GOLDEN VALLEY EDUCATIONAL TRUST

Dr. T. THIMMAIAH INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

TECHNICAL MAGAZINE E-MERGE 2022

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Principal's Message

I am pleased to present E-Merge 2022, the technical magazine of the Department of Electrical & Electronics Engineering. This edition highlights the technical articles, research projects, and innovations from our students and faculty, reflecting their dedication and passion for learning.

I hope E-Merge 2022 inspires young engineers to embrace new technologies, explore innovative ideas, and contribute to advancements in electrical engineering. Wishing all students and faculty continued success in their academic and professional journeys.

DR. SYED ARIFF
Principal
Dr.T.T.I.T, KGF

HOD's Message

I am delighted to present E-Merge 2022, highlighting the technical articles, research, and innovations of our students and faculty. This edition reflects the Department of Electrical & Electronics Engineering's commitment to technical excellence and continuous learning. I hope this magazine inspires curiosity, innovation, and knowledge-sharing among budding engineers. Wishing everyone success in their academic and professional journey.

DR. N. LAKSHMIPATHY
HOD of EEE

ABOUT THE DEPARTMENT

The Department of Electrical & Electronics Engineering was established in 1986 and has since grown into a hub of academic and research excellence. With a team of nine dedicated and highly qualified faculty members, who have completed their undergraduate and postgraduate degrees from prestigious universities, the department is committed to provide students with a solid foundation in Electrical and Electronics Engineering.

Over the years, the department has expanded its expertise to address the evolving needs of society, offering cutting-edge teaching and research in areas such as power systems, renewable energy, embedded systems, and wireless power transmission.

TECH INSIGHT

BATTERY STORAGE FOR ELECTRIC VEHICLES

Battery storage is the linchpin of electric vehicles (Evs), serving as the energy reservoir that fuels their movement. It's a complex system, not just a single component, and its performance dictates everything from how far an EV can travel to how quickly it can accelerate. At the heart of this system are the battery cells themselves. These are the electrochemical reactions occur to store and release energy. Lithium-ion batteries currently dominate the EV market, prized for their relatively high energy density and long lifespan. However, different lithium-ion chemistries exist, each with its own set of strengths and weaknesses. Some prioritize power output for quick acceleration, while others focus on maximizing energy storage for longer range. These individual cells are grouped together into modules, and multiple modules combine to form the battery pack. The pack's design is critical, influencing the overall voltage and capacity, as well as the thermal management and safety of the battery system. Effective thermal management is crucial because batteries generate heat during operation, and excessive temperatures can degrade performance and shorten lifespan.

A sophisticated Battery Management System (BMS) acts as the brains of the operation. It constantly monitors the battery pack, ensuring each cell operates within safe parameters. The BMS estimates the remaining charge, manages the temperature, and implements safety protocols to prevent overcharging, over- discharging, and other potentially hazardous situations. The field of battery technology is in constant evolution. Researchers are exploring new chemistries, like solid-state batteries, which promise even higher energy density and improved safety. Advancements are also being made in areas like faster charging times, longer lifespans, and more sustainable manufacturing processes. As battery technology continues to progress, EVs are poised to become even more competitive with traditional gasoline-powered vehicles, offering a cleaner and more efficient mode of transportation.

Prof. Ronald Lawrence. J
Assistant Professor, EEE

TECHNICAL PAPERS CONTRIBUTIONS

DESIGN AND DEVELOPMENT OF WIRELESS POWER TRANSMISSION

The research focuses on the potential of Wireless Power Transmission (WPT) to revolutionize technology integration into daily life. It delves into the technical challenges associated with inductive magnetic coupling in low-frequency bands for efficient wireless energy transfer. The study emphasizes the importance of addressing these challenges to enhance the performance and reliability of WPT systems. Wireless power transmission (WPT) is a technology that enables the transfer of electrical energy without the need for physical connectors or wires. It is based on principles such as electromagnetic induction, resonant inductive coupling, and microwave or laser-based energy transfer. The design and development of WPT systems involve various components, including transmitters, receivers, and power management circuits. In inductive coupling, a primary coil in the transmitter generates an alternating magnetic field, inducing a current in the secondary coil of the receiver. This method is widely used in charging devices like smartphones and electric toothbrushes. Resonant inductive coupling improves efficiency by using tuned circuits to enhance energy transfer over longer distances, making it ideal for applications such as electric vehicle (EV) charging pads. Microwave and laser-based WPT systems utilize directed energy beams to transfer power over large distances, which is beneficial for space applications and remote power delivery. The development of WPT requires careful consideration of efficiency, safety, frequency selection, and regulatory compliance. Advancements in materials, circuit design, and antenna technology are driving the improvement of WPT, making it a key area for future innovations in consumer electronics, industrial automation, and sustainable energy solutions.

Prof. Somashekar B
Assistant Professor

EV BMS CHARGE MONITOR AND FIRE PROTECTION

Electric Vehicle (EV) Battery Management Systems (BMS) play a crucial role in ensuring the safe and efficient operation of electric vehicles. One of the key functions of a BMS is charge monitoring, which involves tracking the state of charge, voltage, and temperature of the battery. This is achieved through real-time monitoring of battery voltage and temperature, which enables the BMS to prevent overcharging, over-discharging, and overheating. The BMS also performs charge balancing, which ensures that individual cells within the battery pack are not overcharged or undercharged. This helps to prevent cell damage and ensures that the battery operates within its optimal range.

In addition to charge monitoring, EV BMS also incorporate advanced fire protection features to prevent thermal runaway and minimize damage in the event of a fire. Thermal monitoring is a critical component of fire protection, as it enables the BMS to detect potential thermal runaway conditions. Automated fire detection and suppression systems are also integrated into the BMS, which can quickly respond to a fire and minimize damage. In the event of a fire, the BMS can isolate affected cells to prevent propagation of thermal runaway, and initiate an emergency shutdown to prevent further damage. By integrating these advanced charge monitoring and fire protection features, EV BMS can ensure safe, efficient, and reliable operation of electric vehicles.

Mr. G Yashwant Kumar
Ms. Haritha S
Ms. Vyshnavi K

Guided by:
Prof. Ronald Lawrence J
Assistant Professor, EEE

SLAM ROBOT USING LIDAR TECHNOLOGY

SLAM (Simultaneous Localization and Mapping) robots equipped with LiDAR (Light Detection and Ranging) technology have revolutionized autonomous navigation and mapping of unknown environments. LiDAR sensors emit laser pulses to scan the surroundings, generating high- resolution 3D point clouds that provide precise spatial information. This data is then used to create accurate maps and localize the robot's position in real-time, allowing it to navigate complex spaces and avoid obstacles. The SLAM algorithm processes the LiDAR data to detect changes, correct errors, and update the map, ensuring that the robot maintains a consistent and accurate understanding of its environment. The integration of LiDAR technology with SLAM algorithms enables robots to operate in a wide range of environments, from indoor spaces to outdoor terrain. LiDAR's high accuracy and long-range sensing capabilities make it an ideal choice for applications such as autonomous vehicles, surveying, and mapping. Additionally, LiDAR's ability to provide detailed 3D information enables robots to detect and respond to subtle changes in their environment, such as moving obstacles or changing terrain. Overall, the combination of LiDAR technology and SLAM algorithms has enabled robots to achieve unprecedented levels of autonomy and navigation capability.

Ms. Monal Yadav A,
Ms. Sangeetha KR,
Ms. Shreya Yadav MS,
Ms. Lavanya N,

Guided by
Prof. Somashekar B,
Sr. Assistant Professor, EEE

OVER VOLTAGE AND UNDER VOLTAGE PROTECTION OF LOAD USING GSM MODEM SMS ALERT

In the paper, GSM Modem SMS Alert aims to build a system that monitors voltage and provides a breakpoint based low and high voltage tripping mechanism that avoids any damage to the load and sends a text message (SMS) to alert the user whenever the condition of undervoltage or overvoltage occurs. There is a chance of damaging electronic devices due to the fluctuations the AC mains supply. Therefore, a tripping system is required to avoid any damage to these loads. This system consists of a tripping mechanism that monitors the input voltage and trips according to limits provides. It uses 8-bit microcontroller ATmega328 with a GSM modem and 16*2 LCD attached to it externally. As soon as the input voltage falls out of the window range, it delivers an error on screen. Here, a dc motor is used as a load. This system is also configured with a buzzer that goes on as soon as tripping takes place. The states of the system are displayed on the LCD. Whenever fault occurs the microcontroller sends message to the GSM modem, then the GSM modem sends alert SMS to the user to protect their device as soon as possible

Mr. Aneesh Kumar S
Ms. Bhargavi R
Ms. Lisha S

Guided by:
Dr. N. Lakshmipathy
Professor & HOD, EEE

DESIGN AND DEVELOPMENT OF WIRELESS POWER TRANSMISSION SYSTEM

Wireless Power Transmission (WPT) has been attracting a wide range of subjects in various fields and also become a highly active research area because of their potential in providing high technology to our daily lives. This report focuses on the actual technical challenges that must be addressed in the field of inductive magnetic coupling at low-frequency (LF) bands for Wireless Power Transmission (WPT), with special focus on smart objects applications like cars. Inductive coupling is the most common operating principle for WPT, because of the high efficiency and the relatively high amount of energy that can be transferred. This report will present some important applications that can be benefit from this technology. The Wireless Power Transmission will be mandatory to use in the near future because this technology enables the transmission of electrical energy from a power source to an electrical load across an air gap without interconnecting wires. We have also presented and correlated systems to the related history of wireless power transmission systems. The literature survey, objectives and methodology of Wireless Power Transmission are also discussed.

Mr. Madhukar S
Mr. Vinay Kumar R

Guided by:
Prof. Somashekar B
Sr. Assistant Professor, EEE

ASSESSMENT OF FAULT DETECTION AND POWER THEFT IN UNDERGROUND CABLES

project is intended to detect the location of fault in underground cable lines from the base station to location in kilometers using a Node MCU kit. In the urban areas, the electrical cable runs in undergrounds instead of overhead lines. Whenever the fault occurs in the underground cable it is difficult to detect the location of the fault for process of repairing that particular cable. The proposed system finds the type of fault and sends the message to the person concerned.

This system uses a Node MCU kit for Open and Short circuit fault detection and power theft in the system. Here the open circuit test will be sensed by comparator and a rectified power supply for short circuit test made with fixed voltage regulator. The fault creation is made by the set of switches. A 16x2 LCD display connected to the Node MCU through sensor to display the information. Power theft is determined by the current sensor which is connected to Load through current coil which is monitored by Node MCU. Further it sends the message to the department concerned where fault has occurred in the field with. Whenever a fault occurs in a UG cable, Node MCU detects and displays the type of fault on the LCD as well as sends messages to take immediate action by field workers.

Mr. Sendhil Prabakar V,
Mr. Sumukha G S,
Mr. Baligolla Siva Kumar

Guided by:
Prof. Dayananda B R,
Assistant Professor, EEE

DESIGN AND FABRICATION OF AN ORNITHOPTER WITH LIVE VIDEO RECEPTION FOR MILITARY SURVEILLANCE

Raven is a robotic bird used for military purposes. At times of sudden attacks in the country border, there is a chance for many losses like the death of soldiers and people, damages of weapons, and so on. This bird will fly over a particular area near the country border, for the purpose of spying. The camera integrated in bird can capture the area where it flies and stream the live video to the monitoring console which is located in a remote place away from the border. From console, Movements of the bird can also be controlled. The Bird and monitoring system will be connected through Wi-Fi connection. This spy bird uses Ornithopter mechanism where the robotic bird flies similar to a natural bird by generating flapping wing motion. Lower weight of the bird will ease hovering and increase the performance of the bird. Continuous monitoring of the border for susceptible attacks can be ensured by clear live video streaming. Therefore, Raven can detect

the border attacks at right time and warn the soldiers to be prepared and equipped.

Mr. Abhilash G

Guided by:
Prof. Ronald Lawrence J
Assistant Professor, EEE

ROBOT CONTROLLED BY ANDROID APPLICATION

Many of the wireless controlled robots use RF modules, but this paper make use of Android mobile phone for control. The control commands available are more than RF modules.

For this the android mobile user has to install an application on her/his mobile. Then user needs to turn on the Bluetooth in the mobile. The wireless communication commands like move forward, reverse, move left, move right using these commands which are sent from the Android mobile. Robot has a Bluetooth receiver unit which receives the commands and give it to the microcontroller circuit to control the motors. The techniques used to control the robot is Bluetooth technology. Users can use various microcontroller then transmits the signal to the motor driver ICs to operate the motors.

Ms. Mohana M
Ms. Shakunthala K

Guided by:
Prof. Dhanalakshmi V
Assistant Professor, EEE

DESIGN OF 150V, 2A REGULATED POWER SUPPLY

The signal output power supply employs the time proven precision series regulator topology. A constant voltage (150V) /constant current (2A) limit type and it provides laboratory grade performance. It is conventional cooled and packed in a sturdy, attractive and easily serviceable enclosure. The output voltage and current is continuously indicator on a front panel meter. The operating status of the power supply is indicated on the front panel LED indicators and they inform the user the operating condition of the power supply.

This unit provided with three pin connector. For satisfactory operation and to prevent the shock hazard to the operating personal, it is essential that the third pin of the connector be connected to a good quality earth. The input mains voltage is always with in the specified range of 230 +/- 10%.Both the positive and negative terminals are isolated from the ground and hence either of them can be grounded or floated.

Ms. Bhavana G T
Ms. Kathyayani K R
Ms. Sujana N

Guided by:
Prof. Jillian Rufus J
Assistant Professor, EEE

A HYBRID CHARGING PORT FOR SUSTAINABLE SOLUTION AND BETTER LIVING

Quick consequence from the predominant utilization of oil-based transportation have pushed the globe towards zapped transportation. With this push, numerous innovative difficulties are being experienced and tended to, one of which is the turn of events and accessibility of quick evolving advancements. Batteries for storages were first used in E- Vehicles. To contend with petrol-based transportation, electric vehicle (EV) battery charging times need to diminish to the minimum range. This invention gives a promising new methodologies and openings for power electronic converter geographies and frameworks level exploration to propel the best in class in quick charging. The size of the installed charging gadget is compelled by the space inside the vehicle. The present disclosure herein is a hybrid charging system based on photovoltaic effect and wind energy which is converted into electrical energy for charging the batteries. The system comes with a solar module and a windmill which converts the solar energy and the wind energy into electrical energy with the help of an MPPT (Maximum Power Point Tracker) board through which the battery is charged. Converting wind-solar energy into electric energy enables the user to store energy in a battery, transmit it over long distances, or convert the electrical energy to mechanical energy. The system provides hybrid energy conversation through conversion of renewable energy into electrical energy. In this project we have designed the MPPT for an efficient DC to DC converter which is used to maximize the power output of the solar and wind energy. This digitally controlled MPPT have advantage of power point tracking which will not be influenced by change in temperature of cells. It is also used to control the variations in the current-voltage characteristics of solar cells and wind energy output.

Ms. Sangavi J
Ms. Harini A

Guided by:
Prof. Subashini S
Assistant Professor, EEE

DEPARTMENT ACTIVITIES

WORKSHOP ON IPR

The IPR Cell and Institution Innovation Cell (IIC) of Dr. TTIT, KGF, in collaboration with the Office of the Controller General of Patents, Designs & Trademarks (CGPDTM) under the National Intellectual Property Awareness Mission (NIPAM), organized a Seminar Awareness Programme on IPR on 1st July 2022 from 11:00 AM to 1:00 PM. Dr. Mohammad Shoib (DPIIT, Kolkata) was the resource person, introduced by Dr. H. G, Vice Principal, Dr. TTIT, KGF. The session covered the benefits of IPR, its filing procedures in India, and international patent filing through detailed presentations. The event witnessed enthusiastic participation from around 220 faculty members and students from Sri Kengal Hanumanthiah Law College, Dr. T. Thimmaiah Arts and Science College, and Dr. TTIT, making it an insightful and informative session.

FIELD VISIT

Department of Electrical & Electronics Engineering in association with the Institution's Innovation Council organized a One Day Field Visit to Makers Space - Agastya International Foundation on 12th July 2022. Students gained knowledge on converting innovative ideas into models.

Industrial Visit to Agastya International Foundation

WORKSHOP ON "DESIGN AND SAFETY IN ELECTRIC VEHICLE TECHNOLOGY"

Mr. G. Yashwanth Kumar, Ms. Haritha and Ms. Vayshnavi, final year Students, Electrical & Electronics Engineering, along with Prof. Ronald Lawrence. J took part in the Two Days workshop on "Design and Safety in Electric Vehicle Technology" on 25th and 26th November 2022, organized by The Institution of Engineers (India) in Association with BNMIT Bangalore at IEI , Karnataka State Centre, Bangalore


Workshop Organised by IEI

ONE DAY VIRTUAL WORKSHOP ON IPR AND IP MANAGEMENT FOR START-UP

The Department of Electrical and Electronics Engineering (EEE) organized a One-Day Virtual Workshop on IPR and IP Management for Start-ups on 26th December 2022 via Google Meet. Coordinated by Prof. Daphny Shallet M, the workshop provided students with insights into Intellectual Property Rights (IPR), covering patents, copyrights, trademarks, and trade secrets. Dr. K. Paramasivam elaborated on legal frameworks, registration processes, and ethical considerations in IP management, emphasizing the role of IPR in protecting innovations and fostering start-up growth. The session was highly informative, equipping students with essential knowledge on safeguarding intellectual assets.

PROJECT EXPO 2023

Dr. TTIT Project Expo 2023 was held on 20.05.2023. All final Year students participated and Ms. Monal Yadav and team won the 1st Prize for their project Slam Robot using LIDAR Technology, guided by Prof. Somashekar. B

ELECTRICAL NEWS AROUND THE WORLD

During the 2022-23 academic year, the electrical engineering sector experienced significant developments across various domains. Here's an overview of key events and trends:

The rise of renewable energy:
Wind and solar power continued to grow rapidly, and are now a major part of the global electricity mix. This trend is likely to continue as countries around the world try to reduce their reliance on fossil fuels.

The electrification of everything:
We're seeing a shift towards electric vehicles, heat pumps, and other electric technologies. This is driving up demand for electricity and creating new opportunities for the electrical industry.

The impact of the energy crisis:
The war in Ukraine and other factors have led to high energy prices, which has had a big impact on the electrical industry. Some countries have seen a decrease in electricity demand as people try to save money on their energy bills.

New technologies:
The electrical industry is constantly evolving, with new technologies like smart grids and energy storage systems being developed all the time. These technologies have the potential to make the electricity system more efficient and reliable. Overall, the electrical industry is in a period of rapid change. It's an exciting time to be a part of this industry, as there are many opportunities to develop new technologies and help the world transition to a more sustainable energy future.

-Editorial Team

VISION OF THE DEPARTMENT

To produce competent engineers having technical skills oriented towards sustainable development, human values, and professional ethics through comprehensive education in electrical engineering.

MISSION OF THE DEPARTMENT

M1 : To provide a conducive environment in which students can think, learn, and apply.

M2 : To provide technical expertise through hands-on experience on real world projects with a focus on sustainable development and professional ethics.

M3 : To inculcate a positive attitude and leadership qualities in students through co-curricular activities.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO-1: Graduates will be successful in Electrical Engineering and trans-disciplinary areas by pursuing a career in industry and higher education.

PEO-2: Graduates will have the ability to solve societal and industrial problems with cutting-edge technologies in Electrical Engineering to achieve sustainable development in their professional careers.

PEO-3: Graduates will have the ability to apply technical, analytical, communication and ethical skills to ensure technological progress in their careers.

PROGRAM SPECIFIC OBJECTIVES (PSO)

PSO-1: Ability to model, simulate, and analyze electrical and electronic components and systems using logical, technical, and programming skills.

PSO-2: Ability to identify optimal solutions for industrial and domestic energy requirements using specific design and control strategies.