GOLDEN VALLEY EDUCATIONAL TRUST

Dr. T. THIMMAIAH INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

TECHNICAL MAGAZINE E-MERGE 2024

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Principal's Message

I am pleased to present E-Merge 2024, the technical magazine of the Department of Electrical & Electronics Engineering. This edition highlights the research, innovations, and technical contributions of our students and faculty, showcasing their dedication to learning and problem-solving.

At Dr. TTIT, we foster innovation, critical thinking, and hands-on learning to prepare students for the evolving engineering landscape. I hope E-Merge 2024 inspires students to explore new ideas and drive advancements in electrical engineering. Wishing everyone success in their journey ahead.

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

HOD's Message

I am delighted to present E-Merge 2024, a reflection of the Department of Electrical & Electronics Engineering's commitment to technical excellence and innovation. This edition showcases the ideas, projects, and research of our students and faculty, highlighting their passion for learning.

As technology advances, I encourage students to explore, innovate, and apply their knowledge to real-world challenges. May E-Merge 2024 serve as a source of inspiration for continued growth. Wishing all students and faculty success in their future endeavors.

DR. N. LAKSHMIPATHY
HOD of EEE

ABOUT THE DEPARTMENT

The Department of Electrical & Electronics Engineering, established in 1986. With a team of nine dedicated faculty members, all of whom hold undergraduate and postgraduate degrees from esteemed universities, the department is focused on providing students with a strong foundation in Electrical and Electronics Engineering.

As the field continues to evolve, the department has expanded its areas of expertise to meet the growing demands of society. It now offers teaching and research in key areas such as power systems, renewable energy, embedded systems, and power electronics. This ongoing development ensures that students are equipped with the knowledge and skills to lead in the rapidly changing world of electrical engineering.

TECH INSIGHT

ADVANCING SEMICONDUCTOR RESEARCH WITH SCAPS-1D AND SILVACO ATLAS

Semiconductor technology is a cornerstone of modern electronics, and efficient simulation tools are crucial for advancing research in this field. SCAPS-1D and Silvaco Atlas are two powerful software solutions that play a significant role in semiconductor device modeling, enabling researchers to analyze and optimize device performance before fabrication. These tools are essential for advancing research in areas such as photovoltaics, microelectronics, and optoelectronics, benefiting both students and professionals alike.

SCAPS-1D, developed by the University of Ghent, is designed for simulating thin-film solar cells, allowing researchers to explore various photovoltaic materials such as perovskite, CIGS, and CdTe. It enables the analysis of key factors like band alignment, defect states, and recombination mechanisms to enhance solar cell efficiency. With its user-friendly interface and powerful computational capabilities, SCAPS-1D is an invaluable tool for those focused on renewable energy solutions and sustainable technology development.

Silvaco Atlas, a sophisticated TCAD (Technology Computer-Aided Design) software, supports simulation of semiconductor devices such as MOSFETs, LEDs, photodetectors, and power electronics. By incorporating detailed physical models, it evaluates charge transport, breakdown mechanisms, and self-heating effects, offering valuable insights into device performance. This tool is particularly useful in microelectronics research, where precision is critical for designing next-generation components.

The integration of SCAPS-1D and Silvaco Atlas into university curricula is essential for developing a skilled workforce in semiconductor research and development. These tools provide students with hands-on experience in device modeling, preparing them for careers in semiconductor industries, renewable energy sectors, and nanotechnology. By mastering these simulation platforms, students gain the practical skills needed for the evolving tech landscape.

Beyond academia, SCAPS-1D and Silvaco Atlas are also widely used in industrial research and development. They help engineers and scientists optimize semiconductor materials and device structures, reducing experimental costs and minimizing material waste. Industries focused on solar energy, integrated circuit design, and high-power electronics benefit significantly from the predictive capabilities of these tools, driving cost-effective and efficient innovations.

In conclusion, mastering SCAPS-1D and Silvaco Atlas offers a competitive edge to aspiring engineers and researchers. By leveraging these powerful tools, both academic and industrial communities can foster significant advancements in semiconductor device design, contributing to a more energy-efficient and technologically advanced future.

Prof. Daphny Shallet M,
Assistant Professor, EEE

TECHNICAL PAPERS CONTRIBUTIONS

DESIGN AND IMPLEMENTATION OF CHARGING UNIT FOR MARITIME APPLICATIONS

Our research endeavours to tackle the formidable challenges inherent in underwater wireless power transfer (WPT), with a primary focus on optimizing charging ef□ciency and seamlessly adapting to the demanding underwater conditions. Leveraging solar power energy as the primary source, our system seamlessly switches to grid energy when solar energy levels are insuf□cient. The core objective revolves around designing a WPT system that achieves remarkable ef□ciency and unity power factor, critical for ensuring seamless power transmission in underwater environments. Through extensive prototyping and testing, our WPT system demonstrates the ability to transmit an output voltage of approximately 12V over an 6cm inside water gap, covering a maximum sliding distance of 8cm. This signi□cant achievement underscores the system's capability to surmount the barriers of underwater power transfer, paving the way for sustainable operations in challenging aquatic environments. Moreover, our approach integrates diverse energy sources, including solar and grid energy, to enhance adaptability and energy generation capabilities, enabling consistent and optimized power generation vital for prolonged and reliable underwater applications. By amalgamating cutting-edge technologies and innovative design paradigms, our research endeavours to properly the advancement of underwater WPT. This integration of diverse energy sources not only ensures adaptability but also lays the groundwork for transformative solutions in underwater power transmission. Our work represents a signi□cant step forward in addressing the challenges of underwater power transfer, offering promising prospects for sustainable and ef□cient energy transmission in aquatic environments.

Mr. Gokul S
Mr. Mohammed Zaki Ul Iyan
Mr. Vignesh R
Mr. Rahul B V

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

DESIGN AND CONSTRUCTION OF FLOATING MODULAR PHOTOVOLTAIC SYSTEM

In this paper, The design and construction of a modular photovoltaic system represent a pivotal step towards sustainable energy solutions in today's world. This project aims to develop a versatile and scalable system that harnesses solar energy ef□ciently. By utilizing modular components such as solar panels, inverters, and battery storage, the system offers □exibility in deployment and adaptation to diverse environments and energy needs. Through rigorous design considerations and engineering, emphasis is placed on optimizing performance, reliability, and cost-effectiveness. The integration of advanced monitoring and control systems ensures ef□cient operation and maintenance of the photovoltaic array.

This project addresses the growing demand for renewable energy sources, contributing to the reduction of carbon emissions and dependence on fossil fuels. Additionally, the modular nature of the system facilitates easy expansion and upgrades, enabling future enhancements in energy production capacity. Collaboration with stakeholders including communities, businesses, and policymakers is crucial for successful implementation and widespread adoption of solar energy solutions. Through innovation and technological advancements, this project seeks to overcome challenges associated with traditional energy infrastructure and pave the way for a cleaner and more sustainable future.

Ms. Muskan Qureshi
Ms. Issra Annam

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

DESIGN AND FABRICATION OF RETROFIT E-BICYCLE

Electric Motor: Retro□t e-bikes are equipped with an electric motor typically mounted on the front or rear wheel hub or integrated into the bottom bracket. This motor provides electric assistance when pedaling, Battery: These e-bikes have a battery pack that stores electrical energy. The battery is usually detachable and rechargeable, and it powers the electric motor. The capacity and type of battery can vary. Pedal Assist System (PAS): Retro□t e-bikes often use a pedal-assist system that senses the rider's pedaling input and provides electric assistance in proportion to the effort exerted. This allows for a more natural riding experience. Controller: A control unit or controller manages the interaction between the pedal-assist system, motor, and battery. It regulates the level of assistance and may offer various settings. Display: Many retro□t e-bikes feature an onboard display that provides information such as speed, distance, battery level, and assistance mode. Riders can often customize settings through the display. Wiring and Connectors: Wiring is used to connect the battery, motor, and controller. It's typically integrated into the bicycle's frame for a cleaner look. Throttle (Optional): Some retro□t e-bikes come with a throttle that allows the rider to control the motor directly, without the need for pedaling. However, not all retro□t kits include a throttle. Compatibility: Retro□t kits are designed to be compatible with a wide range of traditional bicycles, but compatibility may vary. It's important to ensure that the kit □ts your speci□c bicycle model. DIY Installation: Retro□t e-bikes are often installed by the owner or a skilled mechanic. This DIY aspect allows cyclists to convert their existing bikes into e-bikes, saving on the cost of purchasing a new electric bicycle. Legal Considerations: It's important to be aware of local regulations regarding retro□t e-bikes, as they may have speci□c rules related to power output, speed, and where these bikes can be used. Retro□t e-bicycles provide an environmentally friendly and costeffective way for riders to experience electric-assist cycling without the need to purchase a dedicated electric bicycle. They offer increased convenience, especially for commuting or longer rides, while retaining the familiar feel of a traditional bicycle.

Mr. Pushpak N
Mr. Sadiq Pasha T
Mr. Yashwanth Sigh L
Mr. Yuvaraj L

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

DESIGN AND FABRICATION OF SOLAR TREE

Recently with rising population and energy demands, we should get an option of renewable energy source and that energy source should not cause pollution and other natural harzards.For this condition the solar energy is best alternative for us. A solar power tree is the best innovative way, which requires very less place to produce energy ef□ciently. We can also use the 0.3W solar modules to improve the ef□ciency of the plant.It is far superior to conventional sun powered PV framework in zone perspective and furthermore ef□cient so this will be a very good option and will be implemented spiralling phyllataxy is the method which is utilized in structuring of sun

powered tree. This innovation is utilized to improve the pro□ciency of plant.So this will be a generally excellent alternative. However, the main problem associated with tapping solar energy is the requirement to install large solar collector requires very big space.

Mr. Raswanth. D K
Ms. Priyadharshini. R
Ms. Sandhya. V

Guided by:
Prof. Subhasini. S
Assistant Professor, EEE

PUBLICATIONS

Mr. Gokul S, Mr. Mohammed Zaki Ul Iyan, Mr. Vignesh R and Mr. Rahul B V published a paper titled "Design and Implementation of Charging Unit for Maritime Applications" in Journal of Engineering and Technology Management (JETM), Volume 72, Issue 2, April–June 2024, Page No. 123-131, Impact Factor: 4.8

Mr. Lokananda and Mr. Chandan A S published a paper titled "100V/12V Charging Unit Using Zener Diode" in Journal of Engineering and Technology Management (JETM), Volume 73, Issue 3, July–September 2024, Page No. 522-527, Impact Factor: 4.8

Mr. Lokananda, Mr. Saif Ahmed, Mr. Anjaneya Reddy and Mr. Chandan A S published a paper titled "Smart Charging System for Electric Vehicles Using Wind Energy" in BTH Journal (Scopus Indexed), Volume 24, Issue 12, 2024, Page No. 124–132

Prof. Somashekar B published a research paper titled "Design and Implementation of Charging Unit for Maritime Applications" in a Scopus Indexed and Multidisciplinary Journal, ISSN NO-1879:1719, Volume 72, April–June 2024, Page No: 1321-1329.

Prof. Somashekar B published a research paper titled "Design & Development of Compensation Topologies in WPT Using Mat lab Programming & Mat lab Simulink" in IGI Global Book Series, ISSN NO-1879:1719, Volume 72, April–June 2024, Page No: 1321-1329.

DEPARTMENT ACTIVITIES

The department of Electrical & Electronics Engineering Organized a Five-Day Hands-on Workshop on "Applications of Advanced IoT towards Unleashing Job Opportunities" for the students of Electrical & Electronics Engineering and Mechanical Engineering from 19th to 23rd February 2024, in association with GenEd Technologies, Bangalore.

STUDENT AND FACULTY DEVELOPMENT PROGRAM ON "MACHINE LEARNING AND PYTHON PROGRAMMING: PAVING THE PATH TO INNOVATION"

6-Day Student and Faculty Development Program on Machine Learning and Python Programming: Paving the Path to Innovation" was organized from 12th July 2024 to 19th July 2024, aimed to provide participants with a robust understanding of machine learning principles and pro□ciency in Python programming. Attendees were trained to develop innovative solutions for real-world electrical engineering challenges. This initiative also focused on enhancing creativity, improving problem-solving abilities, and encouraging the adoption of advanced technologies within the □eld of electrical engineering. Major Technologies taught were Machine learning and Python Programming.

DESIGN AND FABRICATION OF SOLAR TREE

Department of EEE, Civil & Mechanical Engineering Conducted One day Seminar on "How to Publish a Research Paper at UG Level" at Mechanical Seminar hall, Dr.TTIT on 16.10.2024 . Prof. Shashi Kumar V N, Assistant Professor, Department of Civil Engineering, Vemana Institute of Technology was the Session Speaker. The session was highly informative and well-structured. It covered key aspects like topic selection, writing techniques, journal selection, and handling peer reviews. The presenter communicated effectively, and the Q&A session was helpful.

VISIT TO INCUBATION CENTRE

Students of the 4th and 6th Semesters visited Tata Aerospace Incubation Centre on 12th June 2024 at Government ITI, KGF.

Students visited Tata Aerospace Incubation centre KGF

INDUSTRIAL VISIT TO DECCAN HYDRAULICS

The Departments of Electrical & Electronics Engineering and Mechanical Engineering organized Industrial Visit to Ms. Deccan Hydraulics, Bangarpet, on 10th June 2024, for the 4th semester students and on 12TH August for 6th sem students. The visit aimed to bridge the gap between academic concepts and real-world applications by demonstrating how engineering and management principles are integrated into industrial projects.

From Electrical & Electronics Department, Prof. Daphny Shallet M, Assistant Professor, coordinated the visit.

Industrial Visit to Deccan Hydraulics, Bangarpet

EEE STUDENT CLUB – E-MERGE ACTIVITIES

The Students Club activities of 'E-Merge' was inaugurated for the year 2024-25, on 29th October 2024. The club has an exciting line-up of activities planned for the semester, encouraging innovation, collaboration, and skill-building among students. The club is led by student coordinators Jayashree and Lokananda (4th Year), Rohitha (3rd Year), and Sharavani Gowda (3rd Year), under the guidance of Prof. Dhanalakshmi and Prof. Somasekar. B as event coordinators.

ELECTRICAL NEWS AROUND THE WORLD

In 2024, the global electrical industry experienced signi□cant developments across various sectors:

Renewable Energy Expansion:

Renewable energy sources, particularly solar and wind, continued their upward trajectory, contributing to over 35% of global electricity generation. This surge was driven by cost reductions and robust climate policies, leading to substantial investments in utility-scale projects and necessitating the expansion of transmission infrastructure.

Policy and Investment Climate:

The policy landscape saw shifts, notably in the United States, where changes in tariffs and tax incentives introduced uncertainties for renewable energy investments. Companies like Engie expressed concerns over the clarity of regulations, which could in□uence their investment decisions in the U.S. market.

Technological Innovations:

Advancements in electrical engineering were marked by projects such as MIT's development of magnetic energy harvesting sensors, aiming to revolutionize energy ef□ciency in various applications.

Corporate Achievements:

Reliance Industries Limited ascended to the No. 2 position on the FutureBrand Index 2024, surpassing Apple and highlighting the growing in□uence of Indian corporations on the global stage.

Energy Storage Milestones:

AESC, a Japan-based leader in battery technology, ranked fourth in global energy storage cell shipments, underscoring the escalating demand for ef□cient energy storage solutions across utility-scale, commercial, and residential sectors.

These developments re□ect a dynamic year in the electrical industry, characterized by a strong push towards renewable energy, signi□cant policy impacts, technological breakthroughs, and notable corporate advancements.

-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 cuttingedge 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.