GOLDEN VALLEY EDUCATIONAL TRUST

Dr. T. THIMMAIAH INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

TECHNICAL MAGAZINE E-MERGE 2021

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Principal's Message

I am pleased to present E-Merge, the technical magazine of the Department of Electrical & Electronics Engineering. This edition highlights the department's achievements, innovations, and technical contributions over the past year, showcasing the hard work of students and faculty.

I hope E-Merge serves as an inspiration for young engineers, encouraging them to explore new ideas and advancements in the field of electrical engineering. Wishing all students and faculty success in their future endeavors.

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

HOD's Message

I am delighted to present E-Merge, showcasing the technical articles, research, and innovations of our students and faculty. This magazine reflects the department's commitment to learning and innovation. Wishing everyone success in their journey ahead.

DR. N. LAKSHMIPATHY
HOD of EEE

ABOUT THE DEPARTMENT

Electrical & Electronics department was established in 1986 and consists of 9 Faculty members who have done their UG & PG degrees from the top universities. The faculty members of this department are consistently doing well in teaching and research. The department grew with time reflecting the needs of changing society and establishing new areas of teaching and research in Electrical Engineering .

TECH INSIGHT

RECENT ADVANCEMENT IN SOLAR CELL TECHNOLOGY

The quest for efficient and sustainable solar energy solutions has led to remarkable innovations, with perovskite solar cells emerging as a frontrunner in the field of photovoltaics. These cells, based on the perovskite-structured compound ABX_3 , have garnered significant attention due to

their exceptional power conversion efficiency, cost-effectiveness, and ease of fabrication. Over the past decade, their efficiency has skyrocketed from a modest 3.8% in 2009 to over 25% in recent laboratory developments, making them a serious contender against traditional silicon- based solar cells. One of the key advantages of perovskite solar cells lies in their tunable bandgap, which allows for better absorption of sunlight across different wavelengths. This property makes them highly suitable for tandem solar cells, where they can be stacked with silicon or other photovoltaic materials to surpass efficiency limits of single-junction cells. Additionally, perovskites exhibit superior light absorption capabilities and a higher defect tolerance, enabling efficient energy conversion even under low-light conditions.

Recent advancements in perovskite solar cell research have focused on enhancing their stability and longevity, addressing the primary challenge of degradation due to environmental factors such as moisture, heat, and UV exposure. Scientists have developed novel encapsulation techniques and introduced hybrid organic-inorganic compositions that significantly improve the durability of these cells. Efforts to replace toxic lead components with environmentally friendly alternatives, such as tin-based perovskites, are also being explored to make the technology more sustainable. The fabrication process of perovskite solar cells is another area witnessing significant innovation. Unlike conventional silicon solar cells that require high-temperature

processing and complex manufacturing techniques, perovskites can be fabricated using simple solution-based methods like spin-coating and inkjet printing. This not only reduces production costs but also enables flexible and lightweight solar panels, expanding their application beyond traditional rooftop installations to wearable electronics, building-integrated photovoltaics, and even space-based solar power systems. With increasing research and development investments, perovskite solar cells are transitioning from laboratory-scale innovations to commercial viability. Startups and industry leaders are actively working on scaling up production while ensuring the technology meets industrial reliability standards. Large-scale pilot projects are demonstrating the potential of perovskite solar modules in real-world conditions, paving the way for commercialization in the next few years. The future of perovskite solar cells is immensely promising, with ongoing research dedicated to optimizing efficiency, stability, and environmental impact. Their potential to revolutionize the renewable energy landscape is undeniable, offering a pathway to more accessible and sustainable solar power solutions. As advancements continue, perovskite solar cells are set to play a pivotal role in achieving global energy transition goals and addressing climate change challenges.

PROF. DAPHNY SHALLET M
Assistant Professor

TECHNICAL PAPERS CONTRIBUTIONS

DESIGN OF STEP-DOWN AC TRANSFORMER FROM 230V TO 60V AC

A transformer is a common component found in electrical systems that connects circuits that operate at different voltages. These are used in situations when there is a need for AC voltages to transition from one voltage level to the next. In AC circuits based on electrical geology, the transformer can either reduce or increase the flow and voltage .In a wide, the transformers are arranged into two kinds to be specific electronic and force transformers. Electronic transformer works at exceptionally low voltages and are appraised at low force levels.The employments of this electronic transformer are TVs PCs Disc/blue ray players. Force transformers is alluded to the transformer with high force and voltage appraisals. These are widely utilized in age of force transmission, appropriation and utility frameworks which increments or diminishes the voltage level. Cycloconverters are called as recurrence transformers that changes over the air conditioner power with one information recurrence to various yield recurrence. Also, employments of it is to change over the extent of AC power. In our day by day quick running life we need the utilization of electrical and electronic gadgets. In which it requires a force supply. Similarly, we employ a 250v 50Hz AC supply, but this force must be converted into the requisite structure with the required characteristics or voltage for exhibiting supply capacity to various types of devices. Venture down converters, move ahead converters, voltage stabilisers, AC to DC converters, DC to DC converters, and DC to AC converters are examples of force electronic converters. For instance, micro converters are often utilized in creating installed frameworks which are utilized in applications.

PROF. SOMASHEKAR B
Assistant Professor

DESIGN AND DEVELOPMENT OF WIND TURBINE

The design and development of wind turbines involve a comprehensive process that integrates principles of aerodynamics, mechanical and electrical engineering, material science, and environmental sustainability. It begins with thorough site assessment, where factors such as wind speed, direction, turbulence, and local climate conditions are analyzed to determine feasibility. Based on this data, engineers design turbine blades with an optimized shape and length to maximize energy capture while minimizing drag and structural stress. These blades are typically made from lightweight and durable materials such as fiberglass, carbon fiber, or advanced composites to ensure efficiency and longevity. The rotor, connected to a central hub, transfers mechanical energy to a gearbox that increases rotational speed, enabling efficient power generation through the generator. In modern designs, direct-drive generators eliminate the need for gearboxes, reducing maintenance and increasing reliability. The tower structure is engineered to withstand dynamic loads, extreme weather conditions, and material fatigue over decades of operation. Advanced control systems and sensors continuously monitor wind conditions and turbine performance, adjusting blade pitch and yaw to optimize energy output while ensuring safety. Electrical components, including transformers and inverters, convert generated power into a grid-compatible format. Prototyping and rigorous testing in wind tunnels and real-world conditions help refine the design for maximum efficiency, durability, and cost-effectiveness. Ongoing research focuses on innovations such as floating offshore wind turbines, improved energy storage solutions, and integration with smart grids to enhance renewable energy adoption worldwide.

MR. DINESH C
MR. FIROSE PASHA R
MR. SHIVA KUMAR

Guided by:
DR. N. LAKSHMIPATHY
Professor & Head

POWER GENERATION USING TRASH

Waste-to-energy (WtE) is a process that converts municipal solid waste (MSW) into electricity or heat. This technology involves several steps, starting with the collection and sorting of waste. The waste is then fed into a combustion chamber, where it is burned at high temperatures (typically between 1,000°C to 1,300°C) to produce steam. The steam drives a turbine, which is connected to a generator that produces electricity.There are several types of WtE technologies, including mass burn, refuse-derived fuel (RDF), and gasification. Mass burn involves burning the waste directly to produce steam. RDF involves processing the waste into a fuel that can be burned to produce steam. Gasification involves heating the waste in the absence of oxygen to produce a synthetic gas (syngas) that can be burned to produce steam.WtE plants offer several benefits, including reducing greenhouse gas emissions, minimizing landfill waste, and providing a reliable source of renewable energy. According to the U.S. Environmental Protection Agency (EPA), WtE plants can reduce greenhouse gas emissions by 2.5 metric tons per ton of waste processed. Additionally, WtE plants can reduce landfill waste by up to 90%.

MS. SHAMSEENA
MS. SERENA JS

Guided by:
PROF. DHANALAKSHMI V
Assistant Professor

DESIGN AND DEVELOPMENT OF 0.5HP SINGLE PHASE INDUCTION MOTOR

Induction Motors are responsible for consumption of nearly 40% of electricity globally, as these are the driving force behind each fan, compressor, pump and nearly every mechanical load which have rotational motion. About 30 million new electric motors are put in use every year for industrial application alone. Despite the advent of permanent magnet-based motors, single phase induction motors (SPIM) out numbers all other types of induction motors, because of its simple and robust construction and low cost. Hence small improvement in the performance of SPIM may greatly impact energy consumption worldwide and reduce carbon footprint eventually (in case of slip ring induction motor). However, this machine cannot deliver optimal efficiency standards. The main benefit with MATLAB Simulink is that in the electromechanical dynamic model can be accomplished in a simple way and it can be simulated faster using function blocks. In this paper optimal design parameter (choice of core material, stator winding, stator and rotor slots, sub-phase capacitor and SWG of copper conductor).Using the MATLAB Simulink the efficiency and torque performance is obtained by selecting the suitable parameters (values).Using MATLAB Simulink the performance characteristics are obtained and this performance characteristics is compared with the practical data and this Simulink and practical data are validated and percentage error will be found.

MS. LISHAS
MR. REVANTHR
MS. BHARGAVI R

Guided by
DR. LAKSHMIPATHY. N
Professor & HOD, EEE

FOOT STEP POWER GENERATION USING PIEZO ELECTRIC TRANSDUCERS

One of the basic needs of today's life is electric power. A large amount of electric power is needed for various operations, energy demand is increasing linearly day by day along with the increase in population, and this project focuses on the power generation from the increased population without negatively affecting the environment. The footstep walking and running energy is converted in to electricity with the help of piezoelectric crystals. It is a non-conventional system in which the mechanical energy from the footsteps is converted in to electrical energy. This system can be implemented in many public places. By using piezo electric crystals, the pressure of the footstep deforms the crystal and produced electrical energy as output. The footstep power generation, here we proposed is an advanced footstep power generation system that uses the piezo electric sensors to generate power through footsteps as a source of renewable energy that can be obtained while walking on a certain arrangement like stepping foot on a piezo tiles, this project describes the use of piezoelectric materials in order to harvest energy from people walking vibration for generating and accumulating the energy.

The basic working principle of footstep power generation system is based on piezo electric sensors. When the flooring is engineered with piezo electric technology, the electrical energy produced by the pressure is captured by the flow sensors and converted to an electrical charge by piezoelectric transducer. These sensors are placed in such a way that it generates maximum output voltage. This output is provided to our monitoring circuitry which is microcontroller-based circuit that allows user to monitor the voltage and charges a battery, and this power source has many applications. Our project model is cost effective and easy to implement.

MS. BHAVANI S
MS. SINDHU B M
MS. GIRIJA G

Guided by:
PROF. DHANALAKSHMI V
Assistant Professor

REGENERATIVE BRAKING ON E-BIKE

As the basic law of Physics says 'energy can neither be created nor be destroyed it can only be converted from one form to another'. During huge amount of energy is lost to atmosphere as heat. It will be good if we could store this energy somehow which is otherwise getting wasted out and reuse it next time we started to accelerate. Regenerative braking refers to a system in which the kinetic energy of the vehicle is stored temporarily, as an accumulative energy, during deceleration, and is reused as kinetic energy during acceleration or running. Regenerative braking is a small, yet very important, step toward our eventual independence from fossil fuels. These kinds of brakes allow batteries to be used for longer periods of time without the need to be plugged into an external charger. These types of brakes also extend the driving range of fully electric vehicles. Regenerative braking is away to extend range of the electric vehicles. In many hybrid vehicles cases, this system is also applied hybrid vehicles to improve fuel economy. A normal car is only about 20% efficient, meaning some 80% of the energy it expends is wasted as heat created by friction. Regenerative braking could reclaim as much as half of that wasted energy, which equates into more motion produced by the fuel we are paying for instead of using that fuel to create heat that is being dissipated uselessly into the environment.

MR. PRAVEEN REDDY N
MR. SHUBHAM PRAKASH SHINDE
MR. SRINIVAS A
MR. SUNDARESHA R

Guided by
DR. LAKSHMIPATHY. N
Professor & HOD, EEE

IoT BASED INDUSTRIAL AUTOMATION USING ZIGBEE COMMUNICATION STANDARD

The current industrial revolution is the industry 4.0. One of its main aim is the replacement of old communication that uses wired links with new communication that is wireless communication. It mainly improves the mobility, reduce the deployment cost, cable damage and improves the scalability. The agenda of our work is to connect devices to IoT so as to improve the accessibility of the industry from anywhere in the world which can automate all of its operation. The proposed system uses Zigbee communication protocol along with the IoT service. IoT can connect anything on the internet enabling communication between devices to achieve smart monitoring, control and administration. As per our idea, here we are using different sensors such as temperature, fire & air quality, AC voltage and AC current sensors. These sensors sense their respective parameters and pass it on to Arduino in real time, displays the same on LCD & under any abnormalities in industrial environment buzzer and relay circuit is activated which takes control over faulty conditions with less time compared to manual detection and operation of fault occurrence. All the above real time parameters and operations done are sent to central system using Zigbee communication and the same is sent to BLYNK Cloud using Wi-Fi protocol. To achieve this work both hardware and software is used. Any smartphone installed with BLYNK application can be remotely connected to the central system.

MS. KAVYA B
MR. RAJENDRA PRASAD M
MS. VEENA

Guided by:
PROF. DHANALAKSHMI V
Assistant Professor

DESIGN AND IMPLEMENTATION OF CONTACTLESS HUMANBODY TEMPERATURE MEASUREMENT AND AUTOMATED HAND SANITIZER DISPENSER

In these critical days of the COVID-19 pandemic, it is difficult to know whether a person is infected with the virus or not. Because the virus will spread from person to person through air medium which results in rapid spreading. During the sanitizing process or checking a person for the infection of the virus an another person i.e. the one who checks , needs to be closer to the one who needs to be checked , at this time the one who checks is in danger to the infection of virus . In order to overcome this situation “Implementation of contactless human temperature sensor and automated sanitizing dispenser” can be used. By using this idea we can use a machine without an human being and reduce the number of affected persons.

As per our idea, here we are using an contactless sensors rather than a contact sensor in order to avoid the contact between the two members. When a person is instructed to stand at the defined place, which is suitable for the sensor to sense. The sensor senses the temperature of the human body and generates the signal and transfers the signal data to the ARDUINO were it converts signal data in to a digital data in a suitable way of displaying it on the LCD. After this process the person is allowed to pass if he has normal body temperature and sanitized by the automated sanitizer dispenser, If the temperature of the person is more than the normal temperature the buzzer will give an alert sound ,and the person is not allowed to pass through .This idea requires both hardware and software components for its working.

MS. FLORENCE V
MS. POOJA SHREE B
MS. PREETHI SREE M
MS. SHAMINI S

Guided by:
PROF. SOMASEKHAR B
Associate Professor, EEE

TO IMPLEMENT 3 PHASE FAULT PROTECTION FOR UNDER VOLTAGE, OVER VOLTAGE AND OVER LOAD CONDITIONS USING AURDINO

Automation in the distribution field permits utilities on actualizes all the adaptable control for distribution systems, which can be used to upgrade efficiency, reliability, quality of electric service. Automation not only upgrades those qualities but also reduces human effort and saves time. Under, over voltage and over load problem is one of the common types of problems which lead most of the insulation and appliance damage throughout our country. The paper aims to develop micro-controller based auto-recloser for the three phase supply system, The circuit breaker closes automatically after a brief interruption in the event temporary fault while it remains in tripped condition in case of permanent fault. This mechanism will possibly replace the mechanical relays in the system and combine it with data acquisition system which will increase system efficiency and reduce the cost of line equipments. In this paper we are going to show how under, over voltage and over load problem leads a system into catastrophic situation and also describe how those problems can be minimized economically using automation with auto closer system with alert in IOT system.

MS. MISBA FATHIMA,
MS. ANUPALLAVI L,
MS. KEERTHISHREE N,
MS. AISHWARYA M,

Guided by:
PROF. DAYANANDA B R
Assistant Professor, EEE

A GREENER APPROACH TO HARVEST ENERGY USING PIEZO SPEED BREAKER

The energy saving, generating, and compensating is the deal of the day. A lot of effort has been spent to generate power from speed breaker and many mechanisms implemented for the same goal. This method of Electrical power generation needs no input power. This Project is implemented by using simple drive mechanism such as piezo and roller, some interfaced Electrical components and chain drive Mechanism. The electro-kinetic power generator is a method of generating electricity by harnessing the kinetic energy of automobiles that drives over the track. In order to overcome this problem, we need to execute the techniques of optimum use of conventional sources for conservation of energy. One such technique is explained here. The count of vehicles passing over speed breakers on roads has increased these days. Such speed breakers are designed for heavy vehicles, as it increases the input torque and ultimately results in increasing the power as output. The main approach of the project is to lighten the street light and to light the villages utilizing the jerking pressure over speed breaker in highways and roadside.

Then, this mechanical energy can be transformed to electrical energy using generator or dynamo which can be stored with the use of a battery. All these conversions take place in an electro- mechanical unit. This energy saved during the daytime can be used at night to light the street lamps. Therefore, by using this arrangement a large amount of energy can be conserved which can be used to fulfill our future demands.

MR. AJAY SALAUNKE R
MS. ASMA FIRDOUS S
MR. GAGANDEEP R NAIK
MR. MATHEW AM,

Guided by:
PROF. RONALD LAWRENCE J
Assistant Professor, EEE

DEVELOPMENT AND OPTIMIZATION OF HYBRID POWER GENERATION AND STORAGE TO PROMOTE CLEAN ENERGY

Energy is critical to the economic growth and social development of any country. Indigenous energy resources need to be developed to the optimum level to minimize dependence on imported fuels, subject to resolving economic, environmental and social constraints. This led to an increase in research and development as well as investments in the renewable energy industry in search of ways to meet the energy demand and to reduce the dependency on fossil fuels. Wind, hydro and solar energy are becoming popular owing to the abundance, availability and ease of harnessing the energy for electrical power generation.

Stand-alone power generation systems make use of solar PV and turbines to produce and store the energy for future use. Solar electricity has regulations that it could not produce power within the night and in the cloudy season so we want to triumph over this drawback we will use each wind, solar and hydro together so that any individual of source fails every other supply will maintain generating the electricity and in accurate weather situation. It is a hardware proposed design of a compact stand-alone hybrid power generation system using wind-hydro-solar resources. This system can be implemented in industries/houses where the wind and solar energies are obtained by turbine and PV-Cells, during the rain the water is allowed to flow through a mini-turbine which in-turn produce energy during the rain fall.

Finally total energies will be acquired simultaneously for charging the batteries and is utilized for satisfying the electrical demands of domestic and rural areas. Uninterrupted power can be supplied in industries and factories using an inverter.

MR. C NISHAN
MR. KISHORE KUMAR N
MR. KRUTHIK NL
MR. ARUN KUMAR R

Guided by
PROF. SUBHASHINI S
Assistant Professor, EEE

DESIGN OF STEP-DOWN AC TRANSFORMER FROM 230V TO 60V AC

In the Expeditiously changing technologies in the power industry ,new references labeling new technologies .Based on this reality, we need to track up the international affairs and schemes taking place in the modern transformer design field .Dependable and meticulous solution methods is demanded by the complexity of transformer design .Engineers must guarantee that conformance with the enforced criteria is met while keeping manufacturing costs low while designing transformers. Transformers are the common device which is found in electrical system that links the circuits which operates at different voltages.

Transmission and distribution of electrical energy are the primary part of the transformer. Designing of a step-down transformer from 230V to 60V AC is done by hardware designing, MATLAB programming and MATLAB simulation. Design is based on computer optimization techniques. Hardware designing is completed by taking the output of O.C and S.C test.

MR. MADHUKAR
MR. VINAY KUMAR R
MS. BHAVANA G T
MS. SUJANA N

Guided by:
PROF. SOMASEKHAR. B
Associate Professor, EEE

DEPARTMENT ACTIVITIES

The Departments of EEE & ECE with the sponsorship of Institution of Electronics & Telecommunication Engineers (IETE) organized “Technical & Cultural Hackathon” on 30-10-2021.

After a long time, offline student activities resumed in the campus with this event. Many Students took part in various technical and cultural competitions that were conducted by the student coordinators.

Inauguration of IETE Hackathon

ICRTTEAS 2021

The third International Conference on Recent Trends in Technology, Engineering and Applied Sciences ICTRREAS2021 was held virtually on 19th and 20th July 2021.

PROJECT EXPO 2021

An Inter Collegiate Project Expo was organized on 4th August 2021 in which Five teams participated.

The Project titled ”Regenerative Breaking on E-Bike” by Praveen Reddy N Shubham, Akash Shinde, Srinivas A, Sunderesha under the guidance of Dr. N. Lakshmipathy won the 1st Prize and Project titled “Development and optimization of hybrid power generation and storage to promote clean energy” by C Nishan, Kishore Kumar N, Kruthik Nl and Arun Kumar. R under the guidance of Prof. Subhashini S won the 2nd Prize while project titled “Design and implementation of contactless human body temperature measurement and automated hand sanitiser dispenser” by Florence V, Pooja Shree B, Preethi Sree M And S Shamini under the guidance of Prof. Somashekar. B won the prize for project with social impact.

Workshop on Python Programming

INDUSTRIAL VISIT

An Industrial Visit was organized for the students of Mechanical & Electrical & Electronics Engineering students on 11.12.2021. Students of 5th and 7th semesters got an exposure on the processes of various divisions in Deccan Hydraulics Pvt. Limited, KGF. The Faculties, Dr. Manjunatha Babu NS and Prof. Somashekar B coordinated.

Industrial Visit Deccan Hydraulics

ELECTRICAL NEWS AROUND THE WORLD

During the 2021-22 academic year, the electrical engineering sector experienced significant developments across various domains. Here's an overview of key events and trends:

Renewable Energy Growth & Records

The International Energy Agency (IEA) reported that 2021 saw the fastest growth in renewable electricity capacity ever, with nearly 290 gigawatts (GW) of new capacity coming online. This was driven by factors like falling costs of renewable technologies, supportive government policies, and increasing corporate commitments to clean energy. China led this growth, accounting for almost half of the new capacity additions. China has made significant investments in renewable energy and has become a global leader in the manufacturing of solar panels and wind turbines. Solar power continued its rapid expansion, becoming the cheapest source of electricity in many parts of the world. The cost of solar panels has fallen dramatically over the past decade, making solar energy increasingly competitive with fossil fuels.

Energy Crisis & Volatility

2021 saw a significant rebound in electricity demand as economies recovered from the COVID-19 pandemic. This, combined with extreme weather events, put pressure on electricity systems worldwide. For example, a severe cold snap in Texas in February 2021 caused widespread power outages. Wholesale electricity prices experienced significant volatility in many regions, particularly in Europe, due to factors like rising natural gas prices and geopolitical tensions. The conflict in Ukraine further exacerbated this situation, as Russia is a major supplier of natural gas to Europe.

Electric Vehicles (Evs)

Global sales of electric vehicles doubled in 2021, marking a major milestone in the transition to electric transportation. This growth was driven by factors like increasing consumer awareness of EVs, government incentives, and the availability of more EV models. Continued advancements in battery technology led to increased range, faster charging times, and lower costs for EVs. This made EVs more appealing to consumers and helped to accelerate their adoption

-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.