and institutional norms, workers on paternity leave will be promised a similar job upon their return, or a comparable position with equivalent salary and benefits.
- No employee will face discrimination or retaliation for taking paternity leave.

Policy History

Policy created on	14-08-2019
Policy reviewed on	28-03-2022

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Publications Contributing to SDG-5

S.No	Title
1	Analysis of Women's Stress using Fuzzy AHP
2	'Wear me' - GSM enabled smart device for women security

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Student Project Contributing to SDG 5

S.No	Name of the Project	Abstract
1	A Machine learning approach to human trafficking prediction	This study introduces a comprehensive method for identifying and predicting human trafficking using Machine-Learning. Given the urgent need for more efficient prevention and intervention techniques in addressing this pervasive crime, the conventional manual approaches are time-consuming. The proposed method automates the identification and prediction processes by leveraging various Machine- Learning techniques. It analyses extensive data, including social media posts, individual demographics, and internet activity, to pinpoint potential victims and forecast their likelihood of involvement in human trafficking. Utilizing methods such as decision trees, support vector machines, and neural networks enhances the system's effectiveness. Employing cross-validation, model evaluation, and feature selection further boosts the accuracy of the system. This technique offers a substantial improvement in accuracy, aiding law enforcement organizations in their endeavours to combat this heinous crime.

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Events to raise awareness for Gender Equality

On 18th March 2023, Chennai Institute of Technology hosted the Women Achiever Awards event, presented by WISE (Women in Science & Engineering). The event celebrated the outstanding contributions and achievements of women in the fields of science, engineering, and academia.

The Institute hosted a special event in celebration of Women Empowerment Day on 10th March 2023 at the Kaveri Auditorium. The event focused on the theme of "Emotional Intelligence & Lifestyle for Young Girls," aiming to inspire and empower young women to navigate the challenges of modern life with confidence, resilience, and emotional insight.

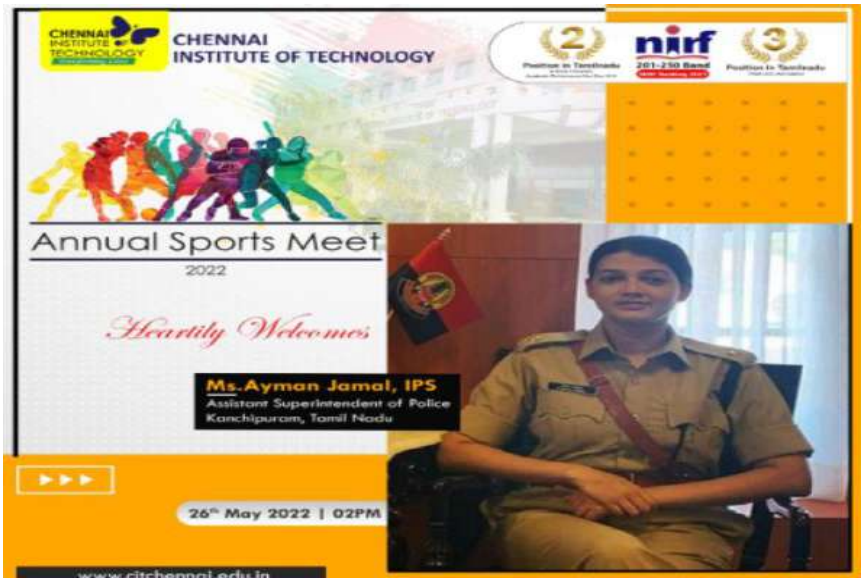
The Institute celebrated Sarojini Naidu's Birth Anniversary on 18th February 2022 with a special competition on Women Empowerment. The event aimed to honor the legacy of Sarojini Naidu, a trailblazer in the fight for women's rights and equality, by encouraging participants to express their thoughts on the importance of women's empowerment in today's society.

The Institute organized a powerful event titled "Defend Strong" on 17th August 2023, focusing on Women Empowerment. The program aimed to equip women with the knowledge and skills to defend themselves physically and emotionally in challenging situations. Through a combination of self-defense training, motivational talks, and interactive sessions, the event encouraged women to embrace their strength, build confidence, and stand up for their rights.

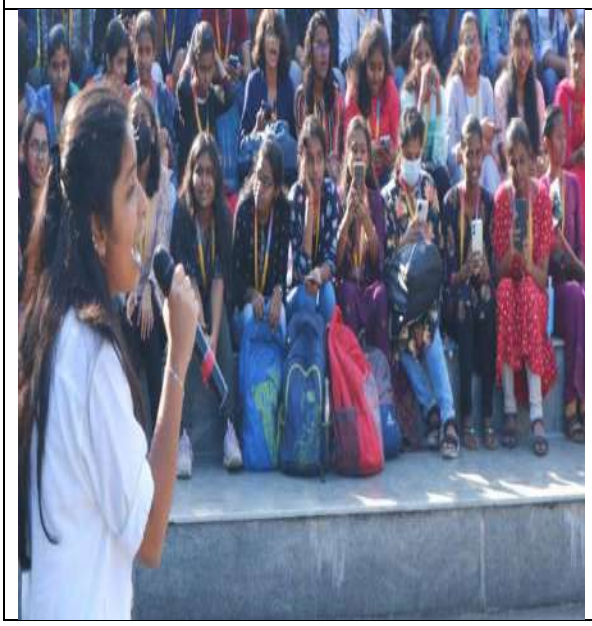
The Institute commemorated the International Day of Women and Girls in Science on 11th February 2022 with an engaging event focused on the theme of "Gender Equality &

Women Empowerment in Science and Engineering." The event aimed to highlight the critical role that women and girls play in the fields of science, technology, engineering, and mathematics (STEM), and to encourage greater participation and representation in these traditionally male-dominated disciplines.

The Institute hosted its much-anticipated Annual Sports Meet on 26th May 2022, with a distinguished guest, Ms. Ayman Jamal, IPS, gracing the occasion. As the chief guest, Ms. Jamal, a respected officer in the Indian Police Service, delivered an inspiring speech, highlighting the importance of physical fitness, discipline, and perseverance in both personal and professional life.



Event Photos



SUSTAINABLE DEVELOPMENT GOALS

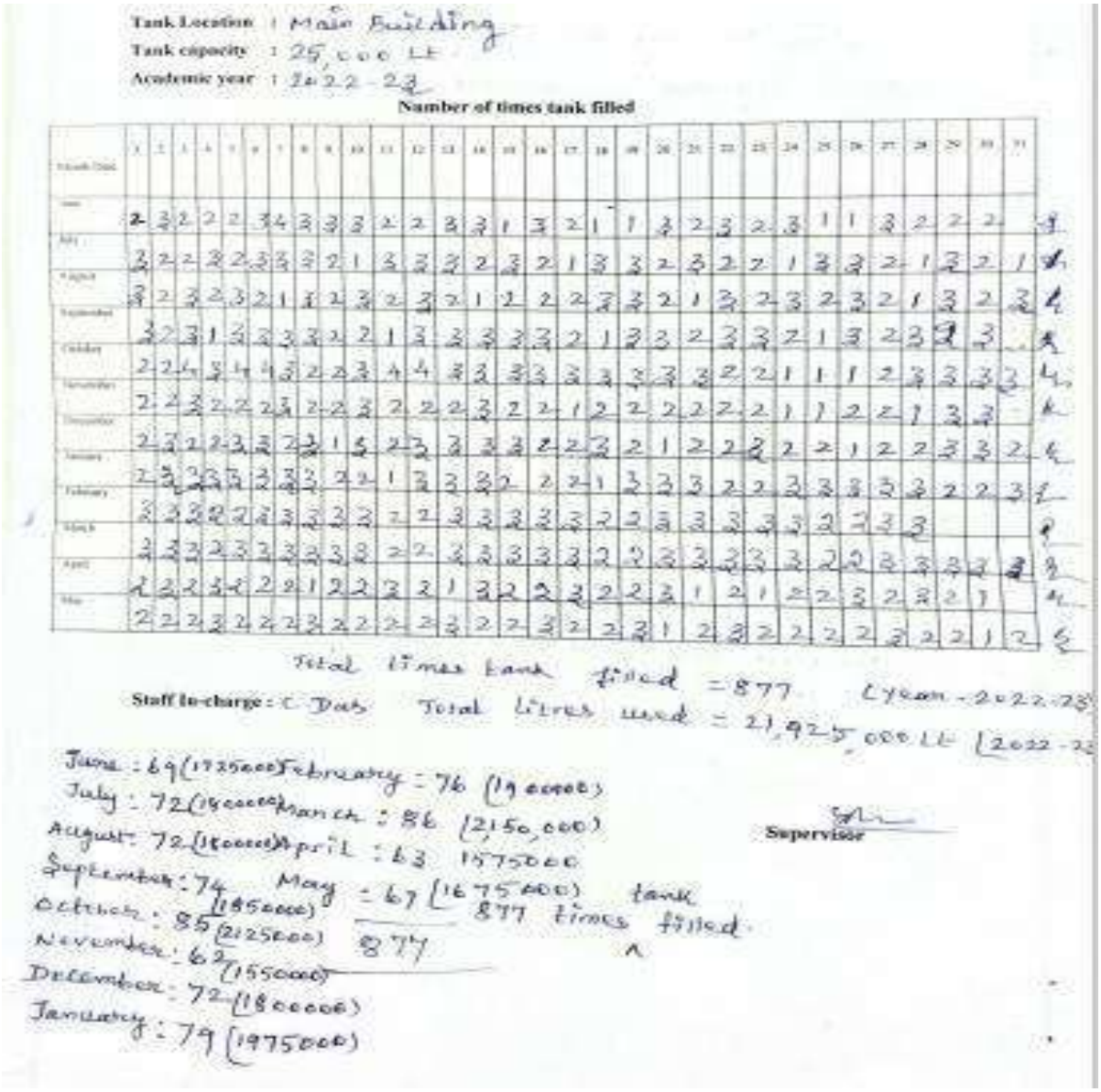
6. CLEAN WATER AND SANITATION

6.2 Water consumption per person

6.2 Water consumption per person

6.2.1 Measure the total volume of water used in the university that taken from mains supply, desalinated, or extracted from rivers, lakes, or aquifers?

On campus, the water supply is managed through four borewells that provide the necessary water to meet daily consumption needs. The in-charge person, carefully monitors and manages the operations to ensure that water is supplied efficiently to various areas such as hostels, academic buildings and canteen. This demand fluctuates depending on various factors, including the number of people on campus, the weather, and specific needs from the RO plants for purified water. The following tank filled data represent the water usage by the campus population for the academic year 2022-23.


Tank Location : Main Building
Tank capacity : 25,000 LL
Academic year : 2022-23
Number of times tank filled
Total times tank filled = 877 (Year - 2022-23)
Staff In-charge : C Das Total Litres used = 21,925,000 LL (2022-23)
June : 69 (1725000) February : 76 (1900000)
July : 72 (1800000) March : 86 (2150,000)
August : 72 (1800000) April : 63 1575000
September : 74 (1850000) May : 67 (1675000) tank 877 times filled.
October : 85 (2125000) 877
November : 62 (1550000)
December : 72 (1800000)
January : 79 (1975000)
Supervisor

CHENNAI INSTITUTE OF TECHNOLOGY

Tank Location : Main building
Tank capacity : 2000 Lt RO
Academic year : 2022 - 23

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	
July	5	2	2	5	5	5	5	5	2	2	5	5	5	5	5	2	2	5	5	5	5	5	2	3	5	5	5	5	5	3	3
August	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5
September	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	
October	3	2	5	5	5	5	5	3	2	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	3	2	5	5	5	5	
November	5	5	5	5	3	2	5	2	5	5	5	2	2	5	3	5	5	5	3	2	5	2	5	5	5	3	2	5	5	5	
December	5	5	2	3	5	5	5	5	5	2	3	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	5
January	3	5	5	5	5	5	3	2	5	5	3	2	5	4	2	2	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5
February	5	5	5	2	2	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5				
March	5	5	5	3	2	5	4	5	5	5	3	2	5	5	5	5	5	3	2	5	5	5	5	5	3	2	5	5	4	4	4
April	3	3	2	3	2	3	3	2	3	3	2	3	2	2	3	2	2	3	2	3	3	2	2	3	2	2	3	2	3	3	2
May	3	3	3	3	3	2	3	3	3	3	3	2	2	3	3	2	3	2	2	3	2	2	3	3	3	3	2	3	3	3	

Total times tank filled : 1441 (in Year 2022-23)

Staff In-charge : 6 Days Total Litres used : 2,882,000 Lt

June - 130 (260,000) January - 126 (252,000)
July - 128 (256,000) February - 120 (240,000)
August - 135 (270,000) March - 132 (264,000)
September - 125 (250,000) April - 74 (148000)
October - 130 (260000) May - 84 168 000
November - 122 (244,000) 1441
December - 135 (270,000)

Supervisor

Tank Location : Kaveri hostel

Tank capacity : 30,000

Academic year : 2022-23

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	5	5	5	3	4	4	4	3	5	5	4	4	5	3	4	4	3	4	3	3	4	5	4	4	3	3	5	5	4	4	
July	5	4	4	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	5	5	5	5	5	5	5	4	5
August	5	5	5	5	5	4	3	4	5	5	5	5	4	3	4	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5
September	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	
October	4	3	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	4	4	5	5	5	5	5
November	5	5	5	5	5	4	5	5	5	5	4	5	5	5	3	5	5	4	3	5	3	5	5	5	4	3	5	5	5		
December	5	5	4	3	3	4	4	5	3	4	4	5	3	5	5	4	3	3	5	5	5	4	4	3	4	5	5	5	4	5	4
January	5	5	5	5	5	5	4	3	5	5	5	5	4	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
February	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	4	3	5	5	5				
March	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	5	5	4	3	5	5	5	4	3	5	5	5	5	5	5	5
April	4	3	4	3	4	3	4	4	3	3	2	2	3	4	3	2	4	4	3	2	4	4	3	4	2	3	2	1	4	4	
May	4	3	4	3	4	4	3	4	3	3	3	2	2	2	3	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Staff In-charge : C. DAS

Number of times tank filled in Ac. year 2022-23 } = 1553.

Total litres used = 46,590,000 Lt

Supervisor

June : 121 (36,30,000)
July : 146 (4380000)
Aug : 141 (4230000)
Sep : 138 (4140000)
Oct : 144 (4320000)
Nov : 138 (4140000)
Dec : 130 (3900000)
Jan : 148 (4440000)
Feb : 128 (3840000)
Mar : 143 (4290000)
April : 97 (2910000)
May : 82 (2460000)

1553

Tank Location : kaveri hostel

Tank capacity : 2000 Lt RO

Academic year : 2022 - 23

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
June	1	1	1	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	–	1	1	1	–	1	1	1	1	1	1	1		½
July	1	1	1	1	1	1	1	1	1	1	1	1	1	1	–	1	1	–	1	1	1	–	1	1	1	–	1	1	1	1	1	½
August	1	1	1	1	–	1	1	1	1	–	1	1	1	1	–	1	1	–	1	1	1	1	1	1	1	1	1	1	1	1	1	½
September	1	1	1	1	1	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		½
October	1	1	1	1	–	1	1	1	1	–	1	1	1	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	½
November	1	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		½
December	1	1	1	1	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	–	1	1	1	1	1	1	1	1	1	1	1	½
January	1	1	–	1	1	1	–	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	–	1	1	1		½
February	1	1	1	1	1	–	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					½
March	1	1	1	1	1	1	–	1	1	–	1	1	1	1	–	1	1	1	1	(	1	1	1	1	1	–	1	1	–	1	1	½
April	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–	1	–		½
May	1	–	1	–	1	–	–	1	–	1	–	1	1	–	–	1	1	–	–	1	–	1	–	1	–	1	–	1	–	1	–	½

Number of times tank filled = 306

Staff In-charge : C. Das

Total Litres used = 612,000

June : 27 54,000
July : 27 54,000
August : 27 54,000
September : 29 58,000
October : 28 56,000
November : 29 58,000
December : 29 58,000
January : 27 54,000
February : 27 54,000
March : 26 52,000
April : 15 30,000
May : 15 30,000

306

Supervisor

Tank Location : Boys HOSTEL-OLD

Tank capacity : 30,000

Academic year : 2022-2023

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	
July	3	2	1	3	3	3	3	3	2	1	3	3	3	2	3	2	1	3	2	3	3	2	2	2	3	3	3	3	2	1	3
August	3	3	3	3	3	2	1	3	3	3	3	3	2	1	1	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	2
September	3	3	2	1	3	3	3	3	3	2	3	3	3	3	3	2	1	3	3	3	3	3	2	3	3	3	3	3	2	1	
October	2	1	3	3	2	3	2	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3
November	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	3	3	3	3	
December	3	3	1	2	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	1	3	3	3	3	3	2
January	1	3	3	3	3	3	2	1	3	3	3	3	3	-	-	-	-	-	3	3	2	2	3	3	3	3	3	3	2	1	3	3
February	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3			
March	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3
April	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	2	1
May	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	2	1	3	3	3

Number of times tanks filled in the academic year 22-23 } = 923

Total litres used = 27690000

Staff In-charge :

Jun - 78 (2340000lt)

July - 76 (2280000)

August - 78 (2340000)

Sep' - 79 (2370000)

Oct' - 76 (2280000)

Nov' - 80 (2400000)

Dec' - 81 2430000

Jan - 68 2040000

Feb - 72 2160000

Mar' - 82 2460000

Apr' - 72 2160000

May - 81 2430000

923

Supervisor

Tank Location : BOYS HOSTEL - NEW

Tank capacity : 30,000

Academic year : 2022-23

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	
July	3	2	1	3	3	3	3	3	2	1	3	3	3	2	3	2	1	3	2	3	3	2	2	2	3	3	3	3	2	1	3
August	3	3	3	3	3	2	1	3	3	3	3	3	2	1	1	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	2
September	3	3	2	1	3	3	3	3	3	2	3	3	3	3	3	2	1	3	3	3	3	3	2	3	3	3	3	3	2	1	
October	2	1	3	3	2	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	2	1	3
November	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	3	3	3	3	
December	3	3	1	2	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	1	3	3	3	3	3	2
January	1	3	3	3	3	3	2	1	3	3	3	3	3	+	+	+	-	-	3	3	3	2	1	3	3	3	3	3	1	2	3
February	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3			
March	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	2
April	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	3	3	3	2	1	3	3	3	3	
May	3	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3	3	3	3	2	1	3	3

No of times tanks filled in the academic year 2022-2023 } = 926

Total litres used = 27,780,000 Litres

Staff In-charge :

Jun' - 78
Jul' - 76
Aug' - 78
Sep' - 79
Oct' - 77
Nov' - 81
Dec' - 81

Jan' - 67
Feb' - 72
Mar' - 80
Apr' - 78
May' - 79
926

Supervisor

Jun : 2,340,000
Jul : 2,280,000
Aug : 2,340,000
Sep : 2,370,000
Oct : 2,310,000
Nov : 2,430,000
Dec : 2,430,000

Jan : 2,010,000
Feb : 2,160,000
Mar : 2,400,000
Apr : 2,340,000
May : 2,370,000

Tank Location : RO Boys Hostel

Tank capacity : 31000

Academic year : 2022-2023

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	1	1	1	-	-	1	1	1	1	-	-	1	1	1	1	1	1	-	1	1	1	1	1	1	0	1	1	1	1	1	
July	1	-	-	1	1	1	1	-	-	1	1	1	1	1	1	-	-	1	1	1	1	1	-	-	1	1	1	1	1	-	-
August	1	1	1	1	1	1	-	1	1	1	1	1	1	0	0	1	1	1	1	1	-	1	1	1	1	1	1	-	1	1	1
September	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	
October	1	0	1	1	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1
November	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1
December	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	
January	0	1	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1
February	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1				
March	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	
April	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	
May	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	

No of times tanks filled in the academic year 22-23 = 297

Total litres used = 297 X 3000

891000

Staff In-charge :

Jun' - 24
Jul' - 22
Aug' - 25
Sep' - 26
Oct' - 23
Nov' - 23
Dec' - 25

Jan' - 23
Feb' - 24
Mar' - 28
Apr' - 28
May' - 27
297

June : 72,000
July : 66,000
Aug : 75,000
Sep : 78,000
Oct : 69,000
Nov : 69,000
Dec : 75000
Jan : 69,000

Supervisor

Feb : 72,000
Mar : 84,000
Apr : 84,000
May : 81,000

Tank Location : CANTEEN MESS RO1

Tank capacity : 3,000

Academic year : 2022-2023

Number of times tank filled

Month/Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June	1	1	1			1	1	1	1	1			1	1	1	1	1			1	1	1	1	1			1	1	1	1	
July	1	–	–	1	1	1	1	1			1	1	1	1	1			1	1	1	1	1			1	1	1	1	1	–	–
August	1	1	1	1	1	1	–	1	1	1	1	1	1	1	–	1	1	1	1	1	–	1	1	1	1	1	1	–	1	1	1
September	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	–	1	1	1	1	1	0	1	1	1	1	1		
October	1	0	1	1	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	
November	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1		
December	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	
January	0	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	
February	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1				
March	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	
April	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0		
May	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1

No of times tanks filled in the academic year 2022-23 = 297

Total litres used = 297 × 3000

= 891000

Staff In-charge :

Jun' - 22
Jul' - 23
Aug' - 27
Sep' - 26
Oct' - 23
Nov' - 26
Dec' - 27

Jan' - 23
Feb' - 24
Mar' - 27
Apr' - 24
May' - 25
297

June = 66,000
Jul = 69,000
Aug = 81,000
Sep = 78,000
Oct = 69,000
Nov = 78,000
Dec = 81,000

Supervisor

Jan = 69,000
Feb = 72,000
Mar = 81,000
Apr = 72,000
May = 75,000

In the Academic year 2022-23, total water usage inside the campus was

1,29,261,000 L

The institution has planned to avoid water wastage (if any) by continuous monitoring.

6.2.2 Water consumption per person

Academic year : 2022-23

Volume of water usage inside the campus per year : 129,261,000 lt

Campus population : 4032

Water consumption per person : 32,059 lt

SUSTAINABLE DEVELOPMENT GOALS

6. CLEAN WATER AND SANITATION

6.3 Water usage and care

6.3 Water usage and care

6.3.1 Waste Water Treatment

Process Involved in the Institution:

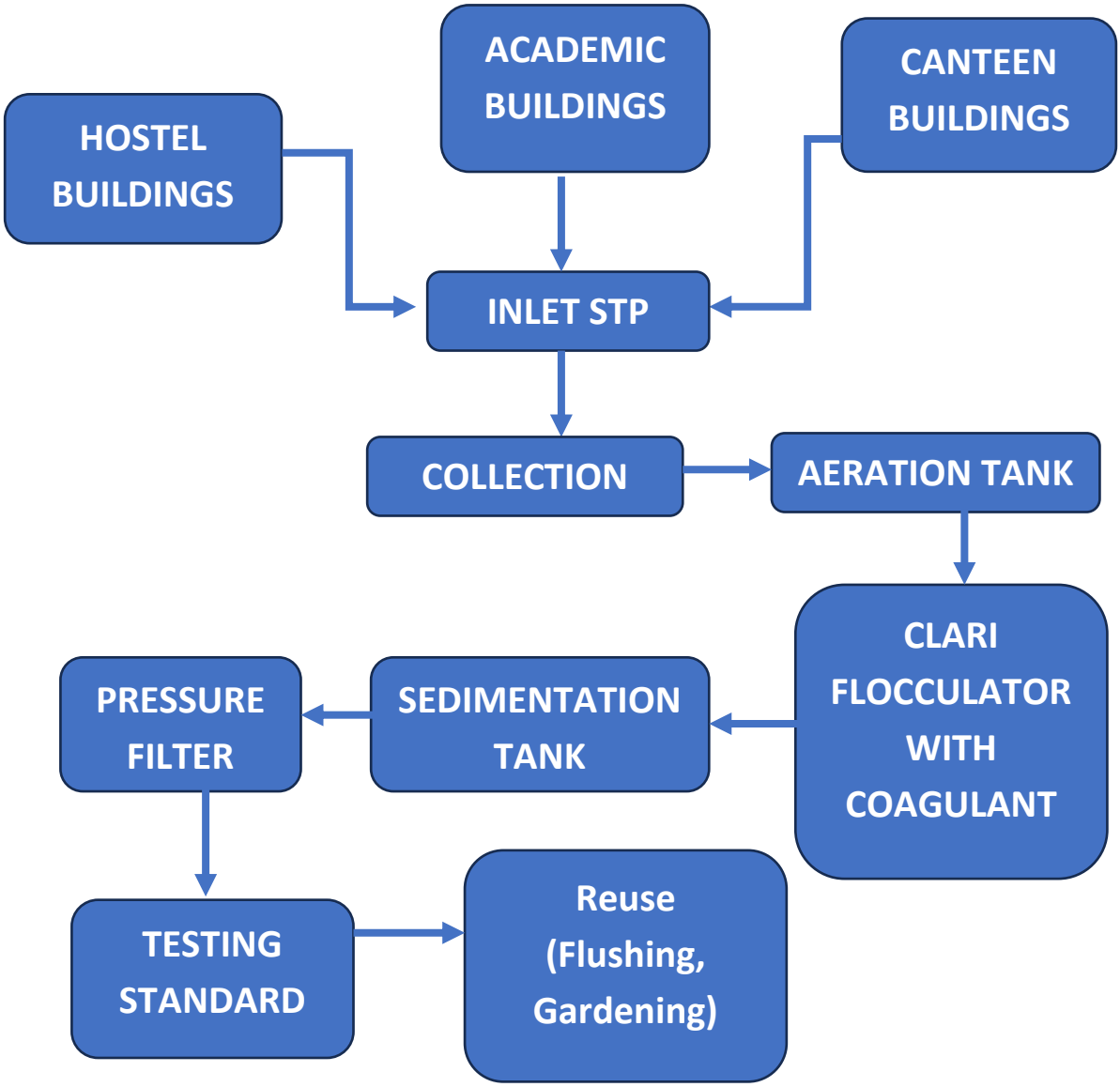
The Chennai Institute of Technology is mindful of the need to conserve society and water for the safety of the environment. The plant comprises 1 unit of capacity 1,25000litres and 2 units of 75,000litres. Initially, the excess water is stored in the storage tank and aired in the aeration tank. After the aeration process, the coagulant is flocculated and sent to the sedimentation tank. And then the water is filtered by pressure and sent to the distribution tank. Water is used for gardening and irrigation of plants.

The Institution is dedicated to sustainability and environmental conservation, and one of the key initiatives in this regard is our Water Recycling Program. This program is designed to reduce water consumption, minimize waste, and promote the efficient use of water resources across our campus.

Several steps are involved in wastewater treatment to eliminate impurities and enhance water quality. To stabilize wastewater flow, screening, grit removal, and flow equalization are used in preliminary treatment to remove big solids and debris.

Through sedimentation and the removal of floating material, first treatment eliminates a sizable amount of solids and organic matter; however, dissolved particles are not addressed. Secondary treatment reduces BOD by 85–95% by using biological processes like as oxidation ponds, trickling filters, and the activated sludge process to break down organic materials.

Through filtration, chemical coagulation, nutrient removal (phosphorus and nitrogen), and disinfection with chlorine, UV radiation, or ozone to get rid of any lingering pathogens, tertiary (advanced) treatment further enhances the quality of the water.



Flow Chart - Process of Collection, Treatment and Reuse


PRESSURE SAND
INLET


ACTIVATED CARBON

Pressure Filter Units

Aerators

Filter Feed , Clarrifier and Sludge drying Beds

Water Re-use Measurement:

Sewage treatment tank capacity	: 275,000 litres/day
Volume of water consumption	: 129,261,000 litres/year;
Per day water inlet to STP plant	: 271,748 litres;

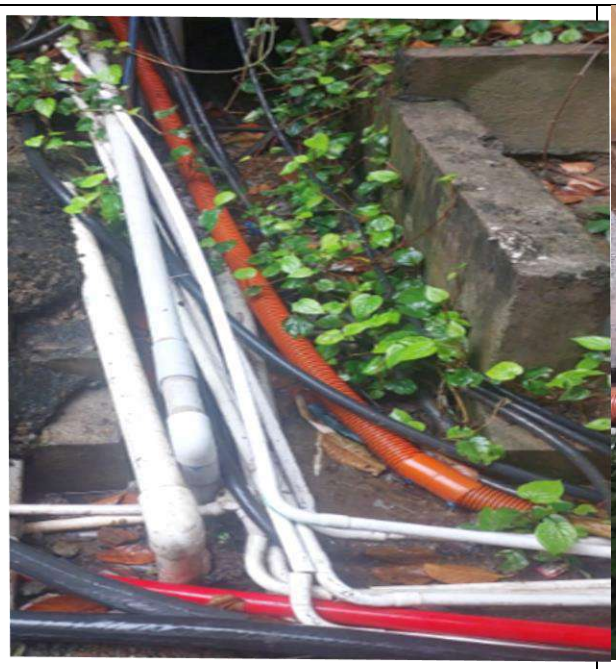
6.3.2 Preventing Water System Pollution

Preventive Actions Involved:

The Institute's plumbing system, which collects water from the respective bore-well and then transports it to the treatment unit and supply, has been carefully designed and put into place. The water is conveyed safely, and the pipes are installed at an appropriate gradient. It is also made sure there were no leaks in the water pipelines by regularly inspecting them. If there is an issue with the water pipes breaking due to an accident, they will also need to be replaced every once monitored. Similarly, different sewer pipelines carry the wastewater that is collected from the institution's numerous locations. There are enough manholes at many intersections to do pipeline inspections. The function of the valves installed in the sewer pipelines is also examined, and necessary maintenance is performed. Additionally, the treated wastewater is used for gardening and flushing while being carried securely. Water and sewer lines can be easily distinguished from one another thanks to distinct markings on the plumbing lines. By taking these steps, the Institute has been able to control the wastewater produced on the property and keep it out of the water pipelines and other water sources.

In-house Safety for RO System

RO System Unit Covered By

	Polycarbonate Housing
	
System provided with Adequate clearance	**System provided with Ease maintenance**
Safety Water System	
	
Different Colors of Pipes for Easy Maintenance	

Water sample Tested for Standard(pH)

Chennai Institute of Technology prioritizes environmental sustainability by actively monitoring water quality to control pollution within our campus. To achieve this, we utilize advanced equipment such as a digital auto-ranging conductivity meter with a magnetic stirrer and a digital pH meter with a magnetic stirrer. The digital pH meter provides precise measurements of the water's acidity or alkalinity, which is critical in assessing the overall water quality. By regularly checking these parameters, we can swiftly identify any anomalies or signs of pollution, allowing us to take preventive measures. This proactive approach helps in maintaining a healthy environment and mitigating water pollution on our campus.

Water sample tested in Laboratory

6.3.3 Free Drinking Water

The Chennai Institute of Technology is equipped with 42 CONWAY Purifiers installed across various locations on campus, providing free purified drinking water. These purifiers are strategically placed on all floors of the buildings, in the hostels, reception area, main gate, entrance, waiting hall, auditorium, cafeteria, mess hall, and other common areas. They serve a wide range of users, including students, faculty, staff, parents, and visitors, ensuring access to clean, safe drinking water throughout the institute. Some sample location access to free drinking water is attached here for evidence.

Drinking water in Ground Floor(Academic Building)

Research Building

First Floor-Academic Building

Second Floor-Academic Building

	
Waiting Hall -Gate 2	**Main Canteen**

6.3.4 Water-conscious building standards

The institution's implementation of water-efficient appliances plays a crucial role in promoting sustainability and conserving water resources. Water is continuously provided for drinking and other uses throughout the clock. This stops residents from storing water improperly in preparation for a shortage. To cut down on evaporation and water use during building construction, we use self-curing construction processes. Every building on campus and in the residence, halls has rainwater gathering capabilities. For instance, the use of washing machines designed to optimize water usage significantly reduces the amount of water needed per load compared to traditional models, which can waste substantial amounts. Similarly, dishwashers equipped with energy-efficient settings not only save water but also ensure thorough cleaning, further enhancing water conservation efforts. The installation of sensor-based water coolers minimizes water wastage by providing water only when needed, while low-flow taps reduce water flow rates without compromising performance, effectively cutting down overall water consumption in restrooms and kitchens. Additionally, dual-flush toilet tanks offer users the option to select between a lower volume flush for liquid waste and a higher volume for solid waste, thus optimizing water use for different needs. The Chennai Institute of Technology has unveiled a rainwater harvesting system with a dedication to supporting the city and the world. Rainwater can be obtained from the roofs of residential buildings and inns, and the water collected is diverted to a deep pit.

Appliance	Total number water Efficient appliances
Washing Machine	32
Dishwasher	3
Drinking water taps	252
Hand Washing Water tap	218
Toilet flush	376

	
Washing Machines (Laundry Unit	**Dish Washer-Mess**
	
Drinking water taps	**Gardening with Reused water**

Sensor Based Water Cooler

Dual-flush toilet tanks

Rainwater harvesting

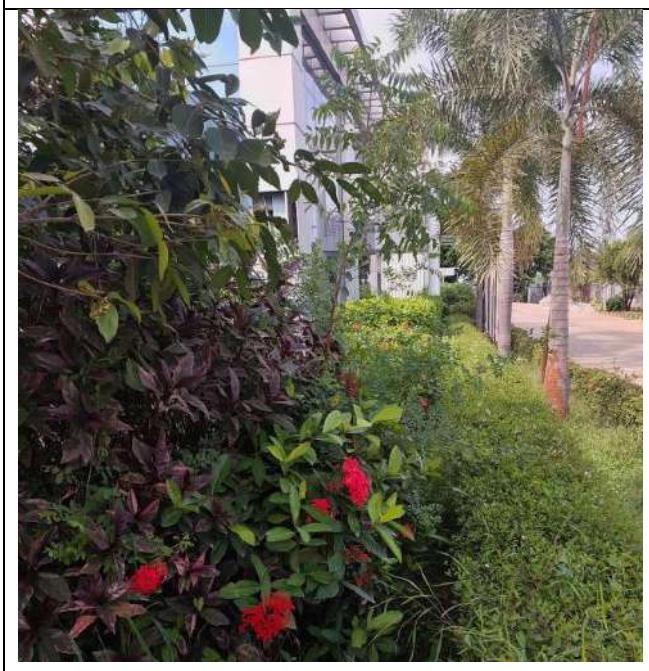
6.3.5 Water-conscious planting

Campus has been provided with the nature of water-conscious planting like drought Tolerant plants for effective adaption to the to the local climate and soil conditions, making them more resistant to drought and requiring less water once established. Additionally, plants like Madagascar Periwinkle, Ruellia tuberosa and Adenium obesum which store water in their leaves or stems, thrive in dry, sunny conditions and are known for their drought resistance.

Grouping plants with similar water needs together. Plants that need frequent watering should be placed near each other, while drought-tolerant plants can be placed in separate zones, reducing overall water usage.

Watering during the cooler parts of the day (early morning or late evening) reduces evaporation losses. Regularly we check plants to make sure they're receiving the right amount of water. Overwatering can be as harmful.

Drought-Tolerant plants



Red ixora at research campus entrance

	
Galphimia Gracilis at opposite to faculty dining hall	**Clerodendrum Macrosiphon near laundry office**

Stepped Hibiscus along the way to main building

Madagascar periwinkle – way to boys hostel

Canna at dining seats near mess hall 2

Creeping-oxeye near fountain

Portulaca grandiflora along the way through cafeteria

Bauhinia purpurea near volley ball court

Crape jasmine at security gate 3

Group plants

From gate 3 to research building along CoE building

	
From college gate 1 to fountain	**From fountain to OAT**
	
Play ground	**Offset area – fountain back side**

SUSTAINABLE DEVELOPMENT GOALS

6. CLEAN WATER AND SANITATION

6.4 Water reuse

6.4 Water reuse

6.4.1 Water reuse policy

Introduction

Chennai Institute of Technology (CIT) is committed to a robust water harvesting and reuse policy, implementing innovative strategies to maximize the benefits of water saving and recycling.

The policy is designed to ensure that campus water resources are managed efficiently and sustainably. By promoting judicious use and maximizing water reuse, the policy aims to minimize the strain on local water sources. Through the implementation of innovative water-saving, rain water harvesting, waste water recycling systems, and comprehensive community engagement initiatives, the policy fosters a culture of conservation. By reducing the water footprint and promoting responsible water management practices inside the campus, CIT aim to set an example of environmental stewardship and sustainability.

Objectives:

1. To promote water conservation on campus by organizing workshops, seminars, and awareness campaigns that educate students, faculty, and staff about the importance of reusing and saving water.
2. To evaluate and enhance water management strategies.
3. To implement water-saving technologies and practices across campus facilities, ensuring efficient water usage and reducing overall consumption.
4. To collaborate with local organizations in sharing effective water reuse practices and resources to promote sustainable water management.

Purpose

The policy aims to ensure that water is used efficiently and reused to the maximum extent possible, reducing the strain on campus water sources. It promotes the adoption of water-saving technologies and practices across all campus facilities, encouraging responsible

water usage among students, faculties, and staffs. By implementing systems for the collection, treatment, and reuse of grey and rainwater, the policy seeks to make significant strides in water conservation.

Policy content

The establishment of a state-of-the-art sewage wastewater treatment facility at CIT marks a significant advancement in environmental sustainability. Every day, the campus generates wastewater from various sources, including hostels and dining facilities. This wastewater is systematically collected through a robust underground sewer network and transported to the sewage treatment and recycling plant, ensuring efficient management and recycling of water resource. The plant processes sewage to produce reusable water which is then utilized for irrigation and other non-potable purposes, significantly reducing the campus's reliance on freshwater resources.

Dedicated research centers are focused on developing advanced technologies to minimize the ecological footprint of waste management, particularly through improved wastewater treatment and efficient composting of solid biological waste, thus reducing water wastage.

Ensuring an uninterrupted supply of water for drinking and other purposes prevents residents from storing water improperly in anticipation of shortages. This consistent supply helps minimize wastage by eliminating the need for excessive storage and reducing the likelihood of spills or overuse. Additionally, the provision of water-efficient fixtures and regular maintenance ensures that drinking water is used responsibly and wastage is kept to a minimum. Utilizing multiple water sources such as bore wells, rainwater, and recycled water reduces dependence on any single source, promoting sustainability and resilience. This diversified approach minimizes water wastage by balancing the usage among various sources and preventing the over-extraction of any one source.

Promoting rainwater harvesting across the college campus, including academic and hostel blocks, aids in groundwater recharging and minimizes water wastage by capturing and utilizing rainwater efficiently. The policy ensures that water is used efficiently and replenished naturally, further reducing water wastage. Additionally, continuous monitoring

and management of these sources allow for timely detection and repair of leaks, preventing unnecessary water loss.

Cleaning dishwashers in the canteen and mess in batches conserves water, ensuring it is used judiciously and minimizing wastage by reducing the frequency and total volume of water required for cleaning. By carefully managing laundry services for students and staff, and recycling and reusing wastewater from laundry facilities, water consumption is reduced and wastage is effectively minimized.

Through educational sessions and visual reminders, students are guided to practice mindful water usage and to turn off taps during non-use periods, which helps significantly reduce water wastage.

Implementing sensor-based automation for water tanks with continuous monitoring of water levels and automatic pump control prevents overflow and minimizes water wastage.

Conducting regular tests of water from the effluent treatment plant (ETP) ensures its quality and safety, allowing for the efficient reuse of treated water and minimizing wastage by preventing improper discharge.

Policy History

Policy created on	25-02-2021
Policy reviewed on	23-03-2022

6.4.2 Water reuse measurement

Academic year : 2022-23

Waste water collected from hostels and mess	: 271,748 lt / day
Sewage treatment tank capacity	: 2,75,000 lt/day

SUSTAINABLE DEVELOPMENT GOALS

6. CLEAN WATER AND SANITATION

6.5 Water in the community

6.5 Water in the community

6.5.1 Water Management Educational Opportunites

Water Leakage Photo Fest

The Water Leakage Photo Fest is a competition aimed at raising awareness about water conservation in Chennai Institute of Technology -Local Community. Participants are invited to submit hard copies of photos that capture instances of water leakage or inefficient water use within the campus premises. The goal is to identify and highlight areas where water management improvements are needed and to foster a culture of responsibility towards water conservation.

Winning entries will be displayed in a special exhibition on campus. A certificate of recognition will be awarded to all top three winners. Winning photos will be used in future water conservation campaigns to illustrate the importance of addressing water leakage.

Event Schedule:

Launch Date **:** 31-08-2022

Announcement of Winners **:** 07-09-2022

Photos collected from water leakage photo fest

Behind academic block	Near hand wash area
	
Hostel water purifier	**Café sink**
	
Hostel tank outlet	**Boys hostel**

6.5.2 Water Conservation

Community Awareness in Somamangalam

A Rally was conducted in Somangalam Village to make the people aware of education on water management as it plays a crucial role in shaping educational opportunities, particularly in areas where water scarcity or poor water infrastructure can be a significant barrier to learning. By ensuring that schools have access to clean water and adequate sanitation, we create healthier, more equitable, and more sustainable learning environments. Additionally, integrating water management into curriculum and encouraging water conservation efforts can equip students with valuable knowledge and skills that contribute to a more water-conscious society.

Tree saplings were given to the people at Somangalam village on 16-09-2022

In Somangalam Village, a tree planting campaign was held to raise awareness of the importance of water management education and how it shapes educational opportunities, especially in places where inadequate water infrastructure or water scarcity can be major learning obstacles. We establish more sustainable, egalitarian, and healthy learning environments in schools by guaranteeing that they have access to clean water and proper sanitation. Furthermore, incorporating water management into the curriculum and supporting conservation initiatives can give students important knowledge and abilities that help create a society that is more water-conscious. Following the rally, the neighborhood received tree seedlings on December of 2022.

A tree planting campaign at Somangalam village on 20-12-2022

Community Awareness in Puthuper on 11.02.2023

A Rally titled "A MARCH FOR MINDS AND WATER", Over 50 students and faculty members took part in the rally, showing solidarity towards the cause. The participants carried banners and slogans emphasizing the importance of Water conservation and preservation. The rally began from CIT and proceeded to Puthuper Village attracting attention and sparking conversations about the importance of water management and literacy towards it.

Thirunageswaram Rafting pond – Cleaning

The Chennai Institute of Technology, in collaboration with the National Service Scheme (NSS), organized a Rafting Pond Cleaning event on 3rd February 2023. A total of 35 students actively participated in the initiative, contributing to the cleaning and maintenance of the rafting pond. This event not only helped in improving the water quality and surrounding environment but also promoted a sense of responsibility and community service among the students.

Rally for Community Service

On February 18, 2023, the National Service Scheme (NSS) unit of Chennai Institute of Technology organized a significant rally named "Country is Our Home" in the picturesque Poonthandalam village. This event was part of NSS's ongoing efforts to foster a sense of national pride and community engagement among students and residents.

The rally was designed to instill a deeper sense of belonging and responsibility towards our country. With a focus on highlighting the importance of community service, national unity, and environmental consciousness, the event aimed to inspire participants to take an active role in societal betterment.

The day began with a gathering at the institute where 45 dedicated volunteers assembled at 3.00pm on that day. These volunteers, comprising both students and NSS members, were briefed about the day's activities and the objectives of the rally. After a motivational speech emphasizing the values of patriotism and civic duty, the group departed for Poonthandalam village. Upon arriving in Poonthandalam, the volunteers were met with a warm reception from the local residents. The village, known for its close-knit community, provided a welcoming atmosphere that further energized the participants. The rally kicked off with a parade through the village streets, during which volunteers carried banners and placards bearing messages of unity, pride, and the importance of community involvement. The parade was marked by enthusiastic chants and slogans, which resonated with the local populace and created a lively, engaging atmosphere. At the end of the event, motivational speech given by the Anna University Vice chancellor.

River Side Cleaning for Water Conservation

The National Service Scheme volunteers of Chennai Institute of Technology conducted a "World Water Day 2023" - a Mass Cleaning Campaign in river side and chembarambakkam lake on 22nd March 2023. The activities for the day started with the volunteers leaving to the College, to clean the River side in Adayar river near Tambaram and chembarambakkam lake. 50 Volunteers played their part in restoring the area to its original glory by engaging themselves from 9 am to 5pm in all the activities of the day with great enthusiasm and helped to restore nature. The programme was organized by the program officer Mr. Yakkana Rajasankar along with NSS volunteers.

River Side Cleaning – Adayar River

Chembarambakkam Lake – Cleaning

Removal ProsopisJuliflora

Removal ProsopisJuliflora

Thirunageswaram Rafting pond – Cleaning

Removal ProsopisJuliflora

The Karuvelam tree, or prosopis juliflora as it's known biologically, is a species native to West Africa and was brought to Tamil Nadu in 1960s as fuelwood. Slowly, these seeds started drifting into dams and rivers, causing problems. The plant according to multiple reports, absorbs excess groundwater, adding to the woes of the water-starved state. The NSS unit of CIT associated with Lions club, Chennai conducted by unwanted tree-cutting program in 19th July 2022. It afforests the wastelands. These trees are cut by the NSS volunteers of CIT near by the waste lands in Periyar nagar village (nearby CIT) to preserve the environment. Totally 58 members are participated in this event.

6.5.3 Sustainable Water Extraction

Sustainable water extraction on campus

The organization has a long-term goal regarding the sustainable use of water resources. There is a thorough plan in place for collecting rainwater and replenishing groundwater supplies.

6.5.4 Cooperation On Water Security

Chennai Institute of Technology provides educational opportunities for local communities to learn about good water management. The Institute adopts various methodologies to educate the local community. The webinars, workshops etc are arranged for the various groups of people in the community who are interested in water management and are looking for opportunities for water conservation. During the webinars, experts in the field will be invited to deliver the lecture on water management and water conservation practices. Lakes are increasingly impacted by the accumulation of water hyacinths and plastic waste on the surface, complicating cleanup efforts. Traditional water surface cleaning methods are often inefficient, labour-intensive, and unable to effectively reach and clean challenging areas. **Eco-Society India** is a non-profit organization based in Chennai, focused on environmental conservation and urban ecosystem protection. It aims to educate and train communities to protect and restore natural resources. The organization is actively involved in the following five key thematic areas:

1. **Eco-restoration of Lakes**: Focused on restoring urban lakes to improve water quality, biodiversity, and sustainability.
2. **Eco-restoration of Tropical Dry Evergreen Forest (TDEF)**: Working to restore and conserve this unique and biodiverse ecosystem in southern India.
3. **Eco-restoration of Kovalam Mangroves**: Protecting and restoring mangrove ecosystems, which are crucial for coastal protection and biodiversity.
4. **Afforestation & Eco-restoration of Degraded Landscapes**: Revitalizing deforested and degraded landscapes through afforestation and soil restoration efforts.
5. **Mural Art & Awareness Wall Paintings**: Using art to raise environmental awareness and engage the public in conservation efforts.

Location: Eco-Society India, #52, Dhayakar Avenue, Kalaivanar Salai, Chitlapakkam, Chennai 600064, India.



Autonomous Lake Surface Cleaner: Reducing Waste Accumulation with 270° Coverage

Research Project Grant

Chennai Institute of Technology has been approved for a grant of the Tamil Nadu State Council for Science and Technology Research Project. The Grant has been titled 'Underground Water Quality Monitoring due to Pumping of Water by Tanker Using GIS and Wireless Sensor Network Technology' and budgeted on Rs.4,35,000. The project "Underground Water Quality Monitoring due to Pumping of Water by Tanker Using GIS and Wireless Sensor Network Technology" aims to monitor the impact of water extraction by tankers on underground water quality. It involves deploying wireless sensors to continuously measure water quality parameters such as pH, turbidity, and contaminants in real time. The data collected by these sensors is transmitted wirelessly to a central system, where it is analyzed and visualized using Geographic Information Systems (GIS). GIS helps map the sensor locations and assess how pumping activities affect water quality over a geographical area. This integrated system allows for early detection of any contamination or quality degradation, enabling more efficient water management and ensuring the sustainability of groundwater resources by providing real-time insights and spatial analysis.

6.5.5 Promoting Conscious Water Usage on Campus

The Institute has adopted various methodologies to educate the students and staff members in Conducting regular water audits to identify wastage points. Campus Buildings were Set up with effective rainwater harvesting. Greywater recycling system that can treat wastewater from sinks and showers for reuse in gardening or Flush toilets. Water-conscious tags are maintained at appropriate places inside the campus.

6.5.6 Promoting conscious water usage in the wider community

The institution participates in the national initiative *Unnat Bharat Abhiyan* to enhance basic amenities in rural areas, including infrastructure, sanitation, healthcare, and education. The college team met with the Village Administrative Officer and the Chairman of the village to discuss raising awareness about the need for water management and the importance of rainwater harvesting. The "Neerottam" Water Marathon, conducted annually, and the cleanup of the Chembarabakkam Lake ridges were initiated by NSS-CIT in collaboration with the Lions Club, Chennai, to encourage the community to remain engaged in water-conscious and sustainable activities..

Students participating marathon

Chembarambakkam Lake – Cleaning

Unnat Bharat Abhiyan

The imperatives of sustainable development which are being felt more and more acutely all over the world also demand eco-friendly development of the villages and creation of appropriate employment opportunities locally. Increasing urbanization is neither sustainable nor desirable. So far, our professional higher education institutions have largely been oriented to cater to the mainstream industrial sector and, barring a few exceptions, have hardly contributed directly to the development of the rural sector. Unnat Bhārat Abhiyān (UBA) is a much-needed and highly challenging initiative in this direction.

The institution carried out reach around the beach, water bodies and public places. This activity enhanced the promotion towards the village people of Kottivaakam, Sirukalathur (near sembarambakam lake) and Thirunageswaram(public place) for sanitation , hygiene and preventing contamination of water bodies.

Beach cleaning activity

Public place (Thirunaganeswaram village)

url:https://www.citchennai.edu.in/campus-life/unnat-bharat-abhiyan/

SUSTAINABLE DEVELOPMENT GOALS

6. CLEAN WATER AND SANITATION

Other details

Other details

1. Research works contributing to SDG6

1. Water quality analysis in peri-urban areas of Chennai city using aqua chem software
2. Detection, prevention and removal of contaminants in hydraulic working fluid
3. Water verge – to forecast water consumption

2. Publications contributing to SDG6

1. Wang, Y., Danook, S. H., AL-bonsrulah, H. A., Veeman, D., & Wang, F. (2022). A recent and systematic review on water extraction from the atmosphere for arid zones. Energies, 15(2), 421.
2. Jayaraman, P., Nagarajan, K. K., & Partheeban, P. (2022). A Review on Artificial intelligence Algorithms and Machine Learning to Predict the Quality of Groundwater for Irrigation Purposes. In 2022 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI) (Vol. 1, pp. 1-8). IEEE.
3. Anuradha, B., Packialakshmi, S., Sanjay, N., & Vivekananthan, V. (2022). An Analytical Study for Assessing Water Productivity in Pre-and Post-Rehabilitation Period of Rural Tank System. Advances in Civil Engineering, 2022(1), 1119931.
4. Vishnupriyan, J., Partheeban, P., Dhanasekaran, A., & Shiva, M. (2022). Analysis of tilt angle variation in solar photovoltaic water pumping system. Materials Today: Proceedings, 58, 416-421.
5. Jayaraman, P., Nagarajan, K. K., & Partheeban, P. (2023). Analyzing the Interplay of Rainfall, Humidity, and Groundwater in Chennai and Kanchipuram through ARIMA Modeling. In 2023 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI) (pp. 1-8). IEEE.
6. Sindhu, R., Eswaramoorthi, S., Loganathan, K., & Jain, R. (2024). Comparative approach of Darcy–Forchheimer flow on water based hybrid nanofluid (Cu-Al2O3) and mono nanofluid (Cu) over a stretched surface with injection/suction. Partial Differential Equations in Applied Mathematics, 11, 100786.

7. Pachaivannan, P., Manimuthu, S., & Jegadeesan, V. (2024). Comparative energy performance analysis of solar water pumping systems across diverse climate zones. Journal of Engineering Research.
8. Prabhu, B., Vengadesan, E., Senthil, S., & Arunkumar, T. (2024). Comprehensive energy and enviro-economic performance analysis of a flat plate solar water heater with a modified absorber. Thermal Science and Engineering Progress, 54, 102848.
9. Prabhu, B., Vengadesan, E., Senthil, S., & Arunkumar, T. (2024). Comprehensive energy and enviro-economic performance analysis of a flat plate solar water heater with a modified absorber. Thermal Science and Engineering Progress, 54, 102848.
10. Jayaraman, P., Nagarajan, K. K., Partheeban, P., & Krishnamurthy, V. (2024). Critical review on water quality analysis using IoT and machine learning models. International journal of information management data insights, 4(1), 100210.
11. Shanmugam, S., Ali, M. S., Narayanan, G., & Rhaima, M. (2023). Finite-Time Boundedness of Switched Time-Varying Delay Systems With Actuator Saturation: Applications in Water Pollution Control. IEEE Access.
12. Sambhavi, A. A., Nagamani, K., Gowtham, B., Packialakshmi, S., & Anuradha, B. (2023). Fluoride Contamination of Groundwater in a Coastal Region-A Growing Environmental Pollution Threat. GLOBAL NEST JOURNAL, 25(9), 41-52.
13. Nagamani, K., Batvari, P. D., Packialakshmi, S., Reddy, C. S. K., & Anuradha, B. (2021). Groundwater Recharge Planning Using Field Survey for Talupula Mandal in Anantapur District, Andhra Pradesh, India. Nature Environment and Pollution Technologythis link is disabled, 20(5), 1981-1987.
14. Ayyadurai, M., Raj, P. V., Vijayaraj, A., Dhanagopal, R., & Kumar, R. S. (2022, April). Hybrid atom search-heap energy optimization algorithm for dynamic topology in underwater acoustic sensor network. In 2022 6th International Conference on Devices, Circuits and Systems (ICDCS) (pp. 472-476). IEEE.
15. Packialakshmi, S., Nagamani, K., & Anuradha, B. (2023). Hydrochemical Investigation and Water Quality Mapping in and Around Pallikaranai Marshland Area in Chennai, India. In Impacts of Urbanization on Hydrological Systems in India (pp. 25-42). Cham: Springer International Publishing.
16. Nagamani, K., Meer, M. S., Anuradhha, B., Bhuvaneswari, C., & Packialakshmi, S. (2023, December). Identification of Groundwater Potential Zones Using Machine

Learning Algorithms and Geospatial Techniques. In 2023 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI) (pp. 1-8). IEEE.

17. Munavalli, G. R., & Saler, P. (2009). Treatment of dairy wastewater by water hyacinth. Water Science and Technology, 59(4), 713-722.
18. Chukka, N. D. K. R., Gomathi Nagajothi, P., Natrayan, L., Reddy, Y. B. S., Veeman, D., Patil, P. P., & Thanappan, S. (2022). Investigation on efficient removal of fluoride from ground water using activated carbon adsorbents. Adsorption Science & Technology, 2022, 7948069.
19. Narayanan, L. K., Sankaranarayanan, S., Rodrigues, J. J., & Lorenz, P. (2020). Multi-agent-based modeling for underground pipe health and water quality monitoring for supplying quality water. International Journal of Intelligent Information Technologies (IJIIT), 16(3), 52-79.
20. Baanu, B. B., Babu, K. J., & Baskaran, A. (2022). Need to educate farmers about the benefits of using treated wastewater for agriculture. Water Policy, 24(8), 1269-1286.
21. Somasundaram, S., Jayabalakrishnan, D., Balajikrishnabharathi, A., & Bhaskar, K. (2024). Performance evaluation of silane-treated Cissus quadrangularis fiber and waste Limonia acidissima hull powder on mechanical, fatigue, and water absorption properties of epoxy resin composite. Biomass Conversion and Biorefinery, 14(5), 6205-6213.
22. Govindhan, P. (2024). Phytochemical analysis of the methanolic extract from the mangrove species Avicennia marina plant species inhabited in coastal water. Natural Product Research, 1-11.
23. Ganesh, V., Pandikumar, A., Alizadeh, M., Kalidoss, R., & Baskar, K. (2020). Rational design and fabrication of surface tailored low dimensional Indium Gallium Nitride for photoelectrochemical water cleavage. International Journal of Hydrogen Energy, 45(15), 8198-8222.
24. Ganesh, V., Pandikumar, A., Alizadeh, M., Kalidoss, R., & Baskar, K. (2020). Rational design and fabrication of surface tailored low dimensional Indium Gallium Nitride for photoelectrochemical water cleavage. International Journal of Hydrogen Energy, 45(15), 8198-8222.
25. ivarethinamohan, S., Rajamanickam, S., Baskaran, A., & Ramakrishnan, D. (2020, November). Rational suitability of low cost activated carbon in removing hexavalent

chromium ions from wastewater by uninterrupted mode of adsorption. In IOP Conference Series: Materials Science and Engineering (Vol. 955, No. 1, p. 012087). IOP Publishing.

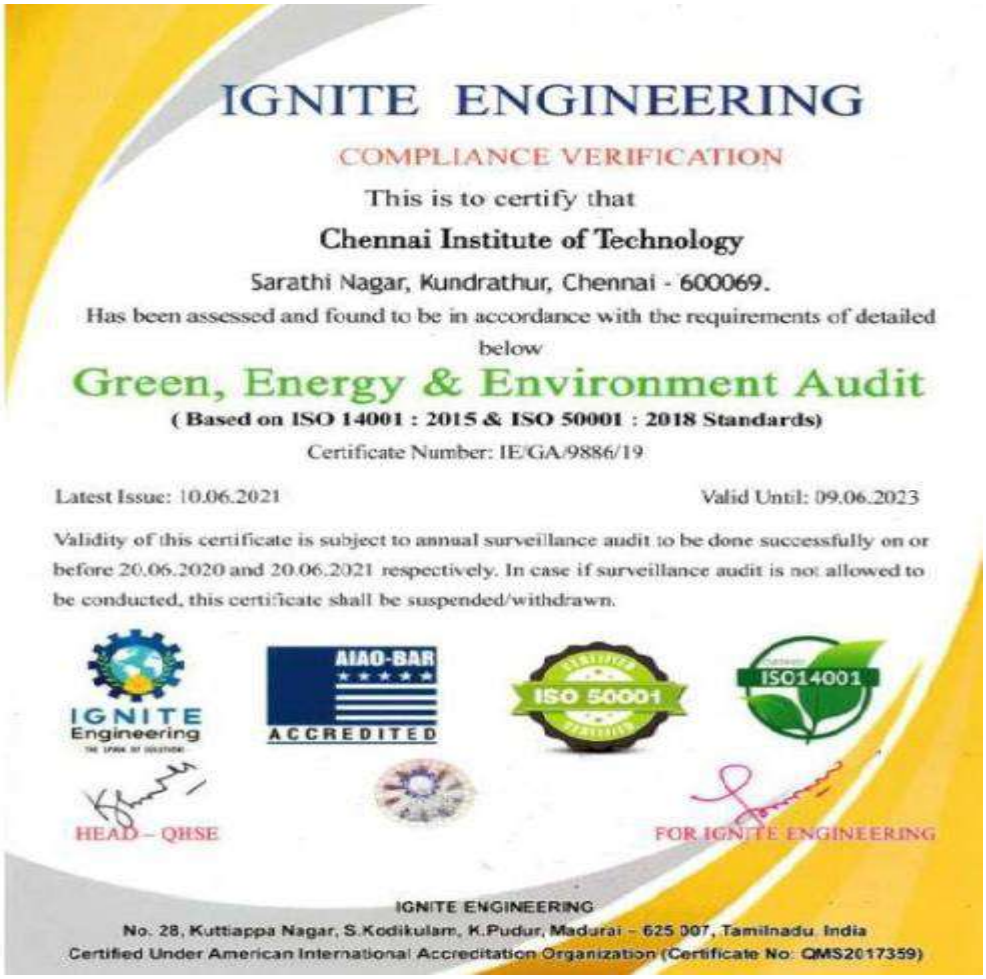
26. Annapoorani, A., Pandimeena, R. B. D. B., & Amutha, S. (2020). Reduction of water consumption in agriculture smart farms based on Internet of Things (IoT). International Journal of Control and Automation, 13(02), 484-493.
27. Vinayagamoorthy, M., Yuwaraj, K. R., Jayabalakrishnan, D., Harish, C., & Mugelan, A. (2024, August). Solar water heater system using computational fluid dynamics-simulation study. In AIP Conference Proceedings (Vol. 2937, No. 1). AIP Publishing.
28. Packialakshmi, S., Anuradha, B., Nagamani, K., Devi, J. S., & Sujatha, S. (2023). Treatment of industrial wastewater using coconut shell based activated carbon. Materials Today: Proceedings, 81, 1167-1171.
29. Raju, H. P., Kumar, M. V., & Partheeban, P. (2023). Wastewater Treatment in Constructed Wetlands by Phytoremediation Technique. In E3S Web of Conferences (Vol. 455, p. 03023). EDP Sciences.
30. Raju, H. P., Kumar, M. V., & Partheeban, P. (2023). Wastewater Treatment in Constructed Wetlands by Phytoremediation Technique. In E3S Web of Conferences (Vol. 455, p. 03023). EDP Sciences.
31. Venkatesh, J., Partheeban, P., Baskaran, A., Krishnan, D., & Sridhar, M. (2024). Wireless sensor network technology and geospatial technology for groundwater quality monitoring. Journal of Industrial Information Integration, 38, 100569.

3. Patents contributing to SDG6

1. IoT based NFT hydroponics system. Application No: 202341077562 A
2. Device for electricity generation from waste water treatment. Design No: 394720-001
3. System for water level detection and control based on internet of things. Application No: 202341006631 A

2. Green, energy and environment audit certification

Chennai Institute of technology has been assessed and found to be in accordance with the requirements of green, energy and environment audit.



IGNITE ENGINEERING

COMPLIANCE VERIFICATION

This is to certify that

Chennai Institute of Technology

Sarathi Nagar, Kundrathur, Chennai - 600069.

Has been assessed and found to be in accordance with the requirements of detailed below

Green, Energy & Environment Audit

(Based on ISO 14001 : 2015 & ISO 50001 : 2018 Standards)

Certificate Number: IE/GA/9886/19

Latest Issue: 10.06.2021 Valid Until: 09.06.2023

Validity of this certificate is subject to annual surveillance audit to be done successfully on or before 20.06.2020 and 20.06.2021 respectively. In case if surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawn.

IGNITE Engineering

AIAO-BAR ACCREDITED

ISO 50001

ISO14001

HEAD – QHSE

FOR IGNITE ENGINEERING

IGNITE ENGINEERING

No. 28, Kuttiappa Nagar, S.Kodikulam, K.Pudur, Madurai – 625 007, Tamilnadu, India

Certified Under American International Accreditation Organization (Certificate No: QMS2017359)

SUSTAINABLE DEVELOPMENT GOALS

7. AFFORDABLE AND CLEAN ENERGY

7.2 University Measures Towards Affordable and Clean Energy

7.2.1 Energy-efficient Building

Name of the Policy/Guidelines	**Policy for Energy Efficiency**
Short Description	This policy is implemented to ensure that all renovations and new builds at Chennai Institute of Technology, adhere to energy efficiency standards. The policy aims to promote sustainable practices, reduce energy consumption, and minimize the environmental impact of construction and building operations.
Scope	This policy applies to all upgradation/ renovations and new construction projects undertaken by Chennai Institute of Technology.
Policy Created on	21-06-2020
Policy Revised on	09-05-2022

Background and Principles

Chennai Institute of Technology is committed to promoting sustainable practices in all aspects of its operations, including building construction and renovations. Energy efficiency is a key focus area to reduce greenhouse gas emissions and minimize the environmental impact of our facilities. This policy ensures that all renovations and new builds at Chennai Institute of Technology meet energy efficiency standards, contributing to a greener and more sustainable campus.

Energy Efficiency Standards

1. Design and Planning:

a. Regional energy efficiency norms and regulations must be followed for all new construction and renovations.

b. To minimize the need for artificial lighting and excessive air cooling, buildings should be constructed to maximize natural lighting and ventilation.

c. To reduce energy usage, passive design techniques including orientation, insulation, and shading should be used.

2. Lighting

a. All newly built and remodeled spaces should have energy-efficient lighting solutions, like LEDs.

b. To optimize energy savings, lighting controls such as daylight harvesting and occupancy sensors should be used.

3. HVAC System

a. Energy efficiency requirements should guide the design and installation of heating, ventilation, and air conditioning (HVAC) systems.

b. To guarantee optimum performance and energy savings, HVAC systems should undergo routine maintenance and optimization.

c. To reduce energy waste, technologies for heat exchange and energy recovery should be taken into account.

4. Renewable Energy Integration:

a. Opportunities for integrating renewable energy sources such as solar panels should be explored during renovations and new builds.

b. Feasibility studies and assessments should be conducted to determine the potential for renewable energy generation on-site.

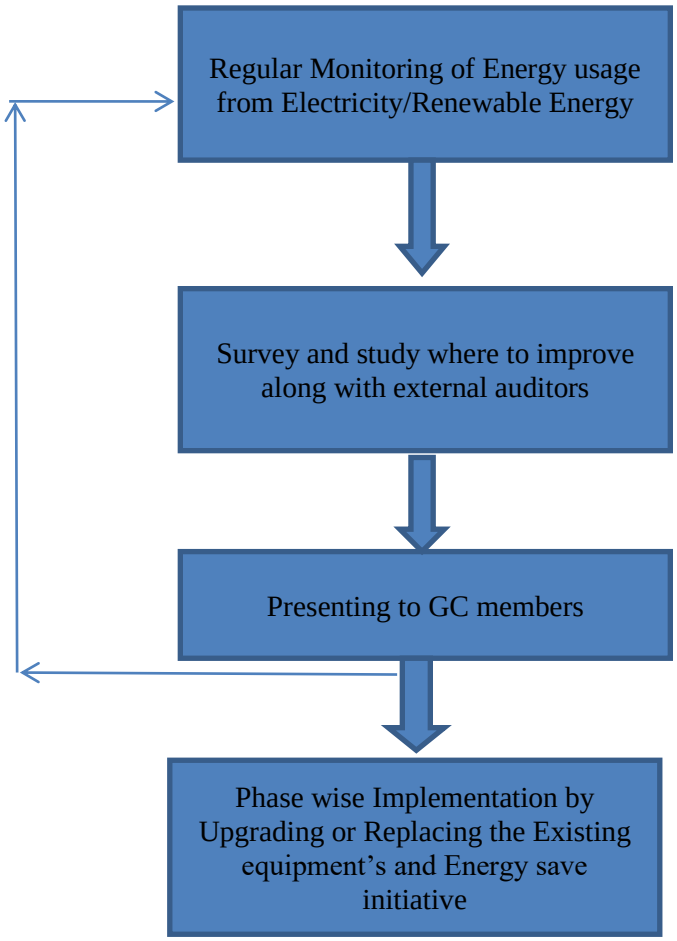
5. Monitoring and Evaluation:

a. Energy performance monitoring systems should be installed in renovated and new buildings to track energy consumption and identify areas for improvement.

b. Regular energy audits and assessments should be conducted by the internal energy audit team to evaluate the effectiveness of energy efficiency measures and identify opportunities for further optimization.

7.2.2 Upgrade Building To Higher Energy Efficiency

Chennai Institute of Technology is having the Internal energy auditing and monitoring team, who regularly audit the usage of energy and advise the leadership team where to save energy and how to improve the energy efficiency. They audit three months once (each building once in three months on rotation) and along with the external auditors report, 6 months once suggestions are implemented phase wise.



Flow Chart -Audit Phase Process

1. **Sensor based LED lights:**
   The CFL lights in the existing academic buildings and the hostels are replaced with LED lamps which saves around 60% of energy and some of the labs are upgraded with LED lights with sensors

S.No	Buildings	Qty	Total
1	Auditorium	150	1950
2	Main block	275	3575
3	First year block	25	375
4	Ladies hostel	190	2850
5	Gent's hostel	350	5250
6	Campus street light	90	2160
7	Canteen	10	150
8	Mess hall	50	900
9	HR office	5	60
10	Parents waiting hall	5	45
11	Food waste management plant	8	220
12	Computer science lab	24	250
13	Sports lighting	29	5800
	Total	**1211**	**23585**

2. Solar based Water heaters in hostels:

The hostel for both boys and girls were equipped with solar heaters, which saves the power of 1200 units per day.

3. Air-conditioners:

The Air-conditioning system was incorporated in the campus, from the normal 1.5 ton split to 5* A/C system, which was a power consumed model with more efficiency in less power pack sources.

MODEL	Qty	TON
1.5 Ton Split 5*	75	112.5
2 Ton Split 5*	23	46
Total	98	158.5

7.2.3 Carbon Reduction And Emission Reduction Process

Chennai Institute of Technology taken the following initiatives for reducing the carbon foot print in campus

1. Renewable Energy (Solar Panel, Solar Panel, Bio Gas).
2. E- Vehicle for internal movement.
3. Usage of Bicycle.
4. Increase the percentage of paperless office.
5. Avoiding usage of single use plastics.

The details of the facilities available/ provided and the evidences are mentioned below

1. Renewable Energy

Solar Panel and Water heater

The 300 kWh solar energy system installed on the rooftops of the academic buildings and hostels generates an average of 1,140 kWh of power per day and 35800 kWh per month. This renewable energy for electricity helps to reduce purchased electricity.

Bio-gas

The institution takes biogas initiative aimed towards reducing waste, generating renewable energy, and promoting sustainable practices on campus, helping to create a greener and more eco-friendly environment. Biogas which generates 22,775 kWh of power per year.

Biogas plant – 100 kg capacity

Wind Energy

Wind energy promotes environmental awareness and sustainability among students and faculty. Wind turbines can help in reducing energy costs. By using wind, the institution generates 1,247 kWh of power per year.

2. E- Vehicle for internal movement.

The Chennai Institute of Technology uses electric vehicles for passengers transport purpose also for carrying loads, which has led to improved greenhouse gas emissions by reducing reliance on fossil fuels and lowering overall carbon footprints.

Electric Vehicle

Electric Bike

EV charging point:

The institution has installed EV charging stations across campus to support the growing use of electric vehicles.These stations are accessible to both campus vehicles and for personal EVs of students

3. Usage of Bicycle

The institution has introduced a range of transportation initiatives which are designed to promote alternative modes of transport, reduce reliance on personal cars, and foster a more sustainable campus environment.

Free to rent bicycle on campus

Bicycle usage inside the campus

4. Increase the percentage of paperless office

To minimize paper waste and promote digital solutions, the institution has launched a paper reduction initiative that encourages the use of electronic resources and sustainable materials. This program aligns with our broader goal of fostering a more environmentally conscious and resource-efficient campus.

Paperless registration

Digital notes

Paperless meeting

Paperless labs

5. Avoiding usage of single use plastics

To support a cleaner, greener campus the institution has rolled out a comprehensive program to significantly reduce plastic waste.

This includes initiatives such as eliminating single-use plastics, promoting reusable alternatives and increasing recycling efforts to minimize plastic pollution which helps to promote more sustainable campus environment.

Promoting No Plastic in Campus

7.2.4 Plan to reduce energy consumption

Energy efficiency plan in place to reduce overall energy consumption

Chennai Institute of technology has a clear plan to reduce the energy consumption in the campus while constructing / renovating the building and upgraded the necessary facilities to reduce energy usage by the following ways

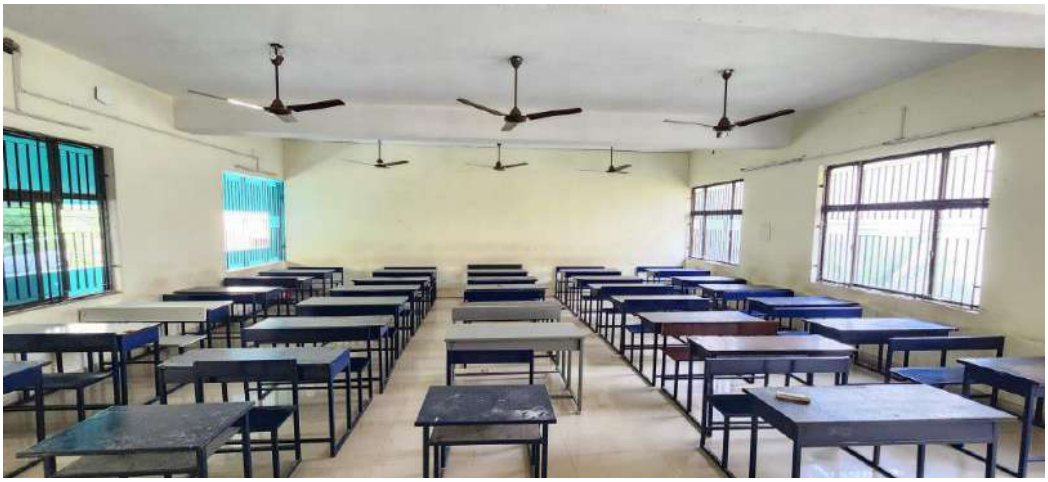
1.Ventilation (For natural lighting and fresh air circulation)

2. Renewable energy

3.Energy saving appliances

1.Ventilation:

Class rooms and faculty room are provided with proper ventilation to ensure nature lighting and natural air circulation is available to save energy and keep them healthy.



2.Energy from Nature Source

Solar Energy

Solar panel installation reduces carbon emission by generating electric energy from sunlight. This reduces the dependence of fossil fuels for energy production. Maintenance of these solar panels are low therefore making it an affordable and accessible source in our campus.

- The 300 kW solar energy system installed on the rooftops of the academic buildings and hostels generates an average of 1,140 kWh of power per day and 35800 kWh per month.

Biogas

Biogas, produced from food waste is another method adapted in the campus to produce energy in an eco-friendly manner. The food waste from around the campus is collected and fed to the system that is converted to obtain electric current. By using biomass, we generate 25,775 kWh of power per year. Our campus keeps track of its energy consumption and revises different ways in which it can be minimized regularly. Research is one such way where we analyze new trends and contemplate on how it would be beneficial to our campus in ways of aligning with the development goals.

Students are often given lectures, and workshops are conducted to bring awareness about these alternate sources of energy. Labs are highly facilitated to understand the working of these wind and solar energy, allowing students to conduct research and allow them to learn more about sustainable ways to produce and consume energy.

Wind Mill

Wind energy promotes environmental awareness and sustainability among students,faculty .wind turbines can helps reduce energy costs. By using wind, we generate 1,247 kWh of power per year.

S.No	Type	Location	Amount of the energy produced (KWH) per year
1	Solar Energy	Roof top of the academic buildings and Hostels	429,320
2	Biomass	Near Mess Hall	25,775
3	Wind Power	Energy Lab	1,247

3.Energy Saving Appliances in campus:

Convenient and Eco-Friendly Laundry


Both hostels feature a "Smart Laundry Facility" powered by Hier, offering an energy-efficient, eco-friendly, and low-cost washing solution. This facility is accessible through a mobile app, enabling students to manage their laundry conveniently. This saves water usage and in turn contribute to the energy saving

Both hostels are equipped with a state-of-the-art "Smart Laundry Facility" powered by Hier. This innovative system offers a hassle-free and sustainable laundry solution for students.

Dishwasher:

Dishwashers are used in the mess of campus and hostels, so that water usage will be reduced and it saves the energy usage

Dishwasher in Mess

Sensor-Controlled LED Lighting

The CFL lights in the existing academic buildings and the hostels are replaced with LED lamps which saves around 60% of energy and some of the labs are upgraded with LED lights with sensors.

S.No	Buildings	Qty	Total
1	Auditorium	150	1950
2	Main block	275	3575
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10	Parents waiting hall	5	45
11	Food waste management plant	8	220
12	Computer science lab	24	250
13	Sports lighting	29	5800
	Total	**1211**	**23585**

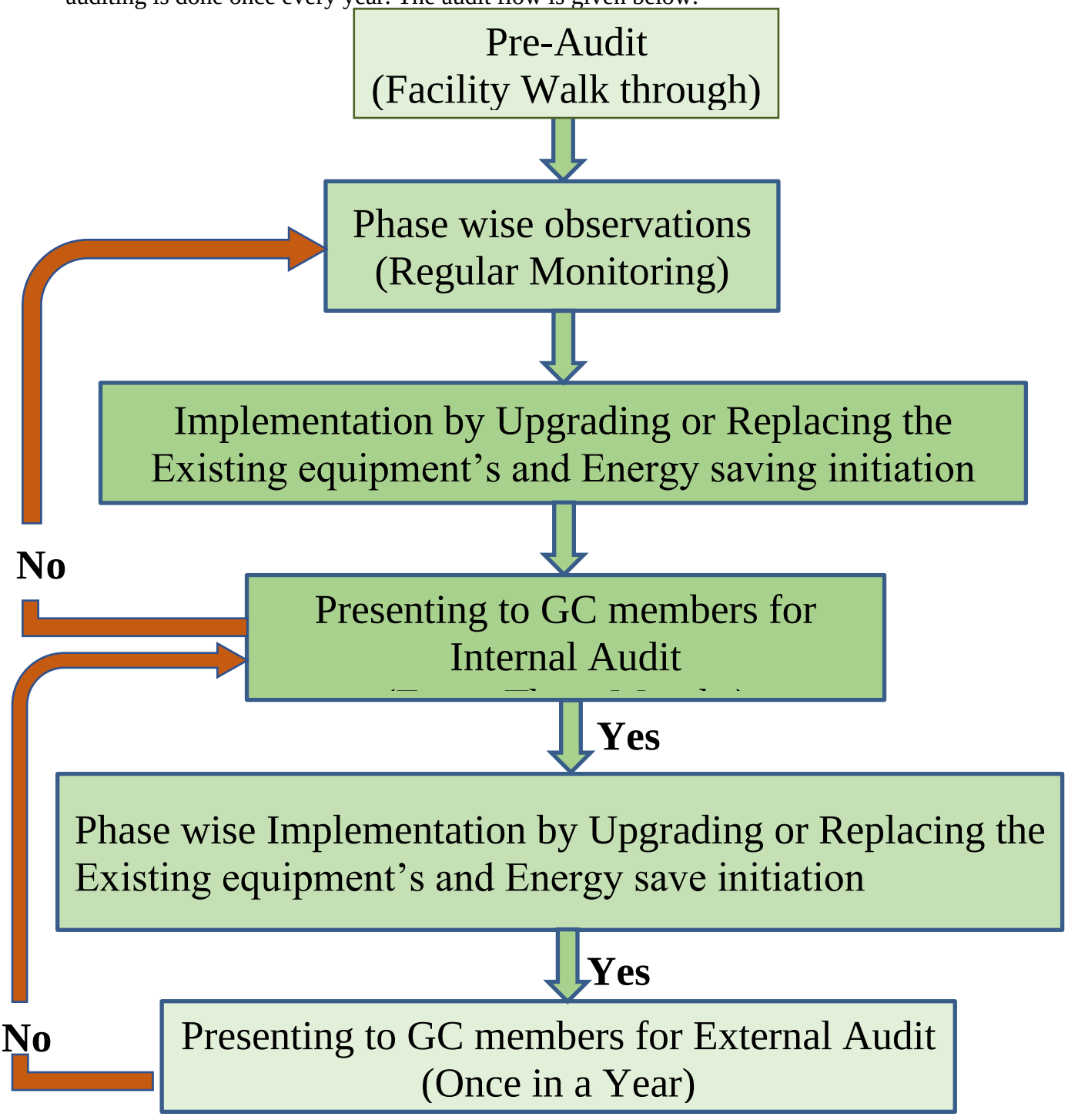
4.Plantation:

Our institute is a green campus, tropical, serene, with a landscape. Students and staff are urged to plant more trees to clear the campus of litter and plastic. Swacch Bharat Abhiyan is being pursued at our college to keep the campus safe. Tree plantation projects help to foster the eco-friendly climate, which provides pure oxygen inside the institute and recognition among villagers.

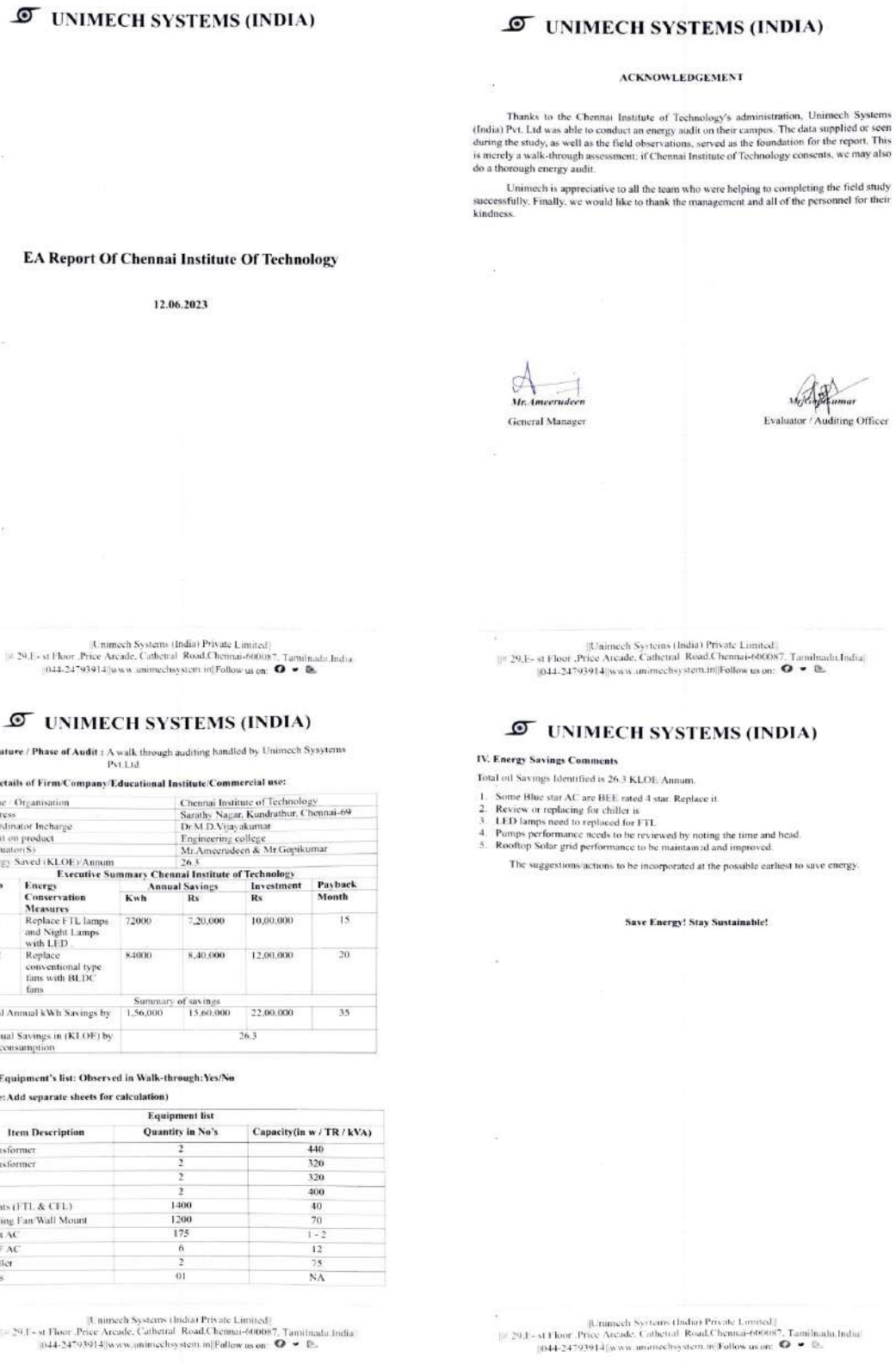
Continuous action to make greener campus

7.2.5 Energy Review to Identify Areas Where Energy Wastage Is Highest

The internal energy monitoring and auditing team of Chennai Institute of Technology reports on routine inspection of energy consumption and suggests guidance to the leadership team on conservation and energy efficiency enhancement. They audit every three months once (each building once in three months on rotation). External experts or consultancy energy auditing is done once every year. The audit flow is given below.



The EA report conducted by Unimech Solutions (India) Pvt. Ltd for 2023 is attached here.



UNIMECH SYSTEMS (INDIA)

EA Report Of Chennai Institute Of Technology

12.06.2023

[Unimech Systems (India) Private Limited]
[# 29,E- st Floor ,Price Arcade, Cathetral Road,Chennai-600087, Tamilnadu,India
[044-24793914][www.unimechsystem.in][Follow us on:

UNIMECH SYSTEMS (INDIA)

ACKNOWLEDGEMENT

Thanks to the Chennai Institute of Technology's administration, Unimech Systems (India) Pvt. Ltd was able to conduct an energy audit on their campus. The data supplied or seen during the study, as well as the field observations, served as the foundation for the report. This is merely a walk-through assessment; if Chennai Institute of Technology consents, we may also do a thorough energy audit.

Unimech is appreciative to all the team who were helping to completing the field study successfully. Finally, we would like to thank the management and all of the personnel for their kindness.

Mr.Ameerudeen
General Manager

Evaluator / Auditing Officer

[Unimech Systems (India) Private Limited]
[# 29,E- st Floor ,Price Arcade, Cathetral Road,Chennai-600087, Tamilnadu,India
[044-24793914][www.unimechsystem.in][Follow us on:

UNIMECH SYSTEMS (INDIA)

I. Nature / Phase of Audit : A walk through auditing handled by Unimech Sysystems Pvt.Ltd

II. Details of Firm/Company/Educational Institute/Commercial use:

Name / Organisation	Chennai Institute of Technology
Address	Sarathy Nagar, Kundrathur, Chennai-69
Coordinator Incharge	Dr.M.D.Vijayakumar
Audit on product	Engineering college
Evaluator(S)	Mr.Ameerudeen & Mr.Gopikumar
Energy Saved (KLOE)/Annum	26.3

Executive Summary Chennai Institute of Technology

S.No	Energy Conservation Measures	Annual Savings Kwh	Rs	Investment Rs	Payback Month
1	Replace FTL lamps and Night Lamps with LED .	72000	7,20,000	10,00,000	15
2	Replace conventional type fans with BLDC fans	84000	8,40,000	12,00,000	20
	Summary of savings				
Total Annual kWh Savings by EB		1,56,000	15,60,000	22,00,000	35
Annual Savings in (KLOE) by EB consumption		26.3			

III. Equipment's list: Observed in Walk-through:Yes/No

(Note:Add separate sheets for calculation)

Equipment list		
Item Description	**Quantity in No's**	**Capacity(in w / TR / kVA)**
Transformer	2	440
Transformer	2	320
DG	2	320
DG	2	400
Lights (FTL & CFL)	1400	40
Ceiling Fan/Wall Mount	1200	70
Split AC	175	1 - 2
VRF AC	6	12
Chiller	2	75
Lifts	01	NA

[Unimech Systems (India) Private Limited]
[# 29,E- st Floor ,Price Arcade, Cathetral Road,Chennai-600087, Tamilnadu,India
[044-24793914][www.unimechsystem.in][Follow us on:

UNIMECH SYSTEMS (INDIA)

IV. Energy Savings Comments

Total oil Savings Identified is 26.3 KLOE Annum.

1. Some Blue star AC are BEE rated 4 star. Replace it.
2. Review or replacing for chiller is
3. LED lamps need to replaced for FTL
4. Pumps performance needs to be reviewed by noting the time and head.
5. Rooftop Solar grid performance to be maintained and improved.

The suggestions/actions to be incorporated at the possible earliest to save energy.

Save Energy! Stay Sustainable!

[Unimech Systems (India) Private Limited]
[# 29,E- st Floor ,Price Arcade, Cathetral Road,Chennai-600087, Tamilnadu,India
[044-24793914][www.unimechsystem.in][Follow us on:

The often-received comments from the internal auditing were reported that in Labs of CoE,

Students leaving for break or lunch hours was not satisfactorily acting towards energy saving.

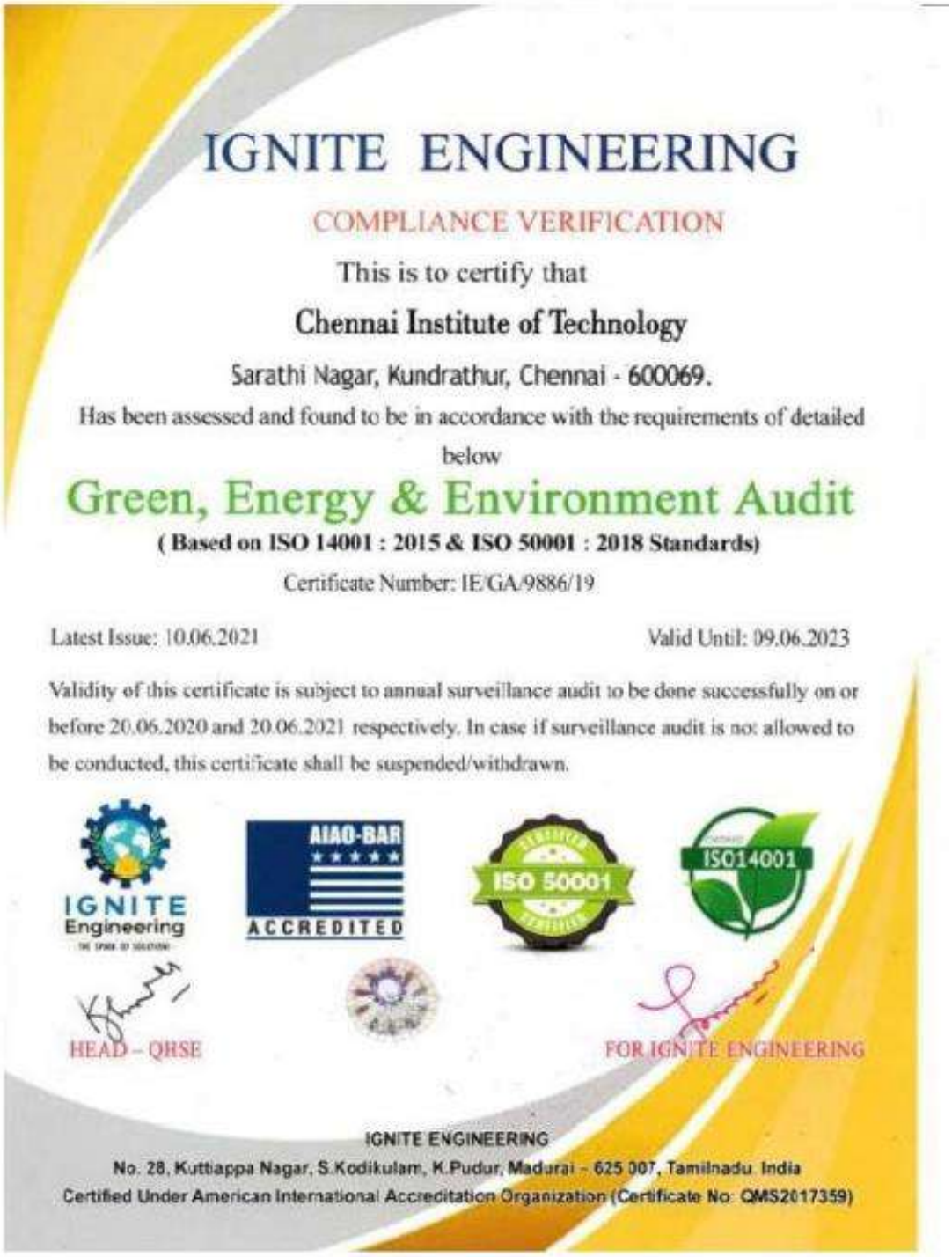
Lights ON during Lunch or break hours

The maintenance and efficiency of DG has been improved by following internal and external auditing panel.

After the audit, the BEE 4-star AC's been replaced energy-efficient 5-star AC.

Energy reducing Fixtures replaced after Observations

The institute has been assessed and certified for Green, Energy and Environment Audit by Ignite Engineering and the evidence attached below.



IGNITE ENGINEERING

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IGNITE Engineering

AIAO-BAR ACCREDITED

ISO 50001

ISO14001

HEAD – QHSE

FOR IGNITE ENGINEERING

IGNITE ENGINEERING
No. 28, Kuttiappa Nagar, S.Kodikulam, K.Pudur, Madurai - 625 007, Tamilnadu India
Certified Under American International Accreditation Organization (Certificate No: QMS2017359)

7.2.6 Divestment from Carbon-Intensive Energy Industries Policy

Name of the Policy/Guidelines	Divestment from Carbon-Intensive Energy Industries Policy
Short Description	This policy aims to guide Chennai Institute of Technology indivesting its investments from carbon-intensive energy industries, particularly coal and oil. The policy aligns with the institution's commitment to environmental sustainability and reducing its carbon footprint.
Scope	This policy applies to all investments made by Chennai Institute of Technology.
Policy Created on	21-06-2020
Policy Revised on	09-05-2022

Background:

Chennai Institute of Technology recognizes the urgent need to address climate change and reduce greenhouse gas emissions. As an institution committed to sustainability, the institute was acknowledging the environmental impact of carbon-intensive energy industries, such as coal and oil. This policy reflects the institute dedication to responsible investment practices and its commitment to supporting a transition to cleaner and renewable energy sources.

Policy:

1. **Divestment from Carbon-Intensive Energy Industries**: Chennai Institute of Technology remove its investments from carbon-intensive energy sectors. The institute will make a concerted effort to limit its exposure to businesses engaged in the production, distribution, or extraction of fossil fuels.

2. **Responsible Investment Practices**: The institute will adopt responsible investment practices that prioritize environmental sustainability and align with its commitment to reducing carbon emissions.

3. **Engagement and Advocacy**: Chennai Institute of Technology will actively engage with stakeholders, including investment managers, to promote the divestment from carbon- intensive energy industries

4. **Monitoring and Reporting**: The Institute will establish mechanisms to monitor and assessthe progress of divestment efforts. Regular reports will be prepared to track the divestment process and communicate the institute commitment to stakeholders.

5. **Review and Updates**: Chennai Institute of Technology will periodically review this Divestment from Carbon-Intensive Energy Industries Policy to ensure its effectiveness and alignment with evolving sustainability goals. Updates will be made as necessary to addressemerging challenges and opportunities.

7. AFFORDABLE AND CLEAN ENERGY

7.4 Energy and the Community

7.4.1 Programmes For Local Community To Learn About Importance Of Energy Efficiency And Clean Energy:

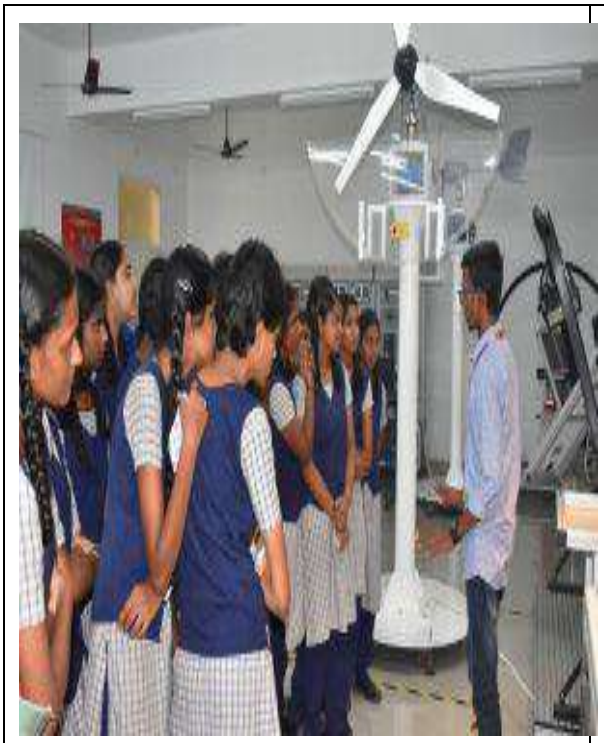
1. a. Arranging pledge program for local community people from industry

Chennai Institute of Technology took an initiative to adopt with the pledge of Government of India for the conservation of energy. The institute encouraged industrial people from Gokul Autotech Pvt.Ltd by taking the pledge on energy saving.

- I pledge to use energy more mindfully and take necessary steps to reduce energy usage in my home and office.
- I will devote my time in taking small steps like switching off the extra lights while I am in the room, turning off the appliances like Tv, computer monitors, ACs and cars/Bikes at the traffic signals.
- The efficient utilisation will help me save money and consequently help in fighting climate change.
- I pledge to take responsible actions in doing my part to improve the environment and help contributing to sustainable growth of the planet Earth.

1.b. Educating Students on Renewable Energy

Students are often given lectures, and workshops are conducted to bring awareness about these alternate sources of energy.



2. Training program for other colleges and industry employees

Training program arranged for various colleges and industry technicians to explore the critical topic of energy harvesting through renewable energy sources. The session focused on practical insights into how renewable energy technologies can be integrated to enhance energy efficiency and sustainability across sectors. The workshop aimed to create awareness about how technologies such as solar, wind, and biomass can be harnessed efficiently for energy generation. The hands-on experience on energy harvesting was provided to the participants.

3. Guest Lecture

The guest lecture, titled **"Artificial intelligence for e-Vehicle applications,"** was held on June 21, 2022, at 10 am. It was part of the IEEE Expert Lecture Series organized by the Institution, and the lecture was transported by Dr. M.Venkateshkumar, the Chairman of Professional Activities at IEEE

4. National Level Workshop

The institution has conducted One-day National Level Workshop on **Hybrid energy, focusing on solar, wind, and e-vehicle technologies, October 14, 2022**, organized by the Centre for **New Energy Systems**. This workshop aimed to provide hands-on training and knowledge dissemination about the integration and applications of hybrid energy systems in the context of renewable energy and electric vehicles to the students.

7.4.2 Pledge Towards 100% Renewable Energy

Chennai Institute of Technology took an initiative to adopt with the pledge of Government of India for the conservation of energy. The students and the faculty members are encouraged to save energy and practise the pledge for the same and to internalise the energy saving.

The pledge has been disseminated through notice boards in the departments, corridors and laboratories. Students are encouraged towards energy saving once a week by wearing uniform non-ironed Polo T-shirts to stick to it. Yearly twice the pledge taken by all the communities inside the campus. Aslo the institute encouraged industrial people from GokulAutotech Pvt.Ltd taking the pledge

Students taking Pledge- Energy saving

Industrial Staff from Gokul Autotech Pvt.Ltd taking Pledge – Energy Saving

Sample - Pledge displayed in Notice Board

Pledge

- I pledge to use energy more mindfully and take necessary steps to reduce energy usage in my home and office.
- I will devote my time in taking small steps like switching off the extra lights while I am in the room, turning off the appliances like Tv, computer monitors, ACs and cars/Bikes at the traffic signals.
- The efficient utilisation will help me save money and consequently help in fighting climate change.
- I pledge to take responsible actions in doing my part to improve the environment and help contributing to sustainable growth of the planet Earth.

7.4.3. Energy Efficiency Assessments, Workshops, Research Renewable Energy Options

Chennai Institute of Technology plays a key role in assisting local industries to improve energy efficiency and adopt clean energy solutions. The institute provides **energy audits and efficiency assessments**, helping businesses identify areas of energy wastage and implement cost-effective solutions to optimize consumption. The institution also conducts **workshops and training programs** on energy management, empowering industry professionals with the knowledge to adopt sustainable practices and technologies. Additionally, its **research and development efforts** focus on renewable energy, collaborating with local industries to implement innovative clean energy systems, such as solar and wind power. This comprehensive approach not only supports industries in reducing operational costs but also contributes to a more sustainable and energy-efficient industrial ecosystem, especially in the **SIDCO area**, where the institute's proximity to local businesses facilitates direct collaboration.

i) Energy Efficiency quality audit awareness program

A Energy Efficiency quality audit meet awarness was held at Gokul Auto Tech, by our institute personnel, the team of quality supervisors were get beneficary based on the awarness training program for two days.

ii) Energy Efficiency quality audit

An energy efficiency audit for Gokul Autotech Pvt. Ltd. was conducted on December 1, 2022, by **Dr. M.D. Vijayakumar**, Professor and Head of the Department of Mechanical Engineering, Chennai Institute of Technology. The purpose of this audit was to raise awareness about energy wastage and provide actionable recommendations to reduce energy consumption, optimize efficiency, and lower operational costs for the company.

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)
NBA NIRF 151 - 200 Band (Engineering 2021) NAAC A+

Energy audit report for Gokul autotech Pvt. Ltd.

Date of Audit : 1-12-2022 and 2 -12-2022
Audit Period : 2 days
Prepared By : Dr. M.D. Vijayakumar

Name of auditor/consulting firm : Dr. M.D. Vijayakumar, Professor & Head
Dept. of Mechanical Engineering
Chennai Institute of Technology, Kundrathr

Contact Information : Mobile: 9994473738
E.Mail: mech@citchennai.net

Total Energy Consumption : 1,10,000 kWh per month.

Energy Cost : 22,00000 INR per month.

Peak Load : 150 kW.

Average Load : 145.83 kW.

Lighting consumption : 8500 kWhr per month

Manufacturing equipments consumption: 99000 kWhr per month

Other systems consumption: 2500 kWhr per month

Energy Efficiency Assessment

This section highlights areas identified as inefficient and provides suggestions for improvement:

The current lighting system uses traditional fluorescent lamps, leading to high energy consumption. The HVAC systems operate without optimal temperature control, causing excess energy use. Air compressors are running longer than necessary due to air leaks.

Renewable Energy Opportunities

In addition to energy efficiency improvements, **Gokul Autotech Pvt. Ltd.** can consider adopting renewable energy solutions:

1. Install solar panels on the factory rooftop to generate electricity, reducing reliance on the grid and lowering energy bills.
2. Evaluate the feasibility of installing small wind turbines on-site to harness wind energy.

3. Consider implementing battery storage systems to store excess energy generated by solar panels for use during peak demand.

Action Plan and Recommendations

Based on the audit findings, the following action plan has been proposed:

1. **Immediate Actions** (0-3 months):
   Replace all lighting with LED bulbs; Conduct a leak survey for compressed air systems and repair leaks.
2. **Short-Term Actions** (3-6 months):
   Install variable speed drives in the compressed air system.
3. **Medium-Term Actions** (6-12 months):
   Initiate feasibility studies for solar panel installation on the factory rooftop.
4. **Long-Term Actions** (1+ years):
   Investigate additional renewable energy sources (e.g., wind energy).

Prepared by
M. D. VIJAYA KUMAR

Verified by
Mr. S. Ganesh

iii) **Energy smart workshop: Unlocking efficiency for a sustainable future**

The "Energy Smart: Unlocking Efficiency for a Sustainable Future" workshop, conducted on August 17, 2022, brought together faculty members from various colleges and industry technicians to explore the critical topic of energy harvesting through renewable energy sources. The session focused on practical insights into how renewable energy technologies can be integrated to enhance energy efficiency and sustainability across sectors. The workshop aimed to create awareness about how technologies such as solar, wind, and biomass can be harnessed efficiently for energy generation. The hands-on experience on energy harvesting was provided to the participants.

iv) Research works contributing to SDG7

1. Efficient implementation of low-power decoders through reversible logic gates with minimal transistor count
2. Optimizing resource allocation in energy enabled multi cluster cognative radio network for hybrid connectivity
3. An improved Energy efficient clustering protocol life time of a WSN based on IoT
4. Kinetic Energy Harvesting:Empowerment Communities through innovative speed breaker power generation.
5. Experimental investigation of the mechanical properties of aluminium 8011/SiC/Graphite Hybrid Composite
6. Optimization of performance and Emission Characteristics of compression ignition engine supplemented with pentanol-Rapessdoil- Diesel Composition
7. Experimental in investigation of performance and Emission characteristics of diesel Engine supplemented with Butanol-Olive oil-Diesel Composition

v) Publications contributing to SDG7

1. Mariraja, R., Harichandran, R., Vijayakumar, R., & Nichelson, A. (2024). Experimental analysis of solar desalination system performance with graphene and graphitic carbon nanopaint-coated solar absorbers. Desalination, 592, 118141.
2. Raman, R., Gor, M., Meenakshi, R., Jayaseelan, G. M., Chaturvedi, A., Taqui, S. N., ... & Kalam, M. A. (2024). Solar energy measurement and monitoring model by using internet of things. Electric Power Components and Systems, 52(10), 1796-1807.
3. Jakeer, S., Rupa, M. L., Reddy, S. R. R., & Rashad, A. M. (2023). Artificial neural network model of non-Darcy MHD Sutterby hybrid nanofluid flow over a curved permeable surface: Solar energy applications. Propulsion and Power Research, 12(3), 410-427.
4. Johnson, J. G., Ramya, G., Sripriya, T., SamuthiraPandi, V., Sudha, K., & Umamaheswari, K. (2023, December). An Intelligent Design of Solar Energy Powered Smart Residence Controlling System Using Novel Power Grid Principles. In 2023 International Conference on Intelligent Technologies for Sustainable Electric and Communications Systems (iTech SECOM) (pp. 397-402). IEEE.
5. Rangasamy, S., Khansadurai, A. M., Venugopal, G., & Udayakumar, A. K. (2023). Graphene-based O-shaped metamaterial absorber design with broad response for solar energy absorption. Optical and Quantum Electronics, 55(1), 90.
6. Partheeban, P., Shiva, M., Vishnupriyan, J., Ponnusamy, R., Kumar, T. S., & Anuradha, B. (2022, December). Solar Energy optimisation using IoT and deep learning-a review. In 2022

International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI) (Vol. 1, pp. 1-3). IEEE.

vi) Patents contributing to SDG7

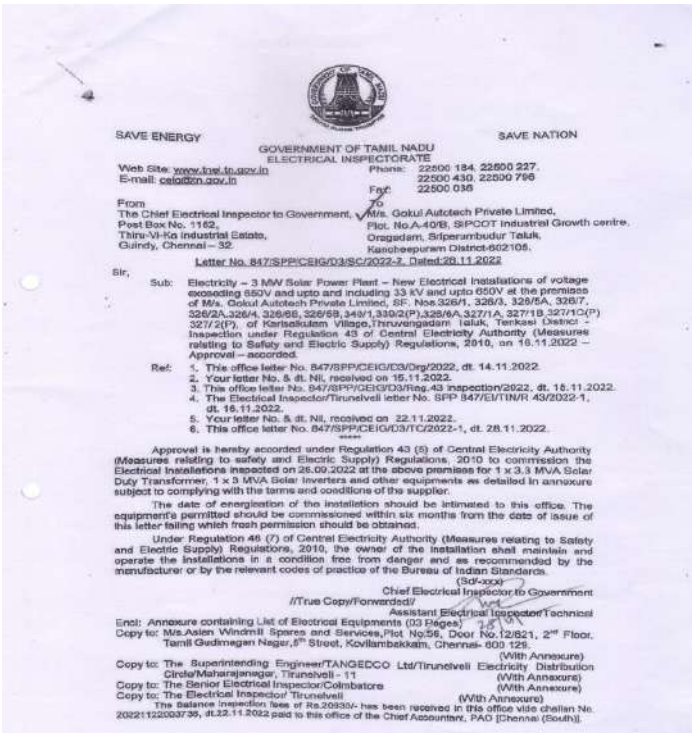
1. Advanced Energy storage system using lithium-sulfer(Li-s)Batteries, 202341080267 A
2. Five Stage constant current charging technique for Lithium-Ion Battery, 202341077563 A
3. Sustainable drive:Solar and wind –Powered EV charging network, 202341073494 A
4. Method of using Waste Plastic oil as fuel on diesel engine, 202341041331 A
5. Electro magnetic energy Absorber, 202341002106 A

7.4.4 Inform and Support Governments In Clean Energy And Energy-Efficient Technology Policy Development

The institute's support for renewable energy aligned remarkably with climate changes, reducing greenhouse gases and cleaner energy contributing towards environmental stewardship, innovation and education goals.

Gokul Autotech Pvt.Ltd

The Chairperson of the Institute also owns Gokul Autotech Pvt. Ltd(GAT). GAT is an industry manufacturer of wide variables of metal die casting. Via Chennai Institute of Technology, GAT maintains close ties with academics, research and development facilities to identify issues that industries face and to discover solutions through a variety of industrial and research projects. Gokul Autotech has a unit of 3MW solar power plant installed in Tenkasi District in adherence with TANGEDCO (Tamil Nadu Generation and Distribution Corporation Limited). This supports the surrounding jurisdictions through the substations. The generation of 3MW power contributing to TANGEDCO plays a vital role in supplying clean, renewable energy towards the state's sustainable goals relying reduction of fossil fuels on the other hand meeting the rising demand for them but also reducing carbon emissions, fostering greener for the community. Through this continuous generation of power, the institutes hold pride in participating in the transition to a cleaner efficient power grid. This highly contributes to the growth of clean energy infrastructure, benefiting not just the power grid but the entire community's well-being. Adhering to the policy regulations, the Institute along with Gokul Autotech will set up systems to track and evaluate the results of divestiture initiatives. To monitor the process and inform stakeholders of the institute's commitment, regular power generation reports will be published. To make sure that from Carbon-Intensive Energy Industries Policy is effective and in line with changing sustainability objectives, the collaborative team with faculties in a rotating roaster will learn, practise industrial exposure and review it regularly.



SAVE ENERGY — SAVE NATION

GOVERNMENT OF TAMIL NADU
ELECTRICAL INSPECTORATE

Web Site: www.tnei.tn.gov.in
E-mail: ceiad@tn.gov.in

Phone: 22500 184, 22500 227, 22500 430, 22500 796
Fax: 22500 035

From
The Chief Electrical Inspector to Government,
Post Box No. 1162,
Thiru-Vi-Ka Industrial Estate,
Guindy, Chennai – 32.

To
M/s. Gokul Autotech Private Limited,
Plot. No.A-40/B, SIPCOT Industrial Growth centre,
Oragadam, Sriperambudur Taluk,
Kancheepuram District-602105.

Letter No. 847/SPP/CEIG/D3/SC/2022-2, Dated:28.11.2022

Sir,

Sub: Electricity – 3 MW Solar Power Plant – New Electrical Installations of voltage exceeding 650V and upto and including 33 kV and upto 650V at the premises of M/s. Gokul Autotech Private Limited, SF. Nos.326/1, 326/3, 326/5A, 326/7, 326/2A,326/4, 326/6B, 326/5B, 340/1,330/2(P),328/6A,327/1A, 327/1B,327/1C(P) 327/2(P), of Karisalkulam Village,Thiruvengadam Taluk, Tenkasi District – Inspection under Regulation 43 of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, on 16.11.2022 – Approval – accorded.

Ref:
1. This office letter No. 847/SPP/CEIG/D3/Org/2022, dt. 14.11.2022.
2. Your letter No. & dt. Nil, received on 15.11.2022.
3. This office letter No. 847/SPP/CEIG/D3/Reg.43 inspection/2022, dt. 16.11.2022.
4. The Electrical Inspector/Tirunelveli letter No. SPP 847/EI/TIN/R 43/2022-1, dt. 16.11.2022.
5. Your letter No. & dt. Nil, received on 22.11.2022.
6. This office letter No. 847/SPP/CEIG/D3/TC/2022-1, dt. 28.11.2022.

*****

Approval is hereby accorded under Regulation 43 (5) of Central Electricity Authority (Measures relating to safety and Electric Supply) Regulations, 2010 to commission the Electrical Installations inspected on 26.09.2022 at the above premises for 1 x 3.3 MVA Solar Duty Transformer, 1 x 3 MVA Solar Inverters and other equipments as detailed in annexure subject to complying with the terms and conditions of the supplier.

The date of energisation of the installation should be intimated to this office. The equipment's permitted should be commissioned within six months from the date of issue of this letter failing which fresh permission should be obtained.

Under Regulation 46 (7) of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, the owner of the installation shall maintain and operate the installations in a condition free from danger and as recommended by the manufacturer or by the relevant codes of practice of the Bureau of Indian Standards.

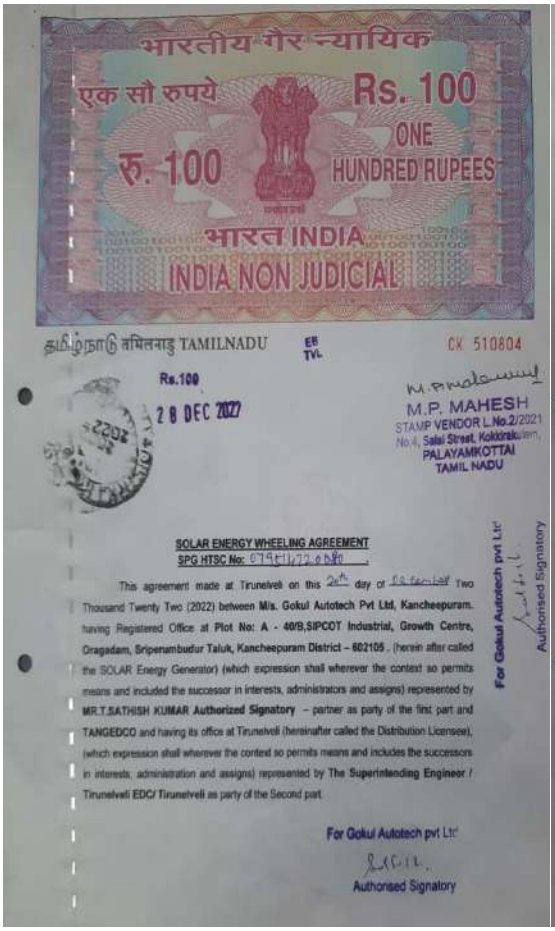
(Sd/-xxx)
Chief Electrical Inspector to Government

//True Copy/Forwarded//
Assistant Electrical Inspector/Technical

Encl: Annexure containing List of Electrical Equipments (03 Pages)

Copy to: M/s.Asian Windmill Spares and Services,Plot No.56, Door No.12/821, 2nd Floor, Tamil Gudimegan Nagar,8th Street, Kovilambakkam, Chennai- 600 129. (With Annexure)
Copy to: The Superintending Engineer/TANGEDCO Ltd/Tirunelveli Electricity Distribution Circle/Maharajanagar, Tirunelveli - 11 (With Annexure)
Copy to: The Senior Electrical Inspector/Coimbatore (With Annexure)
Copy to: The Electrical Inspector/ Tirunelveli (With Annexure)

The Balance inspection fees of Rs.20930/- has been received in this office vide challan No. 20221122003739, dt.22.11.2022 paid to this office of the Chief Accountant, PAO [Chennai (South)].

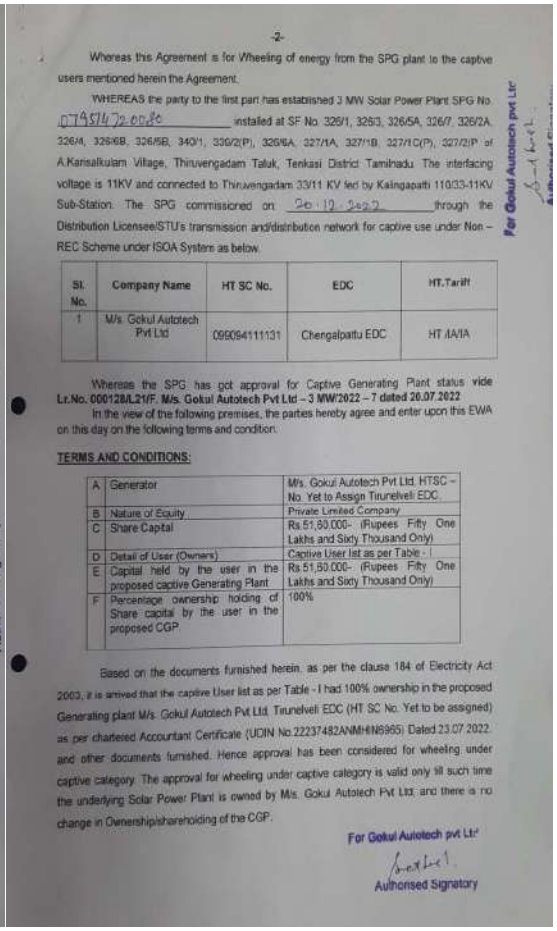


भारतीय गैर न्यायिक
एक सौ रुपये
Rs. 100
ONE HUNDRED RUPEES
रु. 100
भारत INDIA
INDIA NON JUDICIAL
தமிழ்நாடு தமிழ்நாடு TAMILNADU
CX 510804
Rs.100
28 DEC 2022
M.P. MAHESH
STAMP VENDOR L.No.2/2021
No.4, Salai Street, Kokkirakulam,
PALAYAMKOTTAI
TAMIL NADU

SOLAR ENERGY WHEELING AGREEMENT
SPG HTSC No: 0795147220080

This agreement made at Tirunelveli on this 26th day of September Two Thousand Twenty Two (2022) between **M/s. Gokul Autotech Pvt Ltd, Kancheepuram**, having Registered Office at **Plot No: A - 40/B,SIPCOT Industrial, Growth Centre, Oragadam, Sriperambudur Taluk, Kancheepuram District – 602105**, (herein after called the SOLAR Energy Generator) (which expression shall wherever the context so permits means and included the successor in interests, administrators and assigns) represented by **MR.T.SATHISH KUMAR Authorized Signatory** – partner as party of the first part and **TANGEDCO** and having its office at Tirunelveli (hereinafter called the Distribution Licensee), (which expression shall wherever the context so permits means and includes the successors in interests, administration and assigns) represented by **The Superintending Engineer / Tirunelveli EDC/ Tirunelveli** as party of the Second part.

For Gokul Autotech pvt Ltd
Authorised Signatory



-2-

Whereas this Agreement is for Wheeling of energy from the SPG plant to the captive users mentioned herein the Agreement.

WHEREAS the party to the first part has established 3 MW Solar Power Plant SPG No. 0795147220080 installed at SF No. 326/1, 326/3, 326/5A, 326/7, 326/2A, 326/4, 326/6B, 326/5B, 340/1, 330/2(P), 326/6A, 327/1A, 327/1B, 327/1C(P), 327/2(P of A.Karisalkulam Village, Thiruvengadam Taluk, Tenkasi District Tamilnadu. The interfacing voltage is 11KV and connected to Thiruvengadam 33/11 KV fed by Kalingapatti 110/33-11KV Sub-Station. The SPG commissioned on 26.12.2022 through the Distribution Licensee/STU's transmission and/distribution network for captive use under Non – REC Scheme under ISOA System as below.

Sl. No.	Company Name	HT SC No.	EDC	HT.Tariff
1	M/s. Gokul Autotech Pvt Ltd	099094111131	Chengalpattu EDC	HT IA/IA

Whereas the SPG has got approval for Captive Generating Plant status vide **Lr.No. 000128/A.21/F. M/s. Gokul Autotech Pvt Ltd – 3 MW/2022 – 7 dated 20.07.2022**

In the view of the following premises, the parties hereby agree and enter upon this EWA on this day on the following terms and condition.

TERMS AND CONDITIONS:

A	Generator	M/s. Gokul Autotech Pvt Ltd. HTSC – No. Yet to Assign Tirunelveli EDC.
B	Nature of Equity	Private Limited Company
C	Share Capital	Rs.51,60,000/- (Rupees Fifty One Lakhs and Sixty Thousand Only)
D	Detail of User (Owners)	Captive User list as per Table - I
E	Capital held by the user in the proposed captive Generating Plant	Rs.51,60,000/- (Rupees Fifty One Lakhs and Sixty Thousand Only)
F	Percentage ownership holding of Share capital by the user in the proposed CGP	100%

Based on the documents furnished herein as per the clause 184 of Electricity Act 2003, it is arrived that the captive User list as per Table - I had 100% ownership in the proposed Generating plant M/s. Gokul Autotech Pvt Ltd. Tirunelveli EDC (HT SC No. Yet to be assigned) as per chartered Accountant Certificate (UDIN No.22237482ANMH6N6965) Dated 23.07.2022 and other documents furnished. Hence approval has been considered for wheeling under captive category. The approval for wheeling under captive category is valid only till such time the underlying Solar Power Plant is owned by M/s. Gokul Autotech Pvt Ltd. and there is no change in Ownership/shareholding of the CGP.

For Gokul Autotech pvt Ltd
Authorised Signatory

Contribution of Gokul Autotech Pvt.Ltd to TANGEDCO

7.4.5 Assistance to Low Carbon Innovation

CITIL (Chennai Institute of Technology Incubation Lab) is an initiative by the institution committed to fostering entrepreneurship by providing mentorship, state-of-the-art technology, and specialized COEs for deep tech product development. We help ideas become successful enterprises by offering essential funding and all-encompassing support. The goal of CITIL is to turn creative ideas into profitable, long-lasting businesses. Our dedication is to giving companies the tools they need to succeed in the marketplace. CITIL open the door for the expansion of entrepreneurial initiatives by combining technology, specialized support, and mentorship. Start-up towards Climate Action Plan enhances the process of controlling the greenhouse gas emissions profile. The Plan reflects the dedication and involvement of the institution towards the control of CO_2 emissions encouraging, incubating, step-up and leading entrepreneurial pillars. Festa Solar Pvt. Ltd., deals with energy system integrators was initiated by the institute's CITIL and Gokul Autotech Pvt. Ltd that places time for training the institute's faculties and students. This provides a conduit to empowerment, innovation and triumph in the sustainable transformation journey. Listrik Motors, Quarz Motors and FT Motors Pvt. Ltd. were initiated by the incubated students from the institute which makes them incredibly proud that their entrepreneurial spirit drives advancements towards a greener and more sustainable future.

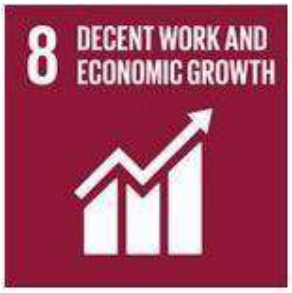
Start-ups with CITIL

S.No	Information
1.	Startup Name: **Festasolar Pvt Ltd** URL: **https://festasolar.com/home** Incorporation Number/CIN: U70109TN2018PTC125820 Date Established: 15.11.2018 District of Registration: Chennai State Registration Number/DPIIT Recognition Number: DIPP152338 Founder Name: Mr. Sampath Kumar Email address: festasolarchennai@gmail.com Description: **Solar Panels**
2.	Startup name: **Listrik Motors Pvt.Ltd** Incorporation Number/CIN: U74140DL2007PTC160476 Date Established: 28.05.2021 District of Registration: Kanchipuram Founder Name: Mr. Rosario

	Email address: listrikmotors@gmail.com Description: **E-Bike Mobility**
3.	Startup name: **Quazr Motors Pvt.Ltd** Incorporation Number/CIN: U34300TN2022PTC151997 Date established: 07.05.2022 District of Registration: Chennai State Registration Number/DPIIT Recognition Number: DIPP101644 Founder Name: Mr. Ruban Email address: quazrmotor@gmail.com Description: **E-Bike Precisions**
4.	Startup name: **FT Motors Pvt.Ltd (Sina Mobility)** Incorporation Number/CIN: U34300KA2017PTC107271 Date established: 14.07.2021 District of Registration: Bangalore Founder Name: Mr. Rishabh Email address: sinamobility@gmail.com Description: **Electric Vehicle Autocomponents**

SUSTAINABLE DEVELOPMENT GOALS

8. DECENT WORK AND ECONOMIC GROWTH



In Chennai Institute of Technology, there is no discrepancy among the employees and it was advised strictly any discrepancies will be viewed seriously and action will be taken and the same is mentioned in the service rule, which is given to all the employees during their joining

The pay scale for the faculty is fixed as per AICTE and UGC pay fixation and for the non-teaching staff its fixed as per the state government norms

SERVICE POLICIES

INTRODUCTION

These rules shall be called "Chennai Institute of Technology, Chennai, Policies, Conduct Rules, and comes into force from the month of August 2016. These rules supersede all the rules put into force, previously. These rules shall apply to all categories of employees (Teaching and Supporting Staff Members).

Definition

"College" means Chennai Institute of Technology, Chennai

"**Trust**" means Pathasarathy Seeniammal Educational Trust, Chennai.

"**Faculty Position**" means a faculty carrying a definite scale of pay / consolidated pay sanctioned without limit of time and included in the cadre of sanctioned position. "**Supporting Staff Members**" means a person appointed in a Non- Teaching post to which no other person holds a lien.

1. RECRUITMENT AND PROMOTION

1.1 SCREENING

a) Recruitment is normally done twice in a year during May and November.
b) The number of vacancies in different cadres shall be communicated by the Principal/Designated Authority based on student strength / existing faculty / resignations or terminations of staff members, to the management for approval / information.
c) Vacancies shall be advertised in leading English newspapers.
d) Screening of applications shall be done by the respective Screening Committee.
e) Short listed candidates shall be informed through call letters and over telephone by the HR Department.

1.2 INTERVIEW

a) Interview Committee will consist of the Principal / Designated Authority, Academic Council members and the respective Heads of the department and Subject experts.

b) The applications received will be short-listed either through a written test or based on qualification and experience and the short-listed candidates will be called for personal interview and selection will be made on merit.

c) Direct interview will be conducted for senior posts. Selection Committee shall be constituted by the Chairman as per the guidelines approved by the Governing Council.

1.3 PAY FIXATION

a) Pay for the selected candidates shall be fixed by the Selection Committee as per the AICTE norms for the respective post, and as approved by the Governing Council based upon the qualification and experience of the candidate and other achievements.

b) Higher Pay Packages for exceptionally meritorious and well experienced candidates will be fixed by the Selection Committee subject to the approval of the Chairman of the Trust.

1.4 PROMOTION

In the case of promotion to a higher post, the appointment and fixation of initial pay in the higher scale will be done as per the prescribed as per AICTE norms. A Committee constituted specially by the Chairman of the Trust will consider the cases of such promotions and obtain the approval of the Principal and the Chairman of the Trust.

1.5 PROBATION

Every person appointed initially to a post, other than temporary appointments, shall be put on probation for a continuous period of one year. If the performance of the person appointed is not satisfactory during the period of probation, he will be issued a notice of warning at the end of the ninth month, and if his work continues to be unsatisfactory, his services will be terminated at the end of the one year period. When the incumbent of any post is promoted to a higher post, he has to undergo probation of one year in the new post also.

1.6 RESIGNATION/TERMINATION OF SERVICE

1 A member of the Staff shall have his/her service terminated by giving one month notice or one month salary in lieu thereof, in case of temporary appointments or during probationary period. In case of staff on permanent service, the staff shall have to tender his/her resignation by giving three months notice or three months salary in lieu thereof. The notice shall be co-terminus with the end of the semester/academic year.

2 The Chairman has the power to terminate the services of a member of the college for any of the following reasons:

   a. Serious misconduct and willful negligence of duty.
   b. Gross insubordination.
   c. Physical or mental unfitness.

d. Participation in any criminal offence involving moral turpitude

2. NO DISCRIMINATION

The Institute is committed to fostering a workplace where every individual is treated with respect, dignity, and fairness. We strictly prohibit discrimination of any kind, whether based on race, gender, age, religion, disability, sexual orientation, nationality, marital status, or any other characteristic protected by law. This commitment extends to all aspects of employment, including recruitment, training, promotions, compensation, and day-to-day workplace interactions. We strive to create an inclusive environment where diversity is valued, and all employees have equal opportunities to succeed. Any form of discriminatory behavior will not be tolerated, and we encourage employees to report concerns without fear of retaliation.

3. LEAVE

3.1 Casual leave and Vacation

a. Faculty and Staff members are eligible to avail one day casual leave for every completed month of service.
b. Casual leave can normally be availed only with prior approval of the Head of the institution through HOD
c. Leave application should be submitted to the Head of the Institution (Principal) one day in advance / the day of availing leave after alternating the workload
d. In emergency cases whenever the staff member is unable to get prior sanction of leave, he / she should inform to the Head of the department concerned, over the phone after alternating the workload. In such case, the leave application should be submitted for approval on the immediate reporting day with relevant supporting documents.
e. Faculty are eligible to avail maximum of 30 days (Winter 10 days & Summer 20 days) in a year as a Vacation after the completion of one academic year. Vacation period shall include Saturdays, Sundays and holidays (preceding / succeeding and in between).
f. The vacation shall start on any day of the week, but the last day of the vacation shall not fall on Fridays, Saturdays and Sundays and also the first day shall not fall on a Monday.
g. Un-availed summer / winter vacation cannot be combined. Also surrendering of vacation period for “claim of salary” is not allowed.
h. Faculty members must report to the duty on the next day of completion of vacation.
i. The On Duty (OD) will be sanctioned for attending workshop, conference, FDP seminars and other duties such as practical examination, valuation, doctoral committee meeting etc.
j. If a faculty / staff member is “Absent: for duty, for more than 2 times, without any intimation the vacation will be deducted from his

/ her account at a ratio of 1:2 (i.e., for 1 day absent, 2 vacation days to be deducted).

k. Faculty/Staff members are eligible to avail two 1 hour permissions per month.

3.2 Maternity Leave

The leave can be granted to all lady staff subject to the following conditions:

a) If the faculty has completed a minimum of 5 years of satisfactory service, then they are eligible for Maternity leave of six months with salary.

b) The faculty should give an undertaking that they will work for two years after re- joining duty and to forego the vacation to the extent of 30 days in the succeeding vacation.

c) The faculties with less than five years of experience can avail six months of leave for their maternity without salary compensation.

3.3 Medical Leave

a. For treatment and hospitalization of serious complaints like T.B, Cancer, Leprosy, Heart Surgery, Kidney Transplantation (or) Retina Transplantation, etc the medical leave will be decided on the merit of individual case.

b. For other ailments and hospitalization 15 days medical leave will be given on production of medical certificate and discharge certificate from recognized hospital.

3.4 On – Duty Guidelines

If the faculty representing the institution under on duty, they are strictly instructed to adhere following:

a) Faculty should report on time to the respective venue.

b) Under any situation he / she should avoid unnecessary arguments in the reporting college.

c) The faculty must abide to the proper dress code (Gents staff should wear white shirt with proper grooming and black / brown formal shoes, ladies staff should wear Saree) and ID card.

d) The faculty should report to the concerned HOD daily and feedback should be given through mail.

e) If there is any allowed expense, he / she must get prior approval from the Principal / Chairman and detail of account should be settled on the next immediate day of reporting to duty, failing which will be adjusted in salary.

f) Attendance report must be submitted on the reporting day, otherwise OD's will be considered as LOP.

g) Faculty Members who are deputed for specific purpose on "Other Duty" should submit a detailed report to the Principal about the purpose for which they are deputed, on the next day without fail.

4. CONDUCT AND DISCIPLINE

The management / trust shall be at liberty to take necessary disciplinary action against any faculty / staff Members for valid reasons. In such cases a formal enquiry shall be conducted and penalties like ceasing increments, ceasing promotions, dismissal from service etc. may be imposed, whenever and wherever required, based on the enquiry report.

5. AWARDS / INCENTIVES FOR FACULTY, STAFF AND STUDENTS

5.1 General

a) Students who secure first three places (year wise) in University Exam will be awarded with Merit Certificates.

b) Students having 100% attendance in each academic year will be awarded with Merit Certificates.

c) Staff Members producing 100% in the theory Subjects during the Anna University Examinations, will be awarded with appreciation certificates.

d) Faculty members are awarded Rs 5,000/- and Rs 10,000/- for publishing papers in Scopus journal and SCI journal publications respectively.

e) Best Student will be selected on the basis of Academics, participation in consultancy projects, funded projects and title win in any National and International competitions.

f) Faculty / Students will be awarded merit certificate and memento for the following activities:

i. University Rank holders & Sports Achievements
ii. Publishing books, Patents and Copy rights.
iii. Best outgoing student in UG and PG.

5.2 Higher studies

The management shall encourage faculty members to upgrade their knowledge and in this context shall undertake to bear the cost of higher academic qualification or special training of faculty members after signing a necessary conditional bond to serve the institution for a certain period after benefitting from such academic qualification/training.

5.3 Patent and IPR

The inventors shall be the owner for all the intellectual property inventions, which includes patent and the inventions invented or created by the inventors/creators who include faculty members, research scholars, students and those who make use of the resources of the Chennai Institute of Technology, Chennai.

The inventions created by the College personnel without using college resources and created outside their assigned/normal duties of teaching/research shall be owned by the inventors and the revenue generated out of such

inventions shall be shared in the ratio of 75:25 between the inventor and College respectively.

If an IP has emerged as a result of an Institutional/Industrial consultancy, sponsored to Chennai Institute of Technology, Chennai the concerned industries and Chennai Institute of Technology Chennai shall own the IP. This however will not apply to those IP that are covered under specific Memorandum of Understandings (MoU's) where the action shall be carried out as per the provisions of the MoU's. If the IP is a result of funds sponsored by an outside agency, then the IP will be shared the Chennai Institute of Technology, Chennai and
the sponsoring agency on case by case basis, as per MoU / Agreement/Undertaking between Anna University Chennai and the outside agency.

a. Patent fee

i. The college pay 100% of the patent registration expenditure.
ii. The patent renewal fees will be paid by the college for the first seven years in all cases when patent is taken by college name.
iii. If it is joint patent with sponsoring agency, then the patenting cost will be equally shared. If the other agency does not show interest in such process, the college can either continue the patent by paying the fees for its full term or withdraw application for the patent protection, at its discretion.

b. Revenue sharing

The revenue sharing arrangements are as below:

a) 30% (Thirty Percent) of the total revenue (lump sum payment, royalty or any other form) accruing from the commercial exploitation of IP owned by the college shall be credited to Inventors. 70 % of the revenue shall be credited to the college.
b) The college bears the charges incurred for processing and acquisition of intellectual property rights and the college shall bear the maintenance charges for the first 7 years or till commercialization, whatsoever is earlier.
c) Conversion/Transfer of IP
   The college shall anytime share the ownership of the IP with the prior consent wit inventor. In such condition inventor shall be the co-owner of the invention and the college, shall be instrumental in process of conversion

5.4 Other Terms and Conditions

a. Free bachelor accommodation / transportation and food shall be provided to all the faculty members to and from the Institution within the city limits (inclusive of the urban agglomeration).
b. Avoid taking leave when the semester classes are going on.

c. Avoid availing permission / late arrival every month as a routine habit.
d. Break of service can be availed for Less than one year, beyond which if it exceeds one year, the faculty member should reappear for Interview and join the duty.
e. The Faculty should not leave the Institute without any prior information and resigning amidst the semester is strictly not permitted.
f. Promotions and Increments are given to the eligible faculty / staff members after the successful completion of one year of service based on their overall performance appraisal.
g. Staff members are permitted to pursue higher studies, as part time programme, while serving in the Institution.
h. Faculty members are allowed to do Ph.D course work through Anna University recognized research Centre, which is also available within the Institution.
i. Management shall pay complete fee for Patent registration and the revenue generated will shared as per the agreement signed.
j. Management shall bear the expenses if any for submitting proposal and getting funding from the funding agencies.
k. Any kind of celebration within the campus has to be organized after seeking approval from the Management, in prior.
l. If found dissuading from anything listed in these Rules, the Management/Trust shall have the power and authority to decide and act upon any matter of concern that leads to chaos and arising difficulties.
m. All the faculty covered with PF and Accident Insurance.
n. There is No Loss of Pay concept for availing leave.

6 RESPONSIBILITIES OF TEAM MEMBERS

6.1 Responsibility of the Principal

a) Responsible for entire Academic regulations including Examination and Image building of the Institute.
b) Responsible for maintain the discipline and decorum in the College premises & regular rounds to all the buildings & hostel
c) Maintain the Administrative dept including monitoring of scholarship and collection of fees and maintain faculty, staff and student welfare.
d) Organizing the statutory body meeting regularly
e) Arrange and monitor AICTE and AU affiliation Inspections and Admission Process
f) NBA and NAAC within stipulated time
g) Monitor the Industry Institute Interaction for Placements, Seminars, FDP, SDP, Industrial Visit, In-plant Training, Internship, Consultancy Projects and Students Projects
h) Monitor Course Content delivery and initiate follow up action for academic Performance Improvement

i) Establishing all the department labs with State of art facility
j) MIS Report to the Chairman periodically
k) Plan, Prepare and monitor the Budget of the Institute
l) Faculty and Staff Recruitment as per the AICTE & AU Norms
m) Develop Academic calendar, Service rules and regulation
n) HOD meetings, Parents meet, Faculty meeting periodically
o) Monitor the feedback students, faculty and initiate remedial measures
p) Website Maintenance and Update Periodically
q) Monitoring the Professional Association, Club and sports activity and arranging various events to build up the image of the institute.
r) Encourage the faculty and staff to participate and conduct FDP, Conference,
Seminar and workshop to update their knowledge
s) Developing the infrastructure as per norms of AICTE / AU
t) Develop the research facility and motivate the faculty, staff and students to involve in it actively.

6.2 Responsibility of the Academic Coordinator

a. Daily Academic Activity Follow up by visiting all the departments within 1st one hour and ensure whether all the faculties are available for the day to handle the class & alternative arrangements made.
b. Academic Audit - to ensure timely completion of Syllabus
c. Monitoring of Class Teacher Meeting (CTM), Subject Teacher Meeting (STM), Class Committee Meeting (CCM) and addressing its issues. Conduct of daily test and assessment test as per the schedule and analyze the results.
d. Visiting all Labs, check the status of experiment completion and lab track record.
e. Students Feedback (On line / off line) Collection, Consolidate and Forward to the Principal for follow up action.
f. Coordinating with Exam cell and departments to update Attendance, Internal Marks and ensure smooth conduction of Examinations.
g. Monitoring of Absentees & Communicating to parents.
h. Monitoring of self study group (Toppers) and Slow learners and counselling.
i. Monitor the Functional Committee of Academic Group.

6.3 Responsibility of Training Coordinator

a. In charge for all the Training provided in the college.
b. Prepare the training brochure based on the facility available.
c. Interacting with Industries for Industrial visit and Training and Internship etc
d. Coordinator for Signing MOU's with leading industries
e. Consultancy Project – Department wise Planning and Execution
f. Creating and maintaining Centre of Excellence with industrial tie up

g. Plan, arrange and monitor Soft skill & core training through Centre of Excellences.
h. Organizing other training required depends on Industry requirement
i. Organize the various events such as workshops, Seminar and hands on training for other college students and generating fund
j. Collecting feedback from the industry about our students performance in their industry

6.4 Responsibility of the Administrative officer

a. Admission Process follow up – (Convener & Management)
b. Coordinating with University / Secretariat /DOTE to ratify the admission process
c. In charge for AU / AICTE affiliation and approval process
d. PRO Activities – Police, Fire, Health , Press , Government and Local body members,
   Political parties if required
e. Handling of Legal issues if any related to AU and AICTE
f. Hospitality In charge for various activity planned in the college
g. Monitoring & Handling the issues of PF, ESI, Insurance, Gratuity, Professional Tax,
   EB, Phone and Internet
h. Purchase of Stationary, House Keeping, Civil, Electrical, Plumbing, Networking Materials, ID Cards, text and note books, Observation and record Books, Attendance Books and other necessary formats made available in time.
i. Issuing of Bonofide, Transfer certificate, Conduct certificate for the students and Appointment order, Experience Certificate, Relieving Order, Salary certificate for the faculty and Staff whenever required after collecting the approval from the higher authorities.
j. Maintaining the College Security, Transport, Hostel, mess and Canteen facilities and issues follow up.

6.5 Responsibility of the Maintenance Manager

a. Stock Inventory – Inward & Outward (All Materials)
b. Ensure the Electricity / Water / Furniture availability in all places in the campus
c. House Keeping, Security, Gardening, Generators - daily maintenance
d. Monitoring the Civil Work and report to Principal / Chairman
e. Plan the Electrical, Carpenter, Plumber works, arrange the necessary materials and assign the works to the concerns for timely completion
f. Maintaining Cleanliness inside and outside the Building
g. Maintaining UPS, Xerox, Air conditioners, RO Plant, Water coolers, STP through AMC if required

h. Collect the maintenance report from all the labs and make the arrangements to do service the equipments and Machines whenever necessary.
i. Maintaining all furniture's, fans and tube lights in class rooms and Labs in good condition
j. To Ensure the saving of Electricity and Water visit all the places in the college regularly and advise the attenders /floor in charges to shut off when not in use.

6.6 Responsibility of the Accountant

a. Collection of all Fees (Tuition fees, Exam fees, Fines if any)
b. Sending report to the Management and Principal
c. Payroll generation for faculty and staff
d. Assisting in Budget preparation / Salary Bill Preparation
e. Arranging the Payments for Vendors / Suppliers / Day to Day activity / Taxes and Insurance / Utility Bills in time
f. Member in Purchasing Committee to ensure transparency in purchase.
g. Interaction with Welfare office to get the Scholarship Payment
h. Update the Students fee dues to the Principal / HoD's and interacting with parents whenever necessary to collect the fees.
i. Marinating Acquaintance Register, Cash Book and Account details of all the transactions.
j. Issue of Form 16 for all faculties

6.7 Responsibility of the Exam cell Coordinator

a. Conducting Internal and External Examination
b. Examination registration and upload the marks to AU portal in time
c. Download the Results and Communicate to the Concern departments
d. Prepare and Circulate the seating arrangement / Invigilation duty - 7 days in advance
e. Prepare the schedule for practical examination and identifying the external examiner in consultation with the HODs / Principal
f. Circulars down load from AU and Communicate to Principal / HoDs / Faculty and Students
g. Strictly Maintain the confidentiality
h. Purchase, Collection, Maintenance dispatch of examination materials.
i. Maintenance of all Exam cell files up to the standard as well as on date
j. Maintain the Account of Exam cell.

6.8 Responsibilities of HOD

a. Responsible for students, faculty and staff discipline.
b. Plan and motivate the student and faculty to produce good academic results.

c. Counsel the toppers to get university ranks and slow learners to clear all the papers Convene faculty meeting every week / fortnight with the following agenda
    i. The progress of syllabus, daily tests, Assessment test
    ii. Submission of the marks
    iii. Behavior of the students in the class and Lab / Workshop
    iv. Completion of experiments in each Lab / Workshop
d. Plan and conduct / monitor Concept of the day, students data book transfer, subject teachers meeting, class teacher meeting, class committee meeting, common subject teacher meetings regularly.
e. Arrange GL / Seminar / WS in the latest topics by eminent industrial Personalities, minimum 2 industrial visits in a semester / class
f. Update the Faculty / Staff / Student Bio data every semester.
g. Check the Lecture notes, Question bank, Lesson Plan, Lab manual in consultation with subject experts and advice the faculty concern to update if there is any modification and make it ready at least one week ahead of semester starting.
h. Check the faculty attendance register regularly in the morning and arrangement of class for the staff on leave / OD / absent.
i. To Allocate the subject and lab as per the choice of faculty, advise them to prepare lecture notes and sample records for lab and prepare the time table well in advance (At least 15 days before the commencement of class).
j. Immediately after the announcement of the University results, HOD's should submit the result analysis in the prescribed formats.
k. Plan and conduct Parents and Teachers meet within one week from the university results announcement.
l. Submit the budget of the department on or before March 30th every year.
m. Plan and conduct the project reviews as per the schedule
n. The formation of groups to be done on or before July 30th every year. Finalize the title of the project work on or before August 31st every year.
o. To publish Department Magazine / news letter, at least one in a 6 month.
p. Any invitation is received from other colleges regarding seminars, paper presentations, our students have to be informed in their class room itself and advise them to participate.
q. To maintain the stock register in your department including furniture. All the items should be numbered.
r. To check whether the staff members utilize the ICT facilities properly, in the class room. A separate stock register is to be maintained for the transparent sheets.
s. HODs to kindly get principal's prior approval before going on CL/OD. It enables smooth running of the system.

t. Monitor and motivate the training, Placement, Higher studies and other competitive exam activities.

6.9 Responsibilities of a Faculty

a. Syllabus of each unit should be covered as per lesson plan, deviation if any should get informed to the HoD.
b. For each subject, a note book must be maintained by the students. During class hours, verify note books of at least 5 students daily.
c. Be in the class room in time and maintain strict discipline and silent during the lecture.
d. If any student misbehaves in the class room , kindly bring to the notice of HOD / Principal immediately.
e. Be cordial in the class, interact with all the students and find their expectations and sort out the issues.
f. Coordinate with all the activities of Department and Institutional development.
g. Motivate all the interested students to participate in various industrial projects and competitions.
h. Attend the FDP upgrade your skills, Publish 1 research paper / year in the SCI / Annexure 1 Journal.
i. Plan and coordinate / associate to conduct a workshop / seminar / FDP and conference.

6.10 Responsibility of Librarian

a. Create awareness about library facilities, resources, equipments, services and policies among students, staff and faculty.
b. Keep the records of books inside & (circulation) out of library.
c. Code, classify and catalog books, publications, films, audio visuals and other library materials based on subject and library classification systems.
d. Train the library staffs such as receiving, cataloging and equipment use, and respond to complaint if any raised by stakeholders and taking action as necessary.
e. Develop the library facilities and constantly upgrade as per the norms of AICTE and Anna University. Evaluate materials to determine outdated or unused items to be discarded.
f. Develop information access aids such as indexes and annotated bibliographies, web pages, electronic path finders and online tutorials.
g. Get inter college library membership and arrange interlibrary loans of materials not available in our library.
h. Confer with teachers, parents, and community organizations to develop, plan and conduct programs in reading, viewing and communication skills.
i. Maintain the stock of all the purchase, conduct audit in every semester, compile list of over dues and notify borrowers.

j. Plan and participate in fund rising drives and write proposals for research or project grants.

6.11 Responsibility of Physical Education Director

a. Develop and maintain the sports, games and gym facilities for both boys and girls.
b. Develop successful teams, both boys and girls in all the games and sports.
c. Increase participation and competitive representation within all focused sports across the college.
d. Organize Inter college and interschool sports events every year
e. Conduct Yoga classes for hostellers in the evening and Day scholars as per the schedule
f. Identify the potential students / players in various sports and games, motivate and provide special training to participate in various competitions at Zonal, State and National level competitions.
g. Organize inter department sports meet annually.
h. Lead / Monitor / Participate in all extracurricular activities such as NSS, NCC, YRC camps organized by the college.
i. As a member of Anti ragging committee and disciplinary committee visit the entire campus, hostel, bus stops to monitor the students.
j. Develop the culture of practicing / playing daily and holidays to motivate the students to participate in various competitions and being healthy.

6.12 General instructions to all the Faculty members

a. All faculties are advised to monitor the boy student's dress code: cleanly shaven face with neat dress, wear shoes and ID cards. They should not have long hair.
b. The girl students with neat and appropriate dress code. The lady faculty members handling the class, should check the same.
c. Exchange of classes not allowed, in emergency cases can be made only with prior approval of the HODs of the concerned faculty members.
d. During the library hour of a class the faculty –in- charge should keep the students in discipline.
e. The faculty members and students are advised not to take any books (including the books already issued) inside the library from outside. However it is allowed for returning the books already taken.
f. Library should not be used for discussion between students and faculty. This can be done either in the class room or in the staff room.
g. Faculty members are specially requested not to have any discussions with students standing outside the class rooms or on the way to lab. Discussions should be made only in the class room or in the staff room.
h. Don`t allow the students to use the Mobile phone inside the class room.
i. Each student is required to bring a scientific calculator with him / her. Check whether the student brings it or not.

6.13 Responsibilities of Counselor

a. The list of Counselor as approved by the HOD should be intimated to all the departments. This enables the staff of other departments to contact the corresponding Counselor.
b. HOD shall nominate one faculty counsellor for every 20 students in the class and the list of counsellors shall be intimated to all faculties and students.
c. The Counsellor should maintain the following data:
d. Disciplinary action by the Principal, regret letters, leave letters, letters regarding his cultural, sports participation from the concerned in-charges and other letters relating to his absence from the classes.
e. Certificate copies wherever he has won prizes in different events or an attested slip by the HOD.
f. He will maintain the actual attendance of the student plus any other absence from regular classes due to the reasons indicated in "A".
g. If a student is absent for three consecutive days, the matter should be intimated to the HOD. If it is more than one week, the same should be informed to the Principal. The
   Counselor should intimate to his parents immediately by letter or email. & over phone and ensure that the parents is aware of students absence and reason for absence.
h. Each Counselor will maintain master attendance. The cumulative attendance is handed over to HOD by 2nd of every month. The attendance should show actual presence in class room and permission granted separately.
i. Test marks and assignment marks should be made available collectively for all subjects for all subjects in one common document.
j. The Counselor should send attendance and academic report at least twice a semester to parents through ERP. Any communication, which needs parents personal attention like discipline, poor attendance, more arrears etc. must be sent though courier or registered Post. Confirmation of the receipt of information shall be ensured by the physical presence of the parent at the college or by personal telephonic conservation.
k. The counselor shall meet individually all the students at least once in a fortnight and collectively whenever necessary. They will know their grievances and problems. This should be reported to the Principal through the HOD every month. Whenever the matter could not be expressed in writing, the same may be brought to the Principals notice immediately.
l. The counselor is virtually a personal guide for the students. Whenever the student has some technical / official problems, he may do the needful to find a possible solution.
m. For each student a data book should be maintained. Whenever a student gives a achievements of his credential / regret letter for his misdeeds

what so ever may be, the same shall be kept in his file after consultation with the HOD.

7 GUIDE LINES FOR THEORY SUBJECTS

a. The faculty members should maintain the lesson plan for the subjects handled by them for every class from the beginning to the end of the semester. They must prepare lesson plans at the beginning of the semester and give copies to student representative, HOD and Principal. All the faculty should follow the schedule to cover the syllabus in time. Assignment and tests will be conducted for the assessment of the students.
b. Assignments / Tests must be promptly corrected by the staff member concerned before the following week end and the students informed of their performance. The parents are to be informed along with the attendance details for all the students. All records of attendance and academic performance should be kept properly i.e. computerized as well as hard copy. The HOD/ Teachers must keep a record of question paper for tests and assignments and also mark statements.

8 GUIDE LINES FOR LABORATORY CLASSES

a. Observation books must be got ready in all respects before allowing the students to commence the experiments. Observations and calculations should be checked and got approved at the end of the lab class.
b. Students must be allowed to perform any experiment only after concern faculty approval. The faculty should check the students whether they have adequate background in relevant theory. Though a viva about theory of the experiment at the start of lab classes.
c. Laboratory records should be written only after faculty approves the observation book. Laboratory records, neatly written and completed in all respects should be submitted while coming to the next lab class.
d. Correction of laboratory records must be completed within same day of submission.
e. The teacher handling a laboratory class should maintain a lab track record.
f. Before the start of every practical examination, the teacher concerned should ensure that the various equipments, components, machines and meters are in proper working condition to avoid hardship to the students during the examinations.

8.1 STAFF-IN-CHARGE OF LABORATORIES

a) Administration / Maintenance activities
    a. Procurement, erection, installation and commissioning of lab equipments.
    b. Procurement and storage of materials, tools and instruments.
    c. Planning, scheduling, organizing and coordinating with staff handling lab classes.

d. Planning and organizing development program for supporting staff.
e. Managing the maintenance of equipments and tools in the lab.
f. Including preventive and break down maintenance / register for regular and periodical maintenance. Participating in professional development activities.
g. Suggesting the removal of obsolete and condemned equipments.
h. Breakage list and explanations are to be sent to HOD at the end of every semester.
i. Stock register to be maintained by the lab-in-charge concerned for machinery / equipment and consumables.
j. Monitoring supporting staff in their work and maintaining discipline.
k. Recommending leave and permission for supporting staff.
l. Displaying Rules and Regulations, safety precautions for the students in the laboratory.
m. Main switch board and fire extinguisher position should be displayed prominently.
n. Intimating the electrical maintenance section in case of adding any electrical equipment.
o. Ensuring proper security of lab equipments.
p. Ensuring locking of laboratory after college hour after switching off Electric power, air conditioners, fans, lights etc.

8.2 Faculty Handling laboratory classes:

1. Responsible for conducting the lab classes for that semester and particular subject.
2. One or two teaching staff will assist him/her.
3. Planning and designing the experiments to fulfill the curriculum.
4. Ensuring discipline and attendance of the students.
5. Explaining the theory and operation for the experiments.
6. Checking and approving the observation book. Checking and correcting Laboratory records.
7. Co-ordinating with Lab-in-charge for efficient and effective conducting of lab classes.
8. Making necessary arrangements for conducting University / model practical examinations, assessing the performance and finalizing the marks.
9. While conducting special classes, ensuring proper transport and canteen facilities for students / staff.

Reporting to Lab-in-charge any damage of the equipment / defective then and there to the Supporting / Assisting Faculty :

8.3 Lab Assistant / Instructor / Foreman / Programmer:

1. During the practical classes, assisting the staff handling the lab classes in conducting experiments.
2. Guiding the students in the performance of practical task / exercise.

3. Ensuring the safety of the students, equipment and machinery while conducting lab class.
4. Assisting the students and faculty members in the fabrication of projects.
5. Making necessary arrangements for conducting university / model practical examinations.
6. Storage and accounting of raw materials, tools and instruments.
7. Arrangements for issuing of raw materials, tools and instruments for the experiment.
8. Take the guidance and suggestion from the Lab-In-Charge for the periodic and preventive maintenance, numbering of equipment, painting, calibration etc.
9. Maintaining the lab by running the machinery periodically when the lab is free.
10. Any Damage of accessories and equipments by students must be brought to the notice of lab-in-charge.
11. Not allowing the students in lab during their theory class.
12. Providing all assistance to the Lab-in-charge in maintaining and running the laboratory smoothly and ensuring safety and security of the lab.
13. He/She is responsible for opening and closing of their comcern Labs
14. He/She is solely responsible for the all the equipments / machines and other materials available in the labs. If any thing is missing / lost it should be brought to the notice of concern HoD`s / Principal immediately, otherwise it will be recovered from your salary. Hence, in order to ensure the safety all the lab assistants are instructed to seal your lab with your sign and date.
15. Don't entertain any sweepers/attenders to clean the lab or machines in your absence

8.4 Mechanic

1. Assisting the instructor in conducting experiments.
2. Guiding the students in their practical class to complete the exercise. Assisting the students and faculty members in the fabrication of projects.
3. Making necessary arrangements for conducting University / model practical exams.
4. Ensuring the cleanliness of machinery, equipments and lab in general.
5. Assisting the Lab-in-Charge as and when necessary.

9. CONFERENCES, COURSES & WORKSHOPS

a. All the faculty members must strive to publish papers in reputed National and International journals.
b. At least one author, in the case of multiple authorship, should present the paper in the conference.
c. Participation is subject to the condition that academic / examination work does not suffer.

d. In case of workshop / FDP / SDP, Junior and Middle level staff are to be encouraged. Preference will be given to those who have not participated in any Course / Workshop during the academic year.
e. A copy of the course material is to be deposited in the department Library with information to the Principal.
f. A brief report on conference / course / workshop must be given immediately after return from the programme.
g. All the Hods should plan to conduct one conference / year regularly, Faculty Development programs, Seminars and workshops in collaboration with funding agencies / Industries

10. STUDENT RELATED POLICY

10.1 Policy and Process for Merit Scholarship

Parthasarathy Seeniammal Educational Trust feels conceited to provide Merit Scholarship to the students of our Institution **Chennai Institute of Technology**, Sarathy Nagar, Kundrathur, Chennai, throughout their course of study to support their Education, trailing the criteria given below:

a) Students who have completed their HSC with an aggregate mark in Mathematics, Chemistry and Physics will be considered eligible to acquire the merit scholarship**.**
b) CITSET- CIT Scholarship Test mark and HSE mark will be given equal weightage for the scholarship process.
c) Aggregate mark accounting to 190 and above will be able to get a complete fee waiver and students who have got an aggregate mark reporting from 185 to 189 will get a semi- fee waiver, provided that the students get approval from the institution before attending the counseling.
d) Students who are single parented, possessing a very low income regardless of their aggregate marks. (evident with the income certificate)
e) Students who are from underprivileged background, despite their aggregate marks. (evident with the income certificate).
f) Special consideration of 10% relaxation in HSC and CITSET for the girls students

10.2 The trust holds the following processes to claim the Merit Scholarship:

a) The students who are eligible have to fill an application form and the same has to be submitted to the Administration Office.
b) The Scholarship committee will verify the authenticity of the certificates through a transparent approach and subsequently recommend the students to the trust for providing the eligible scholarship.
c) A certificate denoting their Scholarship throughout their course of study will be provided as a documentary to the Scholarship availed students through a validated gathering.

11 DELEGATION OF FINANCIAL POWERS

11.1 Financial powers of the Chairman & Managing Director

All financial powers shall be vested with the Chairman as he is the sole signatory of the Trust for spending along with a senior member of the Trust.

11.2 Financial powers of the Vice Chairman / Secretary

The Vice Chairman/ Secretary, they shall be vested with full financial autonomy to assure adequate control on Financial systems.

a. To appoint and fix the remuneration for teaching / non teaching staff of the college and also sanction increments as per norms.
b. To make investment decisions and also arrange for resource mobilizations to meet the financial requirements of the college.
c. To purchase fixed assets within the limits authorized by the Chairman and the budget of the college.
d. To authorize payment of purchase bills and to confirm oral sanctions given, if any, to the Principal / HODs etc. over and above their delegated powers.
e. To delegate the financial powers down the line in cases of exigencies.
f. To introduce adequate control systems to enforce financial discipline
g. To enter into contract for any service or work.
h. The Vice Chairman / Secretary shall exercise powers vested with them judiciously for the effective Management of the financial system of the college.
i. All the decisions taken by the Vice Chairman / Secretary with regard to the management of funds shall be subject the rectification by the Governing Body.

11.3 Financial Power of Principal

The Principal shall be delegated with financial powers up to a maximum of Rs. 1 Lakh for any academic, co – curricular / extracurricular activities or for any one of the following from the approved annual budget.

a. To authorize purchase of consumables for laboratories over and above the powers of the Heads of the departments.
b) To organize the guest lecture, seminar, conference, symposium, cultural events in the campus.
c) To sponsor faculty / staff for any academic or co- curricular / extracurricular activities.
d) To authorize any expenses which he may deem essential.

11.4 Financial powers of the Heads of the departments

The Heads of departments shall be sanctioned an imprest cash of Rs. 5000/- each to meet the following expenses .

a) To meet the expenses towards urgent purchase of consumables for the laboratory.
b) To meet small non – recurring expenses.

c) To pay for the TA/DA or other expenses of the departmental staff within the permitted levels.
d) To incur any other expenditure that may be deemed necessary.

Policy History

Policy created on	05-03-2018
Policy reviewed on	11-05-2022

Proportion of students taking work placements

In Chennai Institute of Technology, it is mandatory for all the students to undergo work placement with industries (Internship) for minimum three months during their studies. This is an integral part of our curriculum, ensuring that 100% of our students participate in work placements. This hands-on experience equips students with valuable industry exposure, enhancing their employability and practical knowledge.

As a result, in the academic year 2022-23, the institution achieved remarkable milestones in student intake, admissions, and placements. With a first-year intake capacity of **780** students, **758** students were successfully admitted, reflecting the trust and demand for our institution. Among these, **645** students secured placements through our campus recruitment efforts, highlighting the effectiveness of our industry connections and commitment to student career development. The mandatory internship program not only enhances employability but also helps students build the skills and confidence required to succeed in their professional journeys.

The following companies have successfully recruited our students from the Chennai Institute of Technology (CIT) campus. By facilitating meaningful employment opportunities and fostering skill development, we contribute to creating a future-ready workforce that supports economic advancement and social equity.

Research Activities Contributing in SDG - 8

S.NO	Name of the Project	Abstract
1	Painting Tomorrow's Canvas: Artistic Insights into sales prediction	They proposed research introduced a sophisticated web-based platform meticulously designed for predicting sales outcomes by leveraging historical sales data and integrating advanced machine learning algorithms. The platform boasts a user friendly interface, incorporating login, sign up, and input gathering pages to ensure a seamless and interactive user experience. Beyond predictive analytic, paramount importance has been placed on the security aspects of the application, with a specific focus on cyber security measures to safeguard business data. The system, fortified against potential threats such as man-in-the-middle attacks, denial-of-service attacks, and rainbow table attacks, showcases intuitive technologies that fortify the application against malicious activities. Through the application of cutting- edge algorithms, the system analyzes patterns and trends within historical sales data, providing users with invaluable insights to fine-tune and optimize sales strategies. Develop a web- based platform capable of accurate 98% predicting sales outcomes and create a user-friendly interface that enhances the overall user experience and that can be accessed by a common man. prioritize the security aspects of the application. and showcase intuitive technologies that fortify the application against malicious activities.
2	Algorithmic trading	This project focuses on providing algorithmic trading

	strategies for financial markets	strategies tailored for financial markets. It offers an accessible and comprehensive guide aimed at both beginners and enthusiasts interested in algorithmic trading.The project covers various stages of algorithmic trading, starting with data collection and pre processing. Techniques for handling financial data, including cleaning, normalization, and feature extraction, are explored to ensure the data is suitable for modeling. Next, a variety of machine learning and statistical models are applied to develop trading strategies. Techniques such as time series analysis, regression, and classification are utilized to forecast market trends, identify trading signals, and manage risk. The model stands at 81.06%, showing improvement from the previous accuracy of 79.22%.Furthermore, the project explores the deployment of trading strategies in Real-world trading environments. Considerations such as transaction costs, slippage, and market impact are addressed to ensure practical implementation. The final Deliverable includes a selection of well-performing trading strategies, along with guidelines for their implementation and deployment. such as NumPy, Pandas, Scikit-learn, TensorFlow, and Keras for m model stands at 81.06%, showing improvement from the previous accuracy of 79.22%.Furthermore, the project explores the deployment of trading strategies in real-world trading environments. Considerations such as transaction costs, slippage, and market impact are addressed to ensure practical implementation. The final deliverable includes a selection of well-performing trading strategies, along with guidelines for their implementation and deployment. Additionally, the project provides insights into ongoing research and developments in algorithmic trading, fostering continued exploration and innovation in this dynamic field.The project utilizes For the web application deployment, frameworks like Flask or Django are considered, with platforms like Heroku or AWS for hosting. By offering a detailed and beginner- friendly approach to algorithmic trading strategies, this project aims to empower individuals with the knowledge and tools to navigate financial markets effectively and strategically. This report is a detailed discussion of how we achieved a higher accuracy, what techniques were used and some samples screenshots of how it mightget implemented in the real-world.
3	Finetuning LLMs for work satisfaction prediction	This paper explores the fine-tuning of large language models (LLMs) for analyzing employee sentiments and predicting work satisfaction scores based on

		likes and dislikes. We compare the performance of Gemma-2B by Google and TinyLlama-1.1B, both fine-tuned using a dataset containing employee feedback parameters. The fine-tuning process involves adapting the models to the task at hand, with a focus on parameter-efficient fine-tuning methods to optimize performance while minimizing resource usage. Our results demonstrate that Gemma 2B outperforms TinyLlama-1.1B in terms of training loss and accuracy, indicating its suitability for analyzing employee sentiments. Furthermore, we highlight the importance of model quantization for de ployment on lower-end GPUs, enabling wider accessibility and scalability of sentiment analysis systems. In conclusion, our research provides valuable insights into the effective utilization of large language models for improving workplace satisfaction and suggests avenues for future research in sentiment analysis and model optimization.
4	Revolutionizing Sales-High impactful performance optimizing dashboard	In the contemporary business landscape, where markets are dynamic and consumer preferences are ever-evolving, the optimization of sales performance stands as a pivotal challenge for organizations across industries. This final year project endeavors to address this challenge by employing a comprehensive, data-driven methodology to enhance sales efficiency and effectiveness. The project will commence with an in-depth exploration of various sources of sales-related data, encompassing customer demographics, purchasing histories, product preferences, and market trends. Leveraging advanced data analytics techniques, including machine learning algorithms and predictive modeling, these datasets will be analyzed to unearth latent patterns, correlations, and potential opportunities for optimization.
5	Sentimental analysis of online product reviews using Bert	The utilization of the BERT neural network model in evaluating emotions from online product reviews has demonstrated its effectiveness in enhancing the comprehension of customer preferences on online products. This approach not only aids platforms in better addressing customer needs but also assists Customers in identifying suitable and budget-friendly Products. This advancement contributes to the refinement of product recommendations through intelligent processing. By harnessing the pretrained BERT model, a series of experiments were conducted involving sentiment analysis. Through meticulous parameter adjustments throughout the experimentation phase, a highly accurate

		classification model was developed. The BERT layer was employed as a foundational word vector layer. Input text sequences were fed into this layer to undergo vector transformation. The resulting vectors, upon passing through corresponding neural networks, underwent classification via the SoftMax activation function. Sentiment analysis involves assessing the attitudes of customers based on textual data, particularly product reviews in this case. Through this study, we developed a solution capable of determining sentiments expressed in online product reviews. To achieve this, we employed algorithms such as Logistic Regression, Random Forest Classifier, and Sentiment Intensity Analyzer. The experimental outcomes illustrate the achieved accuracy in performing sentiment analysis.
6	Predictiomate: Enabling small business empowerment through intuitive data analysis solutions	"Predictiomate" revolutionizes small business data analysis with its user-friendly web platform. Unlike traditional tools like Weka, it supports various file formats like CSV and Excel, eliminating the need for specific formatting. This flexibility streamlines data uploading and analysis, empowering users to extract insights without technical hurdles. By democratizing data analysis, Predictiomate equips small business owners to make informed decisions, enhancing their competitiveness. Its intuitive interface and versatile functionality make it accessible to all users. Bridging the gap between data and decision-making, Predictiomate simplifies complex analyses for small businesses. Through its user-friendly features and file format support, it levels the playing field in data-driven environments. In essence, Predictiomate is a groundbreaking tool, offering accessible yet comprehensive data analysis for small businesses. It empowers users with the insights needed to thrive in the digital age, revolutionizing decision-making processes.
7	Bitcoin sentiment analysis using twitter	Bitcoin has recently gained substantial attention as a highly coveted asset, particularly among younger demographics attracted by its potential for significant returns and the revolutionary promise of blockchain technology. This surge in interest has led to the proliferation of self-proclaimed "experts" in cryptocurrencies and blockchain, further driving the widespread adoption of digital assets. Consequently, institutional investors and "smart money" are increasingly focusing on Bitcoin, employing various strategies to accurately forecast its price movements. Among these strategies, sentiment analysis has emerged as a key tool for predicting Bitcoin's price

		trajectory. Hedge funds, investment banks, and other market participants meticulously analyze social media platforms to glean insights into public sentiment surrounding Bitcoin and related subjects, with Twitter being a valuable source of real-time sentiment data due to its extensive user base and open nature. This project aims to leverage sentiment analysis techniques and deep neural networks to predict Bitcoin's price based on sentiment trends observed on Twitter. By analyzing sentiments expressed in Bitcoin-related tweets, the proposed deep learning models seek to uncover patterns and correlations that may provide valuable insights into future price movements, ultimately enhancing the accuracy and reliability of Bitcoin price predictions.
8	Resume screening and contact extractions system	Resume Screening is the process of evaluating the resume of the job seekers based on a specific requirement. It is used to identify the candidate eligibility for a job by matching all the requirements needed for the offered role with their resume information such as education qualification, skill sets, technical stuff etc. Resume Screening is a crucial stage in candidate's selection for a job role, it is the stage where the decision making is done whether to move the candidate to the next level of hiring process or not. Traditionally, this process is performed manually, but companies often receive thousands of resumes for job applications. In order to reduce the human involvement and errors, many new ways were introduced in this process. This paper discusses about one such process which is very efficient in performing Resume screening. It includes Natural Language Processing (NLP), an automated Machine Learning Algorithm for screening the resumes. This paper explains the end to end working of a python application which efficiently screens the resumes of the candidates based on the organization's requirement.
9	Online resume builder application with integrated audio recorder	The Resume Builder Application is a user-friendly and efficient tool that helps users create professional resumes. The application is designed to simplify the resume-building process, allowing users to create a resume quickly and easily. The application is based on a web-based platform, which means that users can access the application from any device with an internet connection. The application's main features include a user-friendly interface, pre-designed resume templates, and the ability to customize each template to fit the user's needs. The application also includes a resume editor, allowing users to add and

		delete sections and customize the font and color of their resume. The Resume Builder Application also includes a range of resources to help users create the best possible resume. These resources include tips and tricks for writing a successful resume, a list of action verbs to use in resumes, and examples of well-written resumes. The application is designed to be a one-stop-shop for users looking to create a professional resume quickly and efficiently. In conclusion, the Resume Builder Application is a user-friendly and efficient tool that simplifies the resume-building process, providing users with pre-designed templates and resources to help them create professional resumes.
10	Timeflow employee task management system	Time Flow is a web-based employee task manage ment system designed to streamline organizational workflows. It offers features for task assignment, progress tracking, and collaboration. Time Flow enhances productivity by providing a user-friendly interface and scalable architecture. This paper explores the system's design, functionalities, and advantages. Through case studies and user feedback, we demonstrate its effectiveness in optimizing task management processes within organizations.
11	Stock market prediction using machine learning algorithms	This project is an attempt at implementing Python a technique for forecasting stock values. Python has been successfully used to predict stock prices. To help investors make more informed and precise investment decisions, stock price forecasting is done. We propose an approach that integrates mathematical operations, machine learning, and other external aspects to enhance stock price forecast accuracy and produce profitable trades. LSTMs are very good at handling problems with sequence prediction because they can store past data. In our case, this is crucial since examining a stock's historical price can assist anticipate its future price. You can develop a model that forecasts whether the price of a stock will climb or fall while also forecasting that the actual price of the stock will increase.
12	The ultimate time mastery suite for seamless workforce management	This paper presents a comprehensive system for user authentication, password management, two-factor authentication setup, employee and admin dashboards, timesheet management, and scoreboard history within an organizational framework. Users, including administrators and staff, have the capability to register and log in, with the option for admin status indication. Enhanced security measures such as password reset functionality and two-factor authentication are implemented. Employee

		dashboards facilitate efficient timesheet management, while admin dashboards offer advanced data analysis capabilities. Timesheets are presented in a structured format allowing for easy viewing, editing, and submission. Scoreboard history functionality enables users to track performance over time. The proposed system enhances organizational efficiency and security by providing streamlined user management and robust data analysis tools.
13	Optimizing financial risk profiling through machine learning:A comprehensive approach to credit risk assessment	This report examines financial risk profiling, focusing on credit risk analysis to improve understanding of creditworthiness and support informed lending decisions. Utilizing the South German Credit dataset, it conducts exploratory data analysis (EDA) to reveal insights into credit risk distribution, credit amount tendencies, age demographics, and feature correlations. The study evaluates multiple machine learning (ML) models, highlighting the Random Forest model's notable accuracy of 85% in predicting credit risk. The findings offer practical insights for banks and financial institutions, advocating for the integration of predictive models into risk assessment frameworks to enhance credit risk management. This approach not only promotes responsible lending practices but also contributes to long-term financial sustainability and stability in the banking sector.
14	Assert allocation using Machine Learning	In this research, we introduce a new way to optimize portfolios by combining two powerful techniques: sentiment analysis of financial news headlines and multi-asset portfolio optimization using the Capital Asset Pricing Model (CAPM). Our approach blends quantitative analysis with a qualitative assessment of sentiment, allowing us to build portfolios that are both diversified and sensitive to market sentiment. By incorporating multiple assets into our optimization framework, we are able to construct portfolios that better reflect real-world investment scenarios. Our study showcases how this integrated approach can improve investment decision-making by considering both market sentiment and asset pricing models.
15	Cybernetic financial prediction: Quantum forecast analysis for market dynamics: (stock prediction)	In the ever-evolving landscape of financial markets, accurate prediction of stock market trends remains a paramount challenge. This abstract introduces a cutting-edge approach to this challenge, termed "Forecast Analysis for Stock Market Dynamics." Leveraging advanced computational techniques and harnessing the power of artificial intelligence, this innovative methodology transcends traditional

		market analysis. The core of this approach lies in the integration of cybernetic principles and quantum computing capabilities. By assimilating vast datasets and real-time market information, the model attains a level of financial sentience, allowing it to adapt dynamically to changing market conditions. Quantum algorithms further enhance predictive accuracy, navigating the intricate web of financial variables with unparalleled speed and precision. This advanced forecast analysis system not only provides investors with predictive insights but also offers risk assessments and scenario analyses, empowering decision makers with a comprehensive understanding of potential market trajectories. As financial markets become increasingly interconnected and influenced by diverse factors, this holistic approach to stock market dynamics heralds a new era in predictive analytics, offering a robust tool for informed decision-making in the complex world of finance.
16	Collaborative code editor with video conferencing and face detection for interviews	In the ever-evolving times of software development, the adoption of effective coding practices and collaborative techniques stands as a cornerstone for seamless progress. The ability to work harmoniously and exchange ideas in real-time not only enhances teamwork but also fosters innovation within teams. Moreover, the integration of instant feedback mechanisms ensures a continuous cycle of improvement, thereby maintaining the standards and quality of code throughout the development lifecycle. Against this backdrop of technological advancement, recent innovations have yielded powerful tools that hold promise for constructing robust solutions. Among these, CodeMirror provides an intuitive platform for code editing, while Peer.js harnesses the capabilities of WebRTC to facilitate peer-to-peer connections. Additionally, advancements in facial recognition technology, such as FaceAPI, offer opportunities for real- time monitoring and analysis.

Events Contributing in SDG - 8

1. On November 7, 2022, Chennai Institute of Technology hosted an insightful session for Second-year students on *Global Support for Startup Ecosystems & Public Policy Careers*, conducted by ANSHUMAAN KRISHNAN AYYANGAR MIET (Horizon Europe UK National contact point Global Innovation Lead). The session aimed to provide students with a deeper understanding of the dynamics shaping startup ecosystems worldwide, along with the critical role public policy plays in fostering innovation and entrepreneurship. Anshumaan, with his expertise and experience, shared valuable insights on how startups can leverage global support structures and navigate challenges in today's competitive environment. He also highlighted the growing importance of public policy careers, emphasizing the need for skilled professionals to contribute to the development of supportive frameworks for startups. The session was an excellent opportunity for students to gain knowledge on emerging career paths and the evolving startup landscape, inspiring them to explore diverse opportunities in the fields of entrepreneurship and public policy.

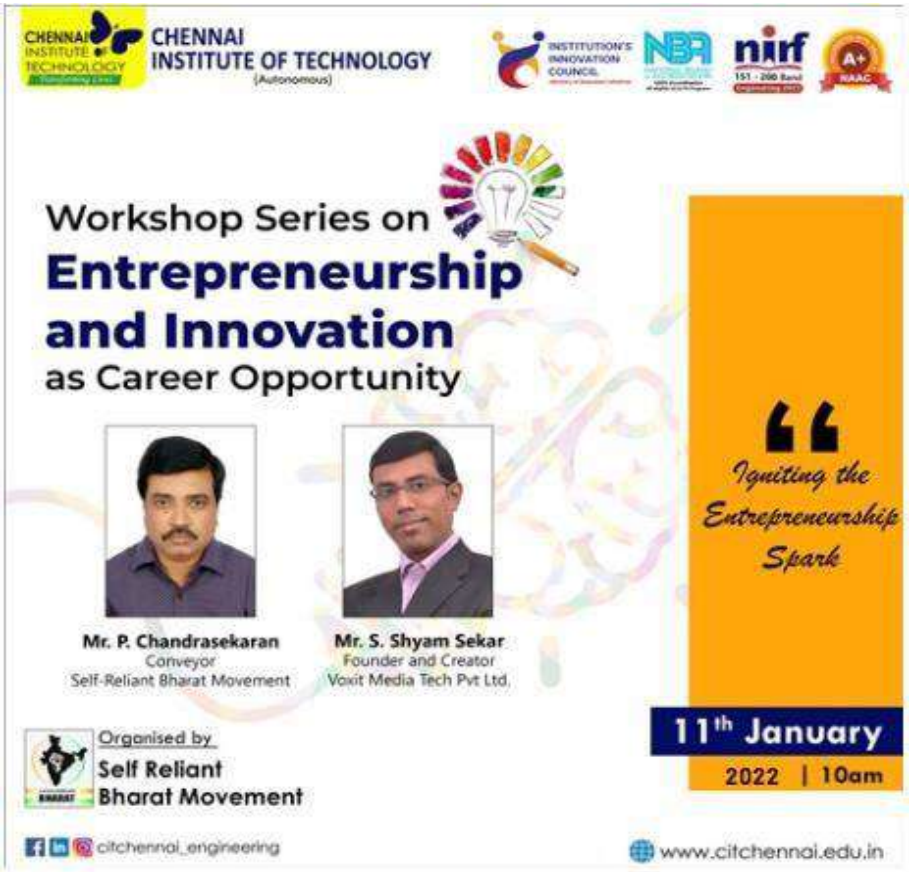
2. On January 9, 2022, Chennai Institute of Technology hosted an insightful expert interaction session for third-year students, featuring Mr. Hiroki Oi, the Resident Representative of the Japan External Trade Organization (JETRO) Colombo. During the session, Mr. Oi shared his extensive knowledge on Japan's external trade policies, economic dynamics, and the role of JETRO in fostering international trade relations. The students were provided with a unique opportunity to gain a deeper understanding of Japan’s global trade strategies, market trends, and the growing significance of international collaboration. This interaction not only enhanced the students' awareness of global trade practices but also opened avenues for potential future careers in international business and trade. The session exemplified the institution’s commitment to providing students with real-world expertise and enriching their academic experience.

3. On March 25, 2022, Chennai Institute of Technology hosted an enriching international conference on "Advances in Manufacturing Technology" for second-year students. The session was led by Dr. Ragavanandham Shanmugam, Program Advisor and Associate Professor of Advanced Engineering Manufacturing Technology at the School of Engineering, Mathematics, and Technology, Navajo Technical University, USA. Dr. Shanmugam shared valuable insights on the latest innovations and trends in manufacturing technologies, including advancements in automation, robotics, and sustainable manufacturing practices. His expert presentation offered students a deep understanding of cutting-edge developments in the field, emphasizing the importance of innovation and research in shaping the future of manufacturing. The conference provided an excellent opportunity for students to engage with global expertise, furthering their academic growth and inspiring future careers in manufacturing technology.

4. On March 4, 2023, Chennai Institute of Technology organized a one-day seminar on "IC Design and Technology - Growth and Recent Advancements" for second-year students. The seminar featured two distinguished experts in the field: Mr. ETB Samuel Jigme Harrison, a Semiconductor Professional and Senior Member based in Singapore, and Dr. R.S. Suriavel Rao, Technical Lead in Physical Design at Edigim Research Private Limited. The event provided the students with an exceptional opportunity to learn about cutting-edge technologies, industry trends, and career prospects in the semiconductor domain. It also emphasized the importance of staying updated with technological advancements to remain competitive in the fast-evolving world of IC design. This seminar was a crucial part of CIT's commitment to bridging the gap between academic learning and industry practices, preparing students for successful careers in technology.

5. On January 11, 2022, Chennai Institute of Technology organized a workshop series for second-year students on "Entrepreneurship and Innovation as Career Opportunities," featuring two distinguished speakers: Mr. P. Chandrasekaran, Convener of the Self-Reliant Bharat Movement, and Mr. S. Shyam Sekar, Founder and Creator of Voxit Media Tech Pvt. Ltd. The session provided valuable insights into the world of entrepreneurship, focusing on the importance of innovation, self-reliance, and the evolving landscape of business opportunities. Mr. Chandrasekaran shared his expertise on fostering self-reliance and how students can contribute to building a sustainable, entrepreneurial India. Meanwhile, Mr. Shyam Sekar discussed the role of technology and media in shaping modern businesses and the opportunities available for students to innovate and create their own ventures. The workshop inspired students to explore entrepreneurship as a viable and rewarding career path, encouraging them to think creatively and take bold steps towards realizing their ideas. The session was an excellent platform for students to gain practical knowledge and

motivation, preparing them for future success in the dynamic world of entrepreneurship.



SUSTAINABLE DEVELOPMENT GOALS

9. INDUSTRY, INNOVATION AND INFRASTRUCTURE

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9.3 List of university spin offs

S.No.	Name	Sector
1	Thermox	Health Care
2	Zetspace	Digital Marketting
3	Food for Health	Food Processing
4	GuideTech Dynamics	Deep Tech
5	Malcom	Deep Tech
6	Pathavan	Tourism
7	Samagaaram	Deep Tech
8	Serinibots Innovations	Deep Tech
9	Meythamil Naturals (Thiru Foods)	Food Processing
10	ULOG3	Deep Tech
11	VK Tutelage	Student Study Material App / Deep Tech
12	Webinfinit	Deep Tech
13	View	Deep Tech
14	Kaizenspark Tech	All Tech Support
15	KV's Bio Medical	Bio Medical
16	Intrino Robotics & Technologies Pvt.Ltd	AR-VR , Digital Twin
17	BioFocus Scientific Solutions Pvt Ltd	Life Science
18	Karking Technologies Pvt Ltd	Parking Facility
19	Namuvi Technologies Pvt Ltd.	E-Comerce
20	Blue Code Applications Pvt Ltd	Home Automation
21	TMDZ Research Labs Pvt Ltd	Bio ink
22	BIO-ADD	Biodegradable Products
23	ARWIN Networks Pvt Ltd	Freelancing under networks
24	HaneTech	Cooling device for Automotives
25	Senscur	Safety
26	AIVIREX	Sports Utility
27	Festasolar Pvt Ltd	Solar Panels
28	Jagetz	Massage Jackets
29	Digicardia (Diatom)	Bio-Print

30	Vibrunator (Thaalam)	Assitive Music Instrument
31	Edigim Research Pvt Ltd	PCB & Chip designing
32	Karthikesh Robotics Pvt Ltd	Robotics
33	Gomonetize	Share Market Analyser
34	AGRICMSD	Soil Health Monitoring
35	GEN Z MARKETERS	Digital Marketting
36	Mechimed Technologies Pvt Ltd	Health Care
37	GOK STUDIO	3D Gaming
38	MAM Industries	Product Development
39	Colakin Pvt.Ltd	Software Development
40	Lazycrew	Software Development
41	Listrik Motors Pvt.Ltd	E-Bike
42	Quantum Pixel Solutions	Software Developoment
43	Quazr Motors Pvt.Ltd	E-Bike
44	FT Motors Pvt.Ltd (Sina Mobility)	EV
45	AvioMotocorp Pvt.Ltd	Automotive
46	Airosspace R&D Private Limited	R&D in Drones
47	Manjappai E-Com Solutions Pvt. Ltd	E-Comerce
48	Fuinn Tech	Reusable 3D (Printer) Materials
49	Ayinar technologies	Software Developoment
50	GoGo soon Pvt. Ltd	Web developers
51	Vattam agro & dairy industries Pvt.ltd	Diary Products
52	Techiegen Ventures Pvt.Ltd	Software Developoment
53	Zestoz Ventures (student start-up)	Mobile App SAAS
54	Steam Troops Innovation Labs Pvt. Ltd.	Massage Jackets
55	Printen 3D Pvt. Ltd.	3D Printing
56	TECIAX	Deep Tech
57	Dr.Mythili's Corner	Health Care Service
58	Lapsina Technology Pvt. Ltd (Rural Basket)	Services - Chemical & Pesticide free Agri-foods

Few of the spin offs are financially supported by the Institute.

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9.4 Research income from industry

As part of research initiatives, the students and faculty members are involved in developing innovative solutions for the below industries.

Accenture Solutions Pvt. Ltd	TATA Consultancy Services	TVS	
Decathlon	Bonfiglioli, Transmission private limited	MK auto Components	Gokul Autotech Pvt. Ltd
Tripower Technologies Pvt. Ltd	Coporate Solutions Redefined India Pvt.Ltd	Daimler India Commercial Vehicles Pvt Ltd	
Maestro Steel Detailing Inc	VEEKAY Engineering	Chennai Heat Treaters Pvt Ltd, Chennai.	
Maruthi Power control systems, Chennai	Swot Technologies PVT Ltd	Win Mach Automations PvtLtd Ambattur, Chennai	

RRT Power Tech pvt ltd	Rane NSK Steering Limited, Chennai	CAD Macro Design & Solutions Pvt Ltd

List of Sample Projects

S.No	Name of the Project
1.	Design and Evaluation of Heavy-duty gear boxes and its endurance study
2.	Neural network-based control research in the path optimization of automated guided vehicle systems
3.	Automated Manufacturing Platform- Opearting Paradigm, Functional requirements in Architecture Design using AI
4.	Experimental Investigation on the application of AI for detecting defects in spare parts
5.	PLC Implementation for production management system
6.	Intelligent Driving Pattern Prediction in Truck -APC
7.	Collaborative and Intelligent Robot Systems
8.	Intelligent Warehouse Management System
9.	Manufacturing as a Service-POC
10.	Design and Detailing of Miami county detention center
11.	Design and Analysis of offshore steel Resort
12.	Design and Analysis of a Ware house
13.	Mix Design, Cube Testing, Rod Testing etc.
14.	Improvement of power factor and voltage stability using active filter
15.	Embedded IOT based Automatic power saving in industries
16.	Analytical approach of design parameter improvement in portable solar street light system
17.	Cockpit Intelligent Platform-II
18.	A smart Industry 4.0 using IoT, Big data, Data Analytics, Cloud and SAAS Technologies
19.	Effect of casting parameters on the solidification behavior of aluminium alloys
20.	Filament utilization systems (recycled 3D printing filaments)

Income of INR 5,69,00,000/- is generated through various industry sponsored projects

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NORMS FOR STUDENT START-UPS

1. Students will be allowed to work on setting up start-ups or work as intern/ part-time in start-ups (incubated in any recognized HEIs/incubators) while studying.
2. Students will be allowed to take a semester/year break (or even more depending upon the decision of a review committee) to work on their start-ups and re-join academics to complete the course
3. Student's entrepreneurs may earn academic credits for their efforts while creating an enterprise. A review committee will be set up to review the student start-ups, and based onthe progress made, it may give appropriate credits for academics. The decisions will be based on the guidelines developed for this purpose.
4. Student inventors will be allowed to opt for a start-up in place of their mini project/major project, seminars, summer training. The area in which a student wants to initiate a start-upmay be interdisciplinary or multi-disciplinary
5. Students entrepreneurs working on a start-up should be allowed to sit for the examination,even if their attendance is less than the minimum permissible percentage, with due permission form the institute. The decision will be based on the recommendations of the review committee set up to monitor the progress of the student start-up.
6. In case the faculty /staff holds the executive or managerial position for more than three months in a start-up, they will go on sabbatical/ leave without pay/utilize-existing leave.
7. Faculty must separate and distinguish on-going research at the institute form work conducted at the start-up/company.
8. Faculty must not involve research staff or other staff of institute in activities at the start-upand vice-versa
9. Human subject relate research in a start-up should get clearance from the ethics committeeof the institution
10. Product document and commercialization as well as participating in and nurturing start-ups will be added to a bucket of faculty-duties, and each faculty would choose a mix and match of these activities (in addition to the minimum required teaching and guidance) and then respective faculty will be evaluated accordingly for their

performance and promotion. It is desired that every facultymember should mentor at least one start-up.

EXIT POLICY FOR STARTUP FROM INCUBATION SUPPORT

Incubatee companies will leave the Chennai Institute Technology Business Incubation Forumunder the following circumstances:

- Completion of stay for stipulated period unless the stay is extended Chennai Institute Technology Business Incubation Forum - CITBIF
- Raising substantial investment from angel investor / Venture Capital Fund any other investor– Rs. 30 Lakh or more.
- Under performance or un-viability of the business proposition: criteria for the same will be decided and applied by CITBIF on the case to case basis.
- Irresolvable disputes between promoters/ founders.
- When the annual revenues of the company exceed Rs. 30 Lakh.
- When the company enters in an acquisition, merger or amalgamation deal or reorganization deal resulting substantially a change in the profile of the company, its promoters, directors, shareholders, products or business plans, or when a company plans for a public issue.
- Change in promoters'/ founders' team without concurrence of CITBIF.
- Non-compliance of term and conditions of CITBIF.
- Any other reasons which CITBIF may find it necessary for an Incubatee company to leave.
- Any other reasons Incubatee decides to CITBIF.
- Not with standing anything written elsewhere, Director - CITBIF decision in connection with the exit of an Incubatee company shall be final and shall not be disputed by any Incubatee company.
- Notice period of one month will be given to the Incubatee companies for the exit or extension either side the extension to the Incubatee companies will be provided only after the approval from the Director - CITBIF may be by circulation.
- In case of exit, physical transfer of the shares from/to the incubator should be completed and all the financial obligations should be settled from both side.
- All the resources provided to the incubates should be returned to the incubator.
- Details of new location should be provided to the CITBIF

Policy History

Policy created on	21-03-2019
Policy reviewed on	10-05-2022

Industry Inside Campus

1. KUKA

This collaborative effort of CIT & KUKA has the main objective to encourage young professionals to take up this cross disciplinary field as a career of their choice and acquaint them with latest technological developments in the field of Industrial Robotics. The centre aims to train young engineering graduates and diploma students of all engineering disciplines up to the Industry expectations and foster research in applied robotics field.The center is equipped with standard training cell comprising of KUKA KR-16 Industrial Robot with required auxiliary equipment. This training cell is capable of performing multitude of operations used for welding, painting, gluing and other essential industrial operations used by the automobile, food & beverages, packaging and other manufacturing/Production industries. In addition to this, a robotics computer simulation lab is also being established with latest industrial robotics simulation Software like SimPro & SimLayout, used to design, develop and simulate robotic operations for different manufacturing establishments.


KUKA
KUKA


KUKA

2. Fronius India Solutions and Skill Centre

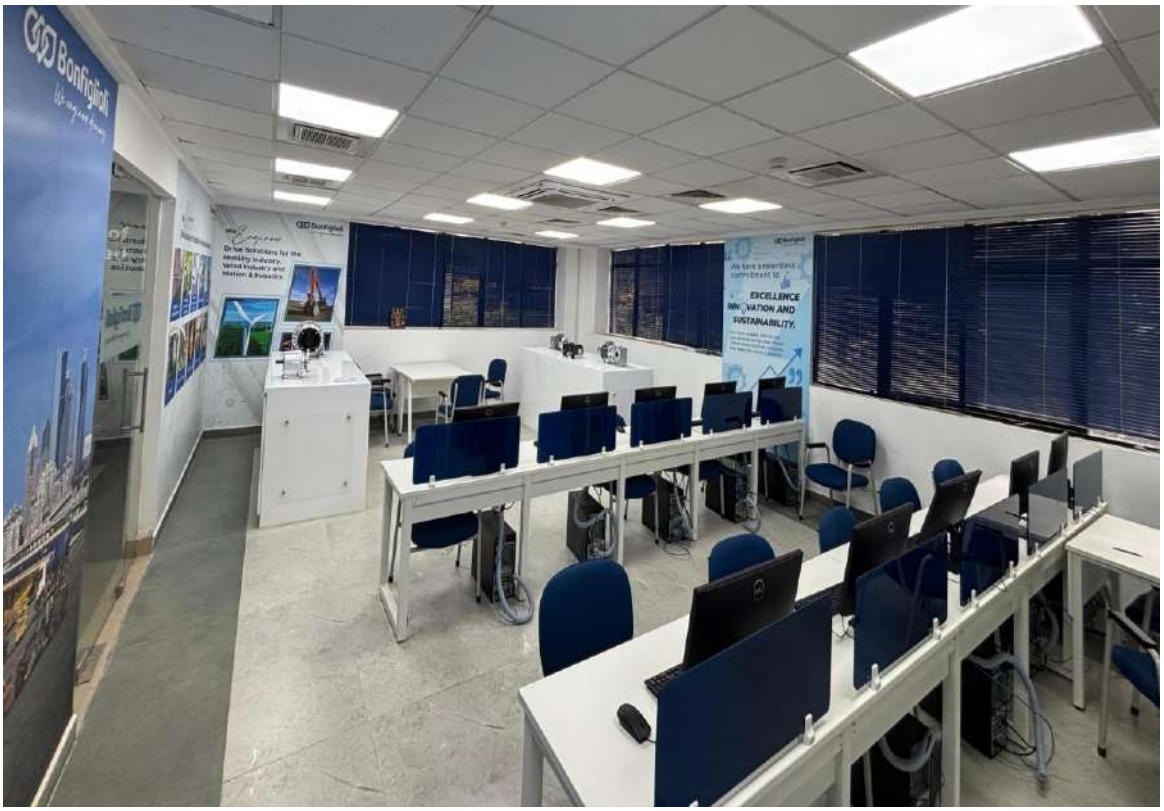
The Fronius India Solutions and Skill Centre represents a significant initiative in the field of vocational education and training, aimed at fostering advanced skills development in welding, automation, and energy technologies. Fronius, a global leader in welding technology, solar energy, and battery charging solutions, established this center to provide hands-on training and innovation opportunities for both professionals and students. The center focuses on

improving the practical skills of individuals while also providing the latest in technological advancements, making it a hub for technical excellence and cutting-edge innovation. Fronius India Solutions and Skill Centre, in collaboration with CIT , plays a crucial role in preparing the next generation of skilled professionals in welding, automation, and energy sectors. By blending industry-leading technology with academic rigor, this partnership ensures students are equipped with both the skills and the confidence needed to excel in today's fast-evolving industries.

3. Bonfiglioli

Bonfiglioli, a leading global provider of advanced gear motors, drive systems, and industrial automation solutions, has long been committed to driving innovation and fostering sustainable growth in the industrial and automation sectors. As part of this commitment, the company has focused on collaborating with educational institutions and colleges to bridge the gap between industry needs and academic knowledge. Bonfiglioli's collaboration with CIT College primarily focuses on creating a pathway for students to gain hands-on experience in the fields of mechanical engineering, automation, and robotics, among others. By working closely with the academic programs, Bonfiglioli helps to ensure that students are not only

prepared with theoretical knowledge but also have the practical skills needed to thrive in the fast-evolving world of industrial automation.




We Engineer
Drive Solutions for Industrial Processes and Automation
Logistics & Stocking Systems
Textile
We Engineer
Drive Solutions for the Mobility Industry, Wind Industry and Motion & Robotics


EXCELLENCE
INNOVATION AND
SUSTAINABILITY.

Industry Supported Labs

Drone Innovation Lab

A Drone Innovation Lab plays a crucial role in pushing the boundaries of what drones can achieve, fostering a collaborative environment for researchers, engineers, and industry professionals to come together and drive innovation in this rapidly evolving field. Knowledge in Aerospace, developing new technologies, algorithms, applications for UAVs, and Certification.

Industrial Robotics Lab

Industrial robot is shaping the future of robotics – with our in-house research and development, strong partnerships with few Companies, Institutions and startups, as well as professional innovation management and a Business Innovation Lab as an accelerator for new ideas. Hands on Training in Robotic Rovers, Personal Assistance and Companion Robots.

Industrial Automation Research Centre

Industrial Automation Research Centre supports in control systems, computers, and information technology to handle different processes and machinery in an industry to replace human intervention. The primary objectives of industrial automation are to increase efficiency, improve reliability, enhance safety, and reduce operating costs. Various technologies are employed in industrial automation, and these systems are commonly found in manufacturing, process control, and other industrial settings. Focuses on technologies related to automation, Smart Manufacturing, Supply Chain Automation, Flexible Manufacturing Systems, and Industrial Communication Networks.

New energy Lab

New energy Lab is emerging and it is alternative sources of energy that differ from traditional fossil fuels. The concept of new energy is closely associated with efforts to transition to cleaner, more sustainable, and environmentally friendly sources of power. Knowledge on Advanced Materials for Energy, Circular Economy in Energy, Bioenergy, Energy Efficiency and Management, Renewable Energy Sources, Smart Grids and Microgrids.

Center for NC Technologies

The institute have world class training area for NC Technology to provide training on CAD/CAM software interfacing with CNC Turning and Milling center for NC Technology and also providing hands on experience to get better skills to participate Various National and International Competitions. We already have achieved “Excellence Award” in Industrial Products Digital Design and Manufacturing among various nations.

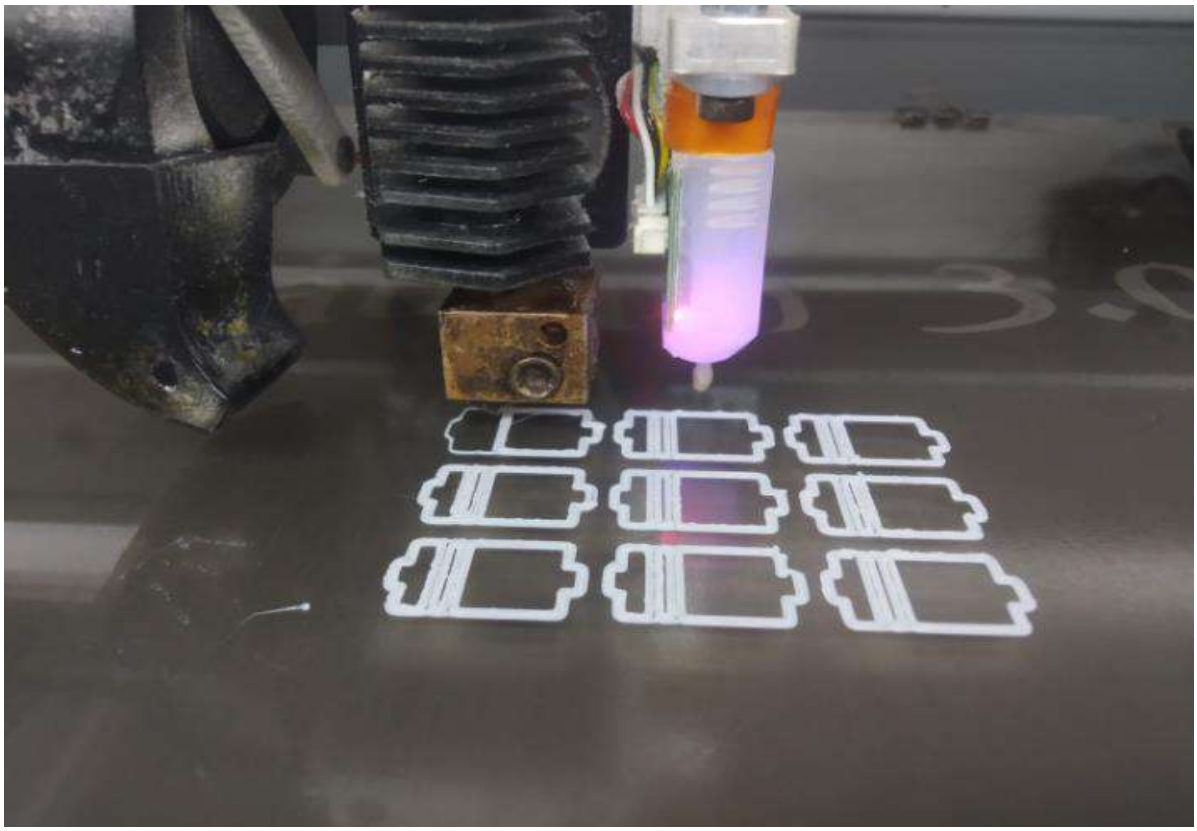
IoT Centre of Excellence

The specific focus and activities of an IoT Center of Excellence is based on the objectives and priorities of the research work taken into consideration. It plays a critical role in the advanced wireless mode of transceiving data between source and destination with high data rate, very high speed and preferably zero percent data loss. Real Time Implementations of IoT Devices, Li-Fi Technology, Health care, internal organs replacements kind of research works has been initiated from the IoT CoE.

AI Centre of Research

This centre highlights the diverse range of fields where AI research can have a significant impact, contributing to technological advancements and addressing real-world challenges. Research centres often collaborate with industry partners, academic institutions, and government agencies to drive innovation and application adoption. Knowledge in Machine Learning Algorithms, Virtual Reality (VR) and Augmented Reality (AR), Human-Computer Interaction.

Additive Manufacturing Research Centre



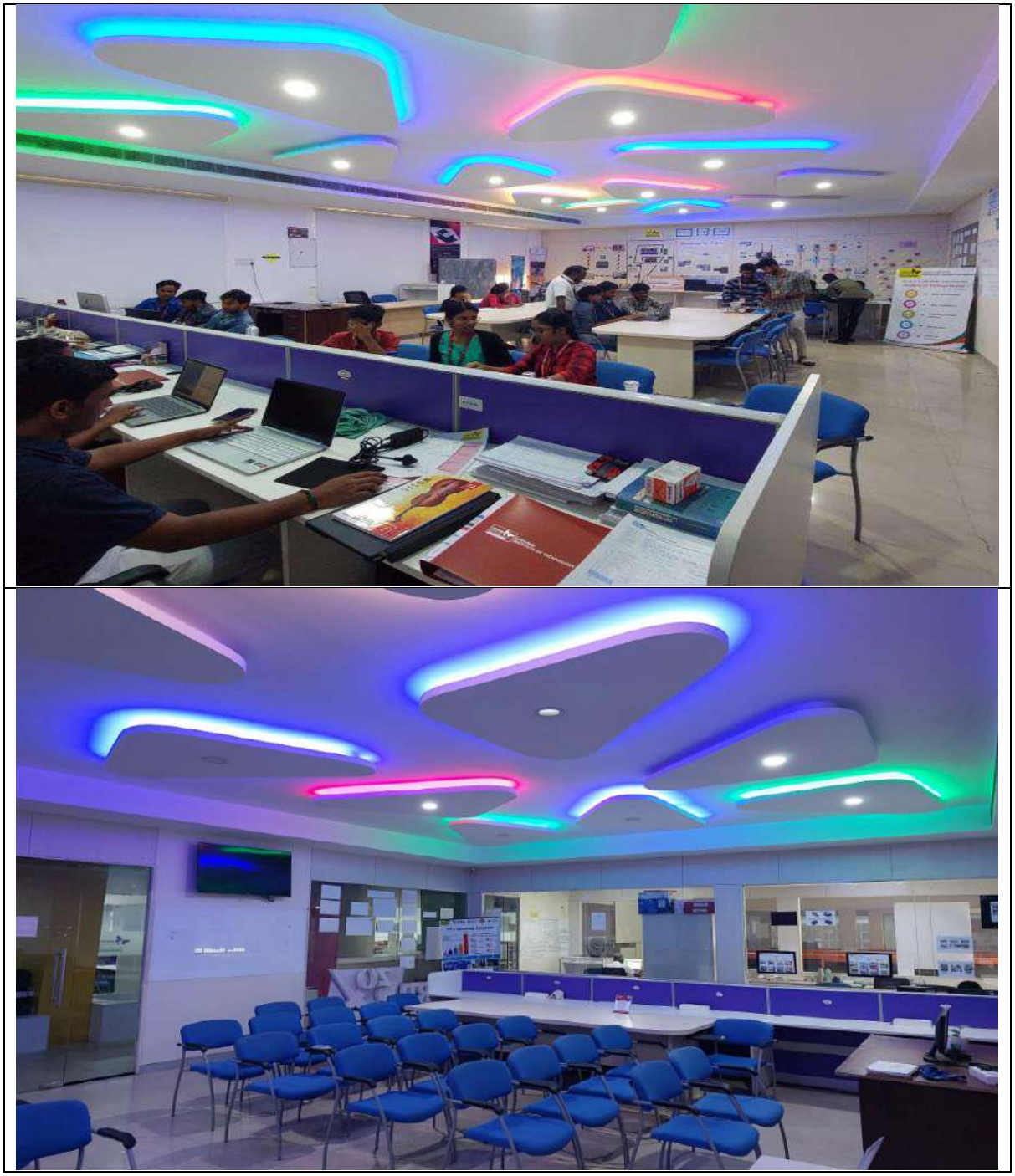
An Additive Manufacturing Research Centre, is a specialized facility focused on advancing research and development in the field of additive manufacturing, commonly known as 3D

printing. These centers are often collaborative efforts between academia, industry, and government bodies, aiming to drive innovation and enhance the capabilities of additive manufacturing technologies. 3D printers and bio printers helps startups to support health care research activities, instruments for assistive technology.

Biomedical Research Center

A Biomedical Research Center is an institution or facility dedicated to advancing research and development in the field of biomedical science and healthcare. These centers focus on a wide range of topics related to human health, medical treatments, and disease prevention. Gain knowledge about the replacement of internal organs with 3D bioprinter, production of Bio Ink, Health Care technologies.

Incubation Cell for Institute spin offs



An Incubation facility that provides support, resources, and mentorship to startup companies and early-stage entrepreneurs. The goal of our incubation is to help these fledgling businesses overcome challenges, accelerate their growth, and increase their chances of success. Incubation are often associated with fostering innovation, promoting entrepreneurship, and contributing to economic development. Create, educate, mentor and support the startup ideas to launch in the market and to grow as a successful business.

Government Funding contributing in SDG-9

S.NO	Name of the Project/ Endowments, Chairs	Name of the Funding Agency	Name of the Principal Investigator/Co-investigator
1	Development of eco-friendly hybrid dryer for fly ash based geopolymer bricks	AU-NLCIL Innovation Hub for Energy	Dr.P.Partheeban Dr.A.Dhanasekaran
2	DST FIST Project	Department of Science and Technology Government of India	Dr.P. Partheeban Dr.V.Dhinakaran
3	MODROB REG (Modernization of Universal Vibration diagnosticand Control platform)	AICTE	Dr.V.Dhinakaran
4	FUSI (Filament Utilization System) - Recycled 3-D printed filaments. - Recycle of 3D printed waste for reuse in 3D printing.	Ministry of Micro, Small & Medium Enterprises	Mr.A.Suresh Mr.Yuvaresh Chandrasekaran
5	Hydrogen Powered electric vehicle	Ministry of Micro, Small & Medium Enterprises	Mr.A.Suresh Mr.Kodavati Sumanth
6	Hydrogen fuel cell Powered electric vehicle	Entrepreneurship Development And Innovation Institute	Mr.A.Suresh
7	Development of eco-friendly hybrid dryer for fly ash based geo-polymer bricks	AU-NLCIL Innovation Hub for Energy	Dr.A.Dhanasekaran
8	Design and Fabrication of Hybrid solar LPG based for Geopolymer bricks	Department of Science and Technology (Technology Mission Division) Solar Energy Research and Development (SERD) Government of India	Dr.A.Dhanasekaran

9	Design and Evaluation of Heavy-duty gear boxes and its endurance study	Bonfiglioli, Transmission private limited	Mr.D.Prakash
10	Neural network-based control research in the path optimization of automated guided vehicle systems	MK auto components India Limited, Ambathur , Chennai	Dr.C.Ezhilarasan Mr.P.Vinoth Kumar Mr.Gokul.P.S
1	Tuberculosis detection for mass screening using chemical sensor	Ministry of Micro, Small & Medium Enterprises	Ms.Sharmili R & Ms. Janani M
12	Novel mass screening Retina Imaging for severity detection of Alzheimer's using Deep learning methods	Ministry of Micro, Small & Medium Enterprises	Dr.M.Kayalvizhi
13	FIST Program -2022	DST	Dr.M.Kayalvizhi
14	Automated Manufacturing Platform- Opearting Paradigm, Functional requirements in Architecture Design using AI	Gokul Autotech Pvt. Ltd	Dr. R.Janarthanan, Dr.B.Sundarambal
15	Experimental Investigation on the application of AI for detecting defects in spare parts	Tripower Technologies Pvt. Ltd	Dr. R.Janarthanan, Dr.B.Sundarambal
16	PLC Implementation for production management system	Coporate Solutions Redefined India Pvt.Ltd	Dr..R.Ponnusamy, Ms.S.Pavitra
17	Intelligent Driving Pattern Prediction in Truck -APC	Daimler India Commercial Vehicles Pvt Ltd	Dr.T. Jeshuadevadas, Mr.R.Ramesh
18	Collaborative and Intelligent Robot Systems	Accenture Solutions Pvt. Ltd	Dr.B.Muthukumar, Mr.G.Senthilkumar
19	Intelligent Warehouse Management System	Accenture Solutions Pvt. Ltd	Dr.T.Ramakrishna, Ms.M.Shanmuga Sundari
20	Manufacturing as a Service-POC	Accenture Solutions Pvt. Ltd	Dr. R. Taalapathy Rajasekar, Mr.S.Senthilkumar
21	ICEEMR 2021	AICTE	Dr. J.Vishnupriyan
22	Recent Trends in Power Engineering and Electric vehicle Technologies ATAL FDP	AICTE	Dr. J.Vishnupriyan
23	Design and Fabrication of Hybrid Solar – LPG base ddryer for geo polymer bricks	Ministry of Science and Technology	Dr. J.Vishnupriyan

Events contributing to SDG-9

1. A workshop on "Entrepreneurship and Innovation as Career Opportunities" was conducted on 15th September 2023 at the CIT campus, engaging 45 students. The session focused on the fundamentals of entrepreneurship, key strategies for innovation, and how to turn ideas into successful ventures. Experts in the field shared insights on building startups, funding options, and the importance of a creative mindset. The workshop aimed to inspire students to explore entrepreneurship as a viable career path and to think critically about innovation in today's dynamic job market.

2. A workshop on "Entrepreneurship and Innovation as Career Opportunities" focused on the field of ultrasound was held on 10th January 2023 at the CIT campus, with 70 students in attendance. The session explored how innovation in medical technologies, particularly ultrasound, is creating new career opportunities in healthcare entrepreneurship. Industry experts and entrepreneurs discussed the latest advancements in ultrasound technology and its applications in diagnostics, as well as the potential for starting ventures in this rapidly evolving sector. The workshop aimed to inspire students to consider healthcare innovation as a rewarding career path and to foster entrepreneurial thinking in the tech-driven medical industry.

3. A one-day hands-on workshop on **KUKA Industrial Robots** was conducted on 3rd September 2022 at the CIT campus, with 50 students actively participating. The session provided students with practical experience in operating KUKA robotic systems, focusing on their applications in manufacturing, automation, and precision tasks. Experts from the industry demonstrated key features of KUKA robots, including programming, movement control, and integration with production lines. The workshop aimed to enhance students' understanding of automation technology and inspire them to explore career opportunities in robotics and industrial automation, essential for the future of smart manufacturing.

4. On 16th February 2022, a guest lecture on **Startup Opportunities and Support by EDIITN** was organized at the CIT campus for 50 students. The session, led by experts from the Department of Industries & Commerce, focused on the various opportunities available for aspiring entrepreneurs in today's dynamic market. The lecture covered key topics such as startup funding, government schemes, mentorship programs, and the essential resources provided by EDIITN to help young entrepreneurs succeed. Students were introduced to the support ecosystem for startups, including incubation, networking, and skill-building workshops, encouraging them to explore and launch their own ventures. The event aimed to inspire and empower students to pursue entrepreneurship with the right knowledge and resources.

5. On 20th August 2022, a session on **Angel Investment and VC Funding Opportunities for Early-Stage Entrepreneurs** was conducted at the CIT campus for third-year students. The session focused on educating students about the essential role of angel investors and venture capital (VC) firms in supporting early-stage startups. Industry experts and investors shared insights on how entrepreneurs can attract funding, the different stages of investment, and key factors that investors look for in a business proposal. The session also covered practical tips on pitching ideas, building investor relationships, and understanding valuation. The goal was to equip students with the knowledge to navigate the funding landscape and inspire them to pursue entrepreneurial ventures with confidence.

6. On 10th August 2022, a specialized **Industry Upskill Program on Systematic Problem Solving Using the QC Story Approach** was held at the CIT campus for second-year students. The program was designed to address the specific needs of **automotive OEMs (Original Equipment Manufacturers)** and **auto ancillary industries**, with a focus on improving problem-solving skills in manufacturing and quality control.The session introduced students to the **QC Story approach**, a structured methodology used in the automotive industry to identify, analyze, and resolve production challenges. Through real-world case studies and hands-on exercises, students learned how to apply tools like root cause analysis, Pareto analysis, and fishbone diagrams to systematically tackle quality issues. The program aimed to enhance students' technical expertise and prepare them to contribute effectively to the automotive industry's continuous improvement processes.

7. **Startup 20X Event - A Spotlight on Innovation and Entrepreneurship** On **4th May 2023**, the **CIT Campus** (Chennai Institute of Technology) hosted the much-anticipated **Startup 20X** event, a dynamic platform designed to celebrate and support emerging entrepreneurs, innovators, and startups. The event aimed to inspire students, budding entrepreneurs, and young professionals by providing them with the tools, insights, and networks to turn their startup dreams into reality.

Event Photos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REFRESHMENT ZONE
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StartupTN
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Students Project Contributing to SDG 9

S.No	Title	Abstract
1	IMPLEMENTATION OF ADVANCED LMS FILTER USING NOVEL FAST ADDER FOR DELAY OPTIMISATION	VLSI (Very Large-Scale Integration) is a technology that involves packing millions of electronic components onto a single microchip to create complex and powerful integrated circuits. Adders are digital circuits used in computer architecture to perform addition operations. It adds binary numbers and often come in several categories, including half adders (addition of two binary digits), full adders (addition of three binary digits with carry), and ripple carry adders (used for multi-bit addition). It plays a crucial role in arithmetic and data processing within computers. Adders are used in computer processors for arithmetic calculations, memory addressing, data encryption, digital signal processing, and error checking in data transmission. In the original study, XOR, NOR, and mux gates were employed to compute sum and carry signals, leading to significant time delay concerns. In innovative approach, it has streamlined the design by exclusively utilizing NAND and XNOR gates, resulting in a remarkable reduction in time delay. This advancement promises improved efficiency and performance, setting a new standard in digital circuitry. Xilinx ISE version 14.7 and MATLAB version R2023a are the software tools used for this project. Xilinx ISE 14.7 is an integrated development environment (IDE) primarily used for designing and synthesizing digital circuits, particularly targeting Xilinx Field Programmable Gate Arrays (FPGAs) and Complex Programmable Logic Devices (CPLDs). MATLAB, is a high-level programming language and interactive environment primarily used for numerical computation, data analysis, visualization, and algorithm development. The efficiency of the proposed adder with respect to gate size and power is 97%
2	PREDICTIVE ANALYSIS AND MAINTENANCE WITH STATISTICAL LEARNING MODELS IN INDUSTRY 4.0	Machine Failure posessed significant challenges in industrial settings due to its adverse effects on asset availability, production quality, and financial resources. This proposed work focused on developing a predictive maintenance system using data mining and machine learning techniques to anticipate equipment failures and optimize maintenance strategies. Equipment failures resulted in asset downtime, deviation from standard procedures, reduced quality and quantity output,

		increased labour costs, and overall loss of productivity. Quick and accurate identification of potential failures is crucial to mitigate these risks. Data mining techniques, coupled with machine learning algorithms, offer a robust approach to analyse vast and complex datasets generated by industrial machinery. The predictive maintenance system provided two key benefits. Firstly, it allowed maintenance teams to schedule preventive maintenance activities strategically, minimizing unplanned downtime and production losses. Secondly, it optimized inventory management by stocking only necessary spare parts, reducing inventory costs while ensuring timely availability of critical components. By implementing this predictive maintenance system, industrial organizations can enhanced equipment reliability, optimize resource utilization, and improve overall operational efficiency. The integration of data mining and machine learning technologies empowered equipment professionals to make data- driven decisions, ensuring smooth and uninterrupted industrial operations.
3	ENHANCING INDUSTRIAL OPERATIONS WITH IOT-DRIVEN PREDICTIVE MAINTENANCE AND AR VISUALISATION	The project aims to revolutionize the approach to maintenance practices in industrial settings by harnessing the power of cutting-edge technologies, develop a predictive maintenance system capable of detecting early signs of motor degradation and optimizing maintenance schedules. Furthermore, by leveraging AR technology for data visualization, the project aims to enhance user interaction and decision-making processes in motor health monitoring. The implementation of the predictive maintenance system involves several key components. Firstly, IoT sensors are deployed to monitor various parameters of motor health, including current, voltage, temperature, humidity, and vibration. These sensors continuously collect real-time data, which is then processed and analysed using machine learning algorithms. In particular, it utilize the Random Forest Classifier algorithm to predict the health status of motors based on the collected sensor data. The integration of AR technology allows Maintenance personnel to visualize the sensor data in a three-dimensional (3D) augmented reality environment. This immersive visualization enhances the understanding of complex data sets and facilitates quick interpretation of maintenance alerts and insights. Through the AR interface, users can interactively explore motor health metrics, identify anomalies, and make informed decisions regarding maintenance actions. The effectiveness of the predictive maintenance system is evaluated based on several performance metrics, including accuracy of predictions, reliability of alerts, and user satisfaction with the AR interface. Including Internet of Things (IoT) and augmented reality (AR).

4	DESIGN AND IMPLEMENTATION OF 32-BIT DADDA MULTIPLIER USING CSA	Dadda multipliers require less area and are slightly faster than Wallace tree multipliers. The Dadda multiplier is known for its high-performance capabilities, critical path delay optimization, and resource efficiency. The objective of this proposed work is to assess the effectiveness of the Dadda multiplier in improving multiplication operations compared to traditional multiplier architectures. The research methodology involves a thorough analysis of the Dadda multiplier architecture, focusing on the implementation of the CSA technique. The CSA technique is utilized to reduce the number of partial products required for multiplication, thus decreasing the computational complexity. Additionally, the critical path delay is optimized by employing efficient carry propagation techniques within the Dadda multiplier. Simulations and performance evaluations are conducted to evaluate the Dadda multiplier's performance in terms of computational complexity reduction, critical path delay optimization, and resource efficiency. These evaluations involved comparing the Dadda multiplier with conventional multiplier architectures, considering factors such as area consumption, power requirements, and throughput. The study demonstrates the benefits of employing the Dadda multiplier with the CSA technique, providing insights into its potential for enhancing performance and energy efficiency in computational systems.
5	REMOTE CABLE LINE MONITORING AND CONTROL PLATFORM	Underground cables are used for power applications where it is impractical, difficult, or dangerous to use the overhead lines. This work is widely used in densely populated urban areas, in factories, and even to supply power from the overhead costs to the consumer premises. The underground cables have several advantages over the overhead lines. It is more expensive to manufacture, and their cost may vary depending on the construction as well as the voltage rating. Underground cables are prone to a wide variety of faults due to underground conditions, wear and tear, rodents, etc. This proposed work is intended to detect the location of faults in underground cable lines from the base station in km using a NodeMCU. To locate a fault in the cable, the cable must be tested for faults. This prototype uses the simple concept of Ohms law. The current would vary depending on the length of the fault of the cable. In urban areas, the electrical cables run underground instead of overhead lines. Whenever a fault occurs in an underground cable it is difficult to detect the exact location of the fault for the process of repairing that particular cable. The proposed system finds the exact location of the fault. The prototype is modelled with a set of resistors representing cable length in km and fault creation is made by a set of switches at every known distance to cross-check the accuracy of the same. This prototype is more efficient in finding the exact distance of the fault. The fault occurring distance and time are displayed on ThingSpeak software interfaced with the microcontroller using a Wi-Fi module.

6	UNMANNED ROBOTIC VEHICLE WITH MULTI SENSOR INTEGRATION AND FACE RECOGNITION	The proposed work's objective is to conceptualize, design, and execute an intelligent unmanned robotic vehicle that harnesses the power of advanced sensor technologies and facial recognition to enhance border security. Through the seamless integration of a diverse sensor suite, comprising a camera, sound sensor, vibration sensor, and ultrasonic sensor, the robotic vehicle achieves a holistic understanding of its surroundings. This comprehensive environmental perception is particularly crucial in detecting potential breaches along the national border. The camera captures visual data, while the sound sensor and vibration sensor are attuned to detect auditory and physical disturbances, respectively. The ultrasonic sensor further contributes by providing distance measurements and obstacle detection capabilities. This amalgamation of sensors empowers the robotic vehicle to operate effectively in varied environmental conditions, ensuring a robust surveillance system. Simultaneously, an Internet of Things (IoT)- based alert is generated and promptly dispatched to designated officers responsible for border security. This immediate alert mechanism ensures a rapid and coordinated response to potential threats, minimizing the risk of unauthorized border crossings.
7	ENHANCING VIRTUAL REALITY: SENSOR FUSION TECHNOLOGY IN LDR-BASED VR TACTILE GLOVES	VR gloves forms the foundation to provide cost-effective and responsive solution for a wide range of applications such as physiotherapy and gaming. By addressing key challenges in motion tracking accuracy and tactile feedback, this research contributed to the advancement of VR technology and a better scope for innovative use cases in various industries. The development and integration of VR gloves is aimed at enhancing user immersion and interaction within virtual environment. Leveraging Unity software for simulation and STM32 microcontrollers for hardware interfacing, the system employed advanced sensor fusion technique - Kalman filtering, to achieve precise hand motion tracking and mitigate noise and drift issues. Additionally, the integration of LDR sensors and tactile feedback mechanisms enhanced the user experience by providing real- time finger position monitoring and a rudimentary sense of touch. This work not only advances the current state-of-the-art in VR technology but also lays the groundwork for future research and development in immersive virtual experiences. The findings presented herein serve as a foundation for further exploration into the optimization of sensor fusion techniques and the enhancement of tactile feedback mechanisms, thereby fostering continuous innovation and evolution in the field of virtual reality.
8	NETWORK INTRUSION DETECTION SYSTEM ANALYTICS	Network Intrusion Detection Systems play a critical role in protecting computer networks from various security threats and attacks. As the complexity and frequency of network attacks continue to evolve, there is a growing need foradvanced analytics techniques to enhance the detection and

	USING MEMORY BASED LEARNING APPROACHES	response capabilities of NIDS. This research focuses on the development and utilization of analytics methods for network intrusion detection systems. The goal is to leverage these techniques to improve the accuracy, efficiency, and effectiveness of NIDS in identifying and mitigating security breaches. The research begins by exploring the fundamental concepts of network intrusion detection, including the different types of attacks and the challenges associated with their detection. Various types of NIDS, including signature-based and anomaly-based systems, are discussed, highlighting their strengths and limitations. Overall, this research aims to advance the field of network intrusion detection by leveraging analytics techniques to enhance the capabilities of NIDS. The proposed methods offer the potential to improve the accuracy of attack detection, reduce false positives, enable efficient processing of big data, and facilitate automated incident response. The findings of this research will contribute to the development of more robust and effective network security systems in the face of ever-evolving cyber threats. In this project, we evaluate and compare the performance of three learning algorithm: Random Forest, Ada Boost and Extra Tree in terms of their accuracy and robustness in handling complex problems
9	IMPROVISED STEGANOGRAPHY FOR IOT NETWORK NODE DATA SECURITY PROMOTING SECURE DATA TRANSMISSION USING GANS	The Internet of Things (IoT) describes the network of physical objects or things that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. Although several IoT devices are openly accessible to all in the network, it is extremely vital to be aware of the security risks and threats of cyber-attacks; therefore, it should be secured. In Cryptography, plain text is converted to encrypted text before it is sent, and it is converted to plain text after communication on the other side. Steganography is a method of hiding secret data, by embedding it into an audio, video, image, or text file. One technique is to hide data in bits that represent the same color pixels repeated in a row in an image file. By applying the encrypted data to this redundant data in some inconspicuous way, the result will be an image file that appears identical to the original image but that has "noise" patterns of regular, unencrypted data. In this project it proposes to encrypt the IoT networks data by hiding the message inside an image file using image data hiding technique. We are going to incorporate the usage of convolutional neural networks in traditional image data hiding method to drastically increase the payload that can be transmitted through an image. Different convolutional parameters will be analysed to achieve the highest payload.
10	CLUSTER BASED MODIFIED SPIN ALGORITHM	Wireless sensor networks (WSNs) are composed of resource-constrained sensor nodes tasked with monitoring and gathering data from an area of interest. Efficient data dissemination and

		routing are critical challenges in WSNs due to the nodes' limited energy resources and bandwidth constraints. The SPIN (Sensor Protocol for Information via Negotiation) protocol addresses some of the drawbacks of traditional flooding-based approaches by employing metadata negotiation before transmitting actual data. This propsed Cluster based modified SPIN algorithm, a novel approach that enhances the SPIN protocol by incorporating the distance based clustering algorithm for optimized cluster formation and energy- efficient routing in WSNs. By combining cluster head selection with SPIN's negotiation mechanism, this work aimed to improve energy efficiency, prolong network lifetime, and ensure reliable data delivery in WSNs compared to existing protocols. Simulation results have demonstrated the superiority of CBM-SPIN in terms of reduced energy consumption, extended network lifetime, making it a promising approachfor efficient data routing in resource-constrained WSNs.
11	TRIPLE MATERIAL HETEROJUNCTION SURROUNDING GATE TFET: DESIGN AND PARAMETER ANALYSIS	The Triple Material Surrounding Gate Tunnel Field-Effect Transistor (TMSG-TFET) emerges as a dependable successor to conventional MOSFET architectures, adept at mitigating the inherent limitations of CMOS circuitry. By virtue of its innovative surrounding gate design, the TMSG-TFET effectively addresses Short Channel Effects (SCEs) such as impact ionization, Drain Induced Barrier Lowering (DIBL) and so on. Notably, this model integrates Indium Phosphide (InP) as the source material, with Hafnium Oxide (HfO2) and Silicon Dioxide (SiO2) serving as high-k dielectric components. An analytical framework has been meticulously devised to ascertain critical device parameters, encompassing surface potential, electric field distribution, and drain current characteristics. The architectural blueprint of the proposed triple material SG TFET has been crafted utilizing the parabolic approximation method, thereby elucidating solutions to Poisson's equation to delineate the surface potential and electric field profiles. Subsequently, leveraging Kane's model facilitates the estimation of drain current, thereby enabling an assessment of the tunnelling generation rate. Rigorous validation through TCAD simulation bolsters confidence in the developed model, attesting to its accuracy and reliability in encapsulating the distinctive device characteristics of the TMSG-TFET architecture.
12	ENHANCED PERFORMANCE ANALYSIS OF DUAL MATERIAL GATE TFET WITH SURROUNDING GATE	The proposed solution introduces a novel analytical model for Dual Material Surrounding Gate Tunnel Field-Effect Transistors (DMSG TFETs), incorporating both two-dimensional (2D) and three-dimensional (3D) considerations. By solving the 2D Poisson's equation with appropriate boundary conditions, the model derives mathematical expressions for the 2D potential distribution at the surface and the electric field within the DMSG TFET structure. Furthermore, the model

		incorporates a comprehensive approach to determine the drain current, involving the derivation of a mathematical expression for the band-to-band (BTB) tunneling generation rate using Kane's formula. To validate the accuracy and effectiveness of the proposed analytical model, simulated results from TCAD simulations are compared with the mathematical predictions, ensuring the model's reliability and applicability in practical device design and optimization.
13	ANALYSIS THE DRAIN CURRENT, SURFACE POTENTIAL AND ELECTRIC FIELD OF SINGLE MATERIAL SURROUNDING GATE TFET	Tunnel Field Effect Transistors, often referred to as TFETs, are progressively emerging as a promising alternative to the more conventional MOSFETs and viewed as a potential solution to overcome the operational constraints such as Short Channel Effects (SCE) that are typically associated with MOSFETs. In this study, present an in-depth examination of the design evolution of TFETs. Specifically on a Single Material Surrounding Gate TFET, with Indium arsenide (InAs)- Si heterojunction being employed as the source material. Using an analytical model and able to determine key device parameters, such as the surface potential, the drain current, and the electric field.
14	HYPERSPECTRAL IMAGE CLASSIFICATION USING TRAINING SAMPLE AUGMENTATION WITH GAN	Hyperspectral imaging has emerged as a powerful tool in medical diagnostics due to its ability to capture detailed spectral information across a wide range of wavelengths. However, accurate disease detection from hyperspectral images remains challenging, primarily due to limitations in training data diversity and abundance. This work proposes a novel approach to address these challenges by integrating Generative Adversarial Networks (GANs) into hyperspectral image classification for disease detection. The proposed methodology harnesses the capabilities of GANs to generate synthetic hyperspectral images, effectively augmenting the training dataset and enhancing its diversity. By learning the underlying distribution of hyperspectral data, the GAN generates realistic synthetic images that closely resemble real-world spectra associated with various disease conditions
15	DYNAMICAL ANALYSIS FOR SYMMETRIC CHAOTIC SYSTEM WITH FIELD PROGRAMMABLE GATE ARRAY	Simulation of nonlinear dynamical systems has received significant attention due to its potential applications in several fields. Chaotic systems are nonlinear dynamical systems that are irregular, aperiodic, unpredictable, and dependent on beginning conditions. While testing with 3D weather simulations. This process attractor generation in nonlinear dynamical systems has gained a lot of attention because of its potential applications in a variety of domains. Chaotic systems are nonlinear dynamical systems that are irregular, aperiodic, unexpected, and dependent on the initial circumstances. This work created a symmetrical chaotic system and discussed its qualitative properties. The Lyapunov exponents of the proposed system indicate that it is symmetrically chaotic, with two positive exponents. The bifurcation outlines of the symmetrical chaotic system

		are investigated to determine the parameter- dependent and quadratic nonlinearities, respectively. The synchronization of symmetrical chaotic systems has a variety of applications, including secure communications and cryptography. This introduces the approaches for adaptive synchronization of sliding mode control in symmetrical chaotic systems with known parameters.
16	CRACK IDENTIFICATION AND SEGMENTATION USING AI MODEL	An AI Model comprising of ResNet50, InceptionV3 and VGG16 was created with Python Programming Language and images of cracks in structural and non-structural components of structures were collected using High-Resolution Cameras and feeded to the model as input. The CNN Model was pre-trained with 1000 images with cracks and 1000 images without cracks which were collected from Kaggle and GitHub as Dataset for this project. After pre-training the model, the model was saved and loaded. The collected images were given as input for the model to detect cracks, perform segmentation and give the prediction of the crack trend development if cracks are present in the image which was feeded as input. Crack width of upto 9 centimeters was predicted as per the image feeded. The pixel size of the training data is 227x277 px which when converted to Centimeters will give approximate of 8.44 cm. Crack width of 1.83cm was identified with ResNet50 Model, 1.79cm with InceptionV3 and 1.86cm with VGG16. These values kept progressing as consecutive year's images were given as input sequentially.
17	EXPERIMENTAL ANALYSIS OF CRACK PATTERNS IN RCC BEAM AND CRACK PREDICTION USING AI TECHNIQUE	This project focuses on the development and implementation of an artificial intelligence (AI) model for the detection of cracks in beams, aiming to enhance structural health monitoring capabilities. The deterioration of structural elements, such as beams, can compromise the safety and integrity of infrastructures. Traditional methods for crack detection often rely on visual inspections or expensive and time-consuming testing procedures. The proposed AI model leverages advanced image processing and machine learning techniques to automatically identify and classify cracks in beam structures. The methodology involves casting 4 beams of size 70 x 15 x 15 cm in which 2 beams are of M20 mix and the other 2 are M25 mix. After casting, the beams are tested to acquire various crack images, load vs displacement and stress vs strain graphs. The maximum load acquired is 68.45KN and the maximum peak stress obtained is 0.0025KN/mm2. With the obtained crack images an AI model is developed to predict the crack patterns. Convolutional Neural Networks (CNN) are then used for the training dataset The developed AI model takes the crack images as input and gives output in the form of crack prediction, Accuracy vs loss, and testing vs loss data as graphs.
18	STRENGTH PREDICTION OF NANO MATERIAL CONCRETE	Nano silica, a promising additive in concrete, has shown potential for enhancing mechanical properties, including compressive and flexural strength. This study presents a novel hybrid

	USING HYBRID MACHINE LEARNING APPROACHES	machine learning framework for predicting the compressive and flexural strength of nano silica concrete. The proposed model integrates diverse machine learning algorithms, such as Linear Regression, Support Vector Machines, Gradient Boosting, Random Forest and decision trees, to exploit their complementary strengths in capturing intricate patterns within the dataset. Utilizing a comprehensive dataset encompassing key parameters like nano silica content, water-to-cement ratio, plasticizer, cement, aggregate and strength characteristics, the hybrid model is trained, tested and validated. The hybrid approach exhibits superior accuracy and generalization performance compared to individual algorithms. This research not only contributes to advancing predictive modelling in concrete technology but also provides valuable insights for optimizing nano silica concrete formulations in real-world construction applications.
19	OPTIMIZATION OF NANO MATERIALS IN CONCRETE USING MACHINE LEARNING ALGORITHMS	Concrete, the second most commonly used construction material after water, has certain limitations due to its brittleness, low ductility, and low tensile strength. Additionally, it is prone to early formation and micro-crack propagation caused by shrinkage at young ages. However, in the past two decades, the production of concrete has significantly increased by incorporating supplementary cementitious materials (SCMs) and nanoparticles such as SiO2, TiO2, Fe2O3, Cr2O3, and Al2O3. This work reviews the inclusion of nanoparticles in concrete and its resulting effects. To facilitate the comparison of the impact of oxide nanoparticles on concrete, graphical representations of these parameters have been provided. Furthermore, the combined use of different types of nanoparticles (NS + NC) has shown a remarkable improvement in concrete compressive strength compared to using the same percentage of a single type of nanoparticles. In this machine learning model predictions the input parameters as cement=450gms, sand=625gms, coarse aggregate=1350gms and water to cement ratio=0.4 for M20 grade concrete and found out that the optimum value of nano silica, nano-clay, silica fume and nano carbon tubes are 2.80 %, 7.0 %, 6.88% and 0.03%for which the max strength attained is 21.48N/mm2, 27.34 N/mm2, 22.20 N/mm2,22.3 N/mm2 respectively in 28th day using Linear regression models in machine learning.For M25 the maximum and minimum strength attained is 32 N/mm2 and 25 N/mm2 respectively. For M30 the minimum and maximum strength attained is 35N/mm2 and 41N/mm2 respectively. For high performance concrete the minimum and maximum strength attained is 46.2 N/mm2 and 82.3 N/mm2.
20	GESTURE INTERPRETATION	The Gesture Interpretation System (GIS) stands as a transformative leap in the realm of user-computer interaction, poised to revolutionize communication dynamics by seamlessly translating intuitive gestures into both text and speech formats. Embeddedwithin its core is a profound

		mission to not only streamline engagement within virtual environments but also to bridge the profound communication chasm existing between individuals with varying auditory capabilities, thereby fostering a more inclusive andaccessible digital landscape. This advanced system, designed for seamless interaction in virtual environments, eliminates the dependence on traditional input methods, streamlining the communication process. By incorporating advanced gesture recognition algorithms, GIS converts gestures into written text,providing users with a convenient and precise mechanism for promptly conveying intricate ideas in a digitally inclusive and accessible environment. By harnessing the power of advancedtechnology, GIS not only deciphers gestures with unparalleled accuracy but also converts them seamlessly into both written text and spoken words, thereby transcending barriers and empoweringindividuals of all auditory capacities to engage fully in virtual interactions.
21	DYNAMICS, SYNCHRONIZATION AND TRAVELLING WAVE PATTERN OF FLUX COUPLED NETWORK OF CHAYNEURON	Many complex systems, including biological and chemical reactions, can display a wide range of spatiotemporal patterns. For instance, the brain can exhibit a variety of complex patterns during cognitive processes depending on the intrinsic parameters, interactions, and its strength. To demonstrate the presence of different dynamical behaviors and their transition, we consider a Chay neuron model with the presence of electromagnetic interactions under three distinct network connectivity: Regular, small-world, and random interactions. We discover that increasing coupling intensity illustrates the dynamical transition from the desynchronization state to the asymmetric traveling wave patterns for regular network connectivity and desynchronization to synchronization for random and small-world network interactions. The emergence of synchronization and travelling wave patterns in a network of Chay's neurons is a complex phenomenon that arises from the interactions between individual neurons and the network architecture. Chay's neurons are a type of model neuron that exhibits a rich variety of dynamical behaviors, including spiking and bursting. When these neurons are connected in a network, their interactions can give rise to synchronous firing and travelling wave patterns. Synchronization occurs when groups of neurons fire together in a coordinated manner.
22	ENCODER AWARE- MOTION COMPENSATION SPATIO TEMPORAL FILTERING	The encoder-aware motion-compensated temporal pre-processing filter (EA-MCTF) is a sophisticated tool designed to optimize video encoding processes. By analyzing block-level encoding parameters such as QP, motion characteristics, and slice types, it dynamically adjusts filtering strategies to the content's spatio-temporal properties. This adaptive approach significantly enhances encoding efficiency, leading to an impressive -12.4% average VMAF BD-rate savings compared to unfiltered encodings when applied to a HEVC encoder. Particularly

		beneficial for noisy source pictures, motion-compensated spatio-temporal filtering (MCSTF) leverages previously generated motion vectors across different resolutions to identify optimal temporal correspondences for low-pass filtering. Implemented on I- and P-frames, this technique effectively reduces noise artefacts while preserving image quality. Through these innovations, video encoding processes achieve higher fidelity and compression efficiency, contributing to enhanced viewing experiences across various platforms and devices.
23	ENCODER-AWARE MOTION COMPENSATED SPATIO-TEMPORALFILTERING	We present an encoder-aware motion compensated temporal pre-processing filter (EA-MCTF) that adapts the filter on a block basis based upon the spatio-temporal content properties and block-level encoding parameters. Some sample parameters include block-level QP, variance and mean-squared error of motion compensated block difference, slice types of adjoining frames, and frequency of a block being used as a reference. Applying the EA-MCTF to a HEVC encoder yields -12.4% average VMAF BD-rate savings over unfiltered encodings. Motion compensated spatio-temporal filtering (MCSTF) is especially useful for source pictures that contain a high level of noise. It uses previously generated motion vectors across different resolutions of the video content to find the best temporal correspondence for low-pass filtering. Temporal filtering is applied to the I- and P-frames.
24	VIRTUAL MOUSE USING HAND GESTURE	The mouse is an indispensable input device that is used in the computer system. The concept of system control using hand gesture recognition. The major advantage of this concept is it reduces the direct interaction between the human and the device. The purpose of this proposed system is to help humans to control the system without directly getting interacted with the device. We first detect the user hand and its moments using ML models such as Palm Detection Model and Hand Landmark Model where the Palm Detection Model first detects the hand palm and then by using Hand Landmark Model it will detect all the hand landmark points. After detection of the hand, finding the distance between the two fingers is done by using Euclidean formula and which helps us to recognize the Hand gestures. Based on the various Hand gestures, an event will be triggered which is basically like mouse move, mouse click. The primary motive behind the paper is to build a system that helps the people to feel more comfortable and interact with devices. The system will allow the user to navigate the computer cursor using without hand bearing color caps or tapes and left click and dragging will be performed using different hand gestures. The proposed system uses nothing more than a low resolution webcam that acts as a sensor and it is able to track the users hand bearing color caps in two dimensions. The system will be implemented using the python and

		OpenCV. Shape and position information about the gesture will be gathered using detection of hand gesture.
25	Dimensional Impressions: A 3D Portfolio Journey with React Three Fiber	This abstract presents a comprehensive overview of a website developed using React 3 Fiber (R3F), GLTF technology, Sketchfab, and Blender, amalgamating cutting-edge tools for immersive digital experiences. Leveraging R3F's capabilities alongside GLTF, Sketchfab, and Blender, this project pioneers the integration of high-fidelity 3D models into web environments. Through meticulous design and development, the website offers visitors an unparalleled journey through dynamic and interactive content, highlighting the fusion of creativity and technology. By incorporating GLTF-rendered assets and animations, the website elevates user engagement, setting a new standard for online presentation. The utilization of Sketchfab and Blender enhances the creation and optimization of 3D models, ensuring seamless integration with R3F for a cohesive user experience. This abstract provides insights into the project's conception, development process, and deployment strategies, highlighting the innovative techniques and tools employed. By harnessing the collective power of R3F, GLTF, Sketchfab, and Blender, this website signifies a paradigm shift in web design, offering a glimpse into the future of immersive digital environments.
26	HYDROPHOBICITY OF ALUMINIUM ALLOY 6061 METAL WITH AL2O3 & TIO2 COATING	This experimentation aims to create hydrophobic surfaces on aluminum 6061 samples by applying Al2O3 and TiO2 oxide coatings Utilizing various machining operations such as milling, grinding, and CNC milling, we systematically manipulate surface roughness profiles. Subsequent to coating the samples using a dip coating method, we quantify hydrophobicity through contact angle measurements. Our findings unequivocally demonstrate the superior hydrophobic properties of Al2O3 coatings over TiO2 coatings across different machining operations. Specifically, Al2O3-coated samples exhibit contact angles as high as 99.670 on milling operations with a surface roughness of 1.5775µm, while TiO2-coated samples achieve a maximum contact angle of 83.750 on milling with a surface roughness of 1.7675 µm. These results underscore the efficacy of Al2O3 coatings in augmenting the hydrophobicity of aluminum surfaces, offering promising avenues for application in diverse industries. The investigation into creating hydrophobic surfaces on aluminium 6061 samples offers potential applications in aerospace, marine engineering, automotive, electronics, medical devices, building materials, renewable energy, food and beverage, sporting goods, and textiles.
27	FABRICATION OF FUNCTIONLY GRADED TRIPLY PERIODIC	Bio-composites for sustainable environment is one of the emerging domains of research, which provides improvised mechanical and transformed chemical properties. Several composites were

	MINIMAL SURFACE STRUCTURE VIA ADDITIVE MANUFACTURING FOR ENGINEERING APPLICATION	available in-terms of better mechanical properties but very few literatures were available on developing composites with both sustainability and improvised mechanical properties. Mechanical properties of egg-shell reinforced PLA material were evaluated through experiments such as tensile, compression, flexural, and hardness. Specimens to be tested were fabricated using five filaments such as0 wt%, 5 wt%, 10 wt%, 15 wt%, and 20 wt% egg-shell composites. Experimental results shows that 15 wt% composite proves to be the best among other composites. Triply periodic minimal surfaces (TPMS) are those structures which posses significant properties such as great energy absorption, lighter in weight, minimalistic material usage. A significant study wasn't carried out on most of the TPMS structures. This study deals with the compressive property evaluation of rare explained TPMS structures such as lidinoid, double gyroid, Schwarz primitive, and split-P. Six other functionally graded TPMS structures were designed by integrating each TPMS structure. Compressive property of those structures were evaluated and the best structure was found by calculating strength-to-weight ratio of each structure.
28	MECHANICAL PROPERTIES OF EPOXY BASED HYBRID COMPOSITES REINFORCED WITH FILLER ELEMENTS	Hard turning is an useful alternative method to the conventionally available fine finishing processes.The hard turning is performed in dry condition enables from the problem of disposal of cutting fluids, with an advantage of no health hazards to workers and free from environmental air and water pollution's. But the usual hard turning techniques which performed in dry conditions lead to reduced tool life because of enormous heat generations and severe mechanical loads at cutting zone and thus in turn affect some of the vital machinability aspects: surface finish of machined components, performance of cutting tools, cutting power consumption of machine tools, chip formations and other associated benefits. Hence in this research work, an attempt was made to diminish the above said difficulties through employing the eco-friendly air cooling technique in hard turning process i.e. machining with following any one cutting environment: dry condition, compressed air and chilled air. The hardened work material AISI H13 tool steels, extremely tough matrix high speed tool steel had taken and turned on rigid CNC turning center with the aid of coated ceramic cutting inserts with wiper and without wiper geometry profile. The vital process control parameters like cutting speed, feed rate, depth of cut,tool geometry, work-piece hardness, cutting environment were considered in order to study their influence on various machinability aspects: surface roughness, cutting power, power consumption, cutting force, material removal rate, tool-chip interface temperature, tool wear and chip forms during the hard turning process.

29	TESTINGANDSTUDYOFMECHANICALPROPERTIESOFSILICON WITH GRAPHENE NANOCOMPOSITES	This research investigates the fabrication of silicon-graphene composites through the stir casting technique, integrating grapheme nanopowder into the silicone matrix. The primary objective is to enhance the mechanical characteristics of silicone, including tensile strength,compression resistance, hardness, and wear resistance, leveraging the large specific surface area per volume of graphene nanopowder. Mechanical evaluations encompassing tensile, compression, and hardness tests, along with wear testing, were conducted on the developed composites with varied graphene nanopowder compositions. Additionally, Raman spectroscopy and FTIR, were employed to analyse the structural and chemical properties of the composites. The outcomes reveal notable enhancements in microhardness, tensile strength, fracture toughness, and reduced wear rate in the silicone-graphene composites compared to pure silicone. These findings underscore the efficacy of incorporating graphene nanopowder into the silicone matrix to augment its mechanical attributes, suggesting promising applications across diverse engineering and industrial sectors.
30	DESIGN AND ANALYSIS OF LINEAR BEARING	This research investigates the design and stress analysis of a point contact linear bearing under varying interference conditions. The design involved creating a unique profile for the ball race, modeled using CATIA V5 software, and simulating it in Abaqus software under static and dynamic conditions. The findings show a correlation between increased interference,stress values, and reaction forces. Additional tests validated strength of the profile shape. The study also examined backlash, measuring its effects on efficiency and precision, and conducted torsional and rigidity tests to understand mechanical characteristics. Insights from this research, enhance understanding the point contact of linear bearing, suggesting potential for improved performance and provide a basis for future work in bearing design and operation.
31	FINITE ELEMENT SIMULATION OF LAMINATED COMPOSITE PLATES REINFORCED WITH EPOXY RESIN BY FIBER ORIENTATION METHOD	This study presents a comprehensive finite element analysis (FEA) of composite materials composed of banana fiber, carbon fiber, and silicon carbide, reinforced with epoxy resin, utilizing the Ansys software platform. The motivation behind this investigation stems from the growing interest in sustainable and high-performance materials for various engineering applications. The mechanical properties of the constituents, including the fibers and epoxy resin, are first characterized experimentally to provide accurate input parameters for the FEA model. Subsequently, a finite element model is developed to simulate the behavior of the composite material under different loading conditions, considering factors such as tensile, compressive, and bending stresses. The FEA enables the assessment of the structural integrity, deformation characteristics, and failure mechanisms of the composite material. Additionally, the influence of varying fiber compositions and orientations on the mechanical properties of the composite is

		investigated through parametric studies. The findings of this research contribute to a deeper understanding of the mechanical behavior of banana fiber, carbon fiber, and silicon carbide composites reinforced with epoxy resin. The insights gained from the FEA simulations can guide the design and optimization of composite structures for applications in aerospace, automotive, and other industries, where lightweight, high-strength, and eco-friendly materials are in the demand.
32	ANALYSING THE MECHANICAL PROPERTIES OF THE EPOXY COMPOSITE USING GRAPHENE NANOFILLER	This research investigates the synergistic capabilities achieved by the intricate process of amalgamating polyester resin, hemp fibers, and 2D graphene to develop an innovative composite material with enhanced properties. By strategically combining these components, we aim to achieve a delicate balance of mechanical strength, lightweight characteristics, electrical conductivity, and environmental sustainability. Hemp fibers, renowned for their natural robustness and lightweight nature, are seamlessly integrated into the composite structure, serving as a reinforcing phase. Meanwhile, the incorporation of 2D graphene structures as nano fillers imparts remarkable mechanical properties and bestows electrical conductivity upon the material. Simultaneously, the infusion of 2D graphene structures as nano fillers injects the composite with exceptional mechanical properties while conferring electrical conductivity, thus broadening its scope of potential applications. Acting as the matrix, polyester resin lends the necessary flexibility and resilience to the material, enhancing its overall performance and durability. The resulting composite material exhibits promising characteristics suitable for a diverse range of applications, spanning from automotive components to construction materials. Its unique blend of strength, flexibility, and electrical conductivity renders it highly desirable for industries where such multifaceted attributes are paramount. This study meticulously delves into the optimization of component ratios and manufacturing processes, aiming to unlock the full potential of this composite material. Ongoing research efforts are deemed crucial for a comprehensive understanding and refinement of its properties, ensuring its efficacy across various industrial sectors. Moreover, the adoption of natural fiber-reinforced composites holds significant promise in mitigating component costs and reducing material wastage, particularly in automotive applications. By embracing sustainable materials and innovative manufacturing techniques, we pave the way towards a greener, more eco-conscious future while simultaneously meeting the evolving demands of modern industry.

33	Investigation on Mechanical and Microstructural Properties of Friction Stir Welded Magnesium AZ31B Alloy"	Friction stir welding (FSW) is a solid-state joining process that uses frictional heat and pressure to bond materials together without melting them.In FSW, a rotating tool with a specially designed profile is plunged into the joint area between two pieces of material to be joined. As the tool traverses along the joint line, it generates frictional heat, softening the material and creating a plasticized zone. The tool also applies pressure, forcing the softened material to consolidate and form a solid-state bond. In this experimental investigation, friction stir welded (FSW) Mg AZ31B alloy is being studied. Friction stir welding (FSW) is conducted at varying rotational speeds, including 900 rpm, 1000 rpm, and 1100 rpm, with corresponding feed rates set at 20 mm/min, 30 mm/min, and 40 mm/min, respectively. In this investigation, the influence of both tool material and rotational speed on the microstructure and mechanical characteristics of the joint are explored. Notably, employing an HSS tool material at a rotational speed of 1100 rpm resulted in superior mechanical properties compared to those achieved at 900 rpm and 1000 rpm. The optimal process parameters are chosen to achieve a refined grain structure in the welded plate, thereby enhancing its microstructure and improving the mechanical and physical properties of the weld through friction stir welding.
34	INTERPRETATION OF MACHINING ASPECTS OF ZINCOXIDE DOPED VEGETABLE BASED NANO FLUIDS WITH GREY RELATION ANALYSIS	The process of turning is influenced by many factors such as cutting velocity, feed rate, depth of cut, geometry of cutting tool conditions etc. In this work, an attempt has been made to analyze the influence of cutting speed, feed rate and depth of cut on machinability characteristics such as surface roughness, material removal rate and flank wear using grey- relation analysis during turning of AISI steel hardened to 46±2 HRC using tungsten carbide tool. Wear developed at the flank face of the cutting tool insert reduces the life of the cutting tool and surface roughness at the machined surface reduces the quality of the component, the improvement in material removal rate which makes this study essential. The measured results were then collected and analyzed with the help of the Taguchi grey relation. The experiments were conducted using Taguchi experimental design technique.The effect of cutting parameters on surface roughness, flank wear and material removal rate was evaluated and the optimum cutting condition for minimizing the roughness value and wear rate with increase in the Material removal rate was also determined.
35	TRIBOLOGICAL AND STRUCTURAL PROPERTIES OF HVOF SPRAYED SUBSTRATE COATINGS	Austenitic stainless steel (SS) are widely used in many fields such as metallurgical, chemical, food, nuclear and biomedical industries due to its potential properties. In recent researches in the field of surface engineering is to improve the properties (corrosion resistance and wear resistance) of 304L SS for high performance and long time durability. Most recently, diamond like carbon (DLC) covered HVOF coatings are frequently considered as hard coatings due to their attractive

		tribo-mechanical properties. In the present work, DLC covered HVOF coatings will be deposited on 304L SS substrates using ratio frequency (RF) magnetron sputtering technique through High velocity oxygen fuel (HVOF). To optimize the tribo-mechanical properties of the nc-DLC covered HVOF coatings, the substrate temperature(Ts) will be varied as RT,100Ċ,200Ċ,300Ċ and 400Ċ .The microstructure and morphology of the nc-DLC covered HVOF coatings can be characterized by X Ray diffraction(XRD),atomic force microscope(AFM) and field emission Scanning Electron Microscope(FE-SEM).The nano-mechanical properties of the nc-DLC covered HVOF coatings will be measured by nano-indentation testing method.
36	A STUDY ON ELECTRICAL DISCHARGE MACHINING OF HYBRID POLYMER COMPOSITE	This study is an experimental investigation on the development of carbon Kevlar epoxy composite (CKEC) and its subsequent machining using micro-electrical discharge machining (μEDM). The mechanical performance of the laminated composites was studied in terms of tensile strength (TS) and elongation at break (EAB). Furthermore, through micro- holes were fabricated on CKEC using μEDM technique. Due to the inherent nature of poor electrical conductivity, it is a challenging task to perform machining on CKEC. However, through proper optimization of various machining parameters such as, voltage, pulse on time, and tool speed, the micro-machining of the CKEC using μ EDM was made feasible. The highest TS of 564 MPa was shown by CKEC containing 2 layers of Kevlar fabrics. The machining performance of CKEC was compared with that of carbon fiber reinforced polymer (CFRP). It was revealed that for fabricating one through-micro-hole on the CFRP laminate of approximately 1500 μm thickness, the machining time (MT) was 700 s. The corresponding value of MT for CKEC was 785 s depicting an increase of 12.14%. The quality of the hole in terms of circularity and overcut was better at the exit. The material removal during μEDM of CKEC was assisted by the deposited pyrolytic carbon and the rotating tool. The morphological study revealed that surface damages are inevitable during μ EDM of CKEC and these damages are more around the entry of the hole due to the side surface sparking of the tool electrode. The results of the study will be beneficial to researchers and manufacturers working on the development of micro-features on polymer composites for intended applications in aerospace, automotive, and sports goods industries.
37	Manufacture and Characterization of Nano Filler Strengthened Dissimilar AISI 1010 Steel-Copper Friction Stir Welded	Alloys of Copper have the immense capability for usage in a variety of industrial sectors including marine systems, construction,transportation, for encapsulating materialwastages especially nuclear wastes etc and this usage is possible mainly because of their superior thermal and electrical conductivities, a unique combination of ductility and strength, exemplary resistance to corrosion etc. In the contemporary scenario, the need for Copper (Cu) and its alloys are inevitable

		in various industrial sectors including automotive, marine, electronics etc. For instance, in automotive industries, relative weight is a decisive precedent in deciding the suitable metalfor truck and car radiators. Even though aluminium has been widely employed owing to itslow density feature, its inferiority in resistance to corrosion, repairability and thermal conductivity demands for an alternate, appropriate metal and alloys of Cu (especially CDA101 alloy), an environmentally congruent metal is preferred for this application, due to their low chemical reactivity, extreme level of resistance towards corrosion, highest degree of recyclability etc., thereby improving the energy efficiency of Cu based radiator cores to several times when compared with that of the Al based radiator cores. In addition to this, alloys of Cu are also widely employed in marine sector applications ranging from desalination and power plants to offshore gas and oil platforms, in manufacture of electrical components, complex architectural structures including plumbing, roofing, heat exchangers, etc.
38	Examination on the Impact of Framework on Ultra Structure Transitions and Strength During Joining of CDA101 Plates Using Friction Stir Welding	Alloys of Copper have the immense capability for usage in a variety of industrial sectors including marine systems, construction, transportation, for encapsulating material wastages especially nuclear wastes etc and this usage is possible mainly because of their superior thermal and electrical conductivities, a unique combination of ductility and strength, exemplary resistance to corrosion etc. In the contemporary scenario, the need for Copper (Cu) and its alloys are inevitable in various industrial sectors including automotive, marine, electronics etc. For instance, in automotive industries, relative weight is a decisive precedent in deciding the suitable metal for truck and car radiators. Even though aluminium has been widely employed owing to its low density feature, its inferiority in resistance to corrosion, repair ability and thermal conductivity demands for an alternate, appropriate metal and alloys of Cu (especially CDA 101 alloy), an environmentally congruent metal is preferred for this application, due to their low chemical reactivity, extreme level of resistance towards corrosion, highest degree of recycle ability etc., thereby improving the energy efficiency of Cu based radiator cores to several times when compared with that of the Al based radiator cores. In addition to this, alloys of Cu are also widely employed in marine sector applications ranging from desalination and power plants to offshore gas and oil platforms, in manufacture of electrical components, complex architectural structures including plumbing, roofing, heat ex changers, etc.
39	INVESTIGATION ON MECHANICAL BEHAVIOUR OF TUNGSTEN CARBIDE / REDMUD	The research article focuses on the development of Al6061 sustainable composites with the utilization of biomass waste through the use of stir casting process. Recycling industrial waste is essential for reducing environmental impact. Thus, the remud waste came from the aluminium

	HYBRID POWDERS REINFORCED WITH ALUMINIUM ALLOY METAL MATRIX COMPOSITES	production process, which was considered for producing the sustainable metal matrix composites (MMCs). Also, Tungsten carbide (WC) nanoparticles have been used to develop hybrid aluminum composite materials. The concentrations of redmud and tungsten carbide were by 2%, 4%, and 6%, and were used to achieve the desired strength performance of aluminium MMCs. Mechanical characterizations of aluminum hybrid sustainable composites were also investigated, including tensile, compression, and microharness testing. The results show that increasing reinforcement by up to 4% increases the mechanical strength of aluminum MMCs. The tensile, compression, and microhardness of MMCs are increased by 62.2%, 70.1% and 148%, respectively, as compared to AA6061 alloy. The surface morphology of metal matrix composites was analyzed by utilizing Fourier infrared scanning electron microscopy (FESEM).
40	ANALYSING THE PROPERTIES AND BEHAVIOUR OF ALUMINIUM 4043 METAL IN CMT ON DED	This final year project focuses on the comprehensive analysis and observation of the mechanical and welding properties of aluminum metal using the Directed Energy Deposition (DED) process, specifically incorporating the Cold Metal Transfer (CMT) technology. Aluminum, known for its lightweight yet durable characteristics, plays a pivotal role in various engineering applications, especially in industries such as aerospace and automotive. The project's primary objective is to evaluate the mechanical properties of aluminum after undergoing the DED process with CMT welding. Through a meticulously designed experimental setup, the project aims to investigate factors such as tensile strength, hardness, and microstructure changes resulting from the welding process. Furthermore, the welding quality and integrity of the aluminum joints produced using CMT in DED will be thoroughly examined and analyzed. To achieve these objectives, the project employs advanced testing methodologies and equipment, including tensile testing machines, hardness testers, microscopy techniques, and welding inspection tools. The experimental process involves selecting appropriate aluminum alloys, optimizing welding parameters, and conducting systematic testing procedures to gather accurate data. The significance of this project lies in its potential contributions to enhancing the understanding and utilization of CMT technology in the DED process for aluminum welding. By analyzing the mechanical properties and welding quality, valuable insights can be gained.
41	DESIGN AND DEVELOPMENT OF COST OPERATIVE ELECTRONIC IGNITION DRIVER CIRCUIT FOR GDI ENGINE	In recent developing automotive vehicles, electronically controlled ignition timing control is one of the major control parameters towards superior combustion process and emission control strategy. The cost of the entire ignition driver circuit is higher and it’s merged with the fuel injection driver circuit along with the microcontroller board. Need to be replacing the entire electronic control unit instead of replacing only the fault ignition driver component. To overcome

		this disadvantage, the cost operative electronically controlled ignition driver circuit was developed and tested. With the developed ignition driver, the ignition timing was controlled using Arduino Uno controller, Hall Effect sensor used as CAM/Crank position sensor, and L298N motor driver circuit used to trigger the time of ignition through coil on plug type ignition coil. Using these cost operative electronic components, the ignition timing was varied effectively at different crank angles using gasoline direct injection engine.
42	Manufacturing of Functionally Graded Pipe (SS347/Inconel 625) Through Wire Arc Additive Manufacturing for Nuclear Power Applications	A major advancement in additive manufacturing technology has been made with the creation of a Functionally Graded Material (FGM) pipe made of Inconel 625 and SS 347 using Wire Arc Additive Manufacturing (WAAM) based on Cold Metal Transfer (CMT). Through process variable optimisation, this work overcame the difficulties in obtaining inhomogeneous microstructures in FGMs and produced defect-free fabrication. When combined with coarsened grains, the presence of Niobium Carbide (NbC) and Laves phases at the interface produced improved strength qualities than traditional SS 347. The complex temperature history encountered during manufacturing was identified as the cause of microstructural differences, hence clarifying the significance of process factors. The results of the simulation correctly confirmed the results of the experiments, confirming the effectiveness of the selected fabrication method. The resultant pipe has characteristics that make it perfect for harsh uses in pipeline systems and pressure vessels in the nuclear, aerospace, and marine industries. This accomplishment signals the beginning of many breakthroughs in additive manufacturing technologies and their broad industrial adoption. It also highlights the promise of CMT-based WAAM in making high-performance, customised components with customisable material properties.
43	ADDITIVELY FABRICATEDS AND WICH STRUCTURE FOR FUNCTIONAL APPLICATION	This project explores the mechanical characteristics and microstructure of multilayer components fabricated via Cold Metal Transfer (CMT)-based wire arc additive manufacturing (WAAM). Comprising layers of mild steel, stainless steel 347 (SS347), and Inconel 625, these components are designed to leverage the distinct properties of each material. Through mechanical tests (Tensile, Bend and Hardness) alongside microstructural analysis using optical and scanning electron microscopy, the study assesses the performance and integrity of the fabricated sandwich structure. The results indicate enhanced mechanical properties and well-bonded interfaces between layers, indicating the potential of CMT-based WAAM for producing functional components with tailored material properties. This research contributes to advancing the understanding of additive manufacturing techniques, particularly in the context of multilayer component fabrication. The findings highlight the feasibility of employing CMT-based WAAM

		in diverse industrial sectors requiring components with enhanced mechanical performance and specific material characteristics.
44	APPROACH AND EFFECT OF DIFFERENT CUTTING INSERT SON MACHINING EN24 STEEL FOR THE GENERATED SURFACE PROFILE AND WEAR DEBRIS	Hard turning is an useful alternative method to the conventionally available fine finishing processes. The hard turning is performed in dry condition enables from the problem of disposal of cutting fluids, with an advantage of no health hazards to workers and free from environmental air and water pollution's. But the usual hard turning techniques which performed in dry conditions lead to reduced tool life because of enormous heat generations and severe mechanical loads at cutting zone and thus in turn affect some of the vital machinability aspects: surface finish of machined components, performance of cutting tools, cutting power consumption of machine tools, chip formations and other associated benefits. Hence in this research work, an attempt was made to diminish the above said difficulties through employing the eco-friendly air cooling technique in hard turning process i.e. machining with following any one cutting environment: dry condition, compressed air and chilled air. The hardened work material AISI H13 tool steels, extremely tough matrix high speed tool steel had taken and turned on rigid CNC turning center with the aid of coated ceramic cutting inserts with wiper and without wiper geometry profile. The vital process control parameters like cutting speed, feed rate, depth of cut, tool geometry, work-piece hardness, cutting environment were considered in order to study their influence on various machinability aspects: surface roughness, cutting power, power consumption, cutting force, material removal rate, tool-chip interface temperature, tool wear and chip forms during the hard turning process.
45	DEVELOPMENT OF PARALLEL MANIPULATOR MECHANISM WITH SHAPE MEMORY ALLOY: KINEMATIC APPROACH & EXPERIMENTAL	This study presents the design, kinematic analysis, and experimental validation of a novel parallel manipulator mechanism incorporating shape memory alloy (SMA) actuators. The utilization of SMAs offers unique advantages, such as high-power density and lightweight characteristics, enhancing the overall performance of the manipulator. The kinematic approach involves a comprehensive analysis of the mechanism’s geometric configuration, examining the relationships between joint variables and end- effector pose. To validate the theoretical findings, a physical prototype of the parallel manipulator is constructed, integrating SMA actuators. Experimental tests are conducted to assess the real- world performance, including precision, speed, and energy efficiency. The results obtained from the experiments are compared with the theoretical predictions, confirming the effectiveness of the proposed kinematic approach and highlighting the practical viability of the SMA-based parallel manipulator. This research contributes to the

		advancement of parallel manipulator mechanisms by integrating innovative materials, specifically SMA.
46	ENHANCEMENT OF HPDC SPRAY BUNDEL USING DIGITALT WIN CONCEPT	In this project begins by elucidating the foundational concepts of digital twin technology and its evolution in industrial settings, emphasizing its role as a virtual replica of physical assets. Furthermore, it delves into the critical functionalities and enhancement of High Pressure Die Casting spray nozzles in industrial operations, elucidating their pivotal role in processes ranging from manufacturing to precision components. The findings underscore the transformative potential of this integration in enhancing operational efficiency, minimizing downtime, and fostering sustainable practices across industries. The integration of digital twin technology with spray nozzle systems presents a revolutionary approach to optimize industrial processes. In high pressure die casting machines the conventional spray coat bundles used for the process is replaced by single spray bundle that can be controlled in vice versa in both alignments are performed using the digital twin. Elucidate how digital twins enable precise simulations, predictive analytics, and proactive adjustments in spray nozzle behavior, ultimately leading to improved productivity, resource utilization, and cost-effectiveness. Additionally, challenges pertaining to data integration, security, and computational complexities are addressed, offering insights into mitigating these obstacles for seamless adoption and implementation.
47	ENHANCING MECHANICAL PROPERTIES OF SILICONE MATRIX REINFORCED WITH GRAPHENE	The project delves into enhancing the mechanical properties of silicone, a highly versatile material in material science. Despite its widespread use owing to its flexibility, biocompatibility, and thermal stability, silicone often lacks the necessary mechanical strength and stiffness for demanding applications. To address this, the study aims to augment the mechanical properties of silicone by integrating reinforcements such as graphene, ceramics, or polymers. Of these options, graphene is chosen due to its two-dimensional structure and expansive surface area, promising superior enhancements. Utilizing a relatively straightforward and cost-effective method, mechanical mixing (specifically, stir casting) is employed to disperse graphene within the silicone matrix. Three weight proportions of graphene (0.4wt%, 0.45wt%, and 0.5wt%) are tested to assess their impact on the mechanical properties. Various mechanical tests, including tensile strength, compression resistance, hardness, and wear resistance, are conducted post-mixing to evaluate the composite material's performance. The results demonstrate significant improvements across these mechanical properties compared to pristine silicone. Complementary techniques such as Raman spectroscopy and Fourier Transform Infrared Spectroscopy (FTIR) are employed to analyze structural changes, chemical interactions, and functional groups within the composite matrix,

		providing detailed insights into its composition and properties. These findings underscore the efficacy of incorporating Graphene nano powder into the silicone matrix for enhancing its mechanical attributes, thus suggesting potential applications across diverse engineering and industrial domains.
48	Fabrication and Electrical Discharge Machining Studies on Aluminium-Boron Carbide-Graphite Hybrid Metal Matrix Composites	This project aims to fabricate the Al-B4C-Graphite Hybrid Metal Matrix Composites- MMC (Al-B4C -Graphite) using a two-step stir casting method. Mechanical properties of Al- B4C-Graphite were evaluated and also EDM machining studies were carried out. It is observed that the hardness of the composites is strength, and impact strength. Machinability studies were carried out on fabricated composite by Electrical Discharge Machining (EDM) process. Also EDM process parameters optimization were carried out using Taguchi L9 orthogonal array with input parameter such as pulse on time, pulse off time and current density for the material removal rate (MRR) and tool wear rate (TWR) as response parameters. It is observed that current density and pulse on time is the most influential parameters increased with increasing in B4C reinforcement. It had been found that increasing the graphite content within the aluminum matrix results in significant increase in the ductility, ultimate tensile strength, yield for the MRR.
49	EXPERIMENTATION AND ANALYZING AL7075 COMPOSITES THROUGH ABRASIVE WATER JET MACHINING	Aluminium alloy composite materials are widely sought-after for highly scientific applications worldwide because of their low weight, high strength, and improved tribological qualities. Using the sand mold method in an electric resistance furnace, Al7075 hybrid composite was produced. The mechanical properties of Al7075, B4C, and C hybrid composites with a B4C weight percentage of 6% and stable C contents of 6% were investigated in this work. Microstructure analysis, hardness, and tensile and compressive strength were among the mechanical properties evaluated in both pure and cast specimens. The ASTM standard was used in this study's experimental investigation and validation of the hybrid composites' mechanical properties constructed of Al7075 alloy. Results indicated that mechanical properties including compressive strength and hardness were enhanced while tensile strength was decreased when hard ceramic particles (B4C/C) were introduced to a matrix alloy (Al7075).
50	EXPERIMENTAL CHARACTERIZATION OF METALLURGICAL AND MECHANICAL FEATURES IN ALUMINIUM COMPOSITES FOR AUTOMOBILE APPLICATIONS	Al-MMCs are renowned for their lightweight, low density, and superior high- temperature mechanical properties, making them a popular choice in diverse fields such as aerospace, structural engineering, oceanic, and automobile applications. The fabrication of these Al-MMCs was meticulously carried out through the stir casting process. The study conducted a thorough analysis of the tensile strength, impact strength, and hardness of the composites. The results revealed a notable improvement in the mechanical properties of the boron carbide and graphene-

		reinforced Al-MMC when compared to pure aluminum. A significant observation was that the addition of these reinforcements greatly enhanced the wear resistance of the Al-MMC. The results strongly suggest that the incorporation of boron carbide and graphene in the matrix alloy can significantly boost the compressive and tensile strength, as well as the wear resistance, of the aluminium hybrid composite. This research is a significant contribution to the ongoing development and optimization of materials for constructional alloys. It provides valuable insights that could pave the way for the creation of more efficient and durable materials in the future. The findings of this study have the potential to drive innovation in the manufacturing of high-performance composites for various applications.
51	DESIGN AND DEVELOPMENT OF ENGINE MOUNT ASSEMBLY TOOL WORK STATION	This Report presents a case study focusing on the product development process within an engine mounts manufacturing company. Notably, the company adopted a distinctive strategy where the design and mounts production were distinct from the design and production of the mounts. Employing a participatory ergonomics approach, a collaborative effort involving designers, production engineers from various plants, and ergonomics researchers. Multiple methods were employed to enhance the product design of the new mounts, emphasizing both productivity and ergonomics in the assembly process. The comprehensive approach included analyses of ongoing mounts production, simulations conducted by experienced workers using prototypes, and computer Rula analysis. The outcomes of this participatory ergonomics approach led to redesigns, significantly improving both the efficiency and ergonomics of assembly operations. The study concludes that this distinctive participatory ergonomics approach, denoted as Participatory Ergonomics Design (PED), alongside other methodologies, holds the potential to enhance communication and collaboration. This article delivers the ergonomic assessment of manpower by victimization methods acknowledged as RULA (Rapid Upper Body Assessment) and REBA (Rapid Entire Body Assessment).
52	EXPERIMENTAL AND NUMERICAL INVESTIGATION OF COMPRESSION BEHAVIOR OF ADDITIVE MANUFACTURED LATTICE STRUCTURES	The crystal lattice structure exhibits excellent properties of energy absorption with great stability and low mass than solid material. It can be fabricated into different structures as per the need of the hour and it makes attractive for a vast field of application like aerospace, defence, and automobile industries. It is utilized in various fields due to their high specific strength, modulus, and energy absorption. Additive manufacturing (AM) is an added advantage to the lattice structure because complicated structures can be easily fabricated which gives an ease to the design constraint. AM is far superior to conventional manufacturing process due to its wide ability, material saving, and design flexibility for fabrication. The main objective of this study is to

		discuss the compression behavior of six different schematic designs of lattice structures produced using Acrylonitrile Butadiene Styrene (ABS) in Fused Deposition Modeling (FDM). The specimens of dimension 50x50x50 mm3 are designed as a cubic system. All specimens are subjected to compression and its behavior is observed. The force displacement curves of all the lattice structures are plotted and results are interpreted by using finite element analysis methodologies and concluded by comparing with experimentation values. This study discusses design methods, compression behavior and performance of lattice structures.
53	STUDY OF MACHINABILITY ANALYSIS AND MICRO STRUCTURE CHARACTERISTICS ON IN CONEL 625 USING WIRE EDM	In modern machining process the non-traditional machining process is a milestone of machining in manufacturing industries. The non-traditional machining process like Electro discharge machining (EDM) and wire electric discharge machining (WEDM) plays a vital role in precision manufacturing industries like automobile, aerospace and sheet metal industries. The present research work is to study the effects of various process parameters of WEDM such as wire feed, wire speed, pulse time on and pulse time off on Material Removal Rate (MRR) and Surface Roughness (Ra) and to obtain the optimal sets of process parameters. This work presents a logical and systematic procedure using Grey relational analysis (GRA), Response surface methodology (RSM) and MINITAB 16 SOFTWARE are used to optimize the operating parameters of WEDM for Aluminium silicon carbide composite(Al/SiCp) and Magnesium silicon carbide composite (Mg/SiCp). The experiments are conducted in SPRINT CUT 734 DI WATER WEDM for through hole drilling on Al/SiCp & Mg/SiCp materials. The tool material was Molybdenum wire. The observations of the machining process are based on L9 orthogonal array for optimizing the process parameters for these composite. The two responses are converted into Grey relational grade (GRG) using Grey relational analysis (GRA). Validity and creativeness of the developed mathematical models have also been tested.
54	ENHANCEMENT OF WELD QUALITY FOR DISSIMILAR METAL TIG WELDING OF INCONEL 600 AND SS 304	The welding of dissimilar materials, such as Inconel 600 and SS 304, presents challenges due to their distinct metallurgical properties and compatibility issues. This study focuses on optimizing weld parameters for Tungsten Inert Gas (TIG) welding of these alloys to achieve robust and reliable joints. Inconel 600 is known for its high temperature resistance and corrosion properties, while SS 304 offers excellent mechanical strength and weldability. However, welding these alloys together demands precise control over welding parameters to ensure the integrity of the joint. The research methodology involves systematic experimentation and material testing methods such as scanning electron microscopy (SEM), tensile testing, and radiographic inspection to investigate the effects of key welding parameters, including welding current, voltage, travel speed, and

		shielding gas flow rate, on the quality and performance of the welds. By varying these parameters within specified ranges and employing statistical optimization techniques, the optimal combination of parameters is determined to enhance weld quality and mechanical properties. The findings of this study contribute to advancing the understanding of TIG welding of dissimilar alloys, particularly Inconel 600 and SS 304, and offer practical guidance for optimizing weld parameters in industrial applications.
55	ENHANCEMENT OF WELD QUALITY FOR SIMILAR METAL TIG WELDING OF HASTELLOY C276	HASTELLOY C276 is a Nickel-chromium-molybdenum wrought alloy that is considered the most versatile corrosion resistant alloy available. This alloy is resistant to the formation of grain boundary precipitates in the weld heat-affected zone, thus making it suitable for most chemical process applications in an as welded condition. Alloy C-276 also has excellent resistance to pitting, stress- corrosion cracking and oxidizing atmospheres up to 1900°F. Alloy C-276 has exceptional resistance to a wide variety of chemical environments. TIG Welding is a welding technology used to join several metal components. Tungsten inert gas produces a arc of high-intensity that is concentrated into one spot. This concentrated heat source enables fine, deep welding and high welding speeds. This experiment reports on a study of mechanical and microstructure properties of alloy C276 usingTIG welding. The scope includes conducting tests related to determine the mechanical properties of the alloy, determining the tensile and hardness strength and presenting the microstructure of metal. Alloys C276 have been given a lot of attention mainly for their innovative use in practical medical applications. These motives led to understand deformation mechanisms, particularly tensile fracture behaviors. In this research, tensile properties will be investigated for similar composition Alloy C276 samples.
56	ENHANCED PROPERTIES OF ALUMINIUM COMPOSITES VIA POWDER METAL LURGYIN CORPORATING TiB2 AND GRAPHENE	This research investigates the thermal conductivity and mechanical properties of a novel composite material comprising aluminium reinforced with titanium diboride (TiB2) and graphene nanoparticles. The primary objective is to optimize these characteristics for superior heat dissipation performance and mechanical strength. The fabrication process involves meticulous control, employing advanced manufacturing techniques, followed by stringent characterization utilizing established experimental methods. Various concentrations of graphene nanoplates (GNPs) were explored to assess interface bonding in aluminium alloy composites. Using ball milling and pressure-less vacuum sintering, graphene-reinforced hybrid nanocomposite samples were produced. Experimental results demonstrate substantial improvements in both thermal conductivity and mechanical strength due to deliberate incorporation of TiB2 and graphene nanoparticles. These findings provide invaluable insights and hold promising applications across

		diverse industries requiring robust thermal management and superior mechanical performance, contributing significantly to the field of composite material engineering.
57	FABRICATION OF ALUMINIUM AND GRAPHENE COMPONENT WITH DIFFERENT COMPOSITION AND STUDYING THEIR METALLURGICAL PROPERTIES	The Report investigates the fabrication and metallurgical properties of aluminium- graphene composites with varying graphene compositions. The research aims to understand how different graphene content affects the microstructure and mechanical behavior of the composite material. Aluminium and graphene powder will be utilized, employing fabrication techniques like powder metallurgy or rolling processes. Fabricated composites will undergo characterization to assess their microstructure, including distribution of graphene platelets within the aluminium matrix. Subsequently, the mechanical properties, such as tensile strength, hardness, and wear resistance, will be evaluated. The correlation between the composition and the observed properties will be established. All samples are subjected to SEM microscopic examination and experimental wear behavior study. The experiment's goal is to measure the wear loss of different compositions of graphene. The tribological experiment was carried out according to ASTM G 99-95 standards on pin-on-disc friction and wear testing machine with disc material: EN-31 steel. These Composites are an excellent material for a variety of applications, including aeronautical, automotive, electric, electrical, and mechanical qualities. This research is expected to contribute to the development of novel aluminium composites with enhanced functionalities by incorporating graphene's unique properties. The findings can guide future applications in various sectors demanding lightweight materials with superior strength and wear resistance.
58	DESIGN AND FABRICATION OF MIST COLLECTOR FOR CNC MACHINE	This project endeavors to address the occupational health and environmental concerns arising from the mist generated during the operation of CNC (Computer Numerical Control) machines. The pervasive issue of airborne contaminants, composed of fine particulate matter and oils, poses a threat to both the operators' well-being and the overall workshop environment. The objective of this undertaking is to design and fabricate an efficient mist collector system tailored for CNC machines, providing a cost-effective and sustainable solution. The proposed mist collector system is meticulously designed to capture and filter the mist generated during CNC machining processes. Comprehensive research into mist collection technologies, market- available systems, and CNC machine specifications informs the development of a system that balances effectiveness, durability, and economic viability. Key components of the mist collector include specially selected filters capable of capturing fine particles and oils, a high-performance fan or blower to ensure optimal airflow, and a robust housing designed to seamlessly integrate with the CNC machine.

		The ducting system is engineered for efficiency, ensuring the effective capture and filtration of mist particles.
59	STUDIES AND EVALUATION OF ABRASIVE WATER JET MACHINING TECHNIQUES OF ALUMINIUM ALLOY	Metal matrix composites are difficult to machine in traditional machining methods. Abrasive water jet machining is a state-of-the art technology which enables machining of practically all engineering materials. Abrasive water jetmachining is a very efficient machining process which overcomes tool wear issues and cutting temperature issues. This experimental investigates a particular study performed on hybrid metal matrix composites prepared by AA6082 and reinforced with 3% Wc, 1.5% Al 2 O 3 in aluminum alloy and processed with abrasive water jets that are formed with garnet 80 mesh size. All output responses majorly influence with traverse speed and roundness error only influenced with Water Pressure. Although developing the statistical models for predicting the machining characteristics and geometrical accuracy and the study carried out in this work would help to choose the parameters carefully.
60	MECHANICAL CHARACTERIZATION OF DISSIMILAR METALS AA1200-H14(AS) and AA1200-H14(RS) PLATES WELDED USING FRICTION STIR WELDING	AA1200 aluminium alloys possess some unique properties like light in weight and high strength to weight ratio. They are becoming the most popularly used medium strength aluminium alloy in aerospace, marine, automobile and structural industries. With increased use of aluminium alloys in industries, a reliable joining technique needs to be developed for the effective utilization of aluminium alloys. Friction Stir Welding (FSW) are the most extensive gas shielded arc welding processes used in joining of aluminium and its alloys due to their preferable flexibility and economy. But there are few problems like low welding speed, partial penetration and lack of the deposited metal occurred during this process. High solubility of hydrogen and other atmospheric gases in the molten state and formation of oxide layer are the major problems associated with this kind of joining process. Hence in this research, an attempt was made to increase the welding speed, to reduce the porosity and to maximize the mechanical properties of the FSW joints by the introduction the weld pool. In this investigation, Bead on plate welding is performed on AA1200 aluminium alloy plate at different combinations of input like tool rotational speed and welding speed. There are no input parameters like welding current (I), welding speed (S) and alternating frequencies of shielding gases (T). From the bead on plate welding experiments, the influence of alternating shielding gases on the bead profile characteristics like depth of penetration, area of penetration, width of weld, reinforcement height, wetting angle and percentage of dilution have been studied. FSW joints were fabricated using alternating current with the help of automated welding machines. The joints were evaluated by conducting tensile tests using universal testing machine and interface hardness were found using Vickers hardness testing equipment.

		Microscopic examinations and characterizations of the joints were done using Optical Microscopy (OM).
61	MECHANICAL BEHAVIOUR OF CERAMIC MATERIAL ADDED 3D PRINTED POLYMERIC COMPOSITE	The Fused Deposition Modelling (FDM) is one of the additive manufacturing techniques which is largely used for printing of metal / thermoplastic materials with ease of design flexibilities. Poly Lactic Acid (PLA) is to be used as polymer matrix and the ceramic particles were used as particle reinforcement for the composite preparation. By varying the parameters of the additive manufacturing process, the mechanical property of the material is to be analysed. In this project the compression strength of the PLA reinforced ceramic composite tubes has been analysed. The process optimization is done to analyse the compressive properties of the ceramic particle reinforced polymer composite with respect to various printing conditions. As a result of the project the relation between the various parameter like infill density, infill orientation, printing temperature has been varied to understand the compressive behaviour of the 3d printed composite analysed. The percentage contribution of each parameter with respect to compression strength response of the prepared sample is experimentally predicted by this study. Infill density has a major contribution of 78.97%, followed by a printing orientation of 14.56%. The remaining parameters, such as printing temperature and printing speed, have minor contributions of 2.03 and 1.56%, respectively.
62	Red Team and Intrusion detection system simulatuion	This paper presents a comprehensive approach to enhancing cybersecurity through the utilization of red teaming and intrusion detection system (IDS) simulation. Red teaming involves the proactive identification of vulnerabilities and weaknesses in a system through simulated attacks, while IDS simulation focuses on evaluating the effectiveness of intrusion detection mechanisms. By integrating these two techniques, organizations can better prepare for and mitigate cyber threats. This paper outlines the process of implementing red teaming and IDS simulation, discusses their benefits, and presents case studies demonstrating their effectiveness in real-world scenarios. The results highlight the importance of proactive cybersecurity measures in today's increasingly complex threat landscape.
63	INTELLIGENT FAULT MONITORING OF MACHINE USING SUPERVISED MACHINE LEARNING TECHNIQUES	Machine Failure, or Intelligent retrieval of machine from failure, is any event in which a piece of industrial machinery underperforms, whether entirely or partially, or stops functioning in the way in which it was intended to. Failures can happen quickly if equipment is not properly cleaned, lubricated, and maintained.Data mining is a commonly used technique for processing enormous data. Researchers apply several data mining and machine learning techniques to analyze huge

		complex data, helping equipment professionals to predict failure of the machine. Different algorithms are compared and the best model is used for predicting the outcome.
64	Quantum immunity: Fortifying digital security through postQuantum crptography	This project delves into the pressing need for quantum-resistant cryptographic algorithms in light of the impending threat posed by quantum computers to traditional encryption methods. With the advent of quantum computing, current cryptographic schemes are at risk of being compromised, potentially undermining the security of digital transactions and communications. This research endeavors to explore the transition towards post-quantum cryptography to ensure the resilience of encryption mechanisms in safeguarding sensitive data and transactions in everyday scenarios. The project commences with an in-depth analysis of the vulnerabilities inherent in conventional cryptographic algorithms, such as RSA and ECC, when confronted with quantum computing capabilities. Through a comprehensive review of emerging post-quantum cryptographic algorithms, including hash-based, lattice-based, and code-based cryptography, this study identifies promising alternatives capable of withstanding quantum attacks.
65	DIMENSIONAL DREAMS: UNLEASHING THE FUTURE WITH AUTOMATED SHOPPING!	Dream beyond traditional shopping experiences with 'Dimensional Dreams,' a groundbreaking project poised to revolutionize the retail landscape. This innovative endeavor introduces Automated Shopping, transcending conventional boundaries to immerse consumers in a dynamic and personalized purchasing journey.
66	FashioGuide: Outfit Trial and Recommendation Website using OpenCV and Deep Convolutional Neural Networks	During the pandemic, the apparel industry—a major economic force—saw difficulties, with conventional retailers particularly hard hit. Brick and mortar retailers still have to deal with problems like long lines and unhygienic in store testing even as the pandemic fades. Online shopping has become increasingly popular as a tempting alternative. Nevertheless, the trial experience continues to be challenging. In order to solve this, our platform includes a virtual try-on function that gives users a true sense of how the clothing feels in their exact size. This invention problems with conventional in-store trials and improves the online shopping experience. Our model, which makes use of ResNet50 and OpenCV, achieves a remarkable 98% accuracy, which speeds up the buying process and gives users trust. The Tryon concept, which combines ease of use, personalization, and state-of-the-art technology, is a revolution in the textile business that could have a big market influence. The platform ushers in a new age in online fashion retail by revolutionizing how consumers approach and enjoy online purchasing.
67	A Survey of Cyber Security Approaches for Prediction	This paper provides an overview of related prediction techniques used in the field of cyber security, and discusses three main types of cyber security prediction tasks: projection and intention recognition of multi-stage or persistent network attack, prediction of other network attacks, and

		network security situation forecasting. Attack intention recognition could analyse the attacker's attack intention, or predict the attacker's ultimate goal. The prediction of cyber-attacks will discuss in more detail what kind of attack will happen when and where. Network security situation forecasting refers to the prediction of the global network security situation. This paper specifically studies the methods and implementation techniques to solve these tasks. In this survey, we find that although the implementation technologies of research topics with similar theoretical background are usually complementary, the application technologies of different research directions have different selection tendencies based on the specific situation of cyber security field.
68	Optimizing evaluation metrics and image segmentation models using deep learning algorithm.	This paper presents a robust methodology for image segmentation leveraging Mask R- CNN, a state-of-the-art deep learning model. The proposed approach combines object detection, classification, and instance segmentation, providing accurate and detailed delineation of objects within images. Extensive experiments demonstrate the model's efficacy in various domains, showcasing its potential for applications in medical imaging, autonomous systems, and industrial inspection. The integration of probabilistic reasoning enhances segmentation precision, making the proposed method a versatile
69	Subnetwork lossless robust watermarking for hostile theft attacks in deep transfer learning models	Steganography, which comes from the Greek terms "steganos" (which means covered) and "graphy" (which means writing), is the technique of hiding confidential data inside of what appear to be innocent carriers, like text, audio files, or photos, in order to prevent unauthorized people from discovering it. Steganography seeks to conceal the message's very existence, as contrast to cryptography, which concentrates on encrypting messages to render them unintelligible. This method has its roots in the old practice of writing secret messages on parchment and covering them with wax. Steganography, in the digital age, is the process of embedding data into digital media files by slightly changing its content, like the amplitude of audio samples or the least important pixels in an image. Digital technological advancements have resulted in the creation of complex steganographic methods that can incorporate substantial amounts of data while being undetectable to the human eye. Steganography is used in many different domains, such as digital watermarking, forensic investigation, copyright protection, and covert communication. However, because it can support illegal operations like terrorism, espionage, and intellectual property theft, its use presents moral and legal questions. Steganography research is still essential to comprehending how information might be safeguarded and concealed in an increasingly digital environment as technology develops.

70	Symmetry breaking of pure quadric soliton with logarithmic nonlinearity in Scarff-II PT symmetric potential	Symmetry breaking phenomena has been a focal point in the study of soliton dynamics, particularly in the realm of nonlinear systems. In this report, we investigate the relationship between symmetry breaking, soliton dynamics, and logarithmic non-linearity with PT symmetric potentials. Specifically, we examine the behavior of pure quadric solitons under the influence of logarithmic nonlinearity within Scarff-II PT symmetric potentials.
71	SMS SPAM FILTERING USING ML	Short Message Service (SMS) has become an essential part of our daily lives as mobile technology has grown exponentially, allowing for quick and convenient contact. However, this convenience is frequently undermined by an endless stream of spam messages, which not only disturb users' conversation but also pose security and privacy risks. In answer to this problem, our final year computer science project focuses on the creation of an intelligent SMS spam filtering system that employs machine learning techniques Traditional rule-based filtering techniques, which are frequently used by messaging platforms or mobile carriers, generally depend on pre-established rules or heuristics to recognise and eliminate spam communications. Although these techniques might provide some protection, their capacity to adjust to the ever-changing nature of spam communications is intrinsically restricted.
72	ADVANCED COMPUTER VISION FOR AUGMENTED IMAGE AND VIDEO ANALYSIS	This document is a study to assess advanced com puter vision, which has become a rapidly evolving field that is changing the way we look at and understand images and videos. Recent advances in image and video analysis have made it possible to use these technologies to a wide range of industries, including autonomous systems, robotics, healthcare, and surveil lance. This abstract provides a summary of recent advancements in computer vision methodologies, algorithms, and techniques utilized in image and video analysis. In conclusion, the field of computer vision has seen remarkable advancements in image and video analysis. Two instances of deep learning techniques that have been applied to improve accuracy, robustness, and efficiency in a range of applications are recurrent neural networks (RNNs) and CNNs.
73	Dynamic synthesis immersive virtual environments for enhanced web -based 3D product visualization and interaction	Online shopping has transformed the retail landscape, offering unparalleled convenience and functionality. With the freedom of unlimited opening hours, customers can browse and purchase products at their convenience, unrestricted by traditional store hours. Additionally, online platforms provide a vast array of products and services, complemented by easy access to reviews and comparisons, thereby enhancing the overall shopping experience. However, challenges such as complex categorization and limited product visualization persist, potentially resulting in dissatisfaction or returns.

74	BARBARIK : The reconnaissance guardian - A comprehensive security analysis tool	In today's interconnected world, proactive cybersecurity is paramount. Reconnaissance Guardian is a comprehensive security analysis and reconnaissance tool designed to empower individuals and organizations to fortify their digital defenses. This innovative tool blends the power of Open Source Intelligence (OSINT) with advanced Python-based techniques to deliver a suite of essential security analysis features. Reconnaissance Guardian delves into the complexities of username analysis, network traffic monitoring, and password strength assessment, uncovering potential vulnerabilities that could be exploited by malicious actors. Beyond simply identifying weaknesses, Reconnaissance Guardian delivers actionable insights. It intelligently analyzes investigation findings and provides tailored recommendations to help users craft stronger passwords, implement robust file encryption, and optimize network security configurations. Reconnaissance Guardian emphasizes the value of proactive reconnaissance, empowering users to stay ahead of evolving cyber threats and take a proactive stance in safeguarding the integrity of their sensitive information and online assets.
75	A Custom neural network paradigm for intricate anomalous activity identification in supply chain analytics.	In this study, we aimed to detect fraudulent activities in the supply chain through the use of neural networks. The study focused on building two machine learning models using the MLPClassifier algorithm from the scikit-learn library and a custom neural network using the Keras library in Python. Both models were trained and tested on the DataCo Supply Chain dataset. The results showed that the custom neural network achieved an accuracy of 97.67% in detecting fraudulent transactions, demonstrating its potential to minimize financial losses for organizations.
76	Unleasing creativity: The potential of an AI image generator	The AI Image Generator is a cutting edge deep learning model that harnesses the power of artificial intelligence to create high-quality images from textualdescriptions. Similar to DALL E, the model is based on a transformer architecture and is trained on a vast dataset of image-caption pairs. During training, the model learns to map textual descriptions to visual features, which allows it to generate images that are both specific and nuanced. This capability opens up new possibilities for creative applications such as digital art, graphic design, and visual storytelling. One of the key strengths of the AI Image Generator is its ability to generate images that are tailored to specific needs and preferences. For example, the model can create images of objects in specific colors, sizes, and shapes or produce images that reflect particular moods or emotions. This flexibility enables designers and content creators to generate custom images quickly and easily, without the need for specialized training or expertise. As a result, the AI Image Generator has the potential to transform the field of digital content creation, making it more accessible and inclusive.

77	AI ART GENERATION USING GAN	Generative Adversarial Networks (GANs) have be come increasingly prominent for their ability to generate diverse and realistic images. These neural networks hold significant potential across various domains, demonstrating their efficacy in practical applications and can be related to [1]. This paper provides an overview of GANs, elucidating their underlying mechanisms and efficiency when integrated with complementary technologies. Furthermore, it explores the application of GANs in transforming textual input into visually compelling images, high lighting their versatility and adaptability in creative endeavors. Through a comprehensive examination, this paper elucidates the multifaceted capabilities of GANs and their role in advancing image generation technologies
78	DEVICE CONTROL USING HAND GESTURES AND SPEECH RECOGNITION	"Device Control Using Hand and Speech Recognition" is a significant advancement in human-computer interaction. It employs advanced algorithms to recognize hand gestures and speech commands, providing a versatile control mechanism for devices. The system is user- friendly, adaptable, and operates in real-time, offering immediate feedback. It demonstrated high accuracy during testing and has potential applications in various fields, including home automation and healthcare. While the project has shown promising results, there is scope for future work in exploring more complex recognition algorithms, integrating with a wider range of devices, and enhancing user experience and customization.
79	Intrusion detection system using memory based learning approach	Network Intrusion Detection Systems (NIDS) play a critical role in protecting computer networks from various security threats and attacks. As the complexity and frequency of network attacks continue to evolve, there is a growing need for advanced analytics techniques to enhance the detection and response capabilities of NIDS. This research focuses on the development and utilization of analytics methods for network intrusion detection systems. The goal is to leverage these techniques to improve the accuracy, efficiency, and effectiveness of NIDS in identifying and mitigating security breaches. Various types of NIDS, including signature-based and anomaly-based systems, are discussed, highlighting their strengths and limitations. Overall, this research aims to advance the field of network intrusion detection by leveraging analytics techniques to enhance the capabilities of NIDS. The proposed methods offer the potential to improve the accuracy of attack detection, reduce false positives, enable efficient processing of big data, and facilitate automated incident response. The findings of this research will contribute to the development of more robust and effective network security systems in the face of ever-evolving cyber threats.

80	INDOOR NAVIGATION SYSTEM FOR VISUALLY IMPAIRED PEOPLE USING LIFI AND DEEP LEARNING	Indoor navigation system for virtually impaired individuals utilizing deep learning techniques. The system addresses the challenge of navigating complex indoor environments by leveraging visible light communication technology to provide real time navigation system. The proposed system encompassesing, modeling selection, training, evaluation, and testing phases. Through iterative improvement and user feedback, the system achieves enhanced performance and usability. Integration into user friendly applications enables seamless deployment in various indoor settings, empowering visually impaired individuals to navigate independently and safely. This system contributes to advancing assistive technologies and promoting accessibility for individual impairments. Throughout the process, factors such as robustness, adaptability to different indoor environments, real time performance and user interface design for accessibility. Additionally, ensuring privacy and security of user data crucial when developing and deploying such systems. Indoor navigation poses significant challenges for visually impaired individuals, hindering their autonomy and mobility.
81	AN AUTONOMOUS VEHICLE BASED ON V2V EFFULGENCE WITH DEEP LEARNING STANDARD FOR COMMUNICATION	This proposed work presented the design and implementation of an advanced autonomous vehicle system integrating Vehicle-to-Vehicle (V2V) communication with Visible Light Communication (VLC) technology, alongside deep learning algorithms for image identification. The system comprised intricate hardware components including an ESP32 microcontroller serving as the central processing unit, ultrasonic sensors for proximity detection, motor drivers for DC motors enabling speed control and obstacle avoidance, and toggle switches for signalling turns. The deep learning software component encompassed convolutional neural networks (CNNs) for real-time image recognition, enabling the vehicle to interpret and respond to complex traffic scenarios accurately. The VLC communication system facilitated high-speed and secure data exchange between vehicles, enhancing coordination and safety measures on the road. Through the synergy of hardware mechanisms and sophisticated software algorithms, this work aims to establish a robust autonomous vehicle platform capable of navigating diverse traffic environments with optimal safety and efficiency
82	DEEP LEARNING-EMPOWERED CHANNEL ESTIMATION AND CSI FEEDBACK FOR ENHANCED RELIABILITY IN 6G NETWORKS	This system delved into the realm of Deep Learning (DL) for channel estimation, focusing on crucial aspects such as DL model selection, training set acquisition, and the design of the RESNET50 architecture. With the increasing integration of automated services, machines, vehicles, and sensors, DL is poised to become a predominant paradigm in the 6G era channel estimation. This system advocated for advanced DL techniques to address diverse challenges, including various frequency bands, wireless resources, and geographical environments. It

		highlighted transfer learning for training DL models and explored federated learning for collaborative task accomplishment. This comprehensive system aimed to guide MIMO communication researchers in integrating DL into their wireless channel estimation applications, fostering robustness and adaptability in diverse environments. By leveraging advanced DL techniques, such as transfer learning and federated learning, researchers can address the complexities of channel estimation across different frequency bands and wireless resources. The adoption of the RESNET50 architecture offers a promising framework for efficient and accurate estimation, further advancing the capabilities of future 6G communication systems. ResNet 50 had the highest accuracy of 99.75% with a loss rate of 0.33, while the other models achieved 98.16%, 98.47%, and 98.56%, respectively. Furthermore, ResNet 50 achieved a validation accuracy of 99.69%, precision of 99.50%, F1- score of 99.70, and AUC of 99.83%.
83	AUGMENTED REALITY RETAIL: NAVIGATING THE VIRTUAL SUPERMARKET LANDSCAPE	Augmented Reality (AR) has emerged as a powerful technology, opening up new possibilities in various domains. The proposed work introduces an innovative AR application designed to create a virtual supermarket experience. Users can enter the augmented supermarket, explore virtual aisles, inspect product details including nutrient levels, and seamlessly add items to their virtual shopping cart. The application tream lines the shopping process by automating the addition of selected items to the cart and concludes with an integrated payment system at a virtual bill counter. Through the AR Virtual Supermarket, users enjoy the benefits of traditional grocery shopping without the constraints of time, location, or physical space. The proposed work exemplifies the potential of AR technology to transform the retail industry, offering a glimpse into the future of shopping experiences that are immersive, interactive, and tailored to individual preferences.
84	Experimental and Numerical Investigation on 3D Printed PLA/Ceramic Reinforced PLA Based Functionally Graded Multilayered Materials	Analyze the mechanical properties (tensile strength, flexural strength, compressive strength) of 3D printed specimens made of PLA, CRPLA, and FGMLM composite structures. Employ Finite Element Analysis (FEA) to simulate the behavior of the materials under different loads until fracture. Conduct microstructural analysis using scanning electron microscopy to understand bonding and fracture morphology. Perform calorimetry analysis (DSC) to determine glass transition temperature (Tg), crystallization temperature (Tc), and melting temperature (Tm) of the materials. Investigate mesh convergence to determine the minimum number of elements required for accurate results. Define failure through a ductile damage model in the simulation process.
85	A MULTI-MODAL APPROACH FOR DEEPFAKE DETECTION SYSTEM USING LSTM AND MLP IN CNN	In the rapidly advancing landscape of machine learning, the detection of deepfake videos has become an imperative challenge. The proposed introduces a novel approach everaging the synergies of Dense Net v2, LSTM, and MLP architectures in a multi-modal system for enhanced

		deepfake detection. In an extensive review of existing work in deepfake detection, identifying key parameters and methodologies. The project model integrates the strengths of Long Short-Term Memory (LSTM) networks and Multi-Layer Perceptron (MLP) classifiers with the feature extraction capabilities of Dense Net v2, creating a robust and efficient framework. The training process involves optimizing key parameters to ensure model accuracy, and discuss the tools employed for data preprocessing and model evaluation. In experimental results, it present a comprehensive performance analysis using precision-recall curves, confusion matrix heatmaps, F1 score comparison bar charts, and accuracy box plots. The proposed multi-modal approach demonstrates superior detection capabilities compared to existing models, showcasing its potential for real-world applications. The study contributes not only to the field of deepfake detection but also to the broader discourse on the intersection of machine learning and video analysis.
86	PERFORMANCE ENHANCEMENT OF VIDEO SURVEILLANCE IN FORTIFYING BANKING SECURITY THROUGH DARKNET ANALYSIS	This research delves into the fusion of the YOLO v5 (You Only Look Once) object detection framework with the Darknet architecture to create an advanced Intelligent Video Image Processing and Monitoring Control System tailored explicitly for enhancing security in the banking sector. Leveraging the real-time object detection capabilities of YOLO v5, the system enables efficient monitoring and surveillance across various areas within bank premises. Darknet, functioning as a neural network framework, serves as the foundational structure for implementing and optimizing YOLO v5 within the proposed system. This integration ensures robust real-time performance, allowing for seamless monitoring and control mechanisms throughout banking environments. By utilizing Darknet's capabilities, the system can effectively handle the complexities of processing video feeds in real-time, enhancing overall security measures within banking facilities. The primary objective of the proposed system is to bolster security measures within banking environments by providing instantaneous and accurate alerts for potential security threats or anomalous activities Through the amalgamation of YOLO v5 and Darknet, the system aims to offer comprehensive surveillance capabilities, enabling banking institutions to proactively identify and respond to security incidents promptly. This innovative approach to video image processing and monitoring control holds promise for significantly enhancing security protocols within the banking sector.
87	AUTHENTICATED ACCESS CONTROL FOR VEHICLE	Fingerprint identification is one of the most popular and reliable personal biometric identification methods. The proposed system consists of a smart card capable of storing the fingerprint of particular person. While issuing the license, the specific person’s fingerprint is to be stored in the

	IGNITION SYSTEM USING RF ANDFINGERPRINT TECHNOLOGY	card. Vehicles such as cars should have a card reader capable of reading the particular license. The same automobile should have the facility of fingerprint reader device .A person, who wishes to drive the vehicle, should insert the smartcard in the vehicle and then swipe his/her finger. If the fingerprint matches with the fingerprint stored in the smart card then it goes for alcohol detection and seatbelt checking. After passing all authentications, the vehicle will be ignited. The vehicle will not be ignited, if any one of the authentications fails and will not proceed the next step. This increases the security of vehicles and also ensures safe driving by preventing accidents. The prototype of the ignition system is used by the Master controller (Cortex M3 based Micro controller) is implemented along with the vehicle prototype is developed and the results are attached. Biometric authentication is an emerging technology that has found its application in various domains. One of the domains that have recently gained attention is vehicle ignition. This technology is used to prevent unauthorized access to the vehicle and ensure that only the authorized driver can start the vehicle. The biometric authentication system typically uses a combination of physiological and behavioural traits to identify the driver, such as facial recognition, fingerprint scanning, recognition, voice recognition, and gait analysis. This paper aims to provide an overview of the biometric authentication system for vehicle ignition, including the advantages, disadvantages, and challenges of implementing such a system. The paper also discusses the different biometric modalities that can be used for authentication, the algorithms used for recognition, and the security aspects of the system. The results show that biometric authentication for vehicle ignition has the potential to increase the security of the vehicle and prevent theft. However, there are still some technical and social challenges that need to be addressed before this technology can be widely adopted.
88	BORDER DEFENSE MECHANISM CLASSIFICATION USING DEEP LEARNING TECHNIQUES	The Advancements in deep learning are set to transform border defense, leveraging attention mechanisms and meta-learning to enhance threat detection accuracy. Integrating diverse sensor types, including aerial imagery, satellite data, social media analytics, and IoT devices, offers a comprehensive surveillance approach. This multi-modal data fusion enables nuanced threat assessments, improving situational awareness. Real- time processing, facilitated by edge computing solutions, ensures swift responses to potential threats by handling high-volume streaming data efficiently. Despite technological strides, ethical considerations remain paramount. Transparency, fairness, and privacy protection are imperative in border security applications. Implementing accountable decision-making processes and privacy-preserving techniques in data processing pipelines is essential. Engaging stakeholders ensures societal concerns are addressed,

		balancing security needs with individual rights. Ultimately, the future of border defense classification holds promise for more accurate, efficient, and responsible systems. By prioritizing ethical principles alongside technological innovation, borders and sensitive areas can be safeguarded effectively while upholding fundamental rights and values.
89	PERFORMANCE ANALYSIS SPACECRAFT ANOMALY DETECTION AND MITIGATION FRAMEWORK	The Autonomous Spacecraft Anomaly Detection and Response System aims to enhance the operational efficiency and safety of spacecraft missions by employing advanced algorithms and AI techniques for real-time anomaly detection and response. This proposals are addressed the critical need for autonomous systems capable of identifying anomalies in spacecraft systems, ranging from hardware malfunctions to environmental disturbances. Leveraging data acquisition and pre-processing methodologies, the system integrates various anomaly detection algorithms, including statistical methods and machine learning models, to effectively identify deviations from expected behavior. Decision-making frameworks facilitate prompt and appropriate responses to detected anomalies, mitigating potential risks and ensuring mission continuity. Through integration and testing phases, the system's performance and reliability are evaluated, with case studies demonstrating its effectiveness in detecting and responding to diverse anomalies. Discussions highlight challenges encountered, comparative analysis with existing systems, and avenues for future enhancements. Ultimately, this proposal contributed to advancing spacecraft automation, offering a robust solution for autonomously managing anomalies in space missions. Autonomous Spacecraft Anomaly Detection and Response system represents a significant advancement in spacecraft autonomy, offering a proactive and adaptive approach to anomaly management that enhances mission resilience and operational efficiency in dynamic space environments.
90	WEARABLE FRACTAL ANTENNA FOR FIRE FIGHTERS USING BODY AREA NETWORKS	Body Area Network technology is rapidly evolving presenting a future where wearable devices seamlessly integrate with our lives, fostering a new era of personalized health care through wearable devices. These devices requires antennas which can withstand the human motion and the immune to noise and produce precise results. The antennas should be flexible and compact in size. The substrate play a deciding role in flexibility of antenna. This paper presents a miniaturized wearable patch antenna for body area network (BAN) applications. The antenna utilizes a crown fractal design technique to achieve a size reduction of 31% compared toconventional designs. Additionally, a flexible Rogers RT Duroid 5880 substrate is employed, making the antenna suitable for wearable biomedical devices. The designed antenna operates in the 2.45 GHz ISM band and exhibits a gain of 4.54 dB and a bandwidth of 145 MHz, covering the entire band.

		imulations analyze the antenna's performance through return loss (S11), directivity, radiation pattern, The results making it a strong candidate for wearable BAN applications.
91	Driver drowsiness detection system	In today's tech world, our project serves as a versatile assistant, integrated with smart devices like Google and Siri. It handles voice input and output for tasks such as medical advice, organization, notes, calculations, and searches. Using microphones, it accesses the web for information, employing Natural Language Processing for communication.
92	Enhanced cloud based infrastructure for secure and efficient medical services with ECC	Smart architecture is the concept to manage the facilities via internet utilization in a proper manner. There are various technologies used in smart architecture such as cloud computing, internet of things, green computing, automation and fog computing. Smart medical system (SMS) is one of the application used in architecture, which is based on communication networking along with sensor devices. In SMS, a doctor provides online treatment to patients with the help of cloud-based applications such as mobile device, wireless body area network, etc. Security and privacy are the major concern of cloud-basedapplications in SMS. To maintain, security and privacy, we aim to design an elliptic curve cryptography (ECC) based secure and efficient authentication framework for cloud-assisted SMS.
93	CUTTING EDGE FPGA BASED APPROACHES FOR LANGUAGE TRANSCRIPTION WITH ADVANCED NEURAL NETWORK ARCHITECTURE	Edge computing, particularly in embedded systems and the Internet of Things, has gained significant traction in recent times. Deep learning, with its wide-ranging applications, has become increasingly prevalent in this technological landscape. Leveraging application-specific hardware, such as Field-Programmable Gate Arrays (FPGAs), offers a cost-effective approach to deploying highly efficient deep learning models in edge computing scenarios. In countries like India, characterized by linguistic diversity, the development of a system capable of recognizing handwritten characters across multiple languages holds considerable significance. However, the implementation of large neural networks poses challenges due to their resource-intensive nature. In this study, a cascading methodology for neural network implementation is proposed with the aim of enhancing resource efficiency. The focus is on efficiently recognizing handwritten characters from three languages: Hindi, Tamil, and English. This approach involves initially classifying input data into one of the three languages using a smaller neural network, followed by routing the data to language- specific neural networks for character recognition. The performance of this cascading method is compared with that of a single neural network, which directly classifies input into respective characters. The results of the proposed work indicate the improvement in efficiency while maintaining accuracy. This approach to multilingual handwritten character recognition demonstrates its potential for practical deployment in real-world

		applications. Additionally, the findings reveal that the cascaded network utilizes 29 neurons less than the combined network, representing a reduction of 3.545% in neuron count compared to the combined CNN model and gives more than 90% accuracy similar to the combined CNN.
94	PERFORMANCE ANALYSIS SPACECRAFT ANOMALY DETECTION AND MITIGATION FRAMEWORK	The Autonomous Spacecraft Anomaly Detection and Response System aims to enhance the operational efficiency and safety of spacecraft missions by employing advanced algorithms and AI techniques for real-time anomaly detection and response. This proposals are addressed the critical need for autonomous systems capable of identifying anomalies in spacecraft systems, ranging from hardware malfunctions to environmental disturbances. Leveraging data acquisition and pre-processing methodologies, the system integrates various anomaly detection algorithms, including statistical methods and machine learning models, to effectively identify deviations from expected behavior. Decision-making frameworks facilitate prompt and appropriate responses to detected anomalies, mitigating potential risks and ensuring mission continuity. Through integration and testing phases, the system's performance and reliability are evaluated, with case studies demonstrating its effectiveness in detecting and responding to diverse anomalies. Discussions highlight challenges encountered, comparative analysis with existing systems, and avenues for future enhancements. Ultimately, this proposal contributed to advancing spacecraft automation, offering a robust solution for autonomously managing anomalies in space missions. Autonomous Spacecraft Anomaly Detection and Response system represents a significant advancement in spacecraft autonomy, offering a proactive and adaptive approach to anomaly management that enhances mission resilience and operational efficiency in dynamic space environments.

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CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

SUSTAINABLE DEVELOPMENT GOALS – 11

Sustainable Cities and Communities

Back to Main

11.1.1: List of Publications

At Chennai Institute of Technology (CIT), students and faculty members are encouraged to publish research aligned with Sustainable Development Goal (SDG) 11, which focuses on sustainable cities and communities.

S.No	List of Publications
1	Evaluating heat health risk in Indian cities: Geospatial and socio-ecological analysis
2	Auto digitization of aerial images to map generation from UAV feed
3	Smart health care waste segregation and safe disposal
4	Optimizing virtual power plant allocation for enhanced resilience in smart microgrids under severe fault conditions using the hunting prey optimization algorithm
5	Mechanical, wear, and dielectric properties of opuntia cladode fiber and pearl millet biochar-reinforced epoxy composite
6	Optimizing Distribution System Resilience in Extreme Weather Using Prosumer Centric Microgrids with Integrated Distributed Energy Resources and Battery Electric Vehicles
7	Leveraging IoT for Real-Time Air Quality Sensing and Optimization in Vehicle Interiors using Gradient Boosting Algorithm
8	Enhancing Environmental Safety: Design and Development of IoT based Air Quality Monitoring System
9	Multi-scale characteristics of drought propagation from meteorological to hydrological phases: variability and impact in the Upper Mekong Delta, Vietnam
10	Cloud-Enabled Neural Networks for Intelligent Vehicle Emissions Tracking and Analysis
11	Extending the FSM Model for Critical Decision-Making and Safety Control in Autonomous Vehicles
12	Why is implementing computational intelligence for social good so challenging? Principles and its application
13	Integrated disaster risk management for flood detection on remote sensing images using deep learning techniques

14	An intelligent hybrid prairie dog optimization algorithm-based stable cluster reliable routing scheme for VANETs
15	Air Quality Monitoring and Analysis for Sustainable Development of Solid Waste Dump Yards Using Smart Drones and Geospatial Technology
16	IoT- and GIS-Based Environmental Impact Assessment of Construction and Demolition Waste Dump Yards
17	IOT based healthcare monitoring system for smart city applications
18	Machine Vision for Driver Safety: YOLOv5-powered Real-time Drowsiness Detection
19	Mapping Severe Tropical Cyclone Tauktae Across the Arabian Sea and Western Coast of India Using Remote Sensing and Machine Learning During May 2021
20	Landscape Patterns in Mining Cities Influenced by Extraction and Terrain Features
21	An Improved Fuzzy Logic Based Alcohol Detection System to Preserve Road Safety using Smart Sensors Association
22	Enhancing Indian Practical Distribution System Resilience Through Microgrid Formation and Integration of Distributed Energy Resources Considering Battery Electric Vehicle
23	Assessing biodiesel feedstocks and production techniques: a comprehensive review
24	Hydrochemical Investigation and Water Quality Mapping in and Around Pallikaranai Marshland Area in Chennai, India
25	Cloud based Landslide Detection and Alerting Nearby People by using IoT Technology
26	A Detailed Analysis of Air Pollution Monitoring System and Prediction Using Machine Learning Methods
27	Internet of Things Enabled Energy Aware Metaheuristic Clustering for Real Time Disaster Management
28	Artificial Intelligence for Internet of Things: Design Principle, Modernization, and Techniques
29	Realization of Sustainable Development Goals with Disruptive Technologies by Integrating Industry 5.0, Society 5.0, Smart Cities and Villages

30	IoT based solid waste management system: A conceptual approach with an architectural solution as a smart city application
31	Air quality monitoring and forecasting using smart drones and recurrent neural network for sustainable development in Chennai city
32	Urban road traffic noise on human exposure assessment using geospatial technology
33	Application of LSTM models in predicting particulate matter (PM2.5) levels for urban area
34	DEEP LEARNING MODELS TO PREDICT COVID-19 CASES IN INDIA USING AIR POLLUTION AND METEOROLOGICAL DATA
35	A Recent and Systematic Review on Water Extraction from the Atmosphere for Arid Zones
36	Cloud Based Smart Vehicle Tracking System
37	A deep learning approach for prediction of air quality index in a metropolitan city
38	A Model for Low Power, High Speed and Energy Efficient Early Landslide Detection System Using IoT
39	Investigation Of the Efficacy of Water Hyacinth (Aquatic Plant) For The Treatment Of Dairy Effluent
40	Integrating the Meteorological Data into a Smart City Service Using Cloud of Things (CoT)
41	Implementation of high-performance traffic management system using novel blockade mechanism
42	Voice assisted smart vision stick for visually impaired
43	Enhanced automation using controller and conscripts
44	Fundamentals and development of self-driving cars
45	Solar photovoltaic tree and its end-of-life management using thermal and chemical treatments for material recovery
46	Health care waste management in india-towards a healthier environment
47	Pedestrian vulnerability analysis using quantum GIS

11.1.2: Student Projects

At Chennai Institute of Technology (CIT), students are encouraged to do projects aligned with Sustainable Development Goal (SDG) 11, which focuses on sustainable cities and communities.

Title: DESIGN AND DEVELOPMENT OF MACHINE LEARNING ENABLED SENSING FRAMEWORK FOR URBAN LIGHTING SYSTEM MANAGEMENT

Abstract:

The exponential growth of urbanization coupled with the increasing demand for energy-efficient infrastructure necessitates innovative solutions for managing street lighting systems effectively. In response to this need, this research presented the design and implementation of a state-of-the-art smart street light monitoring system with integrated fault detection capabilities. The proposed system leverages advanced sensor technologies, including current, voltage, Light Dependent Resistor (LDR), and Global Positioning System (GPS), to collect real-time data on street light performance and environmental conditions. This data is processed using microcontroller technology and relay modules to enable precise control and monitoring of individual street lights. Key features of the system include its ability to detect faults in street lights through comprehensive analysis of current, voltage, and ambient light levels. Utilizing GPS functionality, the system facilitates accurate location tracking of faulty street lights, thereby expediting maintenance and reducing downtime. Furthermore, the system offers both local and remote monitoring capabilities. Local status indication is provided via an I2C display, allowing for on-site assessment of street light performance. Meanwhile, remote monitoring via an Internet of Things (IoT) platform enhances operational efficiency by enabling centralized control and real-time data analytics.

Title: AI BASED STRENGTH PREDICTION OF GEOPOLYMER CONCRETE USING WASTE TYRE RUBBER

Abstract:

Geopolymer concrete is an environmentally friendly and low-cost alternative to conventional Portland cement concrete. Incorporating waste tyre rubber into geopolymer concrete improves its strength and durability. The model predicts the strength of geopolymer concrete reinforced with waste tyre rubber using historical data and experimental data. It factors in the specific gravity of the geopolymer mix, the concentration of waste tyre rubber, and the curing temperature. The AI-based strength prediction model has applications in the construction, engineering, and environmental sectors. The methodology involves casting of M30 grade geopolymer concrete of 3 beams of size 700×150×150 mm for casting the beams which contains fly ash, alkaline activator, coarse aggregates, M sand and waste rubber tyres as our raw materials. The width of the crack is 0.02 mm. By acquisition of high-resolution images of beams during testing of beams, which are pre-processed to enhance relevant features. Graphs have been extracted based on AI model. The compressive strength is obtained to the

compressive strength by applying loads, flexural strength and abrasion resistance of the beams are obtained by testing. The purpose of this paper is to assess the current state of the research being done on geopolymer concrete for the use of waste tyres. The maximum and minimum strength of the beam is 19.52 N/mm2 and 457.14 N/mm2. The purpose of this study is to determine the hardened properties like flexural and compressive strength using AI model which is compared with experimental and predicted values. It also aims to account for additional factors that may influence the strength of geopolymer concrete reinforced with waste tyre rubber.

Title: EXPERIMENTAL INVESTIGATION OF PADDY STRAW ASH BASED GEOPOLYMER CONCRETE

Abstract:

Environmental issues resulted from cement production have become a major concern today. To develop a sustainable future, it is encouraged to limit the use of this construction material that can affect the environment. Cement replacement material was proposed to partially replace cement portion in concrete. Geopolymer is the best solution to reduce the use of cement in concrete. Geopolymer is a hardened cementitious paste made from fly ash, alkaline solution and geological source material. The development of fly ash and paddy straw ash (PSA) as the source material for geo polymer concrete was studied through the observation of the hardened specimen strength and durability properties. Paddy straw ash is a byproduct from the burning of paddy straw at a temperature lower than 6000C.this means that it is in a form that is soft and easy to grind. Rice husk ash is rich in silica about 90%, 5% carbon and 2% K2O. The specific surface of PSA is between 40- 100m2 /g. It is extremely prevalent in East and South-East Asia because of the Paddy production in this area. The addition of PSA as a silica source also had an effect on the strength of Geopolymer. The strength and durability increased with an increase in silica content.

Title: EXPERIMENTAL INVESTIGATION ON GEOPOLYMER CONCRETE SLAB USING WASTE TYRE RUBBER

Abstract:

In our project “Experimental investigation of geopolymer concrete using waste rubber tyre”. We have casted two geopolymer concrete slab using waste rubber tyre. The materials used in this casting process for the slab are “concrete, sand, aggregate, ground granulated blast furnace (GGBS), flyash. The mix design for the slab 1 is M20 and the mix design for the slab 2 is M25. The mix ratio for M20 grade concrete is (1: 1.75: 3) and the mix ratio for M25 grade concrete (1: 1.3: 2.3). The dimension of the geopolymer concrete slab is (500x500x100mm). Later the materials are mixed and it is poured into the slab mould, before this process. The reinforcement has been added inside the geopolymer concrete slab. 12mm rod has been used in the M20 and M25 grade concrete slab. The spacing for the reinforcement rod is about 10cm. After this process, the cover blocks are kept inside the slab to provide additional strength. Then, the slab has been completely casted and then the geopolymer concrete slab has been cured for a period

of 28 days. and then, the two slabs have kept in “Universal testing machine” and compression test have been conducted in these two slabs to find the compressive strength of the geopolymer concrete slab.

Title: FLEXURAL BEHAVIOUR OF THE REINFORCEMENT CONCRETE INCORPORATE WITH CABLE WIRE AND CULLET GLASS

Abstract:

This project explores the synergistic effects of incorporating cable wires and cullet glass into reinforced concrete structures to improve flexural behavior. The combination of high-tensile strength cable wires and the unique properties of cullet glass aims to enhance the structural integrity, durability, and sustainability of traditional reinforced concrete. In this project we are casting 4 beams of size 70 x 15 x 15 cm and testing it for finding its flexural behaviour. The research involves a comprehensive investigation into the mechanical properties of cable-reinforced concrete, assessing its ability to withstand bending loads. Additionally, the incorporation of cullet glass particles into the concrete mix aims to contribute to both the mechanical and aesthetic aspects of the structures. The methodology includes material characterization, laboratory testing, and structural analysis. Mechanical tests will assess the flexural strength, ductility, and crack resistance of the novel composite materials. Structural analysis using advanced modelling techniques will provide insights into the overall performance and behavior of the proposed system. The expected outcomes of this project include a deeper understanding of the synergies between cable wires and cullet glass in reinforced concrete, as well as the development of guidelines for practical applications in construction projects.

Title: EXPERIMENTAL INVESTIGATION OF RICE HUSK ASH BASED GEOPLOYMER CONCRETE

Abstract:

This study investigates the utilization of rice husk ash (RHA) as a promising pozzolanic alternative to partially replace class-C fly ash in geopolymer concrete, with the dual objectives of enhancing concrete strength and mitigating the corrosive impact of harsh environmental conditions. The experimental approach involves incorporating RHA at varying replacement ratios (30% and 40%) in combination with different geopolymer molarities (10M and 12M), followed by dry curing in a solar dryer for different durations (7, 14, and 28 days). The primary focus is on assessing the impact of these variables on the strength properties of the concrete. Comprehensive testing, including compressive strength, flexural strength, and tensile strength tests, along with SEM analysis, has been carried out to evaluate the suitability of partially substituting class-C fly ash with RHA in geopolymer concrete. The findings of this study, which represent a novel contribution to the field, highlight that the addition of fine RHA particles in conjunction with geopolymer leads to the attainment of the requisite strength for flexural, compressive, and tensile properties. Furthermore, SEM analysis has been instrumental in elucidating the bonding strength of the concrete, providing valuable insights into the performance of RHA-incorporated geopolymer concrete. By shedding light on the efficacy of

RHA as a pozzolanic alternative and its potential to enhance the performance of geopolymer concrete, this research contributes to the evolving body of knowledge in sustainable construction materials and paves the way for further advancements in eco-friendly concrete production.

Title: LANELINK – CARPOOLING APPLICATION

Abstract:

LaneLink is a cutting-edge web application that aims to transform daily commutes by promoting effective carpooling among users. LaneLink uses a user-friendly interface and powerful mat ching algorithms to link commuters with appropriate travel routes and timetables, promoting shared trips for a greener, more cost-effective, and less crowded transportation system. LaneLink's key features include customizable profiles, which allow users to select preferences such as preferred departure times, route flexibility, and passenger criteria. The application's sophisticated matching mechanism uses these preferences and real-time traffic data to recommend the best carpooling arrangements, assuring convenience and dependability for all users. Furthermore, LaneLink promotes safety and security by adopting strong verification methods and offering user ratings and feedback. The platform promotes a sense of community and trust among members, encouraging more people to embrace carpooling as a sustainable transportation solution. Through these capabilities, the app enables users to make educated decisions that help to reduce carbon emissions and traffic congestion in their areas. Overall, LaneLink represents a forward-thinking response to current transportation concerns, leveraging technology to encourage shared mobility and improve urban quality of life. LaneLink, with its emphasis on convenience, safety, and sustainability, is on track to become the go-to platform for commuters looking for smarter, greener ways to travel

Title: REAL ESTATE PRICE PREDICTION

Abstract:

Real estate transactions are pivotal financial decisions, and accurate price prediction a crucial role in facilitating informed choices and preventing potential financial losses. In this study, we propose a machine learning-based approach to forecast real estate prices, with the primary goal of enhancing predictive accuracy and aiding stakeholders in making well-informed decision by comparing the efficacy of various machine learning algorithms, including Linear Regression, Random Forest. The training and validation process, along with model interpretation techniques, are discussed to ensure robust performance. We aim told entity the most reliable method for predicting real estate prices. Through comprehensive data analysis and model evaluation, our objective is to provide stakeholders with valuable insights and tools to navigate the dynamic landscape of the real estate market effectively.

Title: Mr. SCRAPPER

Abstract:

In the age of ubiquitous internet access, the proliferation of spam links poses significant risks to users' privacy, security, and overall online experience. To address this challenge, we present "Mr. Scrapper," a novel mobile application designed to identify and classify links as either spam or legitimate with high accuracy. Leveraging a combination of frontend Java interface, Python backend processing, and MySQL database management, Mr. Scrapper integrates seamlessly into users' daily browsing activities. In the age of ubiquitous internet access, the proliferation of spam links poses significant risks to users' privacy, security, and overall online experience. To address this challenge, we present "Mr. Scrapper," a novel mobile application designed to identify and classify links as either spam or legitimate with high accuracy. Leveraging a combination of frontend Java interface, Python backend processing, and MySQL database management, Mr. Scrapper integrates seamlessly into users' daily browsing activities. The significance of Mr. Scrapper extends beyond individual user experiences. By proactively identifying and flagging spam links, it contributes to the collective effort of combating online threats and fostering a safer digital environment for all. Moreover, its modular architecture and reliance on cutting-edge technologies demonstrate the potential for innovation at the intersection of deep learning, mobile development, and cyber security.

Title: PHOTOGRAPHY COMMUNITY

Abstract:

Lensrivals is an innovative web application designed to provide photographers worldwide with a dedicated platform for participating in photography contests and showcasing their talent. Leveraging modern web technologies and a user friendly interface reminiscent of popular social media platforms, Lensrivals aims to revolutionize the way photographers engage with each other and compete for recognition and cash prizes. Key features of Lensrivals include contest participation, where photographers can upload their best shots according to contest instructions, add captions, locations, and hashtags, and engage with other participants' submissions. The platform offers a feed page where users can explore recent photo submissions, a personalized profile for managing posted clicks and tracking contest participation, and a comprehensive list of live and upcoming contests to keep users engaged. Lensrivals utilizes Firebase for backend and database management, ensuring real-time data storage and synchronization, while Clerk Authentication adds an extra layer of security to user accounts. The use of NEXT.js for frontend development and Tailwind CSS for styling ensures a sleek and responsive design, enhancing the overall user experience. Shadcn UI Components further augment the platform with visually appealing design elements. With its unique combination of social media features and contest functionalities, Lensrivals aims to foster a vibrant photography community where photographers of all skill levels can thrive. Join Lensrivals today and discover a new way to showcase your creativity, compete for prizes, and connect with like-minded individuals passionate about photography. With its focus on

innovation and community building, Lensrivals provides a unique space for photographers to showcase their work, connect with peers, and elevate their skills. Whether you're an amateur enthusiast or a seasoned professional, Lensrivals offers a platform where your creativity can shine. Join us today and become part of a thriving community of passionate photographers.

Title: ADAPTIVE CRISIS RESPONSE NETWORK

Abstract:

In emergency situations, rapid response and efficient communication are critical for saving lives and mitigating damages. This paper presents the design and implementation of a Crisis Response System (CRS) aimed at minimizing emergency response time and enabling victims to promptly access nearby hospitals, emergency services, and notify trusted contacts. The system utilizes modern technologies including geolocation services, mobile applications, and real-time communication channels to streamline the response process. Through rigorous testing and evaluation, the CRS demonstrates its effectiveness in reducing response time and enhancing the overall emergency management process.

Title: ON ROAD VEHICLE BREAKDOWN ASSISTANCE FINDER SYSTEM

Abstract:

In the event that an individual's vehicle breaks down, the On-Street Vehicle- Breakdown Application (ORVBA) is a suitable solution for them to seek help in remote areas. Clients of ORVBAFA will be the selected public, and they will establish contact with the specific professional via a dependable application procedure. The framework known as On Street Vehicle Breakdown Application (ORVBA) exclusively targets mechanics who are legally supported and maintained. It is extremely irrelevant that some consumers in a continuous framework have their own master educational file. Additionally, they have no idea whether their cars will break down or experience mechanical issues in isolated locations or in any other far locations from their reliable repair firms. Users can search for a list of professionals in any place (or) surrounding areas who can help them in confusing situations caused by their vehicles' mechanical difficulties under the proposed-On Street Vehicle Break-down Assistance Finder System (ORVBAFS) development.

Title: LoRa-Wan: A RESILIANT FRAMEWORK FOR EMERGENCY COMMUNICATION SYSTEM

Abstract:

In times of crises like natural disasters, effective communication is crucial for coordinating responses and saving lives. Traditional infrastructure often fails during such events, leaving communities vulnerable. LoRaWAN technology of ers a resilient solution, enabling long-range communication between remote devices and gateways. Its low-power protocol makes it suitable for emergency scenarios, ensuring reliability and scalability. LoRaWAN's capabilities facilitate communication even in harsh environments, strengthening collaboration with

stakeholders. Additionally, its unlicensed radio frequency bands reduce traffic, while bidirectional communication supports real-time data transmission and remote device management.

Title: LANE DETECTION AND ALERTS FOR AUTONOMOUS DRIVING

Abstract:

During the driving operation, humans use their optical vision for vehicle maneuvering. The Road lane marking acts as a constant reference for vehicle navigation. One of the prerequisites to have in a self-driving car is the development of an Automatic Lane Detection system using an algorithm. Computer vision is a technology that can enable cars to make sense of their surroundings. It is a branch of artificial intelligence that enables software to understand the content of images and video. Modern computer vision has come a long way due to the advances in deep learning, which enables it to recognize different objects in images by examining and comparing millions of examples and cleaning the visual patterns that define each object. While especially efficient for classification tasks, deep learning suffers from serious limitations and can fail in unpredictable ways. This means that a driverless car might crash into a truck in broad daylight, or worse, accidentally hit a pedestrian. The current computer vision technology used in autonomous vehicles is also vulnerable to adversarial attacks, by manipulating the AI's input channels to force it to make mistakes. For instance, researchers have shown they can trick a self-driving car to avoid recognizing stop signs by sticking black and white labels on them.

Title: TRAFFIC AUTOMATION SYSTEM USING REINFORCEMENT LEARNING

Abstract:

Traffic Automation System (TAS) leveraging machine learning techniques to optimize traffic flow in urban areas. The system aims to alleviate congestion, reduce travel time, and enhance overall traffic efficiency. Central to the system's functionality is the utilization of advanced machine learning algorithms for real-time data analysis and decision-making. The TAS operates on a comprehensive model that incorporates various theories and methodologies. Primarily, the system relies on reinforcement learning (RL) algorithms to develop adaptive traffic control strategies. RL enables the TAS to continuously learn and adapt its control policies based on feedback received from the environment, such as traffic volume, congestion levels, and historical traffic patterns. Furthermore, the project integrates predictive modelling techniques, including recurrent neural networks (RNNs) and Long Short-Term Memory (LSTM) networks, to forecast future traffic conditions. By analyzing historical data and current traffic trends, the system can anticipate congestion hotspots and proactively adjust traffic signals to mitigate potential bottlenecks. TAS incorporates graph theory principles to optimize traffic flow across interconnected road networks. Graph-based algorithms are employed to determine the most efficient routes for vehicles, considering factors such as distance, road capacity, and traffic density. Traffic Automation System presented in this paper represents a holistic approach to traffic management, leveraging machine learning, predictive modelling,

and graph theory to optimize urban mobility and enhance the overall transportation experience to the mass.

Title: SAFEROUTE AI SENTRY - FOR POTHOLE AWARENESA IN AUTONOMOUS DRIVING VIA YOLOV8

Abstract:

The advent of self-driving vehicles has marked a transformative milestone in contemporary transportation, offering unprecedented levels of safety, efficiency, and convenience. However, the persistent challenge of navigating unpredictable road conditions, particularly in the presence of potholes, poses potential safety risks to autonomous driving. This research introduces an innovative cloud-powered next-generation self-driving safety system that leverages the capabilities of artificial intelligence, specifically the You Only Look Once version 8 (YOLOv8) model, in tandem with the wand (Weights & Biases) deep learning platform. This integration facilitates pothole detection and advanced navigation, significantly enhancing the safety standards of autonomous driving. The selection of YOLOv8 is based on its exceptional accuracy and speed in object detection. YOLOv8 utilizes a singular neural network to predict object bounding boxes and class probabilities directly, enabling rapid and precise object detection. The cloud-based architecture of this system supports continuous model updates and refinements, ensuring adaptability to evolving road conditions and pothole variations. Beyond its application in pothole detection, this system holds the potential to redefine the landscape of autonomous transportation, ushering in a new era of safety and reliability in self-driving technology. The proposed approach not only addresses the challenges posed by potholes but also establishes a foundation for safer and more efficient autonomous travel, showcasing the transformative impact of cutting-edge technology in the field of self-driving vehicles.

Title: THERMAL VISION AND OBSTACLE DETECTION FOR LOW VISIBILITY ENVIRONMENTS

Abstract:

Navigating through low visibility environments, vital for exploration and rescue operations, faces limitations with traditional visual-based systems. This project develops a robust navigation system for such environments using thermal vision and LiDAR within ROS. Integrating a thermal camera and YD LiDAR sensor, the system aims to enhance situational awareness and obstacle detection. The methodology includes sensor integration, software development, and testing. Expected outcomes include improved navigation accuracy and adaptability, contributing to safer and more efficient missions in challenging conditions. Through this project, advancements in navigation technologies for low-visibility environments are pursued, with implications for various applications requiring exploration and safety in adverse conditions.

Title: EXPERIMENTAL INVESTIGATION ON CEMENT MORTAR WITH PARTIAL REPLACEMENT OF CEMENT AND FINE AGGREGATE AS GLASS POWDER AND E-WASTE

Abstract:

This experimental investigation explores the effects of partially replacing cement with glass powder (10%, 20%, 30%) and sand with E-waste powder (constant 10%) in mortar. The study aims to assess the potential of these alternative materials in enhancing mortar properties while reducing the environmental impact of traditional concrete production. The experimental procedure involves preparing concrete mixtures with varying replacement levels of cement with glass powder and sand with E-waste powder. Test specimens are then prepared and subjected to various tests to evaluate the fresh and hardened properties of the mortar, including compressive strength, split tensile strength, flexural strength, workability, water absorption, and durability. By comparing the test results of the mixtures with different replacement levels, the study seeks to assess the impact of the partial replacement of cement with glass powder and sand with E-waste powder on the properties of mortar. 30% of glass powder and 10% of E waste powder test sample gives the maximum compressive strength of 24.33 N/mm sq, durability, and the environmental benefits of using waste materials in mortar production. This investigation contributes to the understanding of sustainable and eco-friendly concrete mix designs and may offer valuable implications for the construction industry in adopting more environmentally conscious practices.

Title: YOLO LANDSLIDE SENTRY: A FRAMEWORK FOR RAPID DETECTION AND RESPONSE

Abstract:

This project introduces an innovative approach to landslide detection in hairpin bend regions using the You Only Look Once (YOLO) object detection framework. Hairpin bends, with their unique topography, pose specific challenges for landslide detection, necessitating a tailored solution that integrates advanced computer vision techniques. The proposed methodology combines high-resolution satellite imagery data to create detailed terrain models of hairpin bend areas. YOLO, known for its real-time object detection capabilities, is adapted to identify potential landslide triggers, including slope instability and changes in vegetation cover, within these complex landscapes. Real-time monitoring systems, including ground- based sensors and weather stations, are strategically placed to continuously capture environmental conditions. Integration with the YOLO-based detective model enables the early identification of potential landslide threats, facilitating the implementation of targeted early warning systems. Community engagement remains a crucial aspect of this approach, involving local residents in the development of evacuation plans and preparedness strategies. The synergy between YOLO-based technology and community involvement creates a comprehensive solution for proactively managing landslide risks in hairpin bends

Title: CONVOLUTIONAL NEURAL NETWORK FOR HUMAN DETECTION

Abstract:

This work investigates the application of YOLOv8, a cutting-edge deep learning model, for real-time human detection. YOLOv8's efficient single- stage architecture enables rapid object identification while maintaining accuracy. This report explores the implementation of YOLOv8 for human detection tasks. Pre-trained models are utilized, leveraging their inherent ability to recognize humans within a broader object classification. Frameworks like PyTorch and libraries like Ultralytics streamline the implementation process. Creating some manual annotations using the Roboflow application and creating and training over 1000 images and testing and training to attain more accuracy than previously used methods for detection. This work delves into the pre-processing steps for input images, ensuring compatibility with the chosen YOLOv8 variant. The model's output, bounding boxes with confidence scores for detected humans, is analyzed. Furthermore, the report discusses the applicability of YOLOv8 in real-time scenarios like video surveillance. Potential applications in pedestrian counting and activity monitoring are highlighted. Integration with multi-object tracking algorithms like Deep SORT is explored to enhance functionality. This report emphasized that while pre-trained models offer a convenient starting point, fine-tuning with human-centric datasets can refine detection accuracy. Finally, this project concluded by underlining YOLOv8's potential as a powerful and adaptable solution for real-time human detection across diverse scenarios.

Title: INTELLIGENT SURVEILLANCE SYSTEM FOR VEHICLE EMISSION

Abstract:

This proposed work of manual inspection processes for verifying vehicle emissions, an innovative surveillance system leveraging image processing and computer vision has been developed. This system focuses on real-time detection of smoke emissions from vehicles, addressing inefficiencies and inaccuracies inherent in manual methods. By utilizing deep learning, an advanced object detection model, the system autonomously analyzes surveillance footage captured by strategically positioned cameras. This enables prompt identification of smoke emissions, triggering immediate alerts to relevant authorities via an integrated alert mechanism. Compared to manual inspection methods, the proposed system offers several advantages. It automates the verification process, eliminating the need for manual intervention and reducing reliance on human personnel, thereby improving efficiency. The system's real-time monitoring capabilities enable proactive enforcement of regulatory standards, ensuring timely interventions and compliance across diverse traffic conditions. The proposed surveillance system represents a significant advancement over manual methods for detecting vehicle emissions.

Title: AN AUTONOMOUS VEHICLE BASED ON V2V EFFULGENCE WITH DEEP LEARNING STANDARD FOR COMMUNICATION

Abstract:

This proposed work presented the design and implementation of an advanced autonomous vehicle system integrating Vehicle-to-Vehicle (V2V) communication with Visible Light Communication (VLC) technology, alongside deep learning algorithms for image identification. The system comprised intricate hardware components including an ESP32 microcontroller serving as the central processing unit, ultrasonic sensors for proximity detection, motor drivers for DC motors enabling speed control and obstacle avoidance, and toggle switches for signalling turns. The deep learning software component encompassed convolutional neural networks (CNNs) for real-time image recognition, enabling the vehicle to interpret and respond to complex traffic scenarios accurately. The VLC communication system facilitated high-speed and secure data exchange between vehicles, enhancing coordination and safety measures on the road. Through the synergy of hardware mechanisms and sophisticated software algorithms, this work aims to establish a robust autonomous vehicle platform capable of navigating diverse traffic environments with optimal safety and efficiency

Title: DEEP LEARNING-EMPOWERED CHANNEL ESTIMATION AND CSI FEEDBACK FOR ENHANCED RELIABILITY IN 6G NETWORKS

Abstract:

This system delved into the realm of Deep Learning (DL) for channel estimation, focusing on crucial aspects such as DL model selection, training set acquisition, and the design of the RESNET50 architecture. With the increasing integration of automated services, machines, vehicles, and sensors, DL is poised to become a predominant paradigm in the 6G era channel estimation. This system advocated for advanced DL techniques to address diverse challenges, including various frequency bands, wireless resources, and geographical environments. It highlighted transfer learning for training DL models and explored federated learning for collaborative task accomplishment. This comprehensive system aimed to guide MIMO communication researchers in integrating DL into their wireless channel estimation applications, fostering robustness and adaptability in diverse environments. By leveraging advanced DL techniques, such as transfer learning and federated learning, researchers can address the complexities of channel estimation across different frequency bands and wireless resources. The adoption of the RESNET50 architecture offers a promising framework for efficient and accurate estimation, further advancing the capabilities of future 6G communication systems. ResNet 50 had the highest accuracy of 99.75% with a loss rate of 0.33, while the other models achieved 98.16%, 98.47%, and 98.56%, respectively. Furthermore, ResNet 50 achieved a validation accuracy of 99.69%, precision of 99.50%, F1-score of 99.70, and AUC of 99.83%.

11.1.3: List of Patents

At Chennai Institute of Technology (CIT), students and faculty members are encouraged to publish and grant patents aligned with Sustainable Development Goal (SDG) 11, which focuses on sustainable cities and communities.

APPLICATION NO.	TOPICS
202341075392 A	Smart mobility vehicle for short distance
202341076446 A	IOT-based image defogging system to minimize road accidents based on image processing
202341077370 A	Self-healing network architectures with integrated ai-based anomaly detection
202341079472 A	A supervised learning and multi agent systems for fault tolerance in cloud computing
202341079509 A	Community detection in social context based on optimized classification
202341077562 A	IOT based NFT hydroponics system
202341077564 A	Navigation system on AR headset
Design No. 395425-001	Artificial intelligence (AI) based antenna for weather forecast
202341071162 A	An intelligent method for load balancing in cloud computing using machine learning techniques
202341067535 A	A method of improving mechanical properties of recycled aggregate concrete through partial replacement
202341068189 A	A novel face detection and degeneration system based on deep neural networks
202341062974 A	Fifth generation (5g) based firefighting drone
202341037776 A	IOT based sensory cyberphysical system for climate change monitoring
202341015563 A	Ai based autonomous cost analysis application for smart financial management system
202341015893 A	Improving cyber security by improved predictive potential of machine learning models
202311016212 A	Comprehensible ai to assess corporate security operations using EEG data within IOT framework

202341006631 A	System for water level detection and control based on Internet of Things (IOT)
202341006896 A	A novel outline preservation-based segmentation and similarity search hybrid classification for diagnosing liver cells
202341003839 A	Method for wireless network optimization based on big data and machine learning
202341005005 A	Design and method of retinal blood vessel segmentation in retinal images using forward backward filtering and global thresholding
Design No. 372249-001	A versatile fixture for abundant inclined hole drilling
Design No. 374691-001	IOT enabled health monitoring device
202221075234 A	Fuzzy logic and deep learning approaches enhancing industry 4.0 implementation in manufacturing and control sector
202341001124 A	Deep Learning Based Technique to predict the Impact of Residential Energy Storage System Modelling on Power System
202241076371 A	A system for human resource management using artificial intelligence and robotics

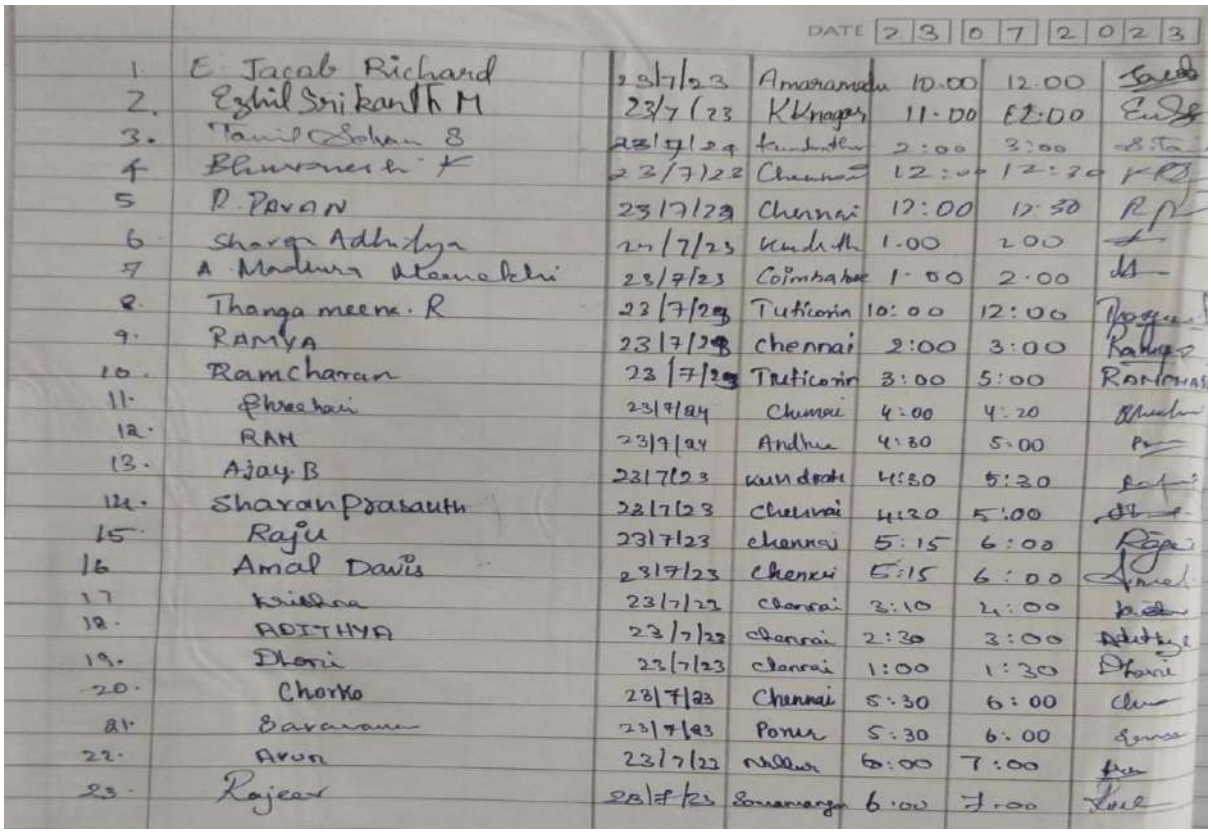
11.2.1: Public Access to Buildings

Chennai Institute of Technology (CIT) buildings is freely accessible by the public thrice in a year who are willing to expand their knowledge by visiting centre of excellence laboratories. To keep student mind vibrant various events and activities are conducted. The students from various schools come to deepen their knowledge and technical skills across various engineering fields. Known for its rigorous curriculum and high standards.

11.2.2: Public Access to Library

The **Chennai Institute of Technology (CIT) library** is freely accessible for public, students, faculty, and researchers with a comprehensive collection of resources. The library is accessible from 8.00 AM to 8.00 PM every day. The Public can freely access from 4.00 PM to 8.00 PM every day and full access on holidays. This helps the public to visit the library at It meets international standards, housing over 25,000 books across fields in Literature, Engineering, Technology, Science, and Humanities.

Digital Library



		DATE 23/07/2023				
1.	E. Jacob Richard	23/7/23	Amaramadu	10.00	12.00	
2.	Ezhil Srikanth M	23/7/23	K Nagar	11.00	12.00	
3.	Tamil Selvan S	23/7/23	Tambaram	2:00	3:00	
4	Bhuvaneshi K	23/7/23	Chennai	12:00	12:30	
5	P. Pavan	23/7/23	Chennai	12:00	12:30	
6	Sharan Adhitya	23/7/23	Kundrathur	1.00	2.00	
7	A Madura Meenakshi	23/7/23	Coimbatore	1.00	2.00	
8.	Thanga meena. R	23/7/23	Tuticorin	10:00	12:00	
9.	RAMYA	23/7/23	chennai	2:00	3:00	
10.	Ramcharan	23/7/23	Tuticorin	3:00	5:00	
11.	Bhushan	23/7/23	Chennai	4:00	4:20	
12.	RAM	23/7/23	Andhra	4:30	5:00	
13.	Ajay B	23/7/23	Kundrathur	4:30	5:30	
14.	Sharanprasauth	23/7/23	Chennai	4:20	5:00	
15.	Raju	23/7/23	chennai	5:15	6:00	
16	Amal Davis	23/7/23	Chennai	5:15	6:00	
17	Krishna	23/7/23	Chennai	3:10	4:00	
18.	ADITHYA	23/7/23	Chennai	2:30	3:00	
19.	Dhoni	23/7/23	Chennai	1:00	1:30	
20.	Chorko	23/7/23	Chennai	5:30	6:00	
21.	Saravanan	23/7/23	Porur	5:30	6:00	
22.	Arun	23/7/23	Nallur	6:00	7:00	
23.	Rajesar	23/7/23	Saravanga	6:00	7:00	

Public Access to Library

11.2.4: Public Access to Green Places

Chennai Institute of Technology (CIT) green places is freely accessible to all, that offers extensive **sports and games facilities** that encourage students to participate in athletics at college, university, district, state, and national levels. The public such as company retreats, Army training, Police training camps are visiting to CIT for practice.

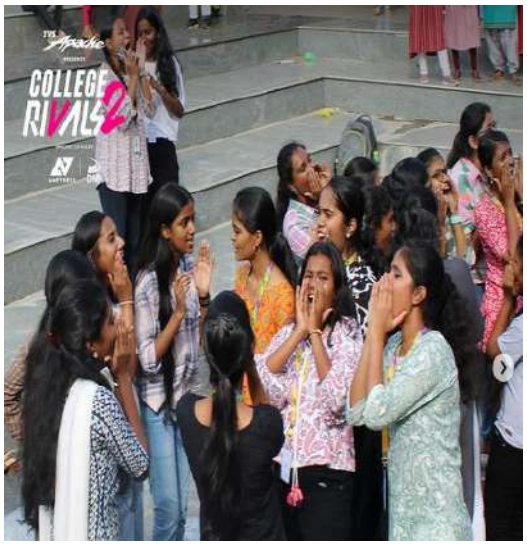


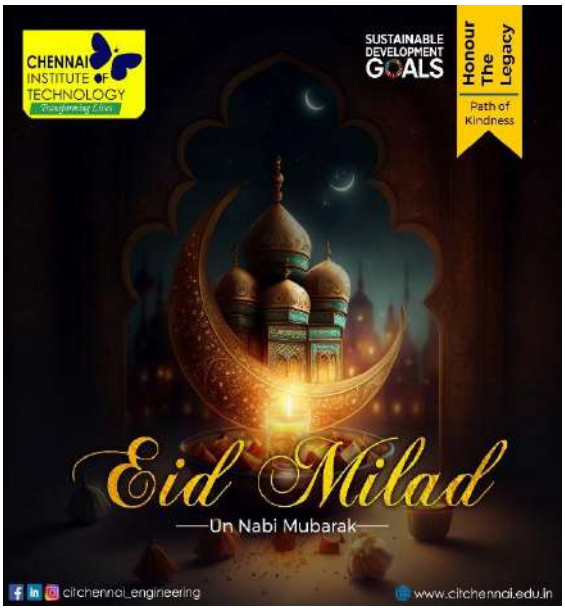
11.2.5: Arts and Heritage Contribution

Chennai Institute of Technology (CIT) supports arts and heritage through various initiatives to foster cultural awareness and appreciation among students. These contributions often include:

1. **Cultural Fests and Events**: CIT organizes cultural festivals where students can showcase talents in music, dance, drama, and traditional art forms, promoting a vibrant cultural environment.

2. **Student Clubs**: The institute hosts arts and heritage clubs where students engage in activities that highlight regional and national cultural heritage, such as traditional painting, craft workshops, and folk performances.
3. **Collaborations with Cultural Organizations**: CIT collaborates with cultural bodies and experts, sometimes inviting artists and historians to conduct workshops and lectures that connect engineering students with the cultural history of the region.
4. **Preserving Traditional Arts**: CIT promotes traditional South Indian art forms by organizing events like Bharatanatyam performances, Carnatic music concerts, and Rangoli competitions, helping preserve and bring awareness to these heritage art forms.
5. **Infrastructure for Arts**: The campus offers dedicated spaces and facilities to practice and display various art forms, encouraging students to explore creative expression alongside their technical studies.





Arts and Heritage Contribution at Chennai Institute of Technology

11.4.1: Sustainable Practices Targets

Our college Chennai Institute of Technology is committed to sustainability and environmental stewardship, and this is reflected in our approach to campus transportation. We have integrated electric vehicles (EVs) and bicycles into our transportation infrastructure to support a greener, more eco-friendly campus environment. We have installed EV charging stations across campus to support the growing use of electric vehicles. These stations are accessible to both campus vehicles and, in some cases, personal EVs for Students. The Institution is dedicated to sustainability and environmental conservation, and one of the key initiatives in this regard is our Water Recycling Program. This program is designed to reduce water consumption, minimize waste, and promote the efficient use of water resources across our campus. Solar water heaters are also installed to create eco- friendly environment.

Electric Vehicle (Chennai Institute of Technology)

Charging points for EV (Chennai Institute of Technology)

Electric Vehicle-Load Carrying (Chennai Institute of Technology)

Cycles

SOLAR HEATER

SOLAR PANELS

RO SYSTEM

PRESSURE FILTER

11.4.5: Affordable Housing for Students

Chennai Institute of Technology (CIT) provides comfortable, well-equipped hostels for both male and female students, designed to be a “Home away from Home.” These hostels aim to offer students a safe, hygienic, and supportive environment with various amenities.

International Hostels

- **Boys' International Hostel**: Established in the 2022-2023 academic year, this hostel has 24 rooms accommodating 96 students. Each room includes essential furniture such as beds and cupboards and provides air conditioning, Wi-Fi, and a dedicated study room. The rooms also come with attached bathrooms equipped with water heaters.
- **Girls' International Hostel**: Also established in 2022-2023, the girls' hostel has 10 rooms designed for 40 students. Like the boys' hostel, each room is furnished with essential items and equipped with air conditioning, Wi-Fi, and study facilities. Bathrooms are attached and come with water heaters for added convenience.

Podhigai Boys Hostel

This boys' hostel offers amenities such as individual cots, study tables, chairs, and wardrobes with locking options for personal storage. The hostel is managed by a team of maintenance staff to ensure cleanliness and order. It provides:

- 24-hour power backup
- High-quality RO drinking water
- Solar water heaters
- A reading room
- A TV lounge for relaxation
- Multiple sports facilities including volleyball, basketball, and badminton courts
- Indoor games like carrom, table tennis, and chess
- Access to a modern gym
- 24/7 high-speed unlimited Wi-Fi

Vaigai Girls Hostel

The girls' hostel is a secure facility with a team of qualified wardens and maintenance staff. It offers similar amenities to the boys' hostel, such as:

- 24-hour power backup
- RO drinking water
- A reading room and a TV lounge
- Shuttle badminton courts
- Indoor games like carrom, table tennis, and chess
- Gym access with specified times for girls in the morning and evening
- 24/7 high-speed Wi-Fi

Additional Facilities

Students are allowed to bring and use laptops and mobile phones in the hostel. They can access the college's Centers of Excellence (COE) and lab facilities to support research activities. The hostels provide homestyle vegetarian and non-vegetarian meals, prepared hygienically in the hostel mess.

Smart Laundry


Both hostels feature a "Smart Laundry Facility" powered by Hier, offering an energy-efficient, eco-friendly, and low-cost washing solution. This facility is accessible through a mobile app, enabling students to manage their laundry conveniently.

11.4.6: Pedestrian Priority on Campus

Chennai Institute of Technology (CIT) places a strong emphasis on the safety and comfort of its staff, students, and visitors by providing **pedestrian-friendly roads** throughout its campus. The college ensures that its pathways are well-designed to accommodate foot traffic, with wide, clearly marked walkways that are free of obstacles, making it easier and safer for people to move around. These pedestrian paths are strategically placed to connect different parts of the campus, ensuring that individuals can move from one building to another without the need to cross busy or dangerous traffic areas.

In addition to the physical infrastructure, the college also focuses on creating a welcoming environment for pedestrians by maintaining clean, well-lit paths, especially during the evening hours. This makes the campus more accessible and safer for students and staff who are walking between classes, events, or other activities. The pedestrian-friendly design is part of CIT's broader commitment to creating a safe and supportive environment for everyone on campus, reducing the risk of accidents, and promoting a walkable and healthy atmosphere for the campus community.

1. Separator between road for vehicle and pedestrian path.
2. Well-Laiden pedestrian at CIT entrance.
3. Street lamp for pedestrian in night.
4. Ramp facility for disabled people
5. Pedestrian friendly road

CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

Accredited by NBA CSE, ECE, EEE, MECH, MCT

NAAC A+ ACCREDITED WITH GRADE

nirf 175th Rank (NIRF Ranking 2022)

Back to Main

SUSTAINABLE DEVELOPMENT GOALS

SDG 12-RESPONSIBLE CONSUMPTION AND PRODUCTION

12.Policy for Responsible Consumption And Production

1.Environmental Impact and Resource Conservation Focus

The institution is keen to implement ethical procurement methods that put preservation of natural resources first and reduce supply chain environmental impact. Choosing suppliers who value sustainability and create materials with little environmental impact is a major priority. This involves making sure that every stage of the supply chain helps to lessen environmental harm by sourcing goods made from recycled, renewable, or ethically sourced materials. Throughout the production and distribution processes, attempts are made to minimise waste formation, improve resource efficiency, and lower carbon emissions in accordance with sustainability goals. The organization seeks to decouple economic growth from the depletion of natural resources by adopting the ideas of the circular economy, which promote a system in which things are continuously recycled, repurposed, and reused.

Policy created on	24-06-2021
Policy reviewed on	23-03-2022

2.Environmental Protection and Safety Focus

To ensure the safe and responsible handling, storage, and disposal of hazardous items, the organization upholds a written waste disposal policy. By ensuring that all substances are maintained in accordance with environmental rules, this strategy lessens the possibility that they will negatively impact ecosystems and human health. The institution reduces its environmental impact and promotes responsible production and consumption by placing a high priority on safety during the disposal process. In order to guarantee that all operations adhere to pertinent legal and environmental norms, the policy also specifies precise protocols for the containment, treatment, and disposal of waste.

Policy created on	25-06-2021
Policy reviewed on	24-03-2022

3.Policy on waste disposal – to measure the amount of waste sent to landfill and recycled

The institution has implemented a waste disposal strategy that places a high priority on trash reduction, recycling, and resource efficiency in order to conform to the principles of responsible consumption and production. With an emphasis on preventing materials from ending up in landfills through better recycling techniques and resource recovery, this policy guarantees consistent monitoring and reporting of the quantity of trash produced. In order to achieve a substantial decrease in landfill trash over time, the organisation will put in place a

continuous measuring procedure to track the amount of garbage that is dumped in landfills in comparison to recycled materials. In order to support a circular economy model where waste is reduced, resources are reused, and sustainability is encouraged at every stage of the supply chain, efforts will be made to improve the lifecycle of products and materials.

Policies around use minimization of plastic

The institution is committed to minimizing the use of plastic in all operations, in alignment with Sustainable Development Goal 12 (responsible consumption and production). This policy outlines a comprehensive approach to reducing plastic consumption by prioritizing the use of alternative, sustainable materials, reducing single-use plastics, and promoting the reuse and recycling of plastic products where applicable. The institution will work to eliminate plastic packaging, encourage the use of biodegradable or recyclable alternatives, and engage employees, suppliers, and stakeholders in efforts to reduce plastic waste. Regular audits will be conducted to assess plastic usage, and measurable targets will be set to continuously decrease the institution's plastic footprint, contributing to a cleaner environment and a more sustainable future.

Policy created on	22-06-2021
Policy reviewed on	21-03-2022

4.Policy for minimization of disposable items

The institution is committed to the minimization of disposable items in all aspects of its operations to support Sustainable Development Goal 12 (Responsible Consumption and Production). This policy focuses on reducing reliance on single-use products by prioritizing reusable, durable, and sustainable alternatives. All departments and operations will be encouraged to adopt practices that reduce waste, such as using reusable containers, cutlery, and office supplies, and eliminating disposable items where feasible. The institution will also promote a culture of responsible consumption among employees, stakeholders, and suppliers through training and awareness campaigns. Regular monitoring and reporting will track progress toward reducing disposable item use, and targets will be set to continuously minimize the environmental impact of disposables across the organization. This policy aims to reduce waste, conserve resources, and foster a more sustainable and circular approach to consumption and production.

Policy created on	23-07-2021
Policy reviewed on	14-04-2022

Solid Waste Management:

The institute has dustbins for all floors, all the departments, common areas, canteen, mess and every other open area. The institute segregates recyclable and biodegradable waste. The copies and other papers are recycled and made available to students as laboratory record books at a very nominal rate. The other biodegradable dry solid waste such as dead leaves, papers etc. are not allowed to burn or dump in the ground, rather they are converted into compost Use of plastics is strictly banned inside the premises. Use of papers is highly discouraged in all departments and only urgent and unavoidable works are paper dependent. Broken glassware is collected in a separate bin over a week and then submitted for the solid waste disposal.

Waste Collection

Waste Treatment

Bio gas Production:

The institution takes biogas initiative aimed towards reducing waste, generating renewable energy, and promoting sustainable practices on campus, helping to create a greener and more eco-friendly environment. Biogas which generates 22,775 kWh of power per year.

Biogas plant – 100 kg capacity

Waste Water Treatment:

The Chennai Institute of Technology is mindful of the need to conserve society and water for the safety of the environment. The institute follows the full method of water recycling and the steps involved are as follows.

Plant Description

Initially, the excess water is stored in the storage tank and aired in the aeration tank. After the aeration process, the coagulant is flocculated and sent to the sedimentation tank. And then the water is filtered by the pressure and sent to the distribution tank. Water is used for gardening and irrigation of plants.

E-Waste Management

Minister of State (Independent Charge) for Environment, Forestry and Climate Change said that the E-Waste Management Standards have been stricter and reflect the government's commitment to environmental governance. The rules would put the producers under the Expanded Producer Obligation with the goals. Producers have been made liable for storing and exchanging e-waste.

The majority of customers must gather the products and hand them over to the approved recyclers. The Ministry stresses that different producers should have a specific Producer

Accountability Organization to ensure that e-waste is processed and disposed of in an environmentally sound manner.

The Ministry noted that the role of state governments has also been developed to ensure the safety, health and skills development of workers engaged in dismantling and recycling operations.

Knowledge is developed among students regarding the management of e-waste. E-waste from the laboratories is appropriately gathered and given to the certified recycler, reused whenever possible, donated and sold as much as possible. Non-working machines, displays, and printers are destroyed and scrapped on a systematic basis. Any pieces that are suitable for other systems are set aside for potential use. The E-waste garbage box has been deposited and the e-waste materials are collected and disposed of by recycling vendors.

Pursuant to the new regulations, it has been instructed that biodegradable waste should be handled, treated and disposed of as far as possible inside the premises by a compost or bio-meth nation and that residual waste should be disposed of by a waste collector or entity as regulated by the local authority.

CIT also launched a full bio-waste management scheme by building a bio-gas generation facility on campus to represent the nation on energy saving grounds. A awareness-raising initiative, in collaboration with local governments, NGOs and students, has been organized to push for better adoption of these waste management tools. Tools need to work on making solid waste management a people's campaign by discussing challenges, complaints and management of solid waste to residents and grassroots.

Waste Management

Amount of waste generated

Type of waste	Total Produced (Metric tons)
Food waste	15.12
Leaf	18.25
Paper	15.4
Soft Plastic	0.01
Hard Plastic	0.12
Electronics	0.12
Total	**49.02/32.35**

Amount of waste recycled

Type of waste	Amount (Metric tons)	
	Total	**Recycled/Reused**
Food waste	15.12	14.78
Leaf	12.25	11.06
Paper	10.7	10.7
Soft Plastic	0.01	0.01
Hard Plastic	0.14	0.12
Electronics	0.12	0.12
Total	**49.02**	**36.79**

Amount of waste sent to landfill

Type of waste	Amount (Metric tons)		
	Total	**Recycled/ Reused**	**Waste sent to landfill**
Food waste	9.13	9.11	0.34
Leaf	12.25	12.06	0.19
Paper	10.7	10.7	-
Soft Plastic	0.01	0.01	-
Hard Plastic	0.14	0.12	0.02
Electronics	0.12	0.12	-
Total	**32.35**	**32.12**	**0.55**

Other details:

1.Research works Contributing to SDG 12

1. Integrated an efficient E-Waste Management using Deep Learning and web Based platform
2. A comparative study of municipal solid waste treatment methods using LCA approach
3. Experimental Investigation on partial replacement of cement with coconut sheel ash and sand with glass powder in concrete
4. Sustainable Eco friendly concrete using plastic Bottles and polypropylene Fibers
5. Method of improving mechanical properties of recycled course Aggregate concrete through partial replacement of glass waste aggregate
6. Mechanical,Physical,and Microstructural Characterization of Aluminum Hybrid Composites with Agro Industrial Wastes as Reinforcements

2.SDG 12 Publication Details:

[1] Louw, A. S., & Avtar, R. (2025). Methodology for measuring landfill dumping statistics globally using Digital Elevation Change maps. *Resources, Conservation and Recycling*, *212*, 107924.

[2] Bharadwaj, A. S., Rego, R., & Chowdhury, A. (2016, December). IoT based solid waste management system: A conceptual approach with an architectural solution as a smart city application. In *2016 IEEE annual India conference (INDICON)* (pp. 1-6). IEEE.

[3] Rosana, N. T., Joseph, K. L., & Sowmiya, S. (2018). Health Care Waste Management in India-Towards a Healthier Environment. *Research Journal of Pharmacy and Technology*, *11*(12), 5687-5690.

[4] Srinivasan, M., Sudharsan, J. B., & Fujiwara, K. (2024). Computational analysis on novel half Heusler alloys XPdSi (X= Ti, Zr, Hf) for waste heat recycling process. *Materials Science in Semiconductor Processing*, *180*, 108524.

[5] Balasubramanian, S., Srinivasan, M., & Perumalsamy, R. (2023). An ab initio study of novel quaternary Heusler alloys for spin polarized and waste heat recycling systems. *Journal of Magnetism and Magnetic Materials*, *571*, 170541.

[6] Raman, R., Rawandale, C. J., Meenakshi, R., Jayaprakash, S., Latha, R., & Srinivasan, C. (2023, August). Real-Time Video Management System for Robotic Waste Sorting and Recycling Using IoT and Machine Learning. In *2023 Second International Conference On Smart Technologies For Smart Nation (SmartTechCon)* (pp. 227-232). IEEE.

[7] Bommi, R. M., Rajeev, S. V. S., Navya, S., Teja, V. S., & Supriya, U. (2023). Smart health care waste segregation and safe disposal. *Mathematics and Computer Science Volume 2*, 205-221.

[8] Dutta, H., Bora, D., Chetia, P., Bharadwaj, C., Purbey, R., Bohra, R. C., ... & Jayaramudu, J. (2024). Biopolymer composites with waste chicken feather fillers: A review. *Renewable and Sustainable Energy Reviews*, *197*, 114394.

[9] Hemamalini, R. R., Vinodhini, R., Shanthini, B., Partheeban, P., Charumathy, M., & Cornelius, K. (2022). Air quality monitoring and forecasting using smart drones and recurrent neural network for sustainable development in Chennai city. *Sustainable Cities and Society*, *85*, 104077.

Patents Contributing to SDG 12

1. Agricultural Innovation:IOT-Enhanced smart Irrigation System with crop protection-202341073935A
2. Intensification of oil yield from kokum seeds:An energy-Efficient extraction using Ultrasonication Technique-202341067795
3. Comprehensible AI to assess corporate security operations using EEG Data within IoT Framework-202311016212 A
4. Agriculture crop insurance policy using Block chain Technology-202241075331 A

SUSTAINABLE DEVELOPMENT GOALS

13. CLIMATE ACTION

13.2.1 Low carbon Energy Tracking

Solar Panel and Water heater

The 1.08 GJ solar energy system installed on the rooftops of the academic buildings and hostels generates an average of 4.468 GJ of power per day and 134.1 GJ per month. This renewable energy for electricity helps to reduce purchased electricity.

13.2.2 Low-carbon energy Use

Chennai Institute of Technology is committed to sustainability and environmental stewardship, and this is reflected in our approach to campus transportation. The Institute integrated electric vehicles (EVs) and bicycles into our transportation infrastructure to support a greener, more eco-friendly campus environment. Chennai Institute of Technology installed EV charging stations across campus to support the growing use of electric vehicles. These stations are accessible to both campus vehicles and personal EVs of students.

Measurement of the amount of low carbon energy used across the institute: 1631GJ / Year.

Total energy used : 2407 GJ / Year

Total energy used from low-carbon sources : 1631 GJ/Year

Zero emission vehicles (ZEV) policy on campus

Electric vehicle

Charging points for EV

Electric vehicle load carrier (CIT)

Bicycles

e-Vehicle project by Students

13.3 Environmental education measures

13.3.1 Local education programmes on climate

World environmental health day at Chennai institute of technology on 26th September 2022 featured a debate on the question, "Is today's generation protecting the environment or degrading it?" This debate highlighted the importance of local education programs on climate change, which are essential to fostering a more sustainable future. Such programs are designed to raise awareness about the risks and impacts of climate change, particularly at the grassroots level. Through targeted campaigns, communities are educated on climate change mitigation and adaptation, helping them reduce their environmental impact and build resilience to changing weather patterns. By empowering individuals with knowledge about climate change and practical solutions, local education programs ensure that the next generation plays an active role in environmental protection and sustainability.

13.3.2 Climate Action Plan, shared

Climate action plan

The climate action plan for Chennai Institute of Technology outlines a strategic roadmap for reducing the institution's carbon footprint, enhancing environmental sustainability, and fostering a climate-conscious campus. The institution is committed to integrating climate action into its operations, curriculum, and community outreach efforts, ensuring that both short-term initiatives and long-term strategies contribute to sustainable goals.

The institution has following development plans

1. Expanding the installation of solar panels on additional rooftops across campus, Install battery storage systems to store excess solar energy for use during non-sunny hours, improving energy reliability.
2. Increase biomass energy generation
3. Replacement of all old lighting and appliances with energy-efficient LED bulbs. Installation of EV charging stations at key locations on campus to encourage the use of electric vehicles among students and staff.
4. Establishment of dedicated bi-cycle lanes, to encourage cycling as a primary mode of transport.
5. Conduct regular seminars, workshops, and guest lectures on climate change mitigation, adaptation strategies, and sustainability innovations.
6. Plantation of native plant species to support local biodiversity, enhance the campus's carbon sequestration potential, and improve air quality.

13.3.5 Environmental education collaborate with NGO Collaborate with NGOs on climate adaptation

Flood relief efforts for Anakaputhur – November 2, 2022

On November 2, 2022, Chennai institute of technology took significant steps toward fulfilling its social responsibility by organizing and sending much-needed flood relief supplies to Anakaputhur, a locality in Chennai that was devastated by severe flooding. The heavy rains and subsequent floods had led to widespread disruption of daily life, extensive damage to homes, and left many residents stranded without basic essentials. In the face of such a disaster, CIT's response was swift, well-coordinated, and rooted in a deep sense of community commitment. In addition to the immediate relief provided, CIT also that the response was structured in a way that was effective to the needs of the affected population. This included prior communication with local authorities and communities, as well as active collaborations with local non-governmental Organizations, which played a crucial role in both immediate disaster relief and in promoting long-term climate adaptation strategies for the affected area.

A strategic approach to relief

CIT's proactive approach was evident from the early stages of the crisis. The flooding in Anakaputhur prompted the management, faculty, and students to begin planning an effective relief effort. Then took the initiative to reach out to local authorities in Anakaputhur, including community leaders, local councils, and government officials, to gather crucial information about the extent of the damage and the specific needs of the affected population. By staying in constant communication with local bodies, CIT was able to identify the most urgent needs, including food, water, medical supplies, clothing, and other essential relief materials, which were promptly sent and distributed to the affected people.

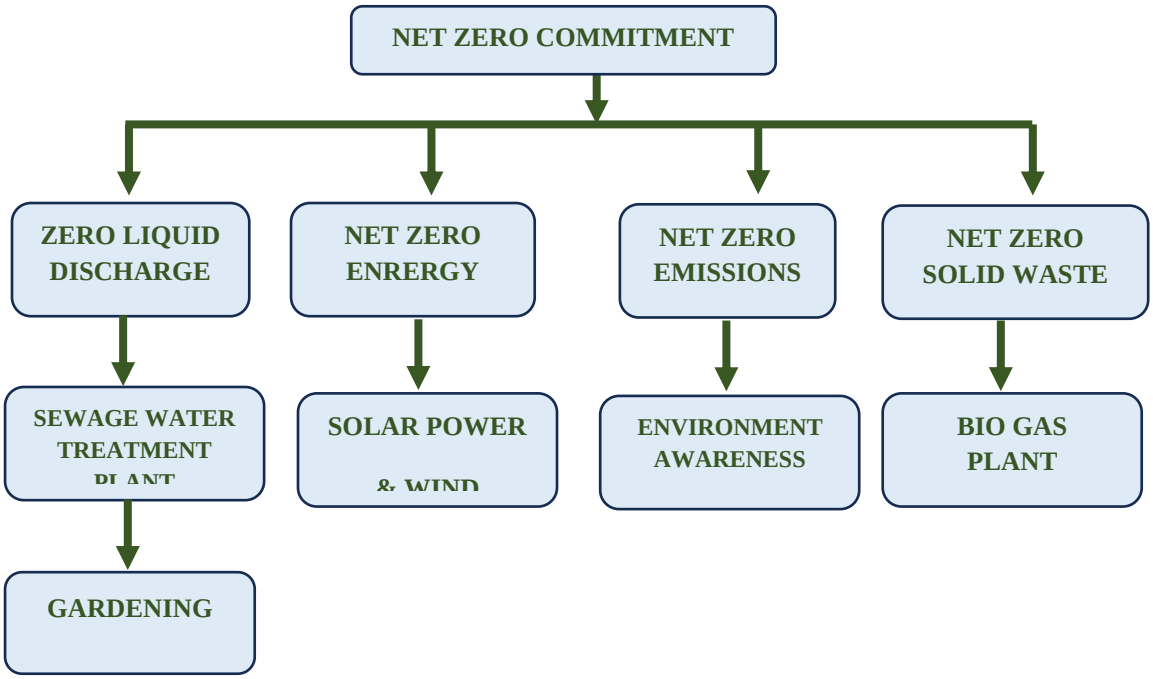
13.4 Commitment to carbon neutral university

13.4.1 Commitment to carbon neutral university

Net Zero Commitment

Chennai Institute of Technology with its vision to be a Net Zero Campus by 2050, producing professional with high technical knowledge, professional skills and ethical values,

it is committed to institutional practices and personal behaviours that will foster public health, environmental protection, and energy conservation.



Establishment of Green Data Centre:

CIT has deployed renewable energy technologies, such as the 300 kW solar system on the rooftops of its academic buildings and hostels, which generates 1,140 kWh of power daily and 35,800 kWh monthly.

Sewage Water Treatment

Wastewater treatment plants operate in the Main campus (275 KLD). A treatment plant with an ultra-filtration facility and it is used for gardening purposes.

An average of 2.7 lakh litres/day of wastewater is generated from various parts of the Main campus to the Sewage Treatment and Recycling plant. It is also proposed to modernize the existing Sewage Treatment Recycling Plant to improve the treated water quality standards for flushing toilets in the new buildings.

Solar Energy

As part of its commitment to climate action, CIT has deployed renewable energy technologies, such as the 300 kW solar system on the rooftops of its academic buildings and hostels, which generates 4.104 GJ of power daily and 128.88 GJ monthly.

All the air conditioners installed in the Departments follow the energy conservation policy (3-Star Quality Rating System).

Bio Gas Power Plant

Disposal of food and vegetable waste from hostel mess has been an perennial issue for the hostel administration. A biogas plant of has been installed towards utilisation of these food/vegetable waste for biogas generation to reduce the dependence of LPG.

Roof Mounted Solar Panels (Chennai Institute of Technology)

Biomass and Wind (Chennai Institute of Technology)

Description:

S.No	Type	Location	Amount of the energy produced (GJ) per year
1	Solar Energy	Roof top of the academic buildings and Hostels	1545.55
2	Biomass	Near Mess Hall	92.79
3	Wind Power	Energy Lab	4.49

- The 300 kW solar energy system installed on the rooftops of the academic buildings and hostels generates an average of 4.468 GJ of power per day and 134.1 GJ per month. By using biomass, we generate 92.79GJ power per year.
- By using wind, we generate 4.49 GJ power per year.

13.4.2 Achieve by

Target Date: 2035

Chennai Institute of Technology is committed to developing a carbon-neutral campus and has a well-defined zero-emission policy aimed at achieving this goal by 2035

SUSTAINABLE DEVELOPMENT GOALS – 14

LIFE UNDER WATER

14.2 Supporting aquatic ecosystems through education

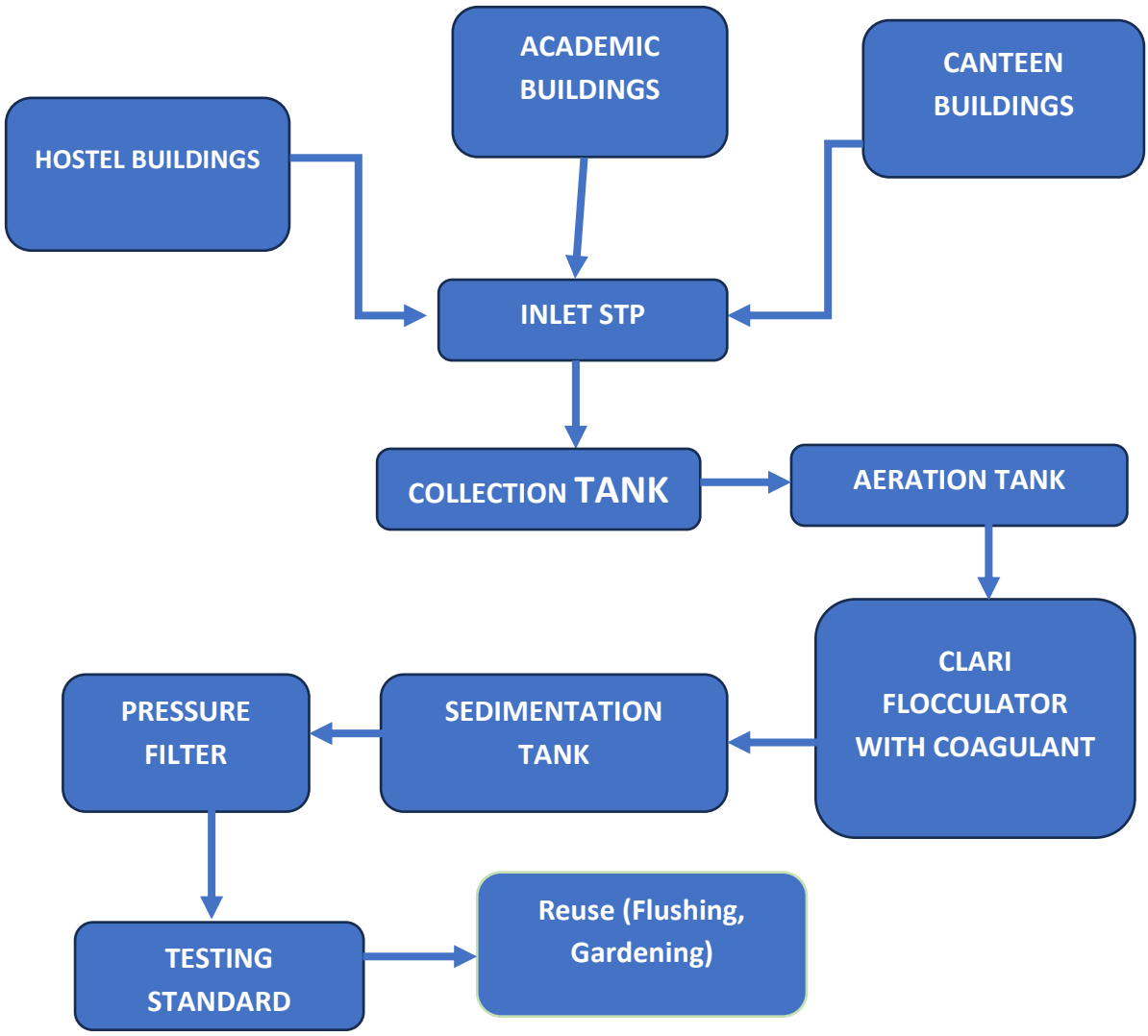
14.2.1 Waste Water Treatment Plant

Wastewater Treatment Plant

An efficient wastewater treatment facility with the capacity of 2,75,000 litres per day is established in campus to treat all wastewater generated from academic, residential, and research buildings.

Promote Wastewater Reuse and Recycling

Recycle treated wastewater for campus needs, such as landscaping, toilet flushing, and cooling systems, to reduce freshwater consumption and wastewater discharge.



Flow Chart -Process of Collection, Treatment and Reuse

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Pressure Filter Units

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Aerators

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Filter Feed, Clarifier and Sludge drying Beds

Water Re-use Measurement

Sewage treatment tank capacity = 275,000 litres/day

Volume of water consumption: 129,261,000 litres/year;

Per day water inlet to STP plant: 271,748 litres;

14.3 Supporting aquatic ecosystems through action

14.3.1 Preventing Water System Pollution

Preventive Actions Involved:

The Institute's plumbing system, which collects water from the respective bore-well and then transports it to the treatment unit and supply, has been carefully designed and put into place. The water is conveyed safely, and the pipes are installed at an appropriate gradient. It is also made sure there were no leaks in the water pipelines by regularly inspecting them. If there is an issue with the water pipes breaking due to an accident, they will also need to be replaced every once monitored. Similarly, different sewer pipelines carry the wastewater that is collected from the institution's numerous locations. There are enough manholes at many intersections to do pipeline inspections. The function of the valves installed in the sewer pipelines is also examined, and necessary maintenance is performed. Additionally, the treated

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wastewater is used for gardening and flushing while being carried securely. Water and sewer lines can be easily distinguished from one another thanks to distinct markings on the plumbing lines. By taking these steps, the Institute has been able to control the wastewater produced on the property and keep it out of the water pipelines and other water sources.




14.3.2 Beach Cleaning

Organize Regular Beach Clean-Up Drives

Conduct regular beach clean-ups involving CIT students, faculty, and staff to reduce marine pollution and maintain the cleanliness of nearby beaches. Partner with local environmental organizations, schedule clean-up events at popular beaches (such as Marina Beach and Besant Nagar Beach), and collect and safely dispose of waste, especially plastics and other non-biodegradable items.

Establish a Beach Waste Data Collection and Monitoring Program

Collect data on the types and quantities of waste found during beach clean-ups to identify major pollutants and track the effectiveness of clean-up efforts. Organize teams to categorize and weigh collected waste, and share findings with local authorities and environmental groups to inform broader waste management policies.

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14.3.3 Promote a Plastic-Free Campus and Community Awareness Campaign

Reduce single-use plastics on campus and promote awareness in the surrounding community to limit plastic use, which often ends up as beach litter. Launch awareness campaigns on campus, collaborate with local shops and communities to reduce plastic usage, and educate students and staff on alternatives to single-use plastics, such as cloth bags and refillable water bottles.

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Other Details

I. Student Projects contributing to SDG14:

Encourage students to participate in wastewater treatment and environmental sustainability projects as part of their academic learning and social responsibility. Provide opportunities for students to work on real-world wastewater treatment challenges, conduct research on innovative treatment solutions, and participate in events related to SDG 14.

Title: DESIGN OF WAVE TANK AND HYDRO DYNAMIC EVALUATION OF FLOATING PLATFORMS FABRICATED WITH REPURPOSED HDPE WATER CANS

Abstract:

This project focuses on exploring floating platforms constructed from repurposed HDPE water cans, emphasizing the design of a specialized wave tank, hydrodynamic analysis using ANSYS Fluent, and experimental validation. The wave tank's design is crucial for replicating realistic wave conditions, optimizing dimensions, wave generation mechanisms, and structural considerations for accurate testing. ANSYS Fluent, a computational fluid dynamics (CFD) software, will conduct hydrodynamic analysis to simulate the behavior of the HDPE water can-based floating platforms under various wave scenarios. This analysis will provide insights into fluid-structure interaction, wave-induced forces, and dynamic response, serving as a baseline for comparison with experimental data. The project will incorporate physical testing of sensor-equipped platforms within the wave tank to capture real-time data on stability, buoyancy, and other parameters. By comparing experimental results with computational simulations, the project aims to validate the accuracy and reliability of the numerical model developed in ANSYS Fluent, enhancing understanding and optimizing the construction of sustainable floating platforms.

Title: SHIP DETECTION USING DEEP LEARNING & SAR IMAGER

Abstract:

The features of synthetic aperture radar (SAR) has been One of the key advantages of CNNs is their ability to learn widely used in maritime surveillance. While various object detection hierarchical representations of data, automatically capturing complex techniques have been proposed, currently, the techniques for patterns and structures within images. This hierarchical feature detecting ships are inconsiderate to the small-scale vessels. Due to the complexity of images, traditional classification techniques often learning allows CNNs to adapt to the varying appearance of ships fail to classify complex images. Also, the intricacies of numerous across different photographs, even in challenging conditions such as ships, varying imaging settings,

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and limited tagged images have varying lighting, imaging orientations, and diverse ship classes. made ship categorization difficult in optical images. While the traditional classification approaches rely on feature extraction; Furthermore, CNNs excel in target segmentation tasks, making them however, they frequently fail to design well-performing features for particularly well-suited for ship categorization. By leveraging complicated images, this paper presents a method that learns architectures such as Fully Convolutional Networks (FCNs)or U-Net, discriminative features and achieves strong classification accuracy CNNs can accurately delineate ship boundaries within images, using deep networks. A novel multi-scale method that uses an R- enabling precise classification and recognition of ships even amidst CNN network has been applied to extract the features of the images. cluttered backgrounds or overlapping vessels. We studied various aspects of ship photography and present the findings in the experiments. The R-CNN-based technique works well for ship categorization, capable of learning discriminative features.

II. Publications contributing to SDG14::

At Chennai Institute of Technology (CIT), students and faculty members are encouraged to publish research aligned with Sustainable Development Goal (SDG) 14, which focuses on sustainable life under water.

III. Research and Innovation contributing to SDG14:

Develop and test new, sustainable wastewater treatment technologies with a focus on resource recovery and minimizing environmental impact.

1	Phytochemical Analysis 0f The Methanolic Extract from The Mangrove Species Avicennia Marina Plant Species Inhabited in Coastal Water
2	IoT Applications in Marine Monitoring: Protecting Ocean Health and Biodiversity
3	Fluoride Contamination of Groundwater in a Coastal Region – A Growing Environmental Pollution Threat
4	Smart Fish Feeding System for Aquaculture

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SUSTAINABLE DEVELOPMENT GOALS

15. LIFE ON LAND

Protect, Restore And Promote Sustainable Use Of Terrestrial Ecosystems, Sustainably Manage Forests, Combat Desertification, Halt And Reverse Land Degradation, And Halt Biodiversity Loss

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss

Goal 15 is about conserving life on land. Its goals are to resist desertification, preserve and restore terrestrial ecosystems, manage forests sustainably, stop and reverse land degradation, and stop biodiversity loss. Earth's ecosystems support a variety of cultural, spiritual, and economic values and are essential to the continuation of human life. They also account for more than half of the world's GDP. However, pollution, biodiversity loss, and climate change are the three crises the world is currently confronting. At least 100 million hectares of productive and healthy land were degraded year between 2015 and 2019, affecting the lives of 1.3 billion people. Nearly 90% of deforestation is directly caused by agricultural expansion. Our food chains are directly affected by this, and between 2000 and 2018, the harvesting of oil palm was responsible for 7% of worldwide deforestation. Particularly for poor nations and the tropics, regional and international initiatives are crucial to maintaining forest ecosystems and their social, economic, and environmental roles. To accomplish Goal 15, we must change how humans interact with nature and acknowledge that it is the foundation of all life on Earth. Goal 15 has additional momentum thanks to the newly agreed Kunming-Montreal Global Biodiversity Framework, which outlines 23 targets to be met by 2030 and four outcome-oriented goals to be accomplished by 2050.

15.1 Policy for Sustainable use, conservation and restoration of land

Objectives:

- To Encourage sustainable land-use methods in forestry, agriculture, and urban areas that promote livelihoods and food security while preserving the health of ecosystems.
- To Use sustainable land management (SLM) techniques to put policies in place that will stop soil erosion, desertification, and deforestation, especially in areas that are already at risk.
- To improve biodiversity and ecological services, preserve natural habitats, stop fragmentation, and rebuild damaged ecosystems, such as forests, wetlands, grasslands, and deserts.
- To Increase the ability of land-based systems to adapt to climate change by using natural solutions like rewilding, agroforestry, and afforestation.
- To Assure vulnerable and marginalized groups, such as women, local communities, and indigenous peoples, of fair land tenure and access rights.

To achieve these objectives, the United Nations says that a fundamental shift in humanity's relationship with nature is necessary. This includes taking action to address the root causes of crises and recognizing the value of nature.

Policy for Strategic Pillars and Actions:

- Utilizing technology to maximize land use, cut waste, and boost output without harming the environment.
- Initiative to increase the number of trees planted in degraded areas, emphasizing native species that enhance ecosystem services and promote biodiversity.
- To support the creation of new protected areas and corridors to safeguard biodiversity hotspots and migratory routes.
- Promotion towards endangered species and important habitats, such as forests, grasslands, and wetlands, is a top priority.
- Empowering local communities, particularly indigenous peoples, to manage forests sustainably and equitably.
- Encouragement of the use of natural solutions to adapt to and mitigate climate change, such as reclaiming wetlands for flood control and carbon sequestration.
- Encouraging initiatives that use sustainable management and restoration to increase carbon reserves in soils and forests.
- Land should be used and managed in ways that provide economic, social, and environmental benefits, without compromising the ability of future generations to meet their needs.
- Land-use and management strategies should integrate ecological principles, recognizing the interdependence of ecosystems, biodiversity, and human activities.
- Recognizing that landscapes are interconnected systems, and promote integrated approaches that consider the full scope of land, water, and biodiversity linkages.

This policy provides a comprehensive framework for the sustainable use, conservation, and restoration of land, aimed at fulfilling the commitments of SDG 15, to protect, restore, and promote the sustainable use of terrestrial ecosystems. By implementing this policy, we aim to build a resilient, biodiverse, and sustainable land management system that benefits both people and the planet, ensuring a prosperous future.

Policy History

Policy created on	07-06-2021
Policy reviewed on	23-03-2022

15.2 Sustainable Land Ecosystems through Education

The Chennai Institute of Technology has recently taken the following specific steps in these directions,

The event Greening the Future (Tree Plantation Camp) took place on 03/06/2023 at the Chennai Institute of Technology. 150 students participated in the tree plantation camp, aiming to promote environmental sustainability. The event focused on raising awareness about the importance of trees in combating climate change and encouraging students to actively contribute to creating a greener future.

The Go Green Cyclothon was held on 26/01/2022 at the Chennai Institute of Technology. A total of 150 students participated in the event. The Cyclothon aimed to promote environmental sustainability by encouraging eco-friendly transportation, raise awareness about the importance of reducing carbon emissions, and inspire students to adopt greener lifestyles. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

One Day Workshop on Applications of Hybrid Energy Dryer in association with Indian Concrete Institute and IEEE Students Chapter supported by Department of Science and Technology, Government of India on 20th December 2023 were conducted to aware preserving energy to make life on Land sustainable.

CIT commitment towards being an ECO-centric campus - a manifestation of that being 300kW Roof Top Solar Power Plant installed, which is equivalent to 20,000+ trees planted, 380+ tons of CO_2 reduction.

15.3 Supporting land ecosystems through action

Vermicomposting Unit:

Vermicomposting is an organic process that uses earthworms to create compost. Composting using worms is another name for vermicomposting. The process of vermicomposting is thought to be an environmentally beneficial way to turn organic wastes into compost that may be used as fertilizer. Several worm species are used in the vermicomposting process, however the most common ones include red wigglers, white worms, and other earthworms. This compost has been used for the significant amount of vegetation cultivated with the institute's hydroponics farm adhering to food policies.

In-house Vermicompost Unit

Hydrophonics

Organic farming has been involved in CIT campus with only organic fertilizers from vermicomposting units. Organically grown Vegetables are cultivated in the Institute. Eco club is initiated with the view of promoting research and development in green engineering concepts and energy conservation activities in and around the campus. The club has also stepped in creating awareness among the students by turning them technically sound on new and renewable energies.

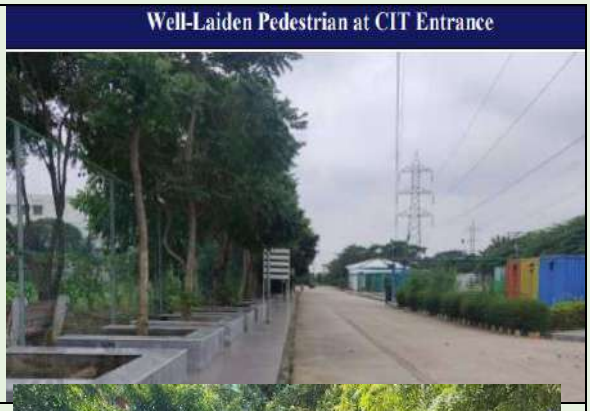
The institution planned for debate about the role of contemporary society in environmental preservation was triggered by the theme "Today's Generation: Protecting the Environment or Degrading It?" Proponents contended that today's youth are more engaged and aware than ever before, supporting eco-friendly technologies, campaigning for climate policies, and encouraging sustainable practices. However, detractors drew attention to the ongoing increases in waste, consumption, and carbon emissions, implying that many behaviours continue to worsen the environment despite awareness. Finally, the conversation emphasized the necessity of more effective systemic reform and shared accountability.

Action towards Maintain and Extend current ecosystems Biodiversity

CIT stepped out activities for a bird watch to be a part of annual bird census near forest open area along with Forest Range Officers 11 March 2023. These activities engage both student members of the eco-club and students from different faculties. Activities pertaining to the preservation and abundance of biodiversity are in line with awareness-raising and educational initiatives.

Ecofriendly Pedestrain Path in campus

The campus pathways are ecofriendly with seperators between the roads and pedestrian paths. The pathways are provided with lamps throughout for ease in night time. Ramps are provided in parallel to conventional access at all entry points. Major pathways are designed with paverblocks such that the water percolation to the ground recharges normally.



Ecofriendly Pedestrian path Facilities in Campus

Usage of Bicycle

A number of transportation-related initiatives have been introduced by the institution. These programs aim to encourage more sustainable campus environments, lessen dependency on private vehicles, and promote alternate forms of transportation.

Free to rent bicycle on campus

Increase the percentage of paperless office

To minimize paper waste and promote digital solutions, our college has launched a paper reduction initiative that encourages the use of electronic resources and sustainable materials. This program aligns with our broader goal of fostering a more environmentally conscious and resource-efficient campus.

Paperless Registration

Digital Notes

Paperless Meeting

Paperless Labs

Avoiding Usage Of Single Use Plastics

Initiation to support a cleaner, greener campus, our college has rolled out a comprehensive program to significantly reduce plastic waste. This includes initiatives such as eliminating single-use plastics, promoting reusable alternatives, and increasing recycling efforts to minimize plastic pollution and foster a more sustainable campus environment.

Promoting "No Plastic" in campus

To provide a thorough introduction to a range of Hybrid Energy subjects, a workshop was held that included hands-on workshops on each idea along with an appropriate balance of theory and practice.

A campaign was conducted to adopt Trees with Mahindra Finance on 16th September 2022.

Chennai Institute of Technology organised Summer School on Applications of Geospatial Technologies - Smart City Traffic and Transportation Planning (Level 2 - Advanced) jointly

organised by the National Resources Data Management System, Department of Science and Technology, Government of India.

National Energy Conservation Day was decorated by the art of students on Global Warming.

Community Awareness in Puthuper on 11.02.2023

A Rally on "A MARCH FOR MINDS AND WATER", Over 50 students and faculty members took part in the rally, showing solidarity towards the cause. The participants carried banners and slogans emphasizing the importance of Water conservation and preservation. The rally began from CIT and proceeded to Puthuper Village attracting attention and sparking conversations about the importance of water management and literacy towards it.

Post-Rally Activities:

Tree-Planting Ceremony: Following the rally, participants gathered in the campus garden for a symbolic tree-planting ceremony. As part of our ongoing green initiatives, we planted three saplings in the institute's garden. These saplings not only represent our dedication to SDG-15 but also symbolize the growth and nurturing of knowledge(SDG4), reflecting our commitment.

Collaborative Art Installation: After the tree planting, we engaged the participants in a creative activity. A large chart was displayed at the playground entrance gate, where each participant made their handprints on the chart. We then drew branches extending from a central trunk, and the thumbprints of participants acted as leaves, transforming the handprints into a

beautiful, symbolic tree. This artwork now stands as a reminder of our collective efforts toward sustainability and education.

15.4 Land Sensitive Waste Disposal

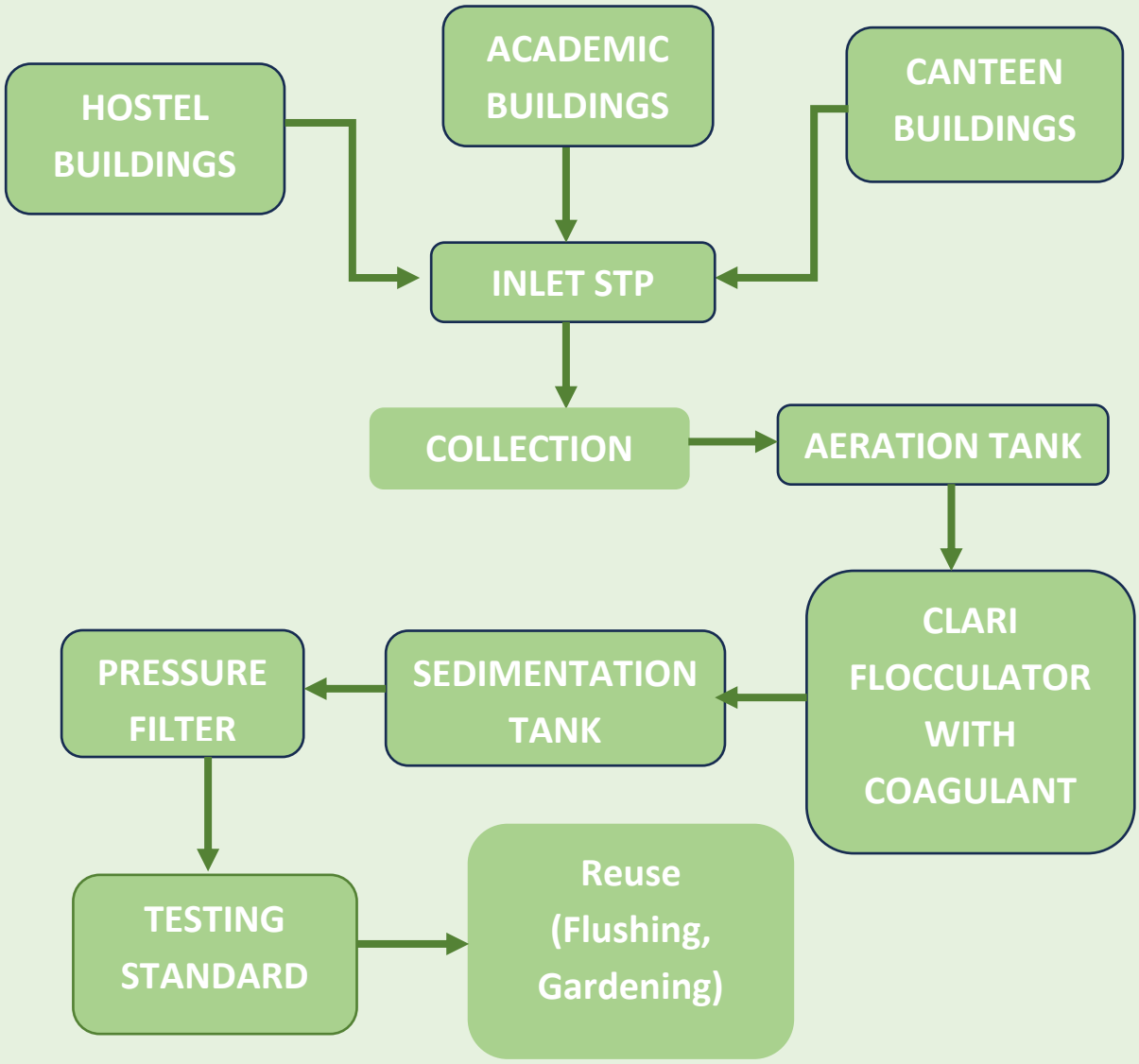
Water Discharge Guidelines And Standards

Water supply in the institute is been managed and supplied from four bore well sources to meet the daily demands. This supplies to input to purified for drinking water. The person in-charge monitors and manages the operations to ensure efficient and adequate supply of water around the campus. The water consumption and reuse standards adheres to the water reuse policy in the institute.

Waste Water Treatment Plant

The Chennai Institute of Technology is mindful of the need to conserve society and water for the safety of the environment. The plant comprises 1 unit of capacity 1,25000litres and 2 units of 75,000litres. Initially, the excess water is stored in the storage tank and aired in the aeration tank. After the aeration process, the coagulant is flocculated and sent to the sedimentation tank. And then the water is filtered by pressure and sent to the distribution tank. Water is used for gardening and irrigation of plants. The Institution is dedicated to sustainability and environmental conservation, and one of the key initiatives in this regard is our Water Recycling Program. This program is designed to reduce water consumption, minimize waste, and promote

the efficient use of water resources across our campus. Several steps are involved in wastewater treatment to eliminate impurities and enhance water quality.



Flow Chart -Process of Collection, Treatment and Reuse

To stabilize wastewater flow, screening, grit removal, and flow equalization are used in preliminary treatment to remove big solids and debris. Through sedimentation and the removal of floating material, first treatment eliminates a sizable number of solids and organic matter; however, dissolved particles are not addressed. Secondary treatment reduces BOD by 85–95% by using biological processes like as oxidation ponds, trickling filters, and the

activated sludge process to break down organic materials. Through filtration, chemical coagulation, nutrient removal (phosphorus and nitrogen), and disinfection with chlorine, UV radiation, or ozone to get rid of any lingering pathogens, tertiary (advanced) treatment further enhances the quality of the water.

Pressure Filter Units

Aerators

Filter Feed , Clarrifier and Sludge drying Beds

Water Re-use Measurement

Sewage treatment tank capacity = 275,000 litres/day

Volume of water consumption: 129,261,000 litres/year;

Per day water inlet to STP plant: 271,748 litres;

Water sample Tested for Standard(pH)

Chennai Institute of Technology prioritizes environmental sustainability by actively monitoring water quality to control pollution within our campus. To achieve this, we utilize advanced equipment such as a digital auto-ranging conductivity meter with a magnetic stirrer and a digital pH meter with a magnetic stirrer. The digital pH meter provides precise measurements of the water's acidity or alkalinity, which is critical in assessing the overall water quality. By regularly checking these parameters, we can swiftly identify any anomalies or signs of pollution, allowing us to take preventive measures. This proactive approach helps in maintaining a healthy environment and mitigating water pollution on our campus.


Water sample tested in Laboratory

15.5 Policy on Plastic Waste Reduction

Objective:

By encouraging sustainable waste management techniques, reducing plastic usage, and encouraging environmental stewardship among students, employees, and the local community, we can lessen plastic waste on college campuses and help achieve Sustainable Development Goal (SDG) 15: Life on Land.

Key Areas of Action:

Reducing or eliminating the use of single-use plastics in campus cafeterias, stores, and canteens, including straws, bags, cutlery, and bottles.

Promoting and encouraging towards use of reusable products (such as coffee cups, and water bottles) to campus stores and cafeterias.

Promoting plastic-free practices, by creating "Plastic-Free Zones" in busy places like classrooms, libraries, and public access areas.

Setting up separate bins such that the segregation handled in place against plastics disposal.

Conducting awareness and campaigns against plastic usage, pollution and its impact.

Monitoring for this progress aligned with SDG 15 with the local community.

Policy History

Policy created on	13-08-2021
Policy reviewed on	18-05-2023

15.6 Policy on hazardous waste disposal

Key Areas of Action:

Managing the e-waste (computers, toner cartridges etc) is handled through the aligned channels.

The institute processes waste from laboratory consumables safely disposed as chemical waste.

The institute monitors that the Medical waste from the clinical dispensary in the campus will be disposed regularly such that they are not contaminating the landscape.

Automotive or maintenance waste (oils, lubricants) from the transport facility or industry oriented CoE's to be segregated and disposed separately.

The wastes are segregated and labeled in accordance with the implementation of these policies are monitored complying with safety standards and regulations. Encouraging towards audit and awareness campaigns of disposal methods with tied agencies to handle the same.

Policy History

Policy created on	13-08-2021
Policy reviewed on	18-05-2023

Environmental Conservation Awareness for the Use Of Natural Resources in a Sustainable Way

The Institute has measures in place to lessen the overall quantity of garbage generated by staff offices. Papers, plastics, glassware, and metals are among the recyclables that are separated at the source. The recycling companies receive the separated garbage while all organic and green garbage is composted on campus. The land and ecosystem are protected by minimizing environmental pollution through these operations. These outcomes are produced by the staff, instructors, and students to increase awareness and advance the ecologically conscious agenda before the campus. They have a practical awareness of how the National Biodiversity Authority, the Pollution Control Board, and other environmental-related authorities operate, and they recognize and value the changes and reforms occurring on a global scale to protect the environment. Marine pollution and water contamination Environmental Protection, Forests and Wild Life, Biodiversity & Wetlands, Air Pollution, Noise Pollution & Climate Change, current environmental issues, good governance and the environment are now covered in the

Environmental law. Numerous seminars, symposiums, and talks have been held to raise awareness of preserving the environment.

Solid Waste Management:

On the Institute campus, about 18 metric tons of solid waste are produced, primarily from dried leaves. Waste is divided into two categories: biodegradable and plastic. Biodegradable waste is converted to compost by a natural process. After that, the fertilizer is made available to the local population so they can utilize the farmland. Teachers are urged to reuse the single-sided paper they use for writing and printing in each lesson. Paper trash is all recycled. The Institute and India Tobacco Company Limited (ITC Ltd.) have inked a Memorandum of Understanding. Waste paper is first gathered and made into sheets. The sheets are rendered and then sent in large packets to the ITC every day. A comparatively small portion of the generated plastic garbage is routinely sent to the provider. Two approved scrap agents are used to treat and dispose of metal and wood waste for further processing.

Separate Garbage Bins around the campus for Waste Collection

E-waste management:

Minister of State (Independent Charge) for Environment, Forestry and Climate Change said that the E-Waste Management Standards have been stricter and reflect the government's commitment to environmental governance. The rules would put the producers under the Expanded Producer Obligation (EPR) with the goals. Producers have been made liable for storing and exchanging e-waste. The majority of customers must gather the products and hand them over to the approved recyclers. The Ministry stresses that different producers should have a specific Producer Accountability Organization (PAO) to ensure that e-waste is processed and

disposed of in an environmentally sound manner. The Ministry noted that the role of state governments has also been developed to ensure the safety, health and skills development of workers engaged in dismantling and recycling operations. Knowledge is developed among students regarding the management of e-waste. E-waste from the laboratories is appropriately gathered and given to the certified recycler, reused whenever possible, donated and sold as much as possible. Non-working machines, displays, and printers are destroyed and scrapped on a systematic basis. Any pieces that are suitable for other systems are set aside for potential use. The E-waste garbage box has been deposited and the e-waste materials are collected and disposed of by recycling vendors. Pursuant to the new regulations, it has been instructed that biodegradable waste should be handled, treated and disposed of as far as possible inside the premises by a compost or bio-meth nation and that residual waste should be disposed of by a waste collector or entity as regulated by the local authority. CIT also launched a full bio-waste management scheme by building a bio-gas generation facility on campus to represent the nation on energy saving grounds. An awareness-raising initiative, in collaboration with local governments, NGOs and students, has been organized to push for better adoption of these waste management tools. Tools need to work on making solid waste management a people's campaign by discussing challenges, complaints and management of solid waste to residents and grassroots.

15.6 Research Activities Contributed:

1. PLANT DISEASE DETECTION USING DEEP LEARNING

The agriculture field has a high impact on our lives. Agriculture is the most important sector of our Economy. Proper management leads to a profit in agricultural products. Farmers do not have expertise in leaf disease so they produce less production. Plant leaf disease detection is important because profit and loss depend on production. CNN is the solution for leaf disease detection and classification. The main aim of this research is to detect the apple, grape, corn, potato and tomato plants leaf diseases. Plant leaf diseases are monitoring of large fields of crops disease detection, and thus automatically detected some feature of diseases as per that provide medical treatment. The proposed Deep CNN model has been compared with popular transfer learning approaches such as VGG16. Plant leaf disease detection is the one of the required research topics as it may prove beneficial in monitoring large fields of crops, and thus automatically detect the symptoms of diseases as soon as they appear on plant leaves. In this project, we focus on providing a quick and effective solution to every farmer who is affected with crop-damaging pests. The recent expansion of deep learning methods has found its application in plant disease prediction, offering a robust tool with high accurate results. The

aim to build a plant disease-predicting model using deep learning and deploy it on a website. This model can predict a plant's disease by seeing its image. And we also provide treatment methods to cure that disease.

2. PET ADOPTION SYSTEM

The pet adoption system is a web-based platform that connects pet lovers with adoptable pets. The system simplifies the process of pet adoption by providing a user-friendly interface that enables pet owners to create listings for their pets and potential adopters to search for pets by breed, age, gender, and location. The systemaims to increase the number of pet adoptions by making it easier for pet lovers to find adoptable pets and providing a secure platform for pet owners to post adoption listings. The pet adoption system is designed to provide a comprehensive solution to the challenges associated with pet adoption. The system not only enables pet owners topost adoption listings but also provides users with valuable information on pet care, training, and nutrition. The system aims to educate users on the responsibilities ofpet ownership and promote responsible pet ownership. In this project report, we will provide a detailed overview of the pet adoption system, including its features, functionalities, design, and development process. Wewill also discuss the challenges and limitations of the system and provide recommendations for future development.

3. ORCHARD MANAGEMENT IN OPEN FIELDS WITH DEEP LEARNING-BASED FRUIT MONITORING

Mango is an important agricultural produce with high export value as it is being consumed internationally. This work presents a method for detection and counting of mangoes in RGB images for further yield estimation. The RGB images are acquired in open field conditions from a mango orchard in the pre-harvest stage. The proposed method uses, deep convolutional neural network-based architecture for mango detection using semantic segmentation. Further, mango objects are detected in the semantic segmented output using contour based connected object detection. Results are analysed using the precision, recall, F1 parameters derived from contingency matrix. Results demonstrate the robustness of detection for a multitude of factors such as scale, occlusion, distance and illumination conditions, characteristic to open field conditions. Further mango fruit size also determined for the estimation of fruit maturation and size distribution, for further decision making to harvest and marketing. To detect fruit, cascade detection with histogram of oriented gradients (HOG) feature is applied. Finally, fruit lineal dimensions were calculated using the RGB-D depth information, fruit image size and the thin lens formula. We believe this work represents the first practical implementation of machine vision fruit sizing in field, with practicality gauged in terms of cost and simplicity of operation.

4. MANGO LEAF DISEASE PREDICTION

The Convolutional Neural Network CNN works by obtaining a picture and designating it with some weightage supported by the various objects of the image, to distinguish them from one another. CNN needs little or no pre-processing information as compared to different deep learning algorithms. Early diagnosis and correct identification of mango plant disease prediction will manage the unfolding of the diseases Mango leaf diseases damage mango

quality and yield. This research uses deep learning to automatically identify leaf diseases in different mango plant kinds. The planned work is Associated with the Nursing correct identification approach for the mango plant disease prediction exploitation of the Convolutional Neural Network. It includes generating comfortable method pathological pictures Associate in nursing coming up with a model and a design of the Convolutional Neural Network to discover mango leaf diseases. The image augmentation method is employed to extend the number of images.

5. CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Construction and demolition (C&D) waste contributes significantly to environmental contamination, making the construction industry a major source of trash generation worldwide. This project investigates ways to minimize, recycle, and reuse materials in order to solve the pressing need for efficient C&D waste management solutions. The study's main objectives are to evaluate the amount of C&D waste generated today, find sustainable disposal methods, and advance the ideas of the circular economy in the building industry. A thorough analysis of waste categories, disposal procedures, and the effects of construction and demolition waste on the environment is part of the project. It also looks at methods and regulations that help reduce waste, like recycling materials, reusing parts in new building, and developing biodegradable materials. This project intends to create useful guidelines and suggest best practices for effective waste handling by carrying out case studies and interacting with local stakeholders. The project's goal is to provide a framework that municipalities and construction companies may use to lessen the environmental impact of building and demolition trash. The results are intended to support sustainable building methods that are in line with international environmental goals, encourage resource efficiency, and reduce greenhouse gas emissions.

6. GROUNDWATER QUALITY ANALYSIS USING MACHINE LEARNING WITH REAL-TIME DATA

Particularly in areas where groundwater is a major supply of water, groundwater quality is crucial for maintaining ecosystems, agriculture, and human health. In order to provide timely insights and predictive skills for groundwater management, this project will use machine learning (ML) approaches to analyze real-time groundwater quality data. The study's main objectives are to identify contaminants, evaluate trends in water quality, and forecast the likelihood of future pollution. As part of the study, real-time groundwater data will be gathered, including dissolved oxygen, turbidity, pH, nitrate levels, and other pertinent indicators. Using machine learning algorithms, this data will be processed to identify patterns and anomalies that signify quality fluctuations. In order to forecast water quality outcomes based on past data patterns and seasonal fluctuations, important techniques such as supervised learning, classification, and regression models will be used. A model that can precisely categorize groundwater quality levels and identify possible contamination events before they happen is one of the expected outcomes. This approach aims to support policymakers, environmental agencies, and communities by providing actionable data for early intervention.

By integrating real-time data with advanced ML techniques, this project seeks to establish a proactive framework for groundwater monitoring, contributing to the sustainable management and conservation of this critical resource.

15.7 Research Publications Contributed:

1. Karmakar, S., Kumbhakar, R., Garai, S., Parastesh, F., Jafari, S., & Pal, N. (2024). Complex Dynamics of a Discrete-Time Food Chain Model. International Journal of Bifurcation and Chaos, 34(06), 2450078.
2. Chakravarthi, V., Santhanavelu, A. S., Palaniappan, K., & Kuppan, V. (2023, January). A novel framework for inspection management system using cloud computing. In AIP Conference Proceedings (Vol. 2523, No. 1). AIP Publishing.
3. Saranya, K., & Sankaradass, V. (2023, December). Hyperpersonalization of Educational Content Through Multimodal Deep Learning and Gamification. In 2023 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI) (pp. 1-5). IEEE.
4. K. K. Ramachandran, S. S. Phatak, S. V. Akram, V. Patidar, A. M. Raju and R. Ponnusamy, "Integration of Machine Learning Algorithms for E-Learning System Course Recommendation Based on Data Science," 2023 International Conference on Artificial Intelligence and Smart Communication (AISC), Greater Noida, India, 2023, pp. 634-638, doi: 10.1109/AISC56616.2023.10085048.
5. Ramachandran, K. K., Ravichand, M., Joshi, K., Vekariya, V., Saini, D., & Ponnusamy, R. (2023, January). Investigation of the educational performance on the revolutionary philosophical electoral online learning platform centred on Deep learning. In 2023 International Conference on Artificial Intelligence and Smart Communication (AISC) (pp. 639-642). IEEE.
6. Janarthanan, R., Partheeban, P., Somasundaram, K., & Elamparithi, P. N. (2021). A deep learning approach for prediction of air quality index in a metropolitan city. Sustainable Cities and Society, 67, 102720.
7. Dhanalakshmi, B., Dhanagopal, R., Raguraman, D., & Thamdapani, T. (2020, December). Improving cognitive learning of children with dyspraxia using selection-based mid-air gestures in athynos game. In 2020 3rd International Conference on Intelligent Sustainable Systems (ICISS) (pp. 231-237). IEEE.
8. Dhinakaran, V., Partheeban, P., Ramesh, R., Balamurali, R., & Dhanagopal, R. (2020, March). Behavior and characteristic changes of generation z engineering students. In 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) (pp. 1434-1437). IEEE.
9. Dhinakaran, V., Partheeban, P., Raguraman, D., Shree, M. V., & Sai, M. S. (2020, March). Powering Sustainable Development Through the Integration of Teaching and Research in Engineering Education. In 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) (pp. 1400-1402). IEEE.

15.8 Patent's Contributed:

S. No	Application No	Title
1	202341000033 A	EVALUATION OF URBAN ENVIRONMENTAL STUDY SPATIALLY
2	202341073484 A	BEYOND BIN: TRANSFORMING WASTE INTO USABLE ENERGY

15.9 Green, Energy and Environment Audit Certification

Chennai Institute of technology has been assessed and found to be in accordance with the requirements of green, energy and environment audit.

IGNITE ENGINEERING

COMPLIANCE VERIFICATION

This is to certify that

Chennai Institute of Technology

Sarathi Nagar, Kundrathur, Chennai - 600069.

Has been assessed and found to be in accordance with the requirements of detailed below

Green, Energy & Environment Audit

(Based on ISO 14001 : 2015 & ISO 50001 : 2018 Standards)

Certificate Number: IE/GA/9886/19

Latest Issue: 10.06.2021 Valid Until: 09.06.2023

Validity of this certificate is subject to annual surveillance audit to be done successfully on or before 20.06.2020 and 20.06.2021 respectively. In case if surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawn.

IGNITE Engineering

AIAO-BAR ACCREDITED

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HEAD – QHSE

FOR IGNITE ENGINEERING

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Certified Under American International Accreditation Organization (Certificate No: QMS2017359)

SUSTAINABLE DEVELOPMENT GOALS

16. PEACE, JUSTICE AND STRONG INSTITUTIONS

Other details

Back to main

Academic Freedom Policy

- Ensure that all faculty, students, and staff can freely engage in research, discussions, and debates on peace, justice, and institutional integrity without fear of censorship or backlash.
- Promote an inclusive atmosphere where a range of perspectives, particularly those from marginalized or underrepresented groups, are acknowledged and appreciated in scholarly discussions on subjects linked to SDG 16.
- Provide resources and protection for research on critical issues like corruption, human rights, peace-building, and social justice, even when findings may challenge powerful interests.
- Encourage ethical practices in research and discourse, ensuring academic work contributes constructively to peace and justice without compromising truth or transparency.
- Protect the academic community from undue political, corporate, or government entities that could threaten independence and integrity in research and teaching.
- Establish transparent and fair processes for handling conflicts related to academic freedom, ensuring impartiality in cases of disputes or challenges to freedom of expression.
- Promote international partnerships and knowledge-sharing on peace, justice, and institutional resilience, supporting SDG 16 on a global scale.
- Lead by example with transparent governance, demonstrating the values of accountability, justice, and ethical decision-making within the institution.
- Educate academics on peace, justice, and strong institutions. Integrate SDG 16 goals into curriculum to promote responsible and informed action.

Policy History

Policy created on	25-04-2019
Policy reviewed on	06-06-2022

Policy- and lawmakers outreach and education

- Conduct targeted outreach campaigns to educate students and faculty about the importance of SDG 16 for sustainable peace, justice, and strong institutions.
- Provide regular training for students on topics like human rights, anti-corruption measures, and governance best practices.
- Educate students on the importance of enforcing anti-corruption laws and promoting integrity within government institutions.
- Encourage students to actively participate in international forums and conventions related to peace, justice, and strong institutions (e.g., UN conventions).
- Promote collaboration between students, civil society organizations, and citizens to ensure inclusive and participatory policy making.
- Empower youth and marginalized communities to actively participate in governance and advocate for SDG 16 principles.
- Create independent bodies to track and report on the progress of SDG 16 initiatives, ensuring that legal and institutional reforms are being effectively implemented.

Policy History

Policy created on	13-05-2019
Policy reviewed on	25-07-2022

Student Projects Contributing in SDG-16

S.No	Name of the Project	Abstract
1	Secure cloud data storage with integer based encryption and efficient space utilization	The increasing reliance on cloud-based data storage necessitates robust solutions to address security vulnerabilities associated with traditional encryption methods. This work addressed the critical problem of potential unauthorized access and decryption of sensitive data stored in the cloud by introducing a novel approach to secure cloud data storage. The proposed system utilized integer-based encryption, adding an additional layer of security by converting input data into integers before encryption. Implemented in MATLAB with a user-friendly graphical interface, the system not only enhanced security but also optimizes storage space through the efficient representation of data as integers. The dual-layered encryption strategy ensured that even in the event of a security breach, compromised data remains encrypted, safeguarding sensitive information. The work contributed to advancing the discourse on secure cloud data storage by presenting a comprehensive solution that aligns with the evolving needs of information management systems in a cloud-centric environment
2	Design and Detection of HT using side channel analysis	Power analysis techniques have emerged as a promising method for detecting hardware Trojans within integrated circuits (ICs). This proposed work explores the application of power analysis in hardware Trojan detection, focusing on the use of power monitors to identify abnormal power consumption patterns associated with Trojan activation. By analyzing the power signatures of ICs during operation, power analysis can uncover subtle deviations indicative of Trojan presence, activation, or malicious behavior. This work begins by providing an overview of hardware Trojans and their potential threats to IC and PCB security, highlighting the need for robust detection methods. It delves into the principles of power analysis, explaining how variations in power consumption can reveal insights into IC behavior and functionality. Specifically, this experiment examines the use of power monitors, which are

		specialized hardware components capable of accurately measuring power consumption in real-time. Next, this work discussed various power analysis techniques employed in hardware Trojan detection, including static power analysis, dynamic power analysis, and differential power analysis. It explored how these techniques leverage power signatures to identify anomalies associated with Trojan insertion, activation triggers, and malicious payloads. Furthermore, this work presented case studies and experimental results demonstrating the effectiveness of power analysis in detecting hardware Trojans across different IC designs and scenarios. This work discusses challenges and limitations associated with power analysis, such as noise, calibration, and sensitivity to Trojan variations, and propose strategies to address these issues.
3	Fake news detection: An ensemble approach	This is a review report on the research performed and a project built in the field of Information Technology to develop a system for Detecting Fake news to prevent the spread of misinformation that happens through various fake news sites, online media, social media, etc. In this project we made use of some existing solutions for fake news detection like using classical approach, ensemble methods, natural language processing, sentiment analysis, and aimed to improve the accuracy of the existing models. The implementation part of the project gave us an idea of how the system works in real world scenarios, its possible use cases and the changes that can be improved or implemented that can enhance the working and utility of the machine learning model. Furthermore, the paper contains a deep analysis about the project architecture along with some important observations made by the authors of the project. These observations were used to achieve better optimization of the proposed system. The machine learning models used in this system were trained on a WELFake dataset which contained over 70,000+ news articles(a mixture of fake and real news). There have been several models and techniques proposed in the past which used the classical machine learning models like Logistic Regression, SVM, Decision Trees, Random Forest, deep learning models like CNN, BERT, and Ensemble Techniques were used in the past as well. The maximum accuracy achieved using those models was around 96.11% but we propose a system that has achieved an accuracy of

		97% This report is a detailed discussion of how we achieved a higher accuracy, what techniques were used and some samples screenshots of how it might get implemented in the real-world.
4	Democracy direct: A Digital poll revolution	The project Digital Poll is a web portal for developing a Voting System for schools and colleges. The project makes the election in digitalized form. Digital Poll is aimed at developing a voting system in online mode. The main objective of developing the system is for voting purpose which saves lot of time in counting process. It makes the voting process fully digitalized. which is very fast and more efficient. Even though this application maintains the records of the students, candidate's records and voting records. Digital Poll can be used by any schools and colleges to make election digitalized. In 'Digital Poll' a voter can use his/her voting right online without any difficulty. Voters has to be registered first to vote the nominee. Registration is mainly done by the system administrator for security purpose.To successfully implement a college voting system, it is important to involve all stakeholders in the process, including students, faculty, administrators.
5	AI -Powered assistance simplifying sentiment analysis in digital discussions	In today's tech world, our project serves as a versatile assistant, integrated with smart devices like Google and Siri. It handles voice input and output for tasks such as medical advice, organization, notes, calculations, and searches. Using microphones, it accesses the web for information, employing Natural Language Processing for communication.
6	Decentralized identity management	Identity management is the process of setting and organizing the roles and access privileges of a user's identity. The current identity management system is centralized and is controlled by a single entity. Users' privacy concerns are not in their best interest. Users have very little to no control over their data. The centralized system becomes a single point of failure which is prone to attack that leads to users losing their data privacy if these centralized systems are breached. Therefore we propose a Block chain-based decentralized Identity Management System that makes use of self-sovereign identity, decentralized identifiers, and verifiable credentials. It also gives users the ability to choose from a very large number of identity providers instead of just a select few corporations. The main advantages of the proposed solution

		include the elimination of the need for a central authority for identity verification and identity data management, the reduction of time spent on identity verification, the ability to share data with permission, and the ability to verify the origin of the data while sharing.
7	People opinion analysis using valence aware dictionary and sentiment reasoner	People opinion analysis primarily focuses on the evaluation of feelings and viewpoints in written material. As opinion mining, sentiment analysis can be referred to. Sentiment analysis identifies and supports a person's feelings toward a specific material source. Huge amounts of sentiment data are present on social media in the form of tweets, blogs, status updates, postings, etc. The viewpoint of the majority can be expressed extremely effectively using sentiment analysis of this widely generated data. Due to slang, misspellings, and repeated characters, Twitter sentiment analysis is more difficult than wide sentiment analysis. We are aware that each tweet on Twitter can only be 140 characters long. Therefore, it is crucial to determine the exact sentiment behind each word. In our research, we provide a very precise model for the sentiment analysis of tweets in relation to the most recent reviews of upcoming Hollywood or Bollywood films. We are accurately identifying these tweets as Positive, negative to offer sentiment of each tweet with the aid of feature vector and classifiers like Support vector machine and Logistic Regression.
8	Secure and Efficient privacy preserving probable data possession	Cloud computing is an emergent paradigm to give dependable and versatile foundation empowering the clients to store their data and the information purchasers can access the data from cloud servers. This worldview decreases stockpiling and support cost of the information proprietor. At the meantime, the information proprietor loses the physical control and ownership of data which leads to many security dangers. Therefore, auditing service to check data integrity in the cloud is essential. This issue has become a challenge as the possession of data needs to be verified while maintaining the protection. To address these issues this work proposes a protected and effective security saving provable information ownership. Further, we stretch SEPDP to support different proprietors, data dynamics and clump verification. The most alluring e feature of this scheme is that the reviewer can verify the possession of data with low computational overhead.

9	Feature level fusion of the face and finger print biometrics	The aim of this paper is to study the fusion at feature extraction level for face and fingerprint biometrics. The proposed approach is based on the fusion of the two traits by extracting independent feature pointsets from the two modalities, and making the two pointsets compatible for concatenation. Moreover, to handle the 'problem of curse of dimensionality', the feature pointsets are properly reduced in dimension. Different feature reduction techniques are implemented, prior and after the feature pointsets fusion, and the results are duly recorded. The fused feature pointset for the database and the query face and fingerprint images are matched using techniques based on either the point pattern matching, or the Delaunay triangulation. Comparative experiments are conducted on chimeric and real databases, to assess the actual advantage of the fusion performed at the feature extraction level, in comparison to the matching score level.
10	SSPRIVACY -Enhanced security in message and file transferring using PHP timestamps and whispering technology	This paper presents an innovative approach to enhancing security in message transmission and file transfer over networks using PHP timestamps and whispering technology. In today's digital landscape, ensuring the confidentiality and integrity of data during transmission is paramount to safeguarding sensitive information from unauthorized access and tampering. Our proposed system leverages PHP timestamps to generate unique identifiers for messages and files, which are then encrypted using whispering technology to obscure their contents from potential eavesdroppers. The utilization of PHP timestamps ensures temporal validity and non-repudiation, while whispering technology provides robust encryption to protect data in transit. Through extensive experimentation and evaluation, we demonstrate the effectiveness and efficiency of our approach in mitigating security risks associated with message and file transfer, thereby bolstering the confidentiality, integrity, and authenticity of communications over networks. Our system offers a viable solution for organizations and individuals seeking to fortify their data transmission mechanisms against evolving cyber threats and vulnerabilities.
11	GLOBAL THREAT MONITORING WITH AZURE SENTINEL AND GEOMAPPING	Cybersecurity threats present substantial risks to organizations globally, necessitating advanced threat monitoring and response mechanisms. This paper introduces a novel approach to augmenting

		real-time threat monitoring capabilities by integrating Azure Sentinel, a cloud-native Security Information and Event Management (SIEM) solution, with GeoMapping technology. By harnessing Azure Sentinel's sophisticated threat detection and investigation capabilities alongside GeoMapping's spatial visualization features, our system offers security professionals comprehensive visibility into global threat landscapes. We discuss the architecture, implementation, and feasibility of our system, emphasizing its technical, economic, and operational viability. Additionally, we present the outcomes of system testing and evaluation, showcasing its efficacy in detecting and responding to cyber threats. This research contributes to the cybersecurity field by proposing an innovative solution for proactive threat defense and risk mitigation in digital environments.
12	Digital counter terrorism to detect the online proliferation of terrorist	Terrorism has proliferated exponentially in certain regions, necessitating urgent action to curb its impact on human lives and property. The widespread adoption of technology, particularly the internet, has facilitated the dissemination of terrorist propaganda through speeches and videos. Terrorist groups exploit online platforms to malign individuals, recruit followers, and incite criminal activities. To counter this threat effectively, the integration of web mining and data mining techniques is imperative. Web mining encompasses diverse text mining methodologies that enable the extraction of pertinent information from unstructured data sources. Text mining plays a crucial role in uncovering patterns, identifying keywords, and extracting significant insights from unstructured textual content. Both data mining and web mining algorithms are instrumental in analyzing structured datasets and extracting valuable information from the vast expanse of web content. However, the varying data structures of websites pose challenges for a singular algorithmic approach. Terrorist groups exploit the internet to spread propaganda and recruit followers through webpages. To counter this threat, web mining and data mining can be used to extract valuable information from vast amounts of web data. Text mining algorithms can then analyze this data to identify patterns and critical information. The internet has become a breeding ground for terrorist activities, used to propagate extremist ideologies and recruit followers. Terrorist organizations

		leverage web pages to spread hate speech and propaganda, urging viewers to join their cause. To combat this threat, web mining and data mining techniques can be employed to extract relevant information from vast amounts of unstructured web data.
13	Distributed ledger technology - Embedded byzantine fault - tolerant web based electoral mechanism (Votechain)	Elections are crucial for modern democracies. However, many individuals do not view them as having a significant impact on democracy. Vote-rigging, hacking Electronic Voting Machines (EVMs), election manipulation and polling booth capturing are some of the issues responsible for the growing mistrust over the electoral process. Block chain is a technology that allows and opens up a possibility for developing a secure and reliable system. This study aims to contribute to the advancement of secure and reliable electoral systems, addressing challenges associated with trust, security, and transparency in traditional voting methods. The block chain is an emerging, decentralized and distributed technology. It eliminates the need of a third party to manage the access control in the process of election. A voting system that relies on block chain ensures both the security and integrity of votes, all while maintaining transparency throughout the process. This project contributes to the evolution of a new way of exercising a healthy democracy. This project focuses on implementing a web-based application that facilitates convenient and secure participation for remote voting through computer or a smartphone. We utilise Ethereum block chain network to implement the project along with Meta Mask wallet. To increase the efficiency of the system, we deploy a new and optimized version of the Byzantine Fault Tolerance (BFT) consensus algorithm called the Federated Byzantine Agreement (FBA). This helps the nodes to achieve consensus even in the face of faulty or malicious nodes. “Distributed Ledger Technology-Embedded Byzantine Fault Tolerant Web-Based Electoral Mechanism (VOTECHAIN)” offers a comprehensive system that is feasible.
14	Credit card fraud detection using Artificial Intelligence	Credit card fraud detection using ARTIFICIAL INTELLIGENCE Abstract: A credit card is issued by a bank or financial services company that allows cardholders to borrow funds with which to pay for goods and services with merchants that accept cards for payment. Nowadays as everything is made cyber so there is a chance of misuse of cards

		and the account holder can lose the money so it is vital that credit card companies are able to identify fraudulent credit card transactions so that customers are not charged for items that they did not purchase. This type of problems can be solved through data science by applying machine learning techniques. It deals with modelling of the dataset using machine learning with Credit Card Fraud Detection. In machine learning the main key is the data so modelling the past credit card transactions with the data of the ones that turned out to be fraud. The built model is then used to recognize whether a new transaction is fraudulent or not. The objective is to classify whether the fraud had happened or not. The first step involves analyzing and pre-processing data and then applying machine learning algorithm on the credit card dataset and find the parameters of the algorithm and calculate their performance metrics.
15	Development of lost kid recognition system using multiclass SVM and CNN	This paper tells a pair of novel use of deep learning methodology which is employed for identifying the reported missing children from the images of multiple youngsters available, with the assistance of face recognition. the ultimate public can upload their images of suspicious children into an everyday portal with landmarks and remarks. The photo are automatically compared with the registered photos of the missing child from the repository. Cataloging of the input child photo is performed and photo with best match are designated from the database of missing children. For this, a deep learning model is trained to properly identify the missing child from the missing child image database provided, using the facial image uploaded by the final word public. The Convolutional Neural Network (CNN), is incredibly effective deep learning technique for image based applications is adopted here for face recognition. Face descriptors are extracted from the images employing a pre-trained CNN model VGG-Face deep architecture. Compared with normal deep learning applications, our algorithm uses convolution network only as a high level feature extractor and thus the kid recognition is completed by the trained SVM classifier. Choosing the foremost effective performing CNN model for face recognition, VGG-Face and proper training of it finally ends up during a very deep learning model invariant to noise, contrast, image pose and also the age of the children and earlier methods in face

		recognition based missing child identification.
16	Truth Track: Harnessing RNNs and NLP for news verification with chatbot support	Research delved into the pervasive issue of fake news and limited information literacy through a novel AI system. The system, which utilized Natural Language Processing (NLP) techniques and Recurrent Neural Networks (RNNs), offered the following key functionalities. An RNN model, trained on a comprehensive dataset of labelled real and fake news articles, was used to analyse news content using NLP. The likelihood of an article being fake news was then predicted by the model. Additionally, legitimate news was categorized into relevant categories (politics, sports, business) using NLP techniques like topic modelling. To address user queries arising from news content, an NLP-powered chatbot was integrated into the project. User questions were understood, and the most relevant and reliable information was provided by the chatbot, leveraging machine learning. The news analysis performed by the first component was drawn upon by the chatbot, guiding users towards trustworthy sources and offering explanations to combat potential biases. The primary objective of the AI system was to empower users to become more discerning consumers of information. Users could readily identify fake news and gained a deeper understanding of legitimate news content. Information literacy was further enhanced by the chatbot, which provided context and facilitated user queries.
17	A Multi-modal approach for Deepfake detection system using LSTM and MLP in CNN	In the rapidly advancing landscape of machine learning, the detection of deepfake videos has become an imperative challenge. The proposed introduces a novel approach everaging the synergies of Dense Net v2, LSTM, and MLP architectures in a multi-modal system for enhanced deepfake detection. In an extensive review of existing work in deepfake detection, identifying key parameters and methodologies. The project model integrates the strengths of Long Short-Term Memory (LSTM) networks and Multi-Layer Perceptron (MLP) classifiers with the feature extraction capabilities of Dense Net v2, creating a robust and efficient framework. The training process involves optimizing key parameters to ensure model accuracy, and discuss the tools employed for data preprocessing and model evaluation. In experimental results, it present a comprehensive performance analysis using precision-recall curves, confusion matrix heatmaps,

		F1 score comparison bar charts, and accuracy box plots. The proposed multi-modal approach demonstrates superior detection capabilities compared to existing models, showcasing its potential for real-world applications. The study contributes not only to the field of deepfake detection but also to the broader discourse on the intersection of machine learning and video analysis.
18	Performance enhancement of video surveillance in fortifying banking security through darknet analysis	This research delves into the fusion of the YOLO v5 (You Only Look Once) object detection framework with the Darknet architecture to create an advanced Intelligent Video Image Processing and Monitoring Control System tailored explicitly for enhancing security in the banking sector. Leveraging the real-time object detection capabilities of YOLO v5, the system enables efficient monitoring and surveillance across various areas within bank premises. Darknet, functioning as a neural network framework, serves as the foundational structure for implementing and optimizing YOLO v5 within the proposed system. This integration ensures robust real-time performance, allowing for seamless monitoring and control mechanisms throughout banking environments. By utilizing Darknet's capabilities, the system can effectively handle the complexities of processing video feeds in real-time, enhancing overall security measures within banking facilities. The primary objective of the proposed system is to bolster security measures within banking environments by providing instantaneous and accurate alerts for potential security threats or anomalous activities Through the amalgamation of YOLO v5 and Darknet, the system aims to offer comprehensive surveillance capabilities, enabling banking institutions to proactively identify and respond to security incidents promptly. This innovative approach to video image processing and monitoring control holds promise for significantly enhancing security protocols within the banking sector.
19	Authentication access control for vehicle ignition system using RF and Fingerprint technology	Fingerprint identification is one of the most popular and reliable personal biometric identification methods. The proposed system consists of a smart card capable of storing the fingerprint of particular person. While issuing the license, the specific person’s fingerprint is to be stored in the card. Vehicles such as cars should have a card reader capable of reading the particular

		license. The same automobile should have the facility of fingerprint reader device .A person, who wishes to drive the vehicle, should insert the smartcard in the vehicle and then swipe his/her finger. If the fingerprint matches with the fingerprint stored in the smart card then it goes for alcohol detection and seatbelt checking. After passing all authentications, the vehicle will be ignited. The vehicle will not be ignited, if any one of the authentications fails and will not proceed the next step. This increases the security of vehicles and also ensures safe driving by preventing accidents. The prototype of the ignition system is used by the Master controller (Cortex M3 based Micro controller) is implemented along with the vehicle prototype is developed and the results are attached. Biometric authentication is an emerging technology that has found its application in various domains. One of the domains that have recently gained attention is vehicle ignition. This technology is used to prevent unauthorized access to the vehicle and ensure that only the authorized driver can start the vehicle. The biometric authentication system typically uses a combination of physiological and behavioural traits to identify the driver, such as facial recognition, fingerprint scanning, recognition, voice recognition, and gait analysis. This paper aims to provide an overview of the biometric authentication system for vehicle ignition, including the advantages, disadvantages, and challenges of implementing such a system. The paper also discusses the different biometric modalities that can be used for authentication, the algorithms used for recognition, and the security aspects of the system. The results show that biometric authentication for vehicle ignition has the potential to increase the security of the vehicle and prevent theft. However, there are still some technical and social challenges that need to be addressed before this technology can be widely adopted.
20	Border defense mechanism classification using Deep Learning techniques	The Advancements in deep learning are set to transform border defense, leveraging attention mechanisms and meta-learning to enhance threat detection accuracy. Integrating diverse sensor types, including aerial imagery, satellite data, social media analytics, and IoT devices, offers a comprehensive surveillance approach. This multi-modal data fusion enables nuanced threat assessments, improving situational awareness.

		Real- time processing, facilitated by edge computing solutions, ensures swift responses to potential threats by handling high-volume streaming data efficiently. Despite technological strides, ethical considerations remain paramount. Transparency, fairness, and privacy protection are imperative in border security applications. Implementing accountable decision-making processes and privacy-preserving techniques in data processing pipelines is essential. Engaging stakeholders ensures societal concerns are addressed, balancing security needs with individual rights. Ultimately, the future of border defense classification holds promise for more accurate, efficient, and responsible systems. By prioritizing ethical principles alongside technological innovation, borders and sensitive areas can be safeguarded effectively while upholding fundamental rights and values.

Events to raise awareness for SDG-16

Raise awareness about Sustainable Development Goal 16 (SDG 16) – "Peace, Justice, and Strong Institutions" – and mobilize individuals and organizations to take actionable steps towards promoting peaceful, inclusive societies.

1. On the **187th birth anniversary of Sri Ramakrishna Paramahamsa**, a **Power Talk** was conducted at **CIT Campus** exclusively for the **2nd-year students**, centered on the inspiring theme: **"Discover the Power Within You."** The event aimed to honor the timeless teachings of Sri Ramakrishna, focusing on the importance of self-discovery and inner strength in navigating life's challenges. It encouraged students to realize their potential and build a strong foundation for personal and professional growth.

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SUSTAINABLE DEVELOPMENT GOALS

17. PARTNERSHIPS FOR THE GOALS

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17.2 Relationships to support the goals

17.2.1 Relationships with regional NGOs and government for SDG policy

The Chennai Institute of Technology has relationships with the following NGOs for SDGS

S.No	Name of the NGOs	NGOs Logo
1.	Eco-Society India	
2.	Ooruni Foundation	
3.	Anandham Youth Foundation	
4.	Maatram Foundation	
5.	Lions Club, Chennai.	
6.	Rotary Club, Chennai.	

Eco-Society India

Eco Society India aim is to restore the urban ecosystems and bridge the gap between ecosystem and man in the urban environment and enable people to live a healthy and comfortable life.

In collaboration with Chennai Institute of Technology, the Eco-Society India completed the "Autonomous Lake Surface Cleaner: Reducing Waste Accumulation" community service project.

Ooruni Foundation

The Ooruni Foundation is dedicated to empowering underprivileged communities through various initiatives focused on education, environmental conservation, and social inclusion. Ooruni's Environmental Initiatives include the successful Mass Plantation Drive, which has planted nearly 3,600 saplings across Tamil Nadu. Ooruni also advocates for women's empowerment through initiatives like AWAKE, which promotes equal opportunities for

women, and the WWAA (Working Women Achievers Award), recognizing the achievements of women in various sectors.

In collaboration with Chennai Institute of Technology, the Ooruni foundation jointly organized the following events during the academic year 2022-23.

Anandham Youth Foundation

Fulfilling the dreams of underprivileged rural students, Anandham Youth Foundation has been at the forefront of educational transformation. Foundation provides 100 % financial support for the underprivileged students who have scored brilliantly in their examinations but cannot incur the cost of higher education. Foundation aim is not only uplift the lesser privileged students but also get them out of the poverty cycle.

In collaboration with Chennai Institute of Technology, the Anandham Foundation provides scholarships to students for their higher education and conducts educational awareness programs.

Maatram Foundation

Maatram leads transformation in the lives of deserving underprivileged students by providing quality sponsored education, continuous skill development, world class exposure to solving real life challenges, getting them placement ready and by imbibing societal skills. In-turn the students get groomed to become the finest in the society.

In collaboration with Chennai Institute of Technology, the Anandham Foundation provides scholarships to students for their higher education and conducts educational awareness programs.

Lions Club

The Club is dedicated to making a lasting impact on the community by focusing on both immediate and long-term needs. Club work is made possible by the generous donations of time and resources from their members, and driven by the belief that serving others leads to growth both for the community and for the Club itself.

In collaboration with Chennai Institute of Technology, the Lions Club jointly organized the following events during the academic year 2022-23.

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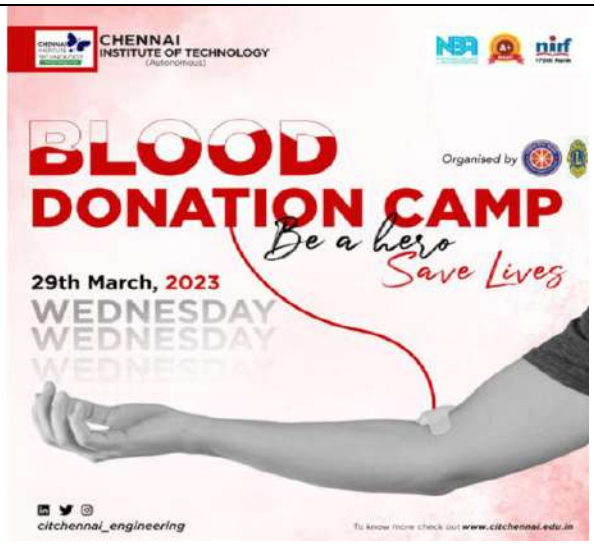
<td> 
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Rotary Club

The Rotary Club of Chennai is a dynamic community organization committed to creating positive change both locally and globally. Rooted in the ideals of Rotary International, the club strives to improve the quality of life for individuals through service-oriented projects, philanthropic activities, and community outreach.

In collaboration with Chennai Institute of Technology, the Rotary Club jointly organized the following events during the academic year 2022-23.

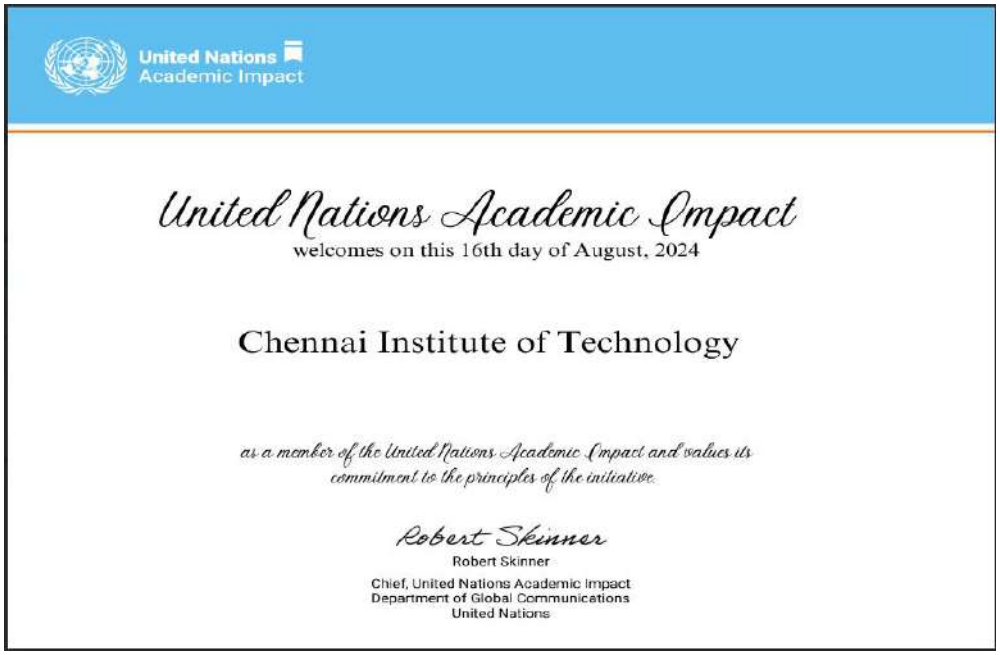
CHENNAI INSTITUTE OF TECHNOLOGY
(Autonomous)

NIRF 151 - 200 Band Engineering 2023

NAAC A+

17.2.2 Cross sectoral dialogue about SDGs

The Chennai Institute of Technology actively participates in cross-sectoral dialogue such as Race to Zero, The SDG Accord, and United Nations Academic Impact, fostering collaboration among academia, industry, and policy-makers to accelerate global climate action and achieve the Sustainable Development Goals



United Nations Academic Impact

United Nations Academic Impact

welcomes on this 16th day of August, 2024

Chennai Institute of Technology

as a member of the United Nations Academic Impact and values its commitment to the principles of the initiative.

Robert Skinner

Robert Skinner
Chief, United Nations Academic Impact
Department of Global Communications
United Nations

Events

Tech4Tomorrow – Hacking the global goals

The Tech4Tomorrow Hackathon - Hacking the Global Goals, organized by Chennai Institute of Technology (CIT), took place on 11th September 2023 at the Kaveri Auditorium. The event saw an impressive turnout, with 100 teams participating, each eager to contribute innovative solutions aimed at addressing the United Nations' Sustainable Development Goals.

CITIL's SDG Ideathon

The CITIL's SDG Ideathon, organized by Chennai Institute of Technology, was held on 4th November 2022 and 5th November 2022 at the Incubation Labs. The event brought together students, innovators, and thinkers with a shared passion for addressing the United Nations' Sustainable Development Goals (SDGs).

Sustainability Ideathon

The Chennai Institute of Technology hosted the Sustainability Ideathon on 16th August 2023 at IoT Laboratory. This event brought together students, innovators, and sustainability enthusiasts to brainstorm and propose innovative solutions aimed at addressing global environmental challenges.

17.2.4 Collaboration for SDG best practice

The following international universities have collaborated with Chennai Institute of Technology to conduct research, review comparative approaches, and develop international best practices.

S.No	Name of the University	Logo	Country	MOU Signing Date
1.	Institute of Research & Development, Ministry of National Defence		Ethiopia	01.02.2021
2.	Kyushu Institute of Technology		Japan	07.02.2023
3.	Istanbul Aydın University		Turkey	07.08.2023
4.	National Chung Cheng University		Taiwan	11.09.2023
5.	Karadeniz Technical University		Turkey	23.10.2023
6.	University of Galati		Romania	23.10.2023
7.	Fu Jen Catholic University		Taiwan	11.10.2023

8.	Ming Chi University of Technology		Taiwan	26.10.2023
9.	University of Strathclyde		Scotland	07.12.2023

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17.4 Education for the SDGs

17.4.2 Education for SDGs: Specific courses on sustainability

S.No	Course title	Notes	Related Goals
1.	NGOs and Sustainable Development (OMG352)	It covers strategies NGOs use to address environmental, social, and economic challenges, along with frameworks like the UN's Sustainable Development Goals (SDGs). Emphasis is placed on partnerships, policy advocacy, and community-based approaches.	SDG 7, 11, 12, 13, 15 & 17
2.	Environment and Social Impact Assessment (OCE351)	It covers methods for impact identification, mitigation strategies, and regulatory frameworks to ensure sustainable development. The course also emphasizes public participation and environmental policy compliance.	SDG 6, 11, 13 & 16
3.	Environmental Sciences and Sustainability (GE3451)	This course explores the principles of environmental science, focusing on ecological systems, pollution, and climate change. It emphasizes sustainable practices, environmental policy, and resource management to address global environmental challenges.	SDG 6, 11 & 13
4.	Environmental Science and Engineering (GE8291)	It covers topics like air, water, and soil pollution, environmental policies, and eco-friendly technologies, aiming to equip students with knowledge for addressing environmental challenges through engineering solutions.	SDG 6, 11, 12, 13, 14 & 15
5.	Renewable and Non - Renewable Power Generation Systems	It explores methods of generating electricity using sustainable sources like solar, wind, and hydro, alongside conventional sources like coal, oil, and natural gas. The course covers the technologies, environmental impacts, and efficiency of both systems, emphasizing the transition to cleaner energy solutions.	SDG 7, 11 & 13
6.	Smart Grids	It involves modernizing traditional electrical grids by integrating advanced communication, control technologies, and IoT. They enable	SDG 7 & 13

		efficient energy management, real-time monitoring, and seamless integration of renewable energy sources, enhancing grid reliability and sustainability.	
7.	Energy storage systems	It explores their design, applications in renewable energy, grid management, and electric vehicles, and evaluates key metrics like efficiency, capacity, and environmental impact.	SDG 7 & 13
8.	Electric Vehicles and Transportation Systems	This course explores the fundamentals of electric vehicle technology, including battery systems, charging infrastructure, and energy management. It also examines the impact of electric vehicles on transportation systems, urban planning, and sustainability, highlighting the transition towards greener mobility solutions. Students will analyze case studies and engage in discussions on policy and technological advancements in the electric vehicle sector.	SDG 7 & 13
9.	Disaster Management (Mandatory Course, III)	This course explores the principles and practices of disaster management, focusing on preparedness, response, recovery, and mitigation strategies for various types of disasters, including natural and man-made events.	SDG 11, 13, 14 & 15
10.	Life Cycle Assessment (CE46O2)	This course covers the principles and methodologies of Life Cycle Assessment (LCA), a systematic approach for evaluating the environmental impacts of products or services throughout their entire life cycle—from raw material extraction to disposal.	SDG 12 & 13
11.	Environmental Impact Assessment (CE46O5)	It is a systematic process used to evaluate the potential environmental effects of proposed projects or developments before they are approved. It involves assessing factors such as air and water quality, biodiversity, and social impacts to inform decision-making and mitigate negative effects.	SDG 11, 12, 13 & 15

12.	Drinking Water Supply and Treatment (EE47O4)	This course covers the principles and practices of sourcing, treating, and distributing safe drinking water. It explores water quality standards, treatment processes (such as filtration and disinfection), and the management of water supply systems to ensure public health and environmental sustainability.	SDG 6, 11 & 14
13.	Renewable Energy Technologies (ME47O5)	It focuses on the various methods and systems used to harness energy from renewable sources, such as solar, wind, hydro, and geothermal. The course covers the principles of energy generation, conversion, and storage, emphasizing sustainability and environmental impact.	SDG 7, 11 & 13
14.	Green Computing (CS47O3)	It aims to reduce energy consumption and waste while promoting eco-friendly technologies and practices throughout the lifecycle of computing systems. Key topics include energy-efficient hardware, sustainable data centers, and the impact of computing on climate change.	SDG 7, 12 & 13
15.	IoT Networks (CS4V62)	This course explores the principles and technologies that enable the Internet of Things (IoT). Students will also learn about data management and analytics to optimize IoT applications across various industries.	SDG 9 & 11
16.	Industrial IoT & Healthcare Systems (CS4V66)	This course explores the integration of Industrial Internet of Things (IoT) technologies in healthcare systems, emphasizing data collection, real-time monitoring, and improved patient outcomes.The course also examines case studies demonstrating the impact of IoT on operational efficiency and patient care in healthcare settings.	SDG 3, 9 & 11
17.	Smart Cities (CS4V67)	This course explores the integration of digital technologies and data analytics in urban planning and management to enhance the quality of life, sustainability, and efficiency in cities.Students will examine case studies and develop strategies for creating more resilient and interconnected urban environments.	SDG 7, 11 & 13

18.	Renewable Energy Systems	This course explores the intersection of human behavior, societal needs, and renewable energy technologies, emphasizing sustainable practices and energy management.	SDG 7 & 13
19.	Waste Management and Recycling	It focuses on strategies for reducing, managing, and recycling waste to minimize environmental impact. The course covers waste types, disposal methods, and the importance of sustainable practices. It emphasizes the role of recycling in resource conservation and pollution reduction.	SDG 12 & 15
20.	Environmental Engineering	It focuses on the development of technologies and practices to protect and improve the environment. The course aims to equip students with the knowledge and skills needed to address environmental challenges and promote sustainability.	SDG 7, 11 & 13
21.	Smart Materials and Structures	This course explores the properties and applications of smart materials that respond dynamically to environmental changes. Students will also investigate the design and analysis of systems utilizing these materials for improved functionality and efficiency.	SDG 9, 11 & 12
22.	Water Resources and Irrigation	This course explores the management and sustainable use of water resources for agricultural and non-agricultural purposes. Students will also analyze water policy and governance frameworks to address challenges in water resource management.	SDG 6, 13, & 14
23.	OPE352-Energy Conservation and Management	To educate students on the various dimensions of energy management across the entire value chain Energy. It is a key instrument to reduce greenhouse gas emissions, besides increasing the cost competitiveness of the entity/ facility while enhancing the energy security of the nation.	SDG 7, 12 & 13
24.	OIE352-Resource Management Techniques	It is the process of planning, scheduling, and allocating organizational resources in the best way possible to maximize the value and potential of your resources.	SDG 7, 12, & 15

25.	GE 3791 Human Values and Ethics	Moral and Social Values and Loyalty and to appreciate the rights of others and for sustainable growth of community	SDG 8, 10 & 16
26.	MC2303 Universal human values	Moral and Social Values and Loyalty and to appreciate the rights of others and for sustainable growth of community	SDG 5, 10 & 16
27.	CBM 357 Medical Device Regulations	Standards to followed design sustainable medical products	SDG 3, 9 & 12
28.	BM2V16 Medical device design and regulation	Standards to followed design sustainable medical products	SDG 3, 9 & 12
29.	CE8512- Water and Wastewater Analysis Laboratory	Physical, Chemical and Biological characteristics of water and wastewater	SDG 6, 13, 14 & 15
30.	EN8592- Wastewater Engineering	Planning And Design Of Sewerage System, Primary Treatment Of Sewage, Secondary Treatment Of Sewage, Disposal Of Sewage, Sludge Treatment And Disposal	SDG 6, 13, 14 & 15
31.	CE8001- Ground Improvement Techniques	Problematic Soil And Improvement Techniques, Dewatering, Institution Treatment Of Cohesion-less And Cohesive Soils, Earth Reinforcement, Grouting Techniques	SDG 11, 13 & 15
32.	CE8005- Air Pollution and Control Engineering	Control Of Particulate Contaminants, Control Of Gaseous Contaminants, Indoor Air Quality Management	SDG 3, 11, 13 & 15
33.	EN8591- Municipal Solid Waste Management	Source Reduction , Waste Storage And Recycling, Collection And Transfer Of Wastes , Processing Of Wastes, Waste Disposal	SDG 6, 11, 12, 13 &15

34.	Introduction to Women and Gender Studies	Women and Gender Studies (WGS) and sustainability are deeply interconnected, as both fields examine power dynamics, social justice, and the implications of societal structures on people and the environment.	SDG 5 & 10
35.	Smart mobility and Intelligent Vehicles	Smart mobility and intelligent vehicles are pivotal in advancing sustainability within transportation systems.	SDG 7, 11, 13 & 15
36.	Electric and Hybrid Vehicles	Electric and hybrid vehicles (EVs and HEVs) play a crucial role in promoting sustainability within the transportation sector.	SDG 7, 11, 13 & 15

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