



MANAV RACHNA  
UNIVERSITY   
Declared as State Private University vide Haryana Act 26 of 2014



# et **elektronika** times

VOLUME 01

ISSUE 02

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# SCHOOL OF ENGINEERING

Department of Electronics and Communication Engineering



**EXPERIENCE THE POWER OF  
POSSIBILITIES-**

Where semiconductor chips, communication & signal processing come together to illuminate tomorrow's innovation.

**9** INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



1 NO POVERTY



09TH OCTOBER, 2023

# Touching Hearts: A visit to old age home

10 REDUCED INEQUALITIES



Faridabad, Haryana, India  
2330, HBH Colony, Sector 28, Faridabad,  
Lat 28.438896°  
Long 77.311486°  
09/10/23 12:52 PM GMT +05:30



Faridabad, Haryana, India  
2304, HBH Colony, Sector 28, Faridabad  
Lat 28.438664°  
Long 77.311501°  
09/10/23 02:57 PM GMT +05:30



Faridabad, Haryana, India  
Near Shahi Exports, Industrial Plot no.41, Sector 31, Faridabad,  
Haryana 121008, India  
Lat 28.439255°  
Long 77.312519°  
09/10/23 02:52 PM GMT +05:30

As part of the SEEK project, students visited “**Vanprasth Vridhjan Sewa Sadan, Sector 28, Faridabad**”, an old age home, offering gifts and essential groceries to the residents. Alongside thoughtful items like fruits, the students provided staples like rice and flour, ensuring the seniors' nutritional needs were met. This act of kindness not only addressed immediate necessities but also strengthened the bond between the students and the elderly, emphasizing the value of compassion and support within the community.



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09/10/23 02:52 PM GMT +05:30

Stepping into the serene atmosphere of the old age home, the students were met with a blend of emotions—compassion, empathy, and a genuine desire to make a positive difference in the lives of the seniors.



**Refurbish, Reuse, Recycle: Join our E-Waste Drive**  
**19th October 2023**

**Hosted by the students of  
ECE department  
under the aegis of  
IETE Student Forum**

- Event attracted active participation from students, faculty & staff.
- Large number of students turned up for the donation drive.
- Discarded electronic devices like computers, smartphones, printers, and batteries were collected.
- E-waste collected by certified recycler **Namo e-Waste Management Pvt. Ltd. Faridabad**, which ensured proper handling of hazardous materials during transportation.
- Initiative aligned with the university's mission to foster social responsibility.



# Trend Bytes: Students' Corner on Cutting Edge Tech Trends

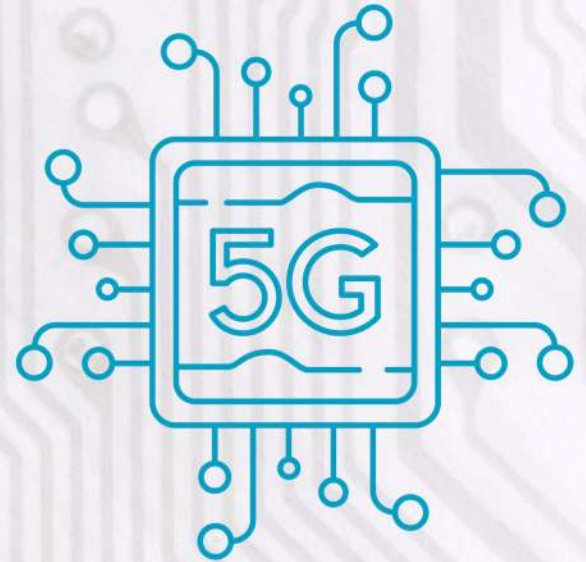
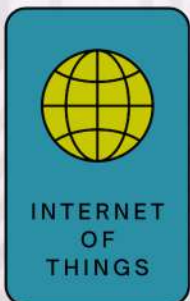
## SIGNIFICANCE OF INTERNET OF THINGS AND 5G

The Internet of Things (IoT) has revolutionized the way we interact with technology and the world around us. This review paper explores the significance of IoT in various domains, including healthcare, transportation, agriculture, smart cities, and industrial applications. Through real-world examples, we illustrate how IoT technologies are transforming processes, enhancing efficiency, and improving quality of life. We also discuss the challenges and future prospects of IoT implementation.



**-LOVANYA**  
**(B.TECH., 3RD SEM)**

One of the rapidly evolving technologies is the Internet of Things (IoT), which has been around for some time but continues to expand into industries like healthcare and transportation. According to Finance Online, there will be approximately 26 billion IoT devices in the next seven years. IoT involves networks of appliances or devices embedded with sensors to exchange data between users and devices. The emerging 5G technology serves as a foundation to unlock the full potential of IoT by providing robust connectivity, enhancing the performance of IoT devices and driving technological advancement. IoT is poised to integrate with artificial intelligence, paving the way for intelligent machines in the near future. Prepare for a future where connectivity transforms our lives into smarter experiences.



## 5G TECHNOLOGY: A NEW ERA OF CONNECTIVITY AND PERFORMANCE

5G technology is the fifth generation of cellular networks, offering faster connectivity speeds, ultra-low latency, and greater bandwidth compared to 4G. It is creating new opportunities for people and businesses, enabling groundbreaking solutions that reach across society. 5G networks are significantly faster than 4G, with speeds up to 100 times higher, and are designed to support a larger number of connected devices simultaneously. The technology is also expected to help autonomous cars communicate with each other and infrastructure, improve remote surgeries, and enhance manufacturing processes.



**-JAYA SAINI**  
**(B.TECH., 5TH SEM)**

5G operates on varied frequency bands, from low to high, each with distinct characteristics. While lower frequencies offer wider coverage and better obstacle penetration, higher frequencies promise faster speeds but struggle with range limitations. Networks are evolving atop existing infrastructure, extending connectivity without always reaching the full potential of 5G speeds. High-band 5G is primarily being deployed in urban areas and select venues. This technology is driving innovation in sectors like e-health, connected vehicles, and mobile gaming, while also enabling IoT, edge computing, and cloud infrastructure. Its deployment heralds significant industry transformations and improved user experiences. In summary, 5G's transformative potential lies in its faster speeds, lower latency, and expanded bandwidth, with its phased rollout set to unlock new opportunities in urban settings and beyond.

# Tech Trends: Unveiling the Future of Innovation!



## EMPOWERING THE FUTURE: THE EVOLUTION AND EMERGING TRENDS OF VLSI TECHNOLOGY

Very Large-Scale Integration (VLSI) is a specialized field of electronics and computer engineering that focuses on packing an enormous number of electronic components onto a single chip. This technology has revolutionized various sectors, including consumer electronics, automotive and transportation, healthcare and biotechnology, and aerospace and defense, by enabling the creation of more efficient and powerful electronic systems. The evolution of VLSI began with the development of the first integrated circuit in the late 1950s. Advancements in semiconductor fabrication processes, lithography techniques, and design methodologies have led to the continuous scaling of transistors and the increasing complexity of Moore's Law.



**-MAYANK**  
**(B.TECH., 5TH SEM)**

VLSI design involves several stages, including system specification, architecture design, logic design, physical design, fabrication, and testing. Each stage requires careful consideration of functionality, performance, power consumption, and cost. Emerging trends in VLSI include System-on-Chip (SoC) integration, low-power design techniques, and 3D Integrated Circuits (3D ICs). SoC integration involves combining multiple functions and subsystems onto a single chip, enabling higher performance, reduced power consumption, and smaller form factors. Low-power design techniques are gaining prominence due to the growing demand for energy-efficient electronics. 3D ICs stack multiple layers of integrated circuits, providing increased functionality and interconnect density while reducing the chip's footprint. The future of VLSI holds tremendous promise, with new materials such as graphene and carbon nanotubes potentially replacing silicon, pushing the boundaries of miniaturization further. VLSI will be crucial in enabling emerging technologies like artificial intelligence (AI), internet of things (IoT), and quantum computing. In summary, the ongoing evolution and emerging trends in VLSI continue to shape the future of technology, enabling groundbreaking innovations and paving the way for a more connected and intelligent world.

## REVOLUTIONIZING ENERGY STORAGE WITH SUPERCAPACITOR MODULES

The latest in energy storage technology, supercapacitor modules feature higher operating voltages, compact design, and rapid power discharge for diverse applications.

In the realm of energy storage, Electric Double-Layer Capacitor (EDLC) modules, or supercapacitor modules, are transforming the landscape with their advanced technology and diverse applications. Developed by industry leaders like Knowles Precision Devices, these modules offer higher operating voltages, compact designs, and rapid power discharge capabilities, surpassing traditional capacitors and batteries. They swiftly store and release large amounts of energy, making them ideal for applications requiring quick power bursts.



**-KUNAL**  
**M.TECH. VLSI**  
**1ST SEM**

Supercapacitor modules find primary utility in renewable energy harvesting, capturing surplus energy from sources like solar and wind for later use. They are also crucial in applications such as mechanical actuators and electric vehicles (EVs), where instant power delivery is essential. Additionally, these modules power various IoT devices, providing reliable energy storage solutions for smart utility meters, handheld scanners, and more. With their compatibility with green energy systems and resilience in extreme conditions, supercapacitor modules are shaping a sustainable future while enhancing efficiency in diverse industries.





# INDUSTRY INSIGHTS: EXPLORING WORLD BEYOND CAMPUS

Confederation of Indian Industry (CII) in association with the Ministry of Railways, Government of India, organized the International Railway Equipment Exhibition (IREE), in New Delhi.

IREE is Asia's largest showcase for the Rail Transportation Sector. The visit to IREE 2023 on 13th October proved to be an enriching and enlightening experience for the students of department of ECE. It offered a glimpse into the dynamic world of rail transportation and its pivotal role in shaping modern infrastructure and connectivity. The exposure to innovative technologies and interactions with industry leaders have undoubtedly broadened the horizons of knowledge and career opportunities for the students, inspiring them to contribute to the future advancements of the railway sector.



15th  
Edition  
IREE

- 12th -14th Oct  
2023
- Pragati Maidan,  
New Delhi



 **GPS Map Camera**

New Delhi, Delhi, India  
Gate 4, Pragati Maidan, New Delhi, Delhi 110002, India  
Lat 28.612867°  
Long 77.244186°  
12/10/23 11:03 AM GMT +05:30







20TH OCTOBER, 2023

# Alumni Spotlight: Illuminating Paths, inspring journeys

## “Tips for thriving in the Real World- Ms Shweta Gussain

The Department of ECE, MRU organized an enlightening and insightful alumni talk on the theme “Tips for Thriving in the Real World” on 20 October, 2023. The speaker of the event was **Ms. Shweta Gussain**, an alumna of the Manav Rachna University, batch 2013-17. She is currently working as an Associate Consultant at **Ernst & Young LLP**. The event aimed to provide current students with valuable advice, wisdom, and practical insights for a successful transition from their academic journey to the challenges of the professional world.



Appreciation for Insightful Talk

She delivered an engaging and highly informative talk, sharing their personal journey and valuable career lessons. Key takeaways included the importance of networking, adaptability, work-life balance, and continuous learning. The speaker emphasized building a strong professional network, being adaptable, maintaining work-life balance, and embracing a lifelong learning mindset. Personal anecdotes illustrated how networking had opened doors to career opportunities, adaptability helped overcome challenges, and strategies for managing time effectively were discussed to avoid burnout.



Group Photograph of Resource Person with Head of Department and student participants

# STUDENT ACCOLADES

30TH OCTOBER 2023

SHAINA DAS

**LinkedIn** Learning

B.TECH. ECE, 3RD SEM

AMBASSADOR



Total 15 Students were selected as LinkedIn ambassadors from Manav Rachna University and Shaina Das was selected amongst them through a rigorous process by the LinkedIn Professionals. They also visited the LinkedIn office wherein they presented an idea on how to promote LinkedIn learning throughout the campus. The LinkedIn professional also discussed about different workshop and activities that they were to conduct in future. Overall it has been a great learning experience for Shaina and others.



# RASHTRIYA EKTA DIWAS PLEDGE

31ST OCTOBER 2023



## NATIONAL UNITY DAY



Rashtriya Ekta Diwas, also known as National Unity Day, was organised in Manav Rachna University on October 31st. Each year this day is celebrated to commemorate the birth anniversary of Sardar Vallabhbhai Patel, the Iron Man of India and one of the architects of independent India. On this occasion, various events and activities are organized across the country to promote unity, integrity, and the spirit of nationalism among the citizens.

## PLEDGE BY ECE FACULTY MEMBERS

One of the key components of Rashtriya Ekta Diwas is the pledge that individuals, organizations, and communities take to reaffirm their commitment to the unity and integrity of the nation. The faculty and staff members of ECE department participated in this pledge declaring to abide by the principles of unity, diversity, and harmony that are enshrined in the Constitution of India.



myGov Pledge  
मेरी सरकार



### Certificate

#### RASHTRIYA EKTA DIWAS PLEDGE

*I solemnly pledge that I dedicate myself to preserve the unity, integrity and security of the nation and also strive hard to spread this message among my fellow countrymen. I take this pledge in the spirit of unification of my country which was made possible by the vision and actions of Sardar Vallabhbhai Patel. I also solemnly resolve to make my own contribution to ensure internal security of my country.*

21ST NOVEMBER, 2023

# IETE STUDENT FORUM (ISF) INAUGURATION

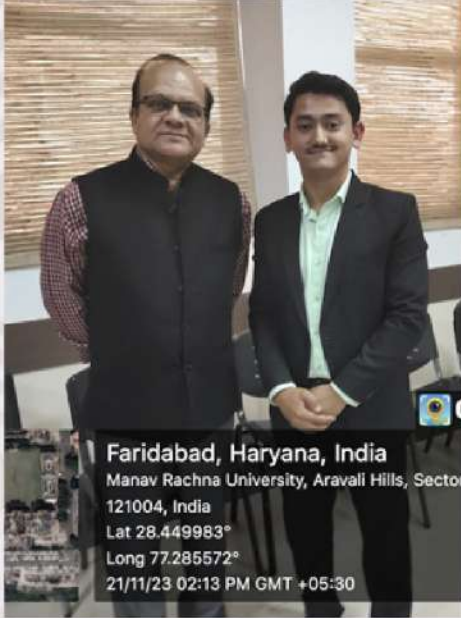
The Department of Electronics and Communication chartered a **technical club** for the benefit of its students in collaboration with the **IETE (Institution of Electronics and Telecommunication Engineers)** which is known as the IETE Student Forum (ISF). There is a total of 36 student members in this club working under the guidance of two faculty members, **Dr. Meenakshi Gupta**, and **Dr. Charu Pathak**



The IETE Student Forum was inaugurated officially by **Prof. (Dr.) A.K Saini**, President of IETE, New Delhi, in a function organised by the Department of Electronics and Communication on November 21, 2023. Prof. Saini, renowned for his extensive contributions, is a Senior Professor and former Dean of Management at Guru Gobind Singh Indraprastha University, with 17 published books and over 120 research papers to his credit.

### Benefits of ISF Members:

IETE Student Forum (ISF) offers numerous advantages for students, including priority publication opportunities in the Journal of Education, access to subscriptions for IETE publications such as the Journal of Research and Technical Review, and discounted registration fees for IETE technical programs in India. Institutions hosting ISF chapters receive benefits like grants for forum activities, access to IETE technical publications for college libraries, and support from local centers for forum initiatives. Additionally, institutions may establish Electronics Hobby Centers with industry support and organize various competitions and technical visits. ISF students are also invited to become corporate members of IETE upon graduation, with reduced membership fees within 12 months of passing exams.



# Inaugural Event of IETE Student Forum



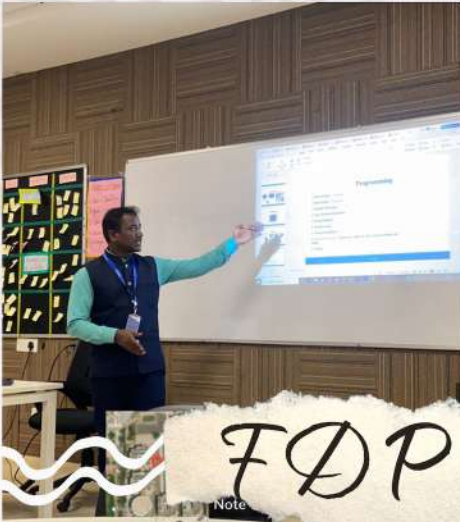
28TH NOVEMBER- 02ND DECEMBER, 2023

# FACULTY DEVELOPMENT PROGRAM



The banner features logos for Manav Rachna University, Enthutech, and ICT Academy. It includes the text: 'Department of CST and ECE jointly organizes Faculty Development Program on Internet of Things'. It also lists the dates '28 NOV-02 DEC, 2023', the venue 'VENUE: LF-10 (L-BLOCK)', and the start time '9AM ONWARDS'. A box for coordinators lists 'DR. PIYUSH CHARAN (ECE) - 9559313115' and 'MS. ESHA KHANNA (CST) - 9711332464'. On the right, four SDG icons are shown: 4 Quality Education, 9 Industry, Innovation and Infrastructure, 11 Sustainable Cities and Communities, and 13 Climate Action. The FDP number 'FDP NO.: 2030' is also present.

The CST and ECE departments of Manav Rachna University, in collaboration with ICT Academy, recently organized a one-week Faculty Development Program (FDP) on the theme of "**Internet of Things.**" The program, held from November 28th to December 2nd, 2023, featured distinguished trainers: **Dr. K. Subramanian**, Technical Lead, and **Dr. Jagadeswaran R.**, Technical Engineer at Enthutech Technology Solutions India Pvt. Ltd. Thirty three (33) enthusiastic participants actively engaged in this FDP, gaining valuable insights and knowledge in the dynamic field of Internet of Things. This Faculty Development Program (FDP) was designed to provide participants with fundamental insights into the applications of the Internet of Things (IoT). It served as a high-level, career-oriented training program, emphasizing a hands-on approach to impart comprehensive experience with cutting-edge technologies. The primary objective was to equip participants with a solid foundation in IoT applications, ensuring a practical and skill-oriented learning experience.



# FDP on Internet of Things





# Innovative Endeavours: Project Showcase

05TH DECEMBER, 2023

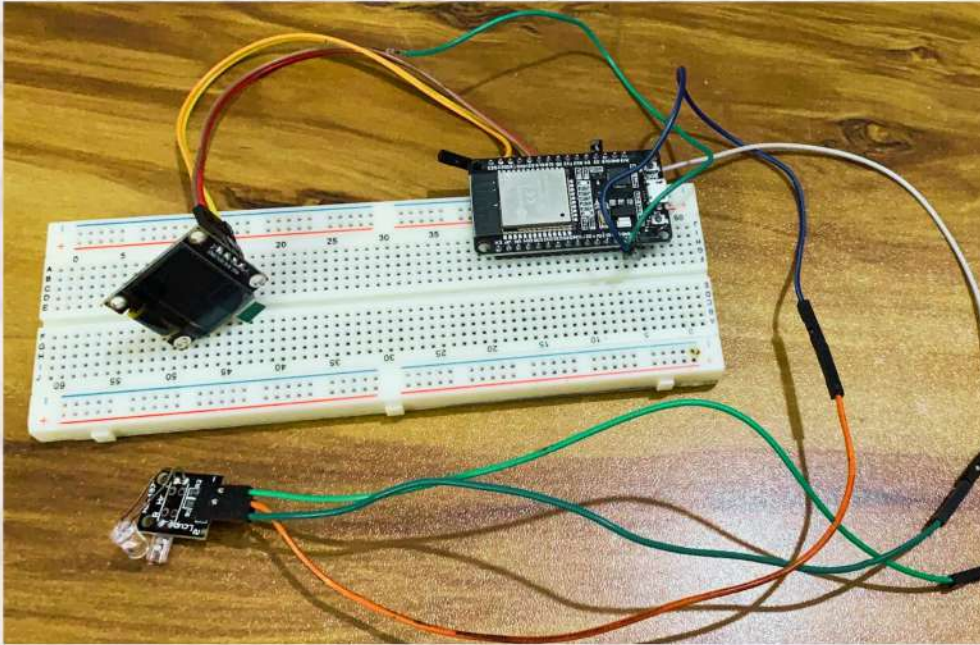
## 1. RADAR SECURITY SYSTEM



The Arduino based project, “**Radar Security System**” was led by students **Aryan, Shivam, Sanjay, Tushar, and Nishchay**, with Aryan handling the motor role with combination of ultrasonic sensors, LEDs, and an LCD display to detect and alert against unauthorized entry in designated Safe, Warning, and Alert zones.

The Arduino Radar Security System delivers real-time feedback and visual cues, bolstering security measures effectively. Upon detecting an intruder in the Warning Zone, it issues a warning message on the LCD and activates a green LED. In the Alert Zone, it escalates with an alert message, a red LED, and a buzzer for audible alerts. Its modular design facilitates seamless integration and scalability, ideal for diverse settings like homes, offices, and industrial spaces, offering a cost-effective security solution. Rigorous testing ensures reliable performance, while its user-friendly interface caters to users of all technical backgrounds. With customizable settings, it adapts to varying security needs, ensuring comprehensive protection.

## 2. HEART RATE MONITORING DEVICE USING ESP8266 NODE MCE AND KY-039 FINGER SENSOR

**Group Members:**

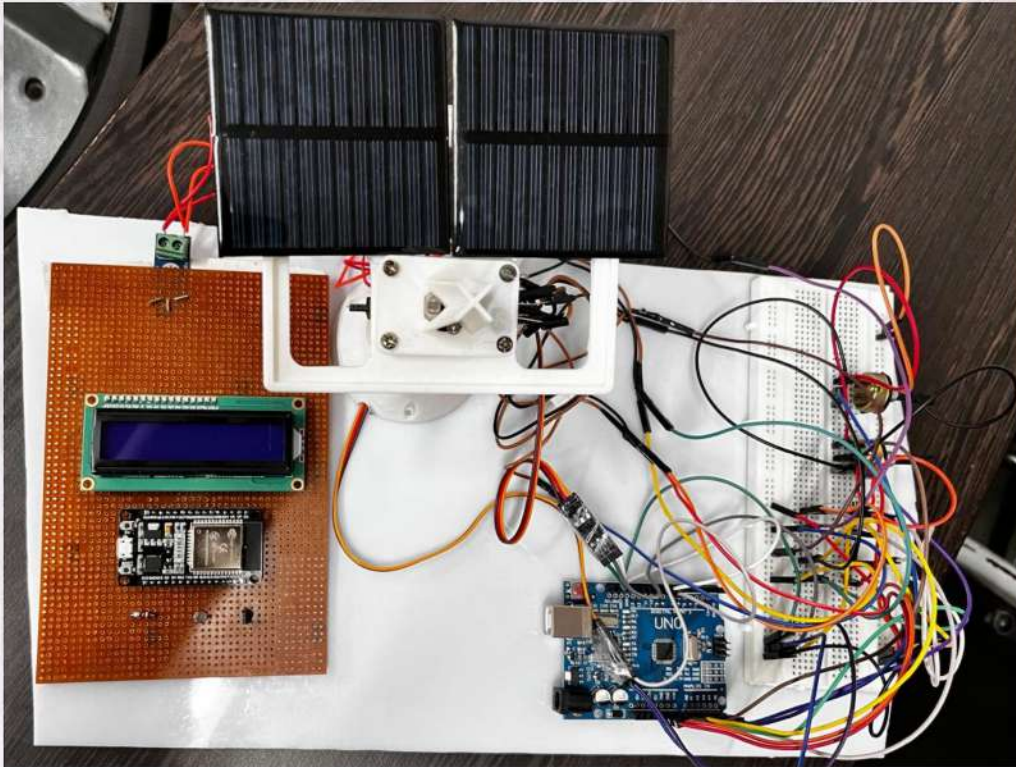
M.Gangadhar Lokesh  
Santosh K. Yegireddi  
Kanthala Rahul  
Guru Sai Teja

The heart rate monitoring device is a cutting-edge project leveraging the ESP8266 NodeMCU microcontroller and the KY-039 finger sensor to accurately measure and monitor heart rate in real-time. At the heart of the project, the ESP8266 NodeMCU serves as the central processing unit, capable of interfacing with various sensors and transmitting data wirelessly. The KY-039 finger sensor, a photoplethysmography (PPG) sensor, detects changes in blood volume in the fingertip, providing a non-invasive method for measuring heart rate.

The device operates by securely attaching the KY-039 sensor to the user's fingertip, where it detects subtle variations in blood flow caused by the heartbeat. The sensor then sends analog signals to the ESP8266 NodeMCU, which processes the data and calculates the user's heart rate in beats per minute (BPM). This information is then displayed on a connected display or transmitted wirelessly to a remote device for monitoring and analysis.

With its compact size and wireless capabilities, the heart rate monitoring device offers a portable and convenient solution for tracking heart health in various settings. Whether used for personal health monitoring, fitness tracking, or medical applications, this innovative project demonstrates the potential of IoT technology to revolutionize healthcare and wellness management.

### 3. DUAL AXIS SOLAR TRACKING WITH SOLAR MONITORING SYSTEM



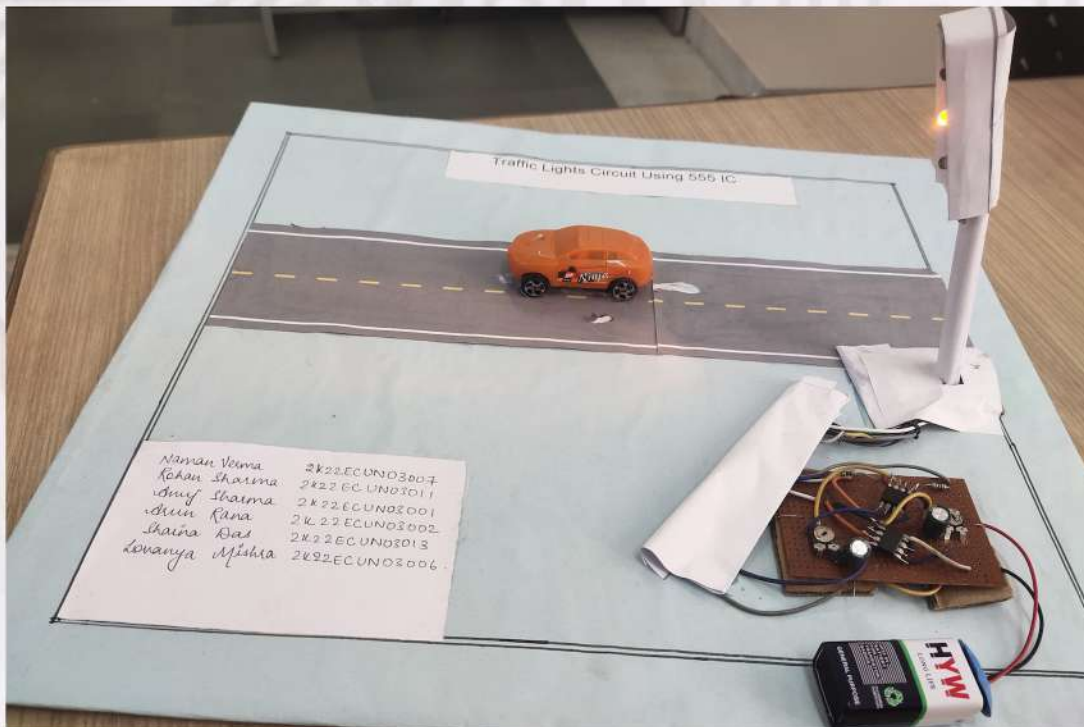
**Group Members:**

Harsh Sharma  
Hrithika Singh  
Kashish Bisht  
Utkarsh Mehra

The project aims to reform solar energy with a “Dual Axis Solar Tracking and Monitoring System”. By dynamically adjusting panel positions for optimal sunlight exposure and real-time monitoring for performance analysis, our system enhances photovoltaic efficiency, advancing sustainable energy solutions globally.

The primary challenge encountered by conventional solar panels concerning the angle at which they are positioned relative to the sun is the inefficiency resulting from their fixed orientation. This lack of adjustability hampers their ability to consistently capture sunlight optimally, consequently diminishing their overall energy production potential. This project addresses this problem in an efficient way. The Dual Axis Solar Tracking and Monitoring System enhances energy production and efficiency compared to fixed solar panels by dynamically adjusting panel orientation to track the sun's movement. It adapts to environmental conditions, provides real-time monitoring for optimization, offers flexibility in system design, and contributes to sustainability goals through increased solar energy utilization.

## 4. TRAFFIC LIGHT SYSTEM USING 555 TIMER IC



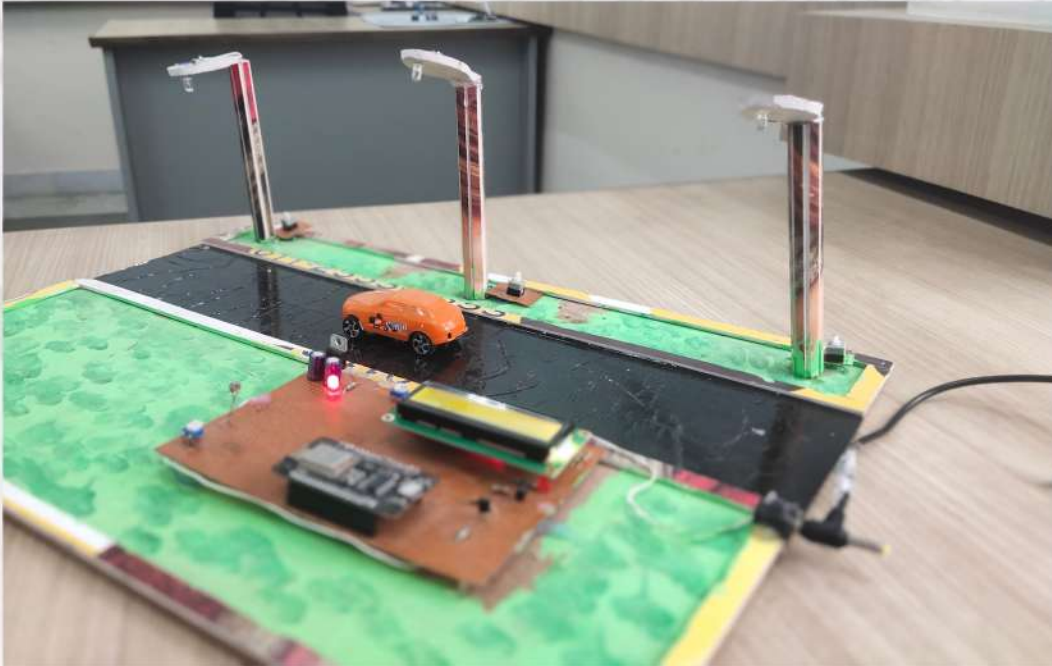
### Group Members:

Naman Verma  
 Rohan Sharma  
 Anuj Sharma  
 Arun Rana  
 Shaina Das  
 Lovanya Mishra

The "Traffic Lights System with 555 Timer IC" project is a sophisticated yet accessible endeavor aimed at creating an efficient and reliable traffic control solution. Utilizing the versatile 555 timer IC as the core component, this project offers a cost-effective and easily replicable solution for managing vehicular traffic flow. The system consists of multiple sets of traffic lights, each controlled by a dedicated 555 timer IC circuit, which regulates the timing of signal changes.

Each 555 timer IC circuit is configured to control the sequence of traffic light signals, including red, yellow, and green lights, ensuring smooth and safe traffic flow at intersections. With adjustable timing parameters, the system can be tailored to suit specific traffic patterns and requirements. Additionally, the project can be expanded to incorporate advanced features such as pedestrian crossing signals or synchronization with adjacent traffic light systems for optimized traffic management.

## 5. IOT BASED SYSTEM FOR FAULT DETECTION IN STREET LIGHTS

**Group Members:**

Karanveer  
Amaan Khan  
Satyam Rajput  
Rohit Sharma  
Aatish

The "IoT-based System for Fault Detection in Street Lights" project introduces a groundbreaking solution for efficient maintenance and management of street lighting infrastructure. Leveraging Internet of Things (IoT) technology, this system utilizes sensors and connectivity to monitor the operational status of street lights in real-time. By deploying sensors capable of detecting various faults such as bulb failures, power fluctuations, or wiring issues, the system can promptly identify and report any anomalies to the central control unit.

At the heart of the system is a network of IoT-enabled devices equipped with sensors, microcontrollers, and wireless communication modules. These devices are strategically deployed across the street lighting network to continuously monitor the health and performance of individual street lights. When a fault is detected, the system automatically generates alerts and notifications, allowing maintenance teams to quickly respond and address the issue, thereby ensuring uninterrupted illumination and enhanced safety for pedestrians and motorists. With its ability to proactively detect and address faults, this IoT-based system offers a cost-effective and scalable solution for optimizing street lighting infrastructure management.

# Research and Development

P a t e n t s



## Design Grant (Indian)

Filed an Indian Design Patent titled, “SEAT BELT WITH HEART RATE RECOGNITION FOR IGNITION OF VEHICLE”

1) Dr. Piyush Charan, 2). Dr. Anshuman Sahai, and 3). Dr. Somya Asthana, 4). Dr. Deepti Maikhuri, 5). Dr. Joginder Singh, and 6). Dr. Moditma with application number 398635-001 on date 27th October 2023 and was granted in Issue Number 03/2024 on 19th Jan 2024.

**Design Application Details**

**Design Number:** 398635-001

**Filing Date:** 27/10/2023 00:00:00

**Article Name:** SEAT BELT WITH HEART RATE RECOGNITION FOR IGNITION OF VEHICLE

**Class:** 29-02-DEVICES AND EQUIPMENT AGAINST FOR ACCIDENT PREVENTION AND FOR RESCUE, NOT ELSEWHERE SPECIFIED

**Journal Number:** 03/2024

**Journal Date:** 19/01/2024 00:00:00

**Applicant Detail**

Sl. No.	APPLICANT NAME	APPLICANT ADDRESS
1	Dr. Piyush Charan	Associate Professor, Department of Electronics and Communication Engineering, Manav Rachna University, Faridabad-121004.
2	Dr. Anshuman Sahai	Assistant Professor, Department of Sciences, Manav Rachna University, Faridabad-121004.
3	Dr. Somya Asthana	Assistant Professor, Department of Biotechnology, Manav Rachna International Institute of Research and Sciences, Faridabad-121004.
4	Dr. Deepti Maikhuri	Assistant Professor, Department of Sciences, Manav Rachna University, Faridabad-121004
5	Dr. Joginder Singh	Professor and Head, Department of Mechanical Engineering, Manav Rachna University, Faridabad 121004.
6	Dr. Moditma	Assistant Professor, Department of Sciences, Manav Rachna University, Faridabad-121004.

**पेटेंट कार्यालय, भारत सरकार** | **The Patent Office, Government Of India**

**डिजाइन के पंजीकरण का प्रमाण पत्र** | **Certificate of Registration of Design**

डिजाइन सं. / Design No. : 398635-001

तारीख / Date : 27/10/2023

पारस्परिकता तारीख / Reciprocity Date : -

देश / Country : -

प्रमाणित किया जाता है कि संलग्न प्रति में वर्णित डिजाइन जो **SEAT BELT WITH HEART RATE RECOGNITION FOR IGNITION OF VEHICLE** से संबंधित है, का पंजीकरण, श्रेणी 29-02 में 1.Dr. Piyush Charan 2. Dr. Anshuman Sahai 3.Dr. Somya Asthana 4.Dr. Deepti Maikhuri 5.Dr. Joginder Singh 6.Dr. Moditma के नाम में उपर्युक्त संख्या और तारीख में कर लिया गया है।

Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class 29-02 in respect of the application of such design to **SEAT BELT WITH HEART RATE RECOGNITION FOR IGNITION OF VEHICLE** in the name of 1.Dr. Piyush Charan 2. Dr. Anshuman Sahai 3.Dr. Somya Asthana 4.Dr. Deepti Maikhuri 5.Dr. Joginder Singh 6.Dr. Moditma.

डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अर्थधीन प्रावधानों के अनुसरण में।  
In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

जारी करने की तिथि : 18/01/2024

**मानविक पेटेंट डिजाइन और व्यापार चिह्न**  
Controller General of Patents, Designs and Trade Marks.

पारस्परिकता तारीख (यदि कोई हो) जिसकी अनुमति दी गई है तथा देश का नाम। डिजाइन का स्वामित्वकर्ता पंजीकरण की तारीख से दस वर्षों के लिए होगा जिसका विचार, अधिनियम एवं नियम के प्रावधानों के अधीन, जब वहाँ की अतिरिक्त अवधि के लिए किया जा सकेगा। इस प्रमाण पत्र का उपयोग निकाय कार्यवाहियों अथवा विदेश में निकाय प्रारंभ करने के लिए नहीं हो सकता है।  
The reciprocity date (if any) which has been allowed and the name of the country. Copyright in the design will subsist for ten years from the date of Registration, and may under the terms of the Act and Rules, be extended for a further period of five years. This Certificate is not for use in legal proceedings or for obtaining registration abroad.

# Research and Development

P u b l i c a t i o n s



## Conference Publications

[1] R. Romisha and **Shruti Vashist**, "An Exploratory Study on Fuzzy Image Processing," 2023 International Conference on Advances in Computation, Communication and Information Technology (ICAICIT), Faridabad, India, 2023, pp. 1231-1234, doi: [10.1109/ICAICIT60255.2023.10465687](https://doi.org/10.1109/ICAICIT60255.2023.10465687).

[2] **Meenakshi Gupta**, Krishna Rathore, "Development of Wireless Communication technologies from 1G to energy efficient 6G", In Proc. of International Conference on Energy Materials and Rechargeable Batteries (ICEMRB)-2023, 19-22 December, 2023.

[3] **Vijay Kumar Gill**, Shiv Kumar Dixit, Sucheta Juneja, **Shruti Vashist**, Sushil Kumar, "Structural and optical properties of highly conducting n-doped nanocrystalline silicon as emitter layer deposited using VHF PECVD process for silicon hetero-junction solar cells", In Proc. of International Conference on Energy Materials and Rechargeable Batteries (ICEMRB)-2023, 19-22 December, 2023.

[4] **Niharika Thakur**, Kunal, "A comprehensive review on Innovations in Lithium-Ion Battery Technology: A Sustainable Approach to Energy Storage", In Proc. of International Conference on Energy Materials and Rechargeable Batteries (ICEMRB)-2023, 19-22 December, 2023.

## Journal Publications

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# Thank You



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