VISHNU INSTITUTE OF TECHNOLOGY

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Department of Electrical and Electronics Engineering

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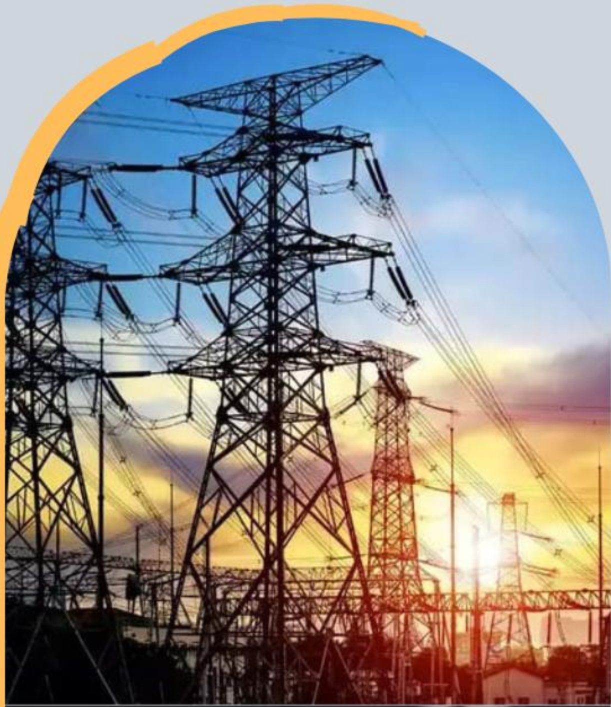
ELECTROZINE

Research, Collaboration & Enterprise



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VISION AND MISSION OF THE DEPARTMENT

VISION:

To be recognized as a Centre of Excellence in the field of Education and Research so as to produce Competent & Ethical Engineers capable enough to contribute to the society.

MISSION:

- To develop innovative, efficient and proficient electrical engineers.
- To keep the curriculum industry friendly, with due regard to the University curriculum.
- To be a place for innovative blended learning and entrepreneurship development in multidisciplinary areas.
- To promote ethical and moral values among the students so as to make them emerge as responsible professionals.

PROGRAM EDUCATIONAL OBJECTIVES(PEO's)

PEO1: To produce Electrical and Electronics Engineering graduates who have strong foundation in Mathematics, Sciences and Basic Engineering

PEO2: To develop problem-solving abilities, technical competency and proficiency in modern engineering tools through hands-on laboratory experience and innovaite projects.

PEO3: To prepare graduates for successful careers in industry, research, or higher education, empowering them to excel in diverse engineering and technology-related fields or become entrepreneurs.

PEO4: To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context through life-long learning.

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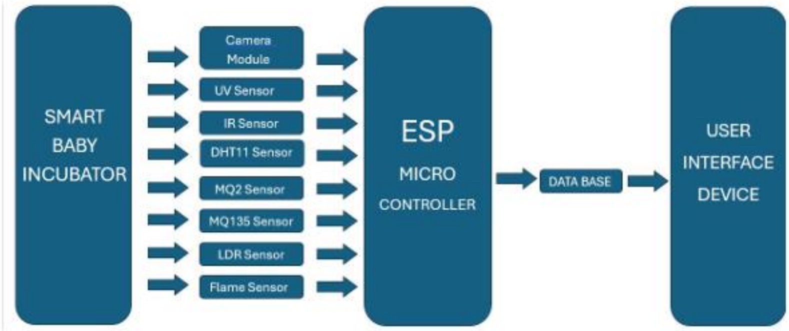
1. Smart Baby Incubator Monitoring System using IoT and Interactive Dashboard

K. Durga Prasad, Ch. Rajesh Varma, K. Abhishek Gupta,
A. Jaswanth Sailesh, D. Mahesh K. Akshay
SUPERVISOR: Dr. V. S. N. Narasimha Raju, M.Tech, Ph.D.

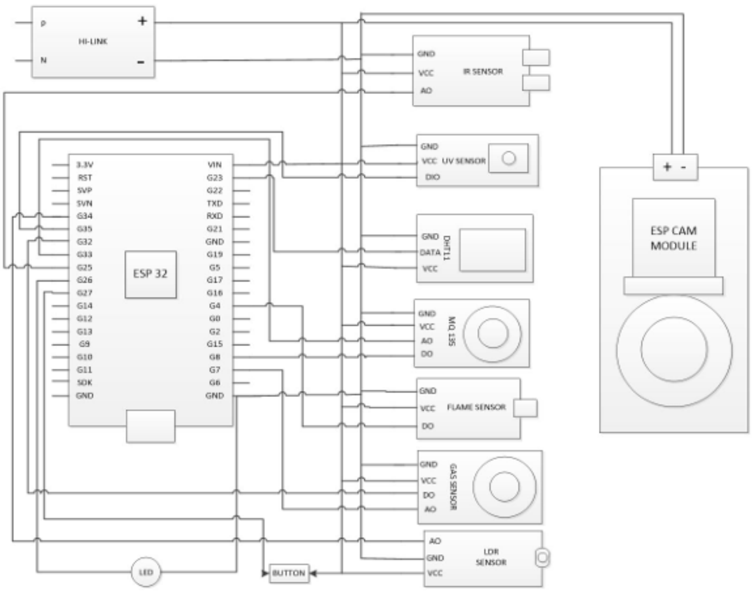
Objectiveoftheproject:

In neonatal intensive care units (NICUs), ensuring the stable operation of baby incubators is critical, as any malfunction or deviation from optimal conditions could pose serious risks to infant health. To address this challenge, this project proposes the development of an advanced monitoring system that continuously tracks key incubator parameters essential for neonatal care. These parameters include temperature, humidity, oxygen levels, heart rate, and respiratory patterns, ensuring a safe and controlled environment for newborns. Leveraging Internet of Things (IoT) technology, the system employs high-precision sensors to collect real-time data on these vital parameters. The data is then transmitted to a centralized platform for processing and analysis. A dedicated web application, developed using HTML, CSS, React JS, and Database, provides an intuitive interface for doctors and parents to monitor incubator conditions remotely. Additionally, the system features automated alerts and data logging to ensure timely interventions in case of abnormalities. By offering continuous monitoring and early warning capabilities, this system enhances neonatal care, reduces the risk of complications, and supports healthcare professionals in making informed decisions. This project represents a significant advancement in incubator technology, improving the safety, reliability, and effectiveness of neonatal health management in medical facilities.

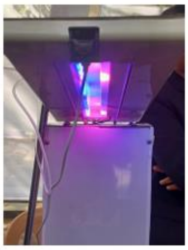
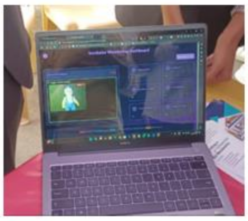
BLOCK DIAGRAM:



CIRCUIT DIAGRAM:



HARDWARE KIT:

CONCLUSION:

In conclusion, The Smart Baby Incubator effectively integrates hardware and software components to provide a real-time neonatal monitoring system. Using an ESP32 microcontroller, multiple sensors such as DHT11, MQ135, IR, UV, LDR, and flame sensors are interfaced to monitor vital environmental parameters, ensuring the baby's safety. The ESP CAM module enables remote visual monitoring, while a button and LED enhance user interaction. Power is efficiently managed through a HI-LINK power module, ensuring reliable operation. On the software side, Arduino IDE programs the ESP32 for data acquisition and communication, while Node.js and Firebase handle backend processing. The React.js-based frontend with Chart.js ensures real-time data visualization for parents and healthcare professionals. With Wi-Fi/MQTT communication, alerts and notifications enable quick response to environmental changes. This system enhances neonatal care by providing a smart, efficient, and scalable solution, significantly improving monitoring and reducing risks for newborns. In this chapter, Smart Baby Incubator Monitoring System using IoT with Interactive Boar has been seen.

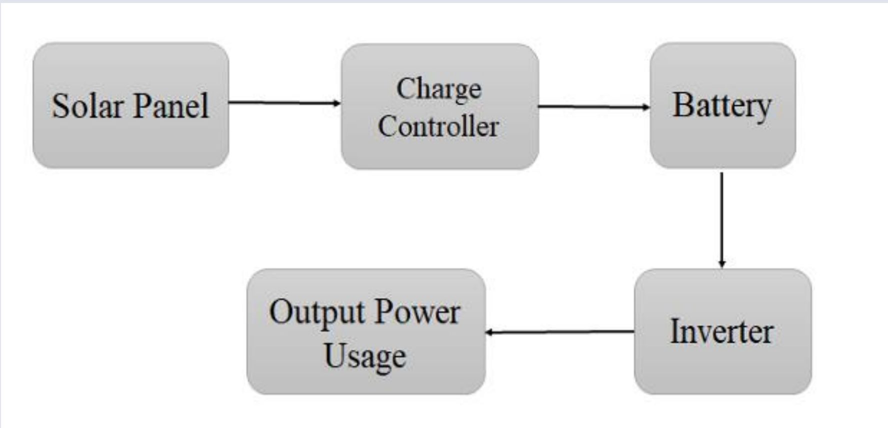
2. SOLAR ROVER: A SELF SUSTAINED POWER UNIT

G. DURGA CHARAN, B. RAHUL SIDHARTHA, A. UDAY KIRAN, CH. SIRISHA, K. JOHNSON RAJU
SUPERVISOR: Dr. S. REDDI KHASIM, Ph.D.

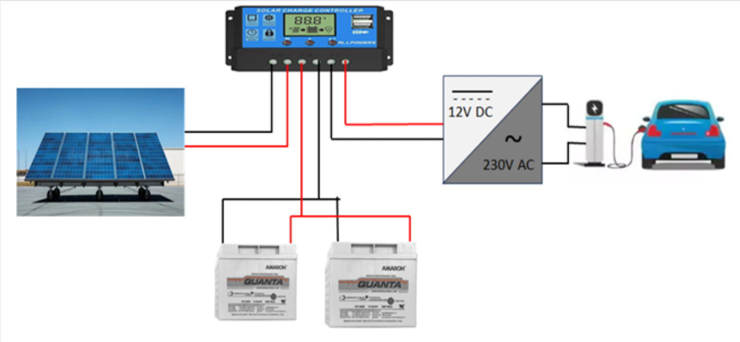
Objective of the project:

A cutting-edge project, the Solar Rover, has been developed as a self-sustaining power unit that harnesses the power of solar energy to provide a reliable and eco-friendly alternative to traditional power sources. This mobile energy system operates by capturing sunlight through solar panels, storing energy in batteries, and converting it into usable AC power via an inverter. The Solar Rover's design incorporates a charge controller to regulate energy flow, ensuring optimal performance and safety. The system is ideal for a wide range of applications, including electric vehicle (EV) charging, disaster relief, military operations, and off-grid living. By utilizing solar energy, the Solar Rover offers a sustainable, portable, and efficient solution to meet energy needs without relying on fossil fuels or traditional grid infrastructure. Its versatility and eco-conscious design make it a viable option for various sectors in need of clean, renewable power sources. This project represents a significant step forward in the development of mobile renewable energy solutions, with the potential to reduce dependence on non-renewable resources and contribute to a more sustainable future. The proposed work has been validated experimentally and the respective results are identified which meets the desired outputs of the system.

Block Diagram:



CIRCUIT DIAGRAM:



CONCLUSION:

The Power on Wheels Solar Rover project successfully demonstrated the feasibility and effectiveness of a portable solar energy system. The system was designed to provide off-grid, renewable power through a well-integrated combination of solar panels, battery storage, an inverter, and a robust mobility structure. The implementation of a 320W solar array effectively harnessed solar energy, providing a consistent and reliable power supply. Throughout the project, detailed analyses were conducted on energy efficiency, battery performance, structural integrity, mobility, and economic feasibility. The solar panels performed as expected, generating an average of 1.5 – 1.6 kWh per day under optimal conditions, with some variations due to weather changes, shading effects, and panel orientation. The system efficiency was found to be 85-90% on sunny days and 70-80% on cloudy days, proving that the tilt angle of 40 degrees was effective for maximizing energy capture. The battery system, using a 45Ah sealed lead-acid (SLA) battery, provided stable energy storage, ensuring continuous operation of connected loads. A full charge was achieved in approximately 2 hours under peak sunlight, with a backup duration ranging from 2.7 to 10 hours depending on load consumption. However, efficiency losses of 10-15% were noted due to battery chemistry limitations, indicating that future versions could benefit from an upgrade to lithium-ion batteries for improved performance and longevity.

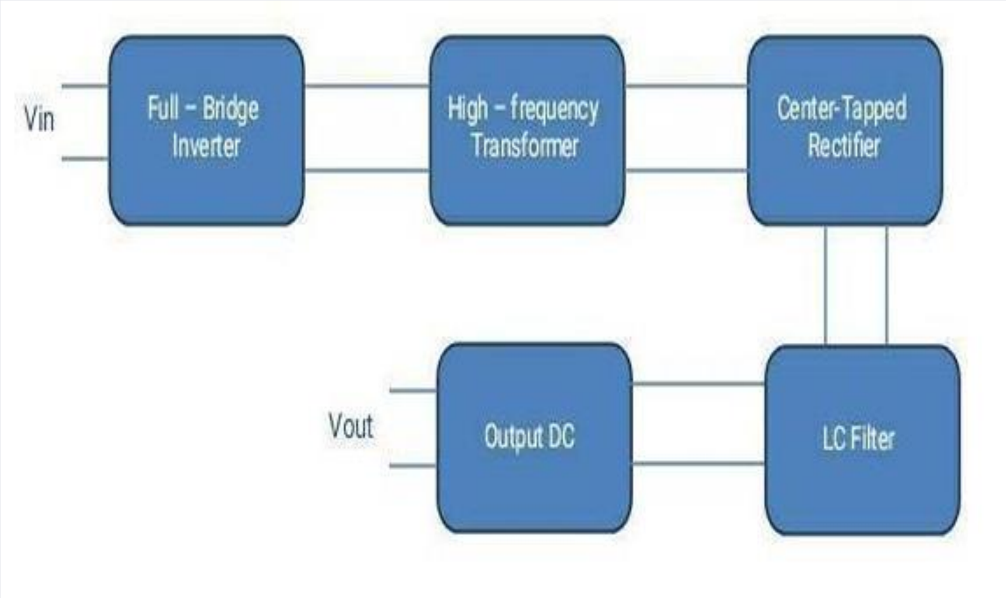
3. SIMULATION OF PHASE SHIFTED FULL BRIDGE DC TO DC CONVERTER

K. GAYATHRI SRI NAGA ARUNA, K. ANIL KUMAR,
K. CHARU HASITHA,CH. DAMODHAR PHANI KRISHNA,
J. TEJA SATYA SAI KUMAR
SUPERVISOR: Mrs. K. Bhanu Priya, M.Tech.

Objective of the project:

High-power DC-DC converters often suffer from high switching losses, reduced efficiency, and increased electromagnetic interference (EMI), making them less effective in applications such as renewable energy systems, electric vehicles, and industrial power supplies. Traditional converters rely on hard switching, leading to excessive power dissipation and thermal stress on components, which ultimately limits their performance and reliability. To overcome these challenges, an efficient power conversion method with minimal losses is required. To address this challenge, a Phase-Shifted Full-Bridge (PSFB) DC-DC Converter offers a solution by utilizing phase-shifted Pulse Width Modulation (PWM). This technique reduces switching losses by allowing MOSFETs to turn on and off at zero voltage, minimizing power dissipation. The full-bridge configuration enhances power transfer capability while maintaining soft switching, thereby improving overall efficiency and reducing EMI. These advantages make the PSFB converter a suitable choice for high-power applications where efficiency and reliability are crucial.

Block Diagram:



CIRCUIT DIAGRAM:

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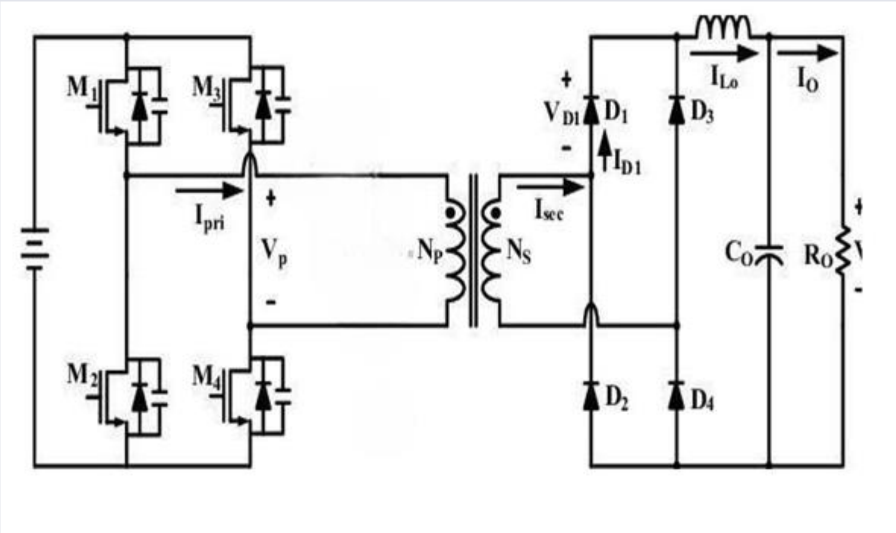
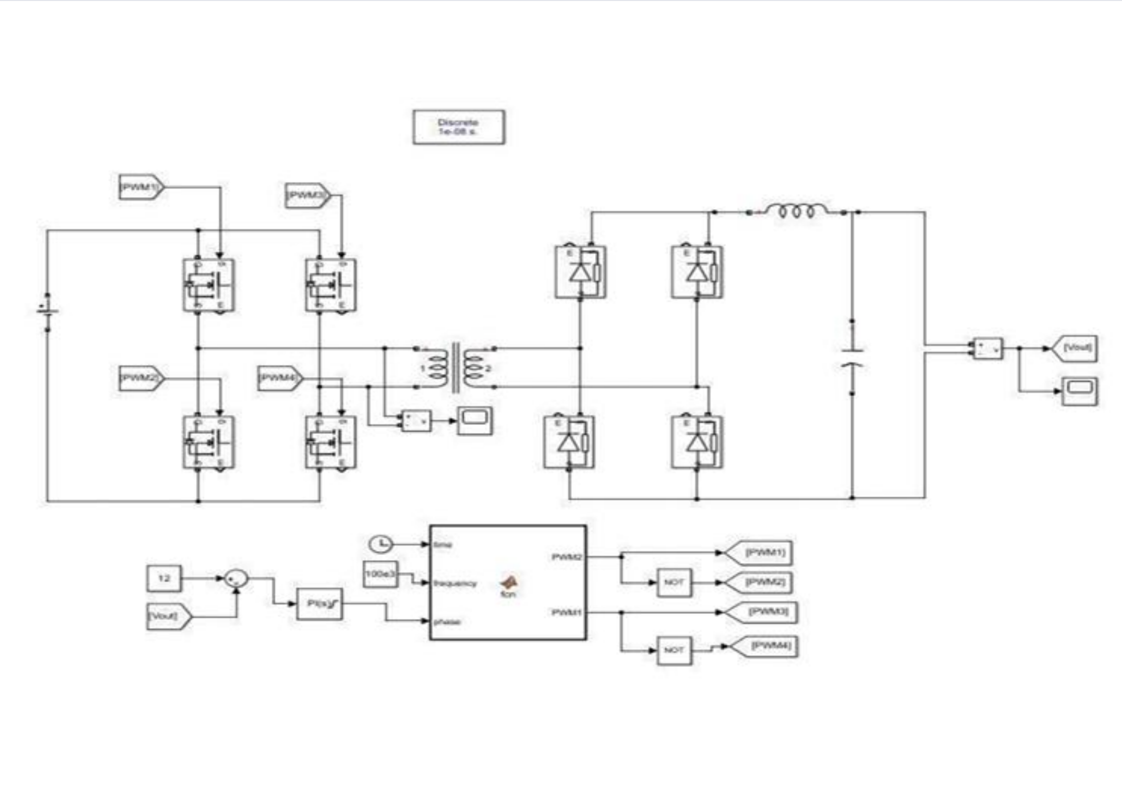


SIMULATION DIAGRAM:



CONCLUSION:

In this chapter we have done a brief discussion on the overall conclusion and future scope of the simulation on phase shifted full bridge dc to dc converter.

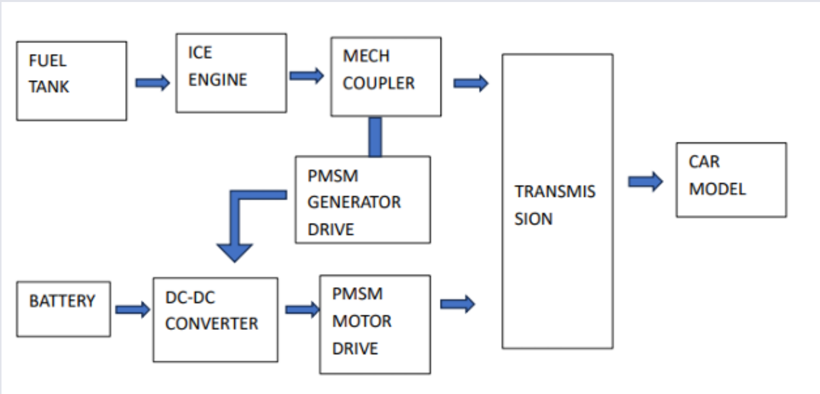
4. DEVELOPMENT AND SIMULATION OF A HYBRID ELECTRIC VEHICLE POWER

CHUNDURI UDAYA KAVYA SRI, K.PAVAN VARMA, CH.VASU B.SRAVIKA, K.JYOTHSNA
SUPERVISOR: Mrs. I V V VIJETHA, M. Tech, (Ph.d)

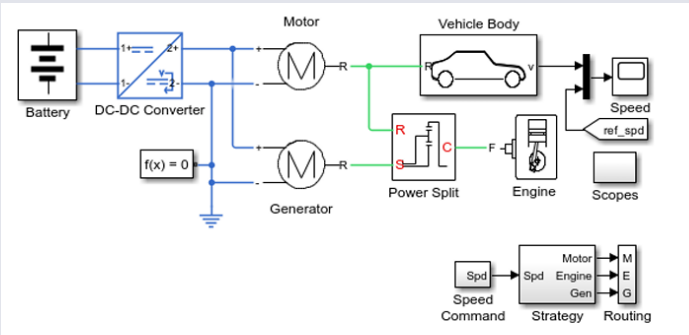
OBJECTIVEOFTHEPROJECT:

This project focuses on the development and simulation of a Hybrid Electric Vehicle (HEV) power train model using MATLAB/Simulink and Simscape Power Systems. The primary objective is to design a comprehensive and modular model that effectively integrates the major components of an HEV, including the internal combustion engine (ICE), permanent magnet synchronous motor (PMSM), battery pack, power converters, transmission system, and control strategy. The simulation emphasizes the dynamic behavior of the vehicle under various driving conditions, enabling analysis of energy flow, battery usage, and motor/engine torque sharing. A planetary gear system is incorporated to simulate the mechanical coupling between the ICE and electric motor, facilitating power-split operation. The Power train Block set is used to streamline model development and simulate realistic driving cycles. Key outputs such as torque, voltage, current, speed, and battery state-of-charge (SOC) are monitored to evaluate system performance. This project demonstrates the effectiveness of using MATLAB/Simulink as a platform for HEV modeling, aiding in design optimization and control algorithm testing. The simulation results provide insights into energy efficiency, component interaction, and system-level behavior of hybrid vehicles

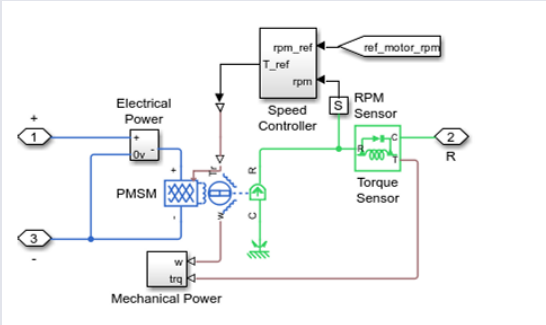
BLOCK DIAGRAM OF HEV POWERTRAIN:



Simulation Architecture in MATLAB/Simulink:



PMSM Simulation in MATLAB/Simulink:



CONCLUSION OF THE PROJECT:

The development and simulation of the Hybrid Electric Vehicle (HEV) powertrain model in MATLAB/Simulink has successfully demonstrated the dynamic interaction between electrical and mechanical components in a hybrid drivetrain. Key performance parameters such as motor torque, angular speed, and electrical currents were analyzed under various driving conditions, including acceleration, steady-state cruising, and regenerative braking. The simulation results show that: The motor delivered a peak torque of approximately 350 Nm, ensuring strong initial• acceleration. The angular velocity followed a predictable pattern, peaking around 67 rad/s, indicating smooth• speed transition during drive and deceleration phases. Regenerative braking effectively recovered energy, as evidenced by the reversal of torque and• current direction, with power recovery values reaching up to ~21.7 kW. Peak output power reached ~23.45 kW, validating the motor's efficiency and dynamic response.• The overall powertrain model responds accurately to control inputs and demonstrates energy• conservation between drive and braking modes. These findings confirm that the simulated HEV powertrain is both accurate and efficient, providing a solid foundation for further development and hardware implementation.

5. DESIGN AND SIMULATION OF MPPT CONTROLLED GRID - CONNECTED PV INVERTER

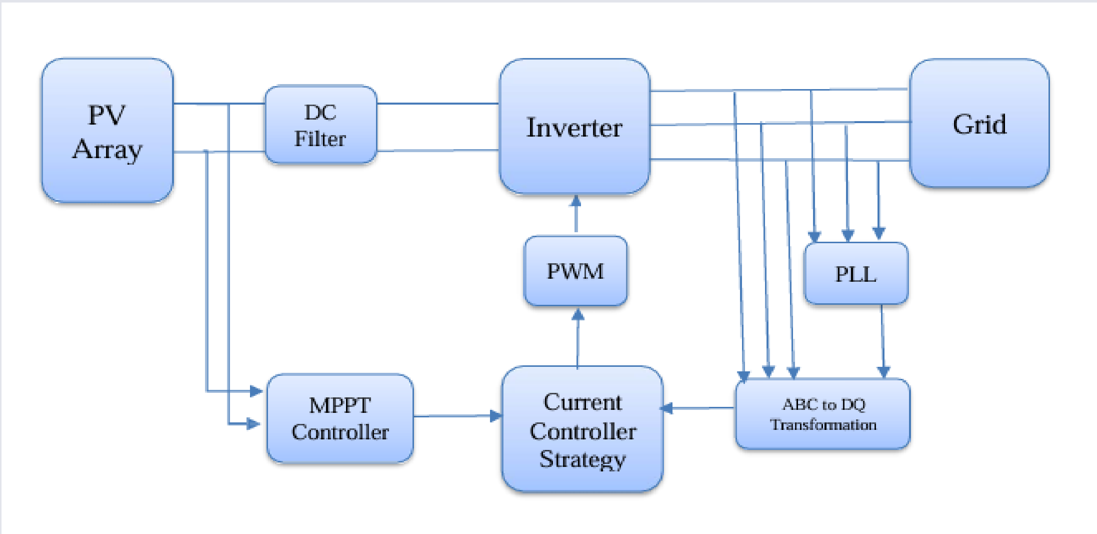
BETHIREDDY RAJESH, BAREGELA YAMINI, BEZAWADA OME PRAKASH, DIDDI NAGA MANI MEGHANA, BATCHALA RAMU, CHILLA BALA ADITYA

SUPERVISOR: Mr. N.Veeraiah, M.Tech, (Ph.D)

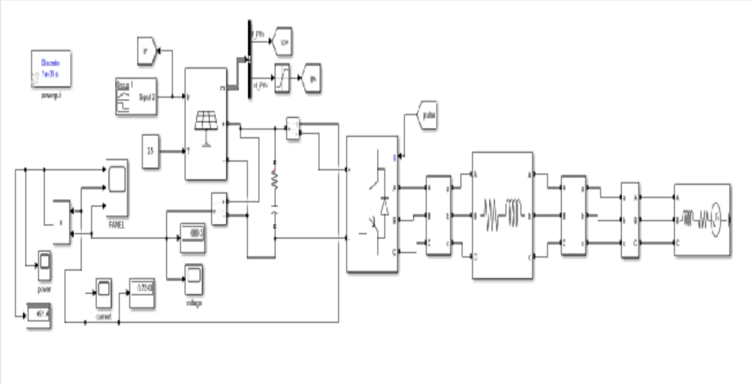
OBJECTIVEOFTHE PROJECT:

The growing demand for renewable energy has made photovoltaic (PV) systems an essential part of modern power generation. However, the efficiency of PV systems is highly dependent on environmental conditions such as solar irradiance and temperature. Maximum Power Point Tracking (MPPT) techniques are employed to optimize the power extraction from solar panels, thereby enhancing overall system efficiency. This project focuses on the design and simulation of an MPPT-controlled grid-connected PV inverter, aimed at minimizing conversion losses by eliminating the need for separate DC-DC conversion stage. The MPPT algorithm ensures that the PV system operates at its peak power point under varying atmospheric conditions. The inverter is responsible for converting DC power from the PV panel into AC power, synchronizing it with the grid. The study also explores the impact of PV characteristics, power factor correction, and grid synchronization. The simulation results demonstrate the effectiveness of the proposed system in maximizing power transfer and ensuring seamless grid integration. Performance metrics such as power factor improvement, active and reactive power flow, and phasor angle synchronization are analyzed. The findings of this project contribute to the development of efficient and reliable renewable energy systems for grid connected applications.

Block Diagram of the System:



Circuit Diagram:



CONCLUSION:

In summary, the MPPT-controlled grid-connected PV inverter system effectively enhances solar energy utilization and contributes to the growth of renewable energy technologies. The results demonstrate improved energy efficiency, power quality, and seamless grid integration. While the system performs well in simulation, future developments such as AI-based MPPT controllers, energy storage integration, and real-time implementation can further refine its capabilities. The continuous advancement of renewable energy systems will play a crucial role in meeting global energy demands sustainably.