SOLAR POWERED EV CHARGING STATION USING IoT

Department Of Computer Science and Engineering
Sapthagiri College Of Engineering, Bangalore-560097, Karnataka

Guide:
Shashi Rekha G (Email Id: shashirekhag@sapthagiri.edu.in , Ph no: 7975627017)
Students:

Name Of the Students	Email-id	Phone no.
Rohith S	rohithsuri270701@gmail.com	9844631016
Sanjana Patil	sanjanadpatil@gmail.com	8296274913
Srushti K S	srushtiks468@gmail.com	8431318790
Vinutha D S	vinuthads21@gmail.com	9353441272

KEY WORDS

- Solar Panel
- EV- Electric Vehicle
- GSM - Global System for Mobile communication
- Android Studio
- Transformer
- LCD-Liquid Crystal Display

INTRODUCTION

Solar-powered EV charging stations using IoT technology are a sustainable solution for the rising demand in electric vehicle charging. They consist of solar panels that generate renewable energy, stored in a battery bank, and an IoT-connected charging station. This technology enables real-time monitoring and optimization, reducing reliance on non-renewable energy and improving efficiency. Advantages include cost-effectiveness, reduced environmental impact, and remote monitoring capabilities. However, potential drawbacks include higher installation costs compared to traditional stations and decreased efficiency on cloudy days. Overall, these stations offer a promising solution to promote sustainability and meet the demand for electric vehicle charging.

Reference Paper: Akhila.A (2019)5th International Conference on Advanced Computing & Communication Systems (CACCS). Charging Station for E-Vehicle using Solar with IoT.

OBJECTIVES

Solar-powered EV charging stations using IoT combine renewable energy and IoT technology. They generate electricity from solar panels, store it in a battery bank, and charge electric cars. IoT enables remote monitoring and optimization, improving efficiency. Advantages include environmental friendliness, cost-effectiveness, and convenience. It reduces reliance on fossil fuels, promotes sustainability, and improves air quality. This innovative solution addresses fossil fuel scarcity and supports a sustainable future.

METHODOLOGY

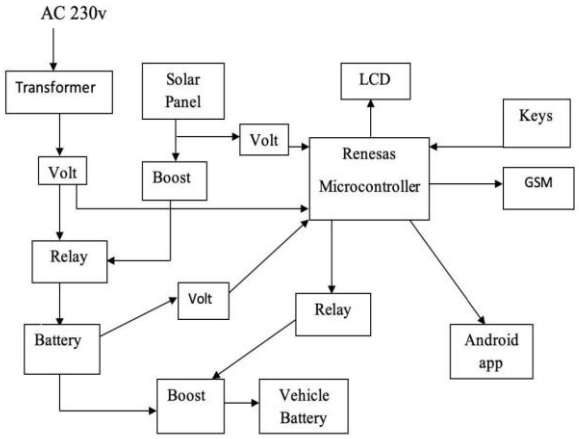

Figure: Design of the Model

The proposed project aims to develop a solar-powered EV charging station with an eco-friendly, cost-effective, and efficient design. It involves a prototype module with individual PCB boards interconnected by jumper wires. The module will be controlled by a Renesas microcontroller, displaying real-time information on an LCD screen.

Users will have the option to select full or half charging for their EV battery using buttons on the station. The LCD will provide essential information like solar panel voltage and AC (230v) readings, ensuring transparency in the charging process. A voltage controller board will regulate the charging process by connecting the solar panel and transformer to a relay. The charging station will prioritize solar energy for EV charging, aligning with its eco-friendly and cost-effective focus. Once the charging is complete, a GSM modem will send SMS alerts to users, keeping them informed about their EV's charging status and enabling better schedule planning.

The project will also include an Android app to track the charging station ID and vehicle status, providing real-time information and enhancing convenience for users. This feature improves the efficiency of the charging process and allows users to monitor progress from their smartphones. In summary, the proposed project aims to develop an innovative and sustainable solar-powered EV charging station. It utilizes individual PCB boards, a Renesas microcontroller, and an LCD display. Solar energy is prioritized for charging, and an Android app and GSM modem ensure real-time monitoring and user notifications. Overall, this project contributes significantly to sustainable transportation and a greener environment.

Hardware Used:

- Renesas/Arduino 64-pin
- LCD
- Solar panel
- GSM
- Battery
- Relay
- Transformer

Software used:

- Windows 10
- Arduino
- Embedded C
- JAVA SDK
- Android Studio

• Keys
• Boost circuit

RESULTS AND CONCLUSION

The transportation sector is embracing sustainable and eco-friendly technologies, notably in EV charging using solar energy and IoT. The proposed solution involves the design of an EV charging station that integrates solar panels for electricity generation and an IoT system for monitoring and controlling the charging process. This solution tackles two key challenges associated with EV charging: high energy demand and the need for efficient and secure charging protocols. Solar energy offers a renewable and sustainable alternative to conventional grid electricity, typically derived from non-renewable sources like coal or gas. Harnessing solar power for EV charging significantly reduces carbon emissions, contributing to the fight against climate change.

SCOPE FOR FUTURE WORK

1. Improving solar panel efficiency can be achieved through the use of higher-quality materials, optimizing panel design, and refining the manufacturing process.
2. Enhancing battery efficiency is crucial for improving EV charging station performance. Advancements in battery technology, particularly increasing energy density, enable the storage of more energy in smaller spaces.
3. Exploring other renewable energy sources such as wind and hydro power can diversify the energy mix for EV charging.
4. Optimizing charging algorithms is an important area of research. Refining these algorithms can enhance the overall charging process.
5. Smart grid integration is crucial to managing the growing demand for EV charging stations without straining the electrical grid.