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- MECHANICAL
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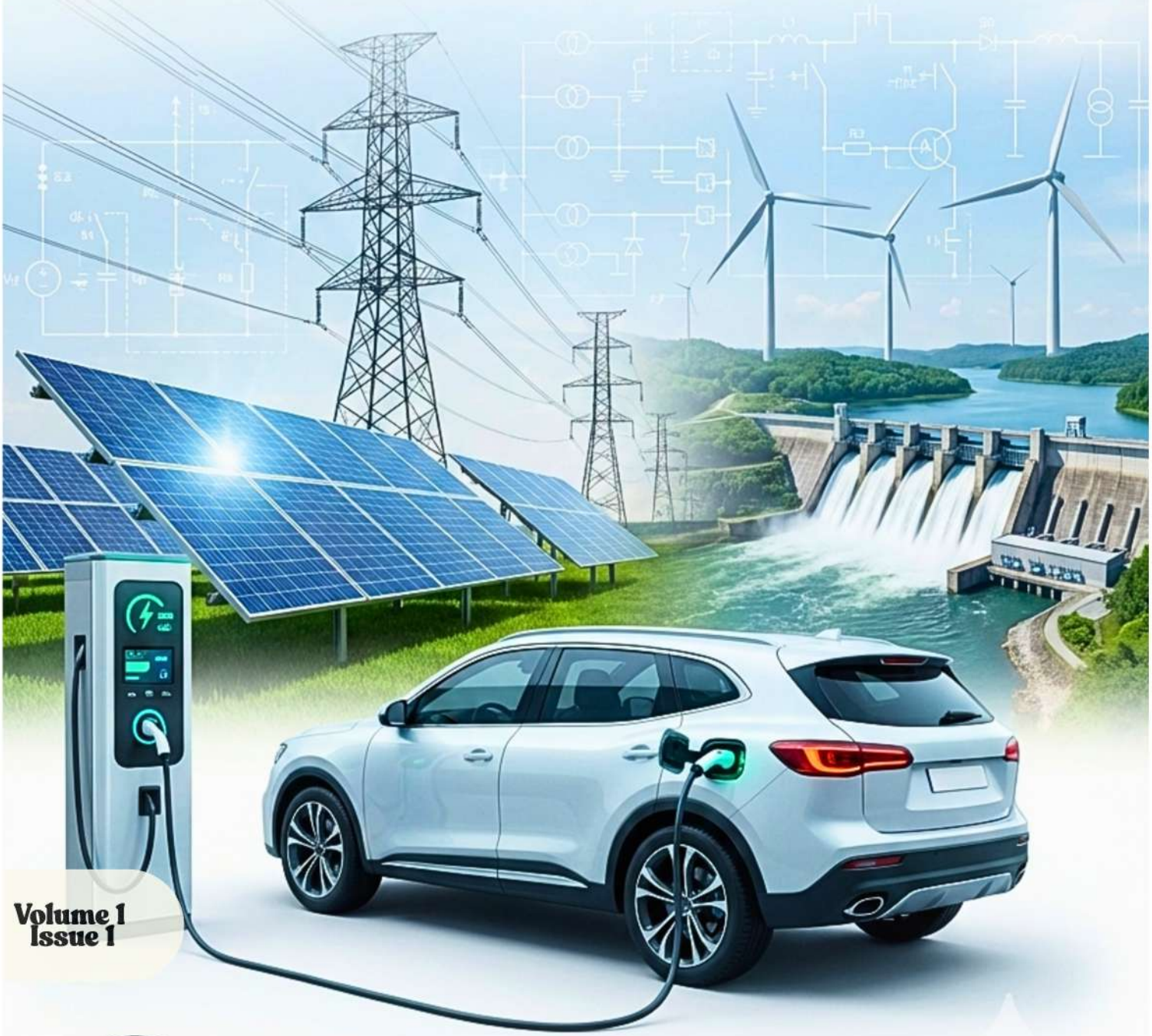

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STUDENT CHAPTER

# Department of Electrical Engineering

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# Coal Ash Based Battery

Parth Rajendra Ahirrao
Sy.B.tech - Electrical

## Abstract

Coal ash, a byproduct of thermal power plants, poses significant environmental hazards due to its volume and hazardous content. However, it contains valuable materials such as silica and iron oxide, which offer potential for innovative applications in energy storage systems. In this study, I explore the development of a battery system using silicon anodes and iron cathodes derived from coal ash, Dispose Dead Coal Ash-Based Battery & Utilization of remaining coal Ash. A coal ash sample composed of 42% silica, 18% iron oxide, and 0.8% alumina was processed to extract silicon and iron for battery fabrication. The resulting battery demonstrated competitive energy density and cycling stability, providing a sustainable alternative to conventional battery materials. The methodology, performance results, and implications for environmental sustainability are discussed in detail. My research presents a novel approach to material recovery from coal ash l, contributing to waste minimization and green energy storage solutions.

# Automatic Roasting Machine

JAYESH BALAJI BALWAD
Sy.B.tech - Electrical

## Abstract

In today's fast-paced world, automation plays a vital role in reducing manual effort and increasing efficiency. This project, titled "Automatic Roasting Machine," is designed to simplify and automate the process of roasting dry food items like nuts and suji, which is typically time-consuming and requires constant attention.

The machine uses an 8051 microcontroller as the brain of the system, along with a 12V DC gear motor, L293D motor driver, and 16x2 LCD display to provide users with easy control and real-time feedback. A push-button interface allows the user to set the desired roasting time, and a buzzer alerts when the roasting is complete. The motor-driven rotating container ensures uniform roasting, similar to a mini cement mixer mechanism.

The aim of this project is to minimize human involvement, prevent over-roasting, and make the process more reliable and consistent. It's a cost-effective, compact, and user-friendly solution suitable for homes, small food businesses, and educational demonstrations. The project also opens up scope for future upgrades like temperature control, speed variation, and mobile-based operation, making it a promising innovation in food automation

GAYATRI ANIL HANDORE
Sy.B.tech - Electrical

# Smart Helmet for Accident Detection

## Abstract

Road accidents are a major cause of injuries and fatalities, often worsened by delays in reporting the incident and locating the victim. This project proposes the development of a smart helmet system designed to detect accidents and automatically send emergency alerts. The helmet integrates sensors such as an accelerometer and vibration sensor to identify sudden impacts or abnormal movements that may indicate a crash. When an accident is detected, a GPS module determines the rider's location and a GSM module sends an alert message with location details to predefined emergency contacts. Additional safety features such as alcohol detection and helmet wearing detection can also be incorporated to ensure responsible riding. The system aims to improve road safety by enabling quick emergency response and reducing accident-related fatalities through the use of sensor-based monitoring and communication technology.

# Autonomous fire-fighting robot

PAYAL MADHAV BODAKE
Sy.B.tech - Electrical

## Abstract

This project presents the development of an autonomous fire-fighting robot designed to detect, approach, and extinguish small fires without human Intervention. The system is built on an Arduino microcontroller that integrates flame sensors for fire detection, a motor driver for mobility control, and a servo-actuated water pump for targeted extinguishing. When a flame is detected, the robot calculates its direction, navigates toward the source, and activates the suppression mechanism to douse the fire. The compact design, low cost, and autonomous operation make this prototype a promising solution for fire safety in homes, laboratories, and small scale industrial setups. Additionally, the project demonstrates practical applications of robotics, sensor integration, and embedded systems in hazard mitigation, offering scope for further enhancement with wireless monitoring, obstacle avoidance, and IoT-based control.