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## **Hybrid Inverter with Monitoring and Protection**

Prof. Vrushali K. Jadhav<sup>1</sup>, Janhavi D. Shinde<sup>2</sup>, Yash V. Rane<sup>3</sup>, Ruchali B. Rahinj<sup>4</sup> Guide, Department of Electronics & Telecommunication Engineering<sup>1</sup> Student, Department of Electronics & Telecommunication Engineering<sup>2,3,4,5</sup> Pune Vidhyarthi Griha's College of Engineering & S. S. Dhamankar Institute of Management, Nashik, India vrushali.jadhav@pvgcoenashik.org, janhavishinde888@gmail.com yashrane388@gmail.com, ruchalirahinj360@gmail.com

Abstract: The conservation and efficient management of energy have become crucial to maintaining industrial productivity, profitability, and competitiveness. The ever-increasing energy demands pose a significant challenge, making energy efficiency and conservation more essential than ever. A major concern in energy generation is the wastage of energy due to inefficient storage systems. Many times, the generated energy goes unutilized due to a lack of proper storage mechanisms. To address this issue, we are developing an autonomous hybrid energy generation and storage system that is both affordable and efficient, making it accessible to smaller loads.

This project integrates a solar panel and an AC grid as energy sources. The system will automatically select the appropriate power source to charge the battery, ensuring optimal energy utilization. A DC-AC inverter system will be implemented to convert stored DC power into AC for usage. The system is designed to monitor solar power generation and battery voltage in real-time. When the battery reaches full charge, the system will disconnect the battery from the solar panel to prevent overcharging and extend battery life. The key parameters, including solar power and battery voltage, will be displayed on a 16x2 LCD screen with the help of an Atmega328 microcontroller. This innovative energy solution aims to improve energy efficiency, reduce wastage, and provide a reliable power source in areas with frequent power fluctuations.

Keywords: Hybrid Energy, Energy Saving, Automation



