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BIBLIOGRAPHY OF PROJECT REPORTS

ACADEMIC YEAR: 2023-2024

DEPARTMENT: ELECTRICAL ENGINEERING (ELEC)

Title: Smart Energy Management of Building based on IOT

Author: Irfan Sheikh, Raj Mirani, Yash Nikam, Krishnakant Sarang

Project Guide: Mohd. Adil Sheikh

Abstracts: In the era of technological advancement, efficient energy management is paramount. The Smart Energy Management using IoT (SEMBIOT) project aims to transform conventional smart building systems by rendering them smaller, cost-effective, and widely accessible across socioeconomic strata. SEMBIOT integrates Internet of Things (IoT) technology to enhance energy monitoring capabilities and incorporates an intelligent AI suggestion system for optimizing energy consumption. Key features include miniaturization and affordability, IoT integration for real-time data exchange, enhanced monitoring of various building systems, and an AI-driven suggestion system for personalized energy optimization. The user-friendly interface ensures accessibility, while scalability allows adaptation to diverse building types. SEMBIOT not only promotes responsible energy usage but also contributes to sustainability goals, thus democratizing smart energy management for a greener future.

Acc.No.PR 2384/ELEC35

Title: Battery Thermal Management System Using Liquid cooling and Air cooling

Author: ZAHEEN JETHWA, ATHARVA KULKARNI, ABHISHEK NAGARE, ADARSH NAIR

Project Guide: Mohd Adil Sheikh

Abstracts: Battery storage is paramount in electric vehicles (EVs), serving as the energy reservoir essential for their operation. An efficient Battery Management System (BMS) is indispensable to maximize battery output and ensure safe operations. This comparative analysis investigates battery thermal management systems (BTMS) for EV batteries, focusing on the comparison between liquid and air-cooling methods using ANSYS software. Detailed computational models of battery packs integrated with both cooling systems are developed to accurately simulate thermal behavior under various conditions. Key performance metrics such as temperature distribution, heat dissipation efficiency, and practical considerations like system complexity and cost are evaluated. The proposed BMS model integrates functions such as current and voltage measurement, State of Charge (SoC) calculation, protection mechanisms, battery status detection, and a liquid crystal display (LCD). Electric vehicles, powered by electric motors and rechargeable batteries, rely on BMS for optimal performance, safety, and longevity. SoC, a critical metric, indicates the remaining energy in the battery, enabling users to estimate usage time or range before recharging is needed.

Acc.No.PR 2385/ ELEC36

Title: Sliding mode control of close loop buck converter

Author: Yogesh basutkar, Dimple singh, Darshana Thorat, Shrutika yadav

Project Guide: Shyma kv

Abstracts: In this Project, a sliding mode controller (SMC) is proposed and analyzed for regulating a buck converter. The buck converter is a widely used power electronics device, and the SMC is employed to enhance its control performance. The SMC design and implementation are detailed, and its effectiveness in achieving robust and reliable voltage regulation is demonstrated through simulations and experimental results. The sliding mode controller exhibits excellent transient response and disturbance rejection, making it a promising choice for applications requiring precise voltage control in buck converter systems. The SMC is designed to improve the converter â€™s performance by ensuring the output voltage remains stable even when the input voltage or load conditions change. The key idea behind SMC is to create a "sliding surface" where the system behavior is constrained. When the system deviates from this surface, the controller takes corrective actions to bring it back. This ensures robust and precise control, making it suitable for power management applications. In essence, the SMC for a Buck Converter helps maintain a consistent and accurate output voltage, regardless of variations in input voltage and load, which is critical in many electronic devices and power systems. The design process involves reliability modeling the Buck converter system, deriving the control law for the sliding mode controller, and implementing the control algorithm.

Title: Decentralized App Implementation with Blockchain Technology for Smart Building

Author: ASAAD NASIR PATEL, ANSH SANJAY SINGH, PAYAL SANJAY BANDKAR

Project Guide: MOHD ADIL SHEIKH

Abstracts: With the recent advancements in the field of internet of things (IoT) and artificial intelligence, smart buildings are gaining popularity. Smart buildings play an essential part in offering an upscale atmosphere with lower energy usage and environmental concern in today's modern living. However, with the increased in consumer interaction with the building through IoT devices, it has open various ports for the intruders or unwanted malicious players to enter into the smart building system. In view of this the project proposes integration of blockchain technology into smart building for enhancing the security. The project focuses on the illumination/lighting and video surveillance systems by developing a blockchain based decentralized application (DAPP) with smart contracts and a blockchain ledger. The proposed DAPP ensures the system security by authentication process with help of private key verification and thus avoids unwanted intruders into the system. For testing the effectiveness of proposed DAPP a comparative analysis in terms of gas fees, transaction prioritization, and transaction speeds is presented which offers the users flexibility in balancing cost and efficiency. From the analysis it can be emphasize that the blockchain provides a resilient solution to the challenges posed by the current system.
Keywords: Blockchain, Decentralized App, Smart Building, Smart Contracts

Acc.No: PR 2387/ ELEC38

Title: Li-ion Capacity, SoC and SoH Determination

Author: Suthar Motilal Hanumanram, Valvi aran Dinesh, Khan Md Sajid Shahzade, Yadav Ivek Ramchandra

Project Guide: Pratik Rahate

Abstracts: Lithium-ion batteries (LIB) are popular for electric vehicle (EV) applications due to their high energy density and long life. As LIB capacity degrades over time due to cycling and calendar ageing, they become unreliable for EV applications when their nominal capacity falls below 80%. Thus, reaching the end of the first service life. It is important from an economic, technical, and environmental perspective to fully utilize LIB capacity. The secondary life of LIB is important. The retired LIBs can potentially be used for applications to overcome grid fluctuations and the disadvantages of intermittent renewable sources. Before implementing these batteries for a second life, it is imperative to conduct a comprehensive assessment of their efficiency and performance. This assessment serves the purpose of segregating identical cells, enabling the formation of homogeneous groups. Subsequently, these cells can be utilized in the construction of battery packs with consistent and predictable characteristics. This project introduces a hardware solution designed to facilitate the evaluation of the feasibility of lithium-ion batteries (LIB) for secondary applications. The hardware system functions by monitoring key parameters, including terminal voltage, current, and temperature, throughout the charging and discharging cycles of LIB. This is used to calculate the state of charge (SOC), state of health (SOH), and battery capacity in mAh based on coulomb counting. This comprehensive monitoring approach serves the crucial purpose of categorizing cells with identical capacities. The categorization is based on LIB capacity and SOH. This categorization process is instrumental in preventing imbalances among cells within the same battery pack. as the overall power and capacity of the pack are inherently limited by the lowest capacity cell, and the state of health directly impacts the longevity and performance of secondary-life applications, notably within domains such as smart grids and islanded energy storage systems.

Title: Implementation of Single-Phase Inverter using Unipolar Technique

Author: Soham Nar, Kaushal Nerkar, Vinil Gosavi, Manfred Fernandes

Project Guide: Pratik Rahate

Abstracts: The primary objective of this project is to create a single-phase inverter for educational purposes, focusing on digitally implementing PWM modulation. Leveraging the accessibility and versatility of Arduino, the aim is to simplify PWM implementation on the inverter, replacing analog circuitry. Rather than using readily available integrated circuits, the project will involve designing and constructing the circuit from scratch to enhance visualization of its components and waveforms. The process begins with a thorough theoretical analysis, followed by defining the specific requirements of the inverter to determine component selection and computation. Programming the PWM signal is crucial, and various code options will be explored to identify the most suitable one. The unipolar switching method offers advantages such as reduced switching losses and simplified control circuitry compared to traditional bipolar switching techniques. The inverter is designed to convert DC power from a renewable energy source or a battery into AC power suitable for domestic or small-scale applications. The proposed inverter architecture and control strategy are discussed in detail, including the modulation technique employed to generate the desired AC output waveform. Experimental results demonstrate the effectiveness of the unipolar switching approach in terms of efficiency, reliability, and cost-effectiveness, making it a promising solution for single-phase inverter applications.

Title: Design & Implementation of Dc-Dc Buck Converter Using SIC Mosfet

Author: Lester Dsouza, Ahtesham khan, Adnan Khully, Zaid Shaikh

Project Guide: Pratik Rahate

Abstracts: Buck Converter is a type of chopper circuit that is designed to perform step-down conversion of the applied dc input signal. In the case of buck converters, the fixed dc input signal is changed into another dc signal at the output which is of lower value. This means it is designed to produce a dc signal as its output that possesses a lower magnitude than the applied input. It is sometimes called Step-down DC to DC Converter or Step-down Chopper or Buck Regulator. The Buck Converter is used in SMPS circuits where the DC output voltage needs to be lower than the DC input voltage. The DC input can be derived from rectified AC or from any DC supply. It is useful where electrical isolation is not needed between the switching circuit and the output, but where the input is from a rectified AC source, isolation between the AC source and the rectifier could be provided by a mains isolating transformer. The switching transistor between the input and output of the Buck Converter continually switches on and off at high frequency. To maintain a continuous output, the circuit uses the energy stored in the inductor L, during the on periods of the switching transistor, to continue supplying the load during the off periods. The circuit operation depends on what is sometimes also called a Flywheel Circuit. This is because the circuit acts rather like a mechanical flywheel that, given regularly spaced pulses of energy keeps spinning smoothly (outputting energy) at a steady rate.

Title: Anti Islanding technique for Grid-connected PV Inverters

Author: Prasad Patil, Rutikesh Potdar, Smit Redekar, Ajinkya Sangale

Project Guide: Mohini Kher

Abstracts: One of the main challenges of integrating distributed generation into the power grid is called islanding which occurs when a disconnected power line is adversely energized by a local distributed generation source. If islanding is not quickly detected, it can present serious safety and hazardous conditions. Conventional passive detection techniques used today are entirely dependent on the parameters of the power system which under certain operating conditions may fail to detect slanding. In this paper, a novel and efficient passive islanding detection technique for grid-connected photovoltaic-based inverters is presented. In this technique, the ripple content of the inverter output voltage at the point of common coupling is monitored for deviations using time-domain spectral analysis. Islanding is then detected whenever the ripple spectral content exceeds a preset threshold level for a certain period of time. The performance of this technique was extensively tested and quantified under a wide range of operating conditions. It was determined that the proposed technique did not exhibit any non-detection zone and was able to detect all types of islanding cases within 300ms of the allowed delay time. Furthermore, the proposed technique was found to be robust and inherently immune to other degrading factors since it is relatively independent of system parameters, power system scaling, or the number of distributed generation sources present within the is landing zone.

Title: Design and Control of Switch Mode Power Converter

Author: Prashant angchekar, Shubham Jadhav, Adnan Malik

Project Guide: Varsha Thandassary

Abstracts: A comprehensive overview of the design principles and considerations involved in the development of SMPC. SMPC, widely utilized in modern electronics, offer a crucial solution for efficient and versatile power conversion. These devices, which include various topologies such as buck, boost, and flyback converters, enable high-efficiency voltage regulation across a multitude of applications. Their compact size, lightweight design, and ability to operate at high frequencies make them ideal for portable electronics, renewable energy systems, and electric vehicles. Additionally, switch-mode power converters provide electrical isolation between input and output in certain configurations, enhancing safety. As the demand for energy efficiency continues to grow, these converters play a pivotal role in enabling cleaner and more sustainable power management across a diverse range of industries. SMPC play a pivotal role in modern electronic systems by efficiently converting electrical power from one form to another. The ability toregulate output voltage or current through the manipulation of switching elements such as transistors and diodes. It underscores the importance of efficiency, size, and reliability in converter design, emphasizing the need for optimal component selection. In conclusion, the abstract underscores the interdisciplinary nature of SMPC design, which encompasses aspects of electrical engineering, circuit theory, control systems, and thermal management. It emphasizes the importance of a systematic and iterative approach to design, coupled with rigorous testing and validation, to yield high-performance and reliable power conversion solutions for diverse applications.

Title: IOT Based Smart Agriculture System

Author: Tanmay Gala, Aaditya Girkar, Rahul Parkar, Yugam Shah

Project Guide: Varsha Thandassary

Abstracts: Internet of things (IoT) is a promising technology which provides efficient and reliable solutions towards the modernization of several domains. IoT based solutions are being developed to automatically maintain and monitor agricultural farms with minimal human involvement. The article presents many aspects of technologies involved in the domain of IoT in agriculture. It explains the major components of IoT based smart farming. A rigorous discussion on network technologies used in IoT based agriculture has been presented, that involves network architecture and layers, network topologies used, and protocols. Furthermore, the connection of IoT based agriculture systems with relevant technologies including cloud computing, big data storage and analytics has also been presented. In addition, security issues in IoT agriculture have been highlighted. A list of smart phones based and sensor-based applications developed for different aspects of farm management has also been presented. We have integrated arduino with 5 different sensors along with its case study and coding.

Title: Conversion of Control System for Injection Moulding Machine from Electrical to PLC control

Author: Satbir Singh Khatoroda, Divya Sutar, Jyotiraditya Varute

Project Guide: Varsha Thandassary

Abstracts: The project "Conversion of Control System for Injection Moulding Machine from Electrical to PLC Control" aims to upgrade an injection moulding machine's control system from traditional electrical controls to advanced PLC automation. This transition seeks to improve automation, precision, productivity, and safety in the manufacturing process, all while maintaining adaptability and cost-effectiveness. The adoption of PLC technology is driven by the need for increased industrial automation in today's competitive global market, enabling enhanced efficiency and revenue. Programmable Logic Controllers (PLCs) play a vital role in regulating various functions within the injection moulding process, ensuring consistent high-quality production and safety through precise control over temperature, pressure, and timing. This abstract summarizes the project's objectives and the role of PLCs in modern manufacturing.

Title: Design and Implementation of PWM Rectifier

Author: Loukik Jathar, Mohammed Adnan shaikh, Shaikh Taufiq Raza, Manoj Sharma

Project Guide: Dr. Sincy George, Shyma KV

Abstracts: Global warming is an important topic of discussion in many of the world organization such as WHO, IPCC, GreenPeace. As per United Nations studies, nowadays, global warming is occurring at a faster rate. The rate of rising of sea levels and the number of deaths associated with heat waves are also increasing day by day. Exhaust gas especially CO2 emission from vehicle which is increasing day by day in large number is one of the causes for global warming. Many countries have set a target of reducing the amount of carbon dioxide (CO2) emission. Introduction of electric vehicle is one of the solutions to achieve this. One of the issues with grid connected EV system is charging of battery which affects power factor and power quality in power system. This project proposes design and implementation of PWM rectifier which can be used for efficient charging of EV battery charging of battery from power grid using PWM rectifier by replacing conventional charging methods improves power factor and power quality. This in turn saves electric energy which is a need for developing country like India.

Title: SMART WASTE MANAGEMENT SYSTEM

Author: Simbron Tuscano, Lionel Gonsalves, Immanuel Singh Nadar, Umar Shaikh

Project Guide: MOHINI KHER

Abstracts: We are living in a world that is in a state of constant up-gradation, but there is one ubiquitous problem that we have not been able to deal with, the problem that is impeding our advancement to a hygienic, clean, and healthy society, is garbage. Mostly in our daily life, we encounter dustbins that are excessively full and garbage spilling out of them. This kind of situation is neither good for our environment nor for our advancement. This problem leads to a huge number of diseases as many insects and mosquitoes breed on the waste accumulated in this garbage. Hence, we developed a project to control the overfilling of the dustbin by making the dustbin smart enough to notify itself for its cleaning. In this project the smart dustbin management system is built on the microcontroller-based system having ultrasonic sensors on each of the dustbins that will show the current status of garbage on the mobile screen

Title: Multilevel Inverter Using Cascade H-Bridge Topology

Author: Shrijita Bangera, Akshata Gawade, Pratik Ingole, Prathamesh Patil,

Project Guide: Megha Fernandes

Abstracts: Multilevel inverters have emerged as a pivotal technology in the field of power electronics, revolutionizing the conversion of direct current (DC) into alternating current (AC). Unlike traditional inverters with limited voltage levels, multilevel inverters offer multiple discrete voltage levels, thereby enhancing output waveform quality, reducing harmonic distortion, and improving overall system efficiency. This abstract delves into the fundamental concepts and key characteristics of multilevel inverters. It explores various topologies, including diode-clamped, flying capacitor, and cascaded H-bridge configurations, elucidating their advantages and trade-offs. The underlying principle of stacking power electronic switches to synthesize different voltage levels is examined, elucidating the intricate control strategies involved. Moreover, the abstract highlights the diverse applications of multilevel inverters, encompassing renewable energy integration, motor drives, and high-voltage transmission systems. It underscores their role in enabling the efficient conversion of DC power sources into high-quality AC power, making them indispensable in modern power systems.

Title: Implementation of Single-phase DC to AC Converter using V2H in EV Applications.

Author: Mohd Usaid Khan, Abhishek Nannaware, Pallavi Varak, Osama Ansari

Project Guide: Megha Fernandes and Josna Jose

Abstracts: Vehicle-to-Home (V2H) energy transfer is an innovative and sustainable approach that leverages the bidirectional capabilities of electric vehicles (EVs) to transfer electrical energy between the vehicle and the home infrastructure. This concept utilizes a DC to AC converter to enable the seamless integration of electric vehicles into the home energy ecosystem. The primary objective is to establish a dynamic energy flow, allowing electric vehicles to act not only as a mode of transportation but also as a mobile energy storage solution. The project commences with meticulous modeling and data visualization techniques, providing insights into the intricate dynamics of an EV system interconnected with essential loads. Leveraging advanced computational tool such as MATLAB, the simulation phase rigorously tests and refines the proposed DC to AC conversion architecture, ensuring robust performance across varied operational conditions. Transitioning from simulation to practical realization, the project culminates in hardware implementation, employing state-of-the-art power electronic devices like MOSFETs. By seamlessly integrating theoretical concepts with tangible implementation, the project endeavors to pave the way for a greener,
more efficient future in EV applications and V2H technology.

Acc.No: PR 2398/ ELEC49

Title: Power Factor Correction using FACTS

Author: Nachiket Ambre, Ashton Lobo, Abhay Maurya, Avdhut Tambe

Project Guide: Megha Fernandes

Abstracts: As the power transmission network continues to expand and grow increasingly complex, power engineers face mounting challenges such as uncontrolled loop flows, overloading, excessive short-circuit current levels, and system instabilities. These critical issues have necessitated the adoption of new transmission technologies, such as Flexible AC Transmission System (FACTS) devices, to enhance the efficiency and reliability of electrical energy transmission. Among the various FACTS controllers, Thyristor Switched Capacitor (TSC) and Fixed Capacitor-Thyristor Controlled Reactor (FC-TCR) play a pivotal role. This paper aims to investigate and compare the load compensation capabilities of TSC and FC-TCR within a power system model by analyzing their respective waveforms. The design and simulation are carried out using MATLAB and PROTEUS software, complemented by the development and evaluation of a hardware model. The findings shed light on the relative merits and performance characteristics of these two FACTS controllers in improving power system operation and stability.

Title: VSGCI: A Simulation Study 12V to 220V Inverter using CD4047

Author: Sainath Beenamoni, Nikita Kawade, Sushanth Nair

Project Guide: Mr. KANNAN K

Abstracts: This paper describes the simulation of a 100 kVA three-phase voltage source grid-connected inverter. The simulation covers the design and analysis of this inverter, which has an 800V DC input and operates at a switching frequency of 10 kHz. MATLAB/SIMULINK was used for the simulation. The system configuration consists of a three-phase IGBT inverter connected to an LCL filter. The output is connected to a three-phase three-wire grid. Additionally, the system incorporates several essential components, including a PI controller, a Phase Locked Loop (PLL), voltage and current transformation units, current controllers, and PWM generators. This project details the construction of a basic inverter circuit that converts 12V DC battery power to 220V AC power. The design utilizes readily available components, including the CD4047 integrated circuit (IC) and MOSFET transistors. The CD4047 functions as an oscillator, generating switching pulses that control the MOSFETs in a push-pull configuration. A transformer steps up the voltage from the battery to the desired 220V AC output. This project offers a practical solution for situations where AC mains power is unavailable.