



e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

Volume 13, Issue 3, March 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.317

☎ 9940 572 462

☎ 6381 907 438

✉ ijareeie@gmail.com

@ www.ijareeie.com



Prepaid EV Charging Station for Two-Wheeler

Jyoti Patil¹, Sai Patil¹, Pratik Mohite¹, Ankit Patil¹, G.R. Kavathekar²

UG Student, Dept. of EE, Annasaheb Dange College of Engineering and Technology, Ashta, Maharashtra, India¹

Assistant professor, Dept. of EE, Annasaheb Dange College of Engineering and Technology, Ashta,

Maharashtra, India²

ABSTRACT: The coin payment-based EV charging station project presents a unique and innovative approach to Electric Vehicle charging infrastructure. From an industry point of view, it modifies the market offerings, attracts a broader customer base and generates revenue from both electricity sales and coin payment system implementation. The coin payment systems serve as backup options during network outages, ensuring accessibility during emergencies. Institutes find research opportunities in assessing system efficiency, user satisfaction, and feasibility. Educational benefits arise from using the project as a case study, encouraging a deeper understanding of technical, economic and societal aspects. Institutes can also drive technological innovation, collaborating with industry partners to enhance system security, reliability, and integration. In conclusion, the coin payment-based EV charging station project brings forth a comprehensive and multifaceted solution that addresses industry diversification, societal inclusivity, and educational research. This project represents an inventive step toward promoting sustainable transportation and accessible charging options for all segments of the population. This project investigates the possibility of charging the battery electric vehicle at charging station. Electric power must become less depend on fossil fuels and transportation must become more electric to decrease carbon emissions and mitigate climate change. By accepting coin or token payments for electricity, these stations cater to individuals who lack access to digital payment methods, ensuring inclusivity in EV charging.

KEYWORDS: coin payment-based, EV charging station, battery, Electric power, reliability.

I.INTRODUCTION

Electric vehicle charging stations are an integral part of the infrastructure that provides electric energy for the recharging of plug-in electric vehicles, such as electric cars and plug-in hybrid electric vehicles. These charging stations can be broadly categorized into three types:

Residential Charging Stations: Residential charging stations are designed for home use and typically do not require user authentication or metering. Some portable chargers can also be mounted as a charging station, offering convenience for homeowners.

Charging While Parked: This type of charging station is operated as a commercial venture, either for a fee or for free, in collaboration with parking lot owners. It allows electric vehicle owners to recharge their cars while taking advantage of nearby facilities, such as shopping malls, small centers, or train stations. The charging speed can vary, offering both slow and high-speed charging options.

Fast Charging at Public Charging Stations: Public fast charging stations are capable of delivering a significant amount of charge in a short time. These stations have a rating of more than 40kw and can provide over 97 km of range in just 10-30 minutes. They are often strategically placed at rest stops, allowing for longer distance trips. Moreover, these fast-charging stations can also be used for charging while parked, whether it's for shorter or longer periods.

Factors Driving Electric Vehicle Adoption Over the last decade, a combination of factors has aligned, creating opportunities for electric vehicles to enter the mass market.



These factors include:

Climate Change: The urgent need to address climate change has prompted the reduction of fossil fuel usage and associated emissions. Countries like India have committed to cutting their greenhouse gas (GHG) emissions intensity by 33% to 35% below 2005 levels by 2030, highlighting the critical role of electric vehicles in achieving these targets.

Advances in Renewable Energy: The advancement of renewable energy technologies, particularly wind and solar electricity generation, has led to a significant reduction in costs. This progress has paved the way for clean, low-carbon, and cost-effective grids, making electric vehicles a viable and sustainable transportation option.

Rapid Urbanization: The process of economic development, especially in emerging economies, has triggered rapid urbanization. As rural populations flock to cities in search of employment, the energy and transport infrastructure faces immense strain, resulting in congestion and pollution. Electric vehicles offer a solution to mitigate these challenges by providing cleaner and more efficient transportation in urban areas.

Battery Technology Breakthroughs: Advances in battery technology have revolutionized electric vehicles. Higher energy densities, faster charging, and reduced battery degradation have significantly improved the performance, reliability, and cost-effectiveness of electric vehicles. With motors continuously evolving for higher ratings, electric vehicles have become more practical and appealing to a wider audience.

Energy security: The petrol, diesel and CNG needed to fuel an internal combustion engine (ICE) based mobility system requires an extensive costly supply chain that is prone to disruption from weather, geopolitical events and other factors. India needs to import oil to cover over 80% of its transport fuel. That ratio is set to grow as a rapidly urbanizing population demands greater intra-city and inter-city mobility. As a result, developed economies such as EU, the USA and Japan as well as developing economies such as China and India have all included Electric vehicles (EV) in their policies to lower their carbon emissions while providing convenient and cost-effective mobility.

Key Objectives of the EV Policy:

- Reduce the consumption of primary oil in transportation.
- Encourage the adoption of electric and clean energy vehicles among customers.
- Promote the adoption, adaptation, and research and development of cutting-edge technology in India.
- Enhance transportation options for the common man in both personal and goods transportation.
- Establish global-scale and competitive manufacturing capacity for electric vehicles.

II.SYSTEM MODEL AND ASSUMPTIONS

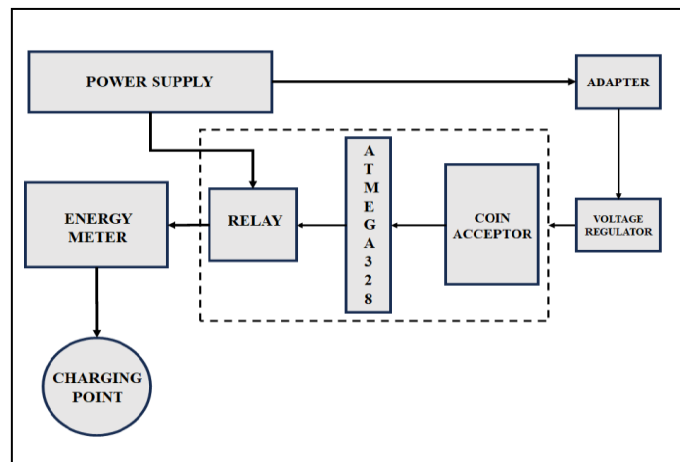


Figure: Block Diagram of Prepaid EV Charging Station for Two-Wheeler

Working:

1. The basic concept of this project is to develop an electric vehicle charging station for two-wheeler.
2. The most important part of this project is the coin validation module. First, we need to train the coin validation module for the coins we use. Here we will use Rs 10 coins.



3. The module is connected to an ATMEGA328, The ATMEGA328 is a popular microcontroller belonging to the AVR family manufactured by Atmel, now a part of Microchip Technology. It can be programmed according to our project needs.
4. Write the program code using Arduino IDE software. The coin validation module provides data about the coins inserted by the user. Loading time is determined by the benefit.
5. For example, if you insert a coin of 10 rupees, the electric car will be charged for 1 hour and the 16*2 LCD will accordingly display all the necessary information for the user, such as “Welcome, put 10rs coin”, “Coin inserted”, “Pulse=2000”, “Load time has ended” etc. It shows,
6. There is a relay that turns the charging point on and off. User can connect his EV charger to his charging point.

III.EFFICIENT COMMUNICATION

Efficient Communication for Coin-operated EV Charging Station (Two-Wheelers)

1. Focus on Simplicity:
 - Large, clear icons: We Use universally understood icons to represent the charging process (plug symbol), coin slot, and charging status.
 - Step-by-step guide with visuals: In our Model, We Display a simple, illustrated guide directly on the station showing:
 - a. Plug your vehicle into the charging point.
 - b. Welcome, put 10rs coin.
 - c. Pulse Time.
 - d. Load time has ended.
2. Coin Payment Information:
 - Coin slot with clear denomination markings: Indicate which coins are accepted (e.g., ₹10) with large, easy-to-read labels directly on the slot.
 - Estimated charging time per coin: Display a pulse showing the estimated charging time users can expect for each coin inserted.
3. Status Communication:
 - Large, illuminated indicator light: Use a bright green light to show the station is available and a red light for occupied.
 - Customer support information: Display a sticker with a phone number or QR code for contacting customer support in case of malfunctions. By focusing on clear visuals, simple instructions, and easy-to-understand coin denominations, the communication for our coin-operated EV charging station will be efficient for two-wheeler users.

IV.SECURITY

1. Physical Security:
 - Station housing: Use strong, weatherproof materials to deter vandalism and tamper
 - Secure coin slot: Make it difficult to pry open or exploit to steal inserted coins. Consider an anti-fishing mechanism.
 - Charging cable: Use a cable with a locking mechanism to prevent theft.
2. Electrical Safety:
 - Surge protection: Install surge protectors to safeguard the station from electrical spikes.
 - Grounding: Ensure proper grounding to prevent electrical hazards.
 - Overload protection: Implement mechanisms to prevent overloading of the circuit.
3. User Safety:
 - Emergency shut-off button: Provide a clear and easily accessible button to stop charging in case of emergencies.
 - Clear warnings: Display labels regarding potential hazards like electrical shock and keeping flammable materials away.
4. Payment System Security:
 - Regular collections: Establish a schedule for collecting coins from the station to minimize the amount of cash stored on-site. By implementing these security measures, you can create a safe and reliable experience for two-wheeler users at your coin-operated EV charging station.



||Volume 13, Issue 3, March 2024||

|DOI:10.15662/IJAREEIE.2024.1303018 |

V. RESULT AND DISCUSSION

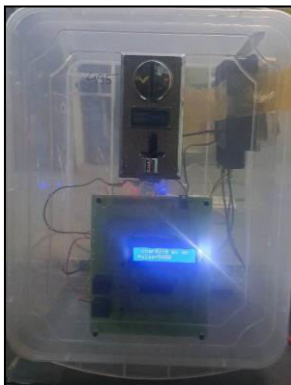
- When we switch ON the device the first message will show “welcome, put 10rs coin”.



- When we insert the 10rs coin the charging will start.



- As per pulse setting charging time will be shown in given results.



(1)



(2)



(3)



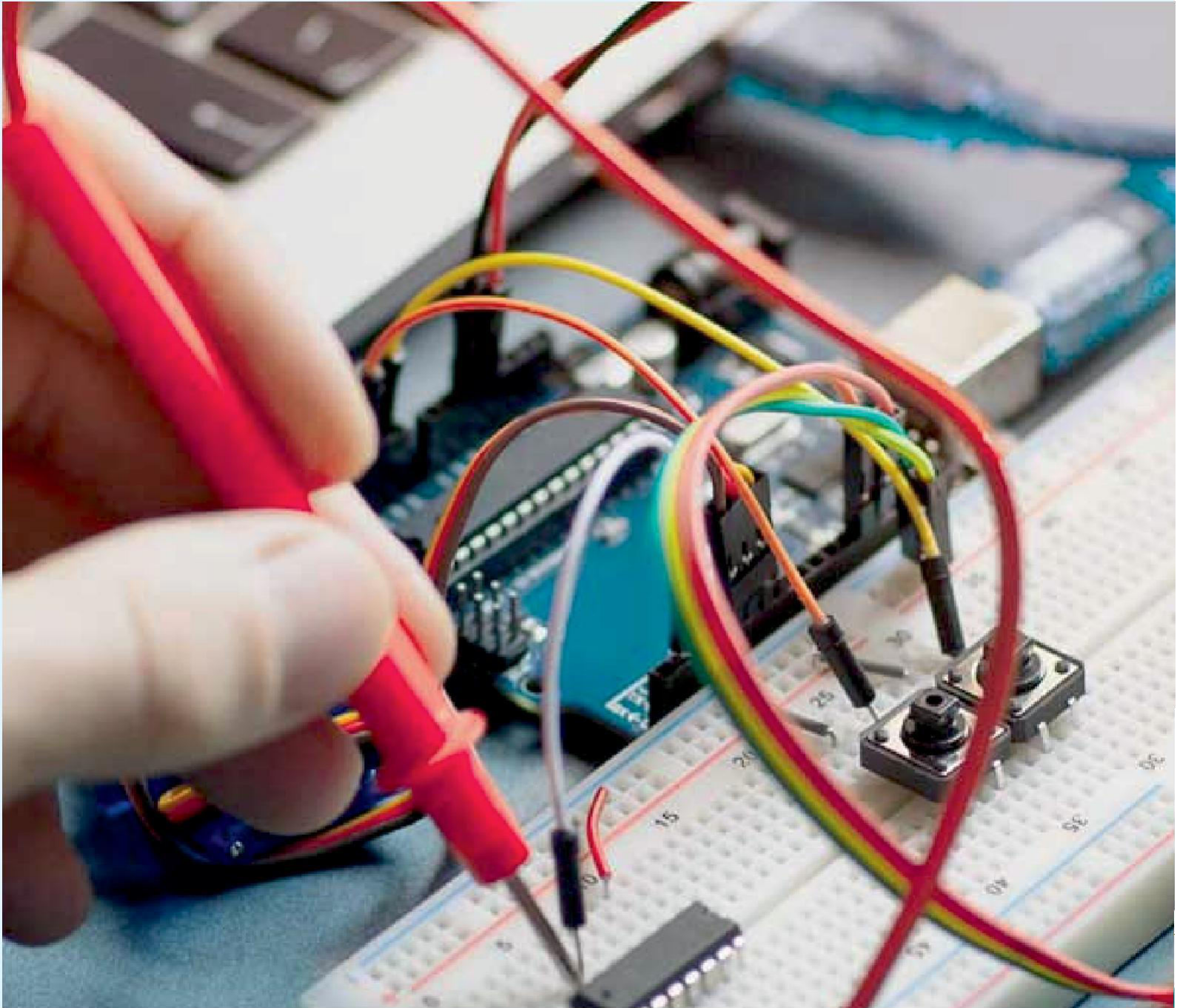
VI.CONCLUSION

The implementation of prepaid EV charging stations for two-wheelers addresses several crucial aspects in the promotion and facilitation of electric vehicle usage. These stations offer a convenient and user-friendly solution for charging, contributing significantly to the widespread adoption of electric two-wheelers. The need for such stations is evident in the evolving landscape of sustainable transportation, emphasizing accessibility, efficiency, and user convenience.

By providing a seamless charging experience through prepaid systems, the stations cater to the growing demand for reliable and hassle-free charging options. Moreover, their integration into urban spaces and the emphasis on modern, eco-friendly themes further contribute to their appeal and alignment with environmental goals

REFERENCES

- [1] U. S. Energy Administrative (EIA). International Energy Outlook, Report No.: DOE/EIA0484(2013). Washington, Dc: Office of Energy Analysis, U. S. Department of Energy, 201320585.
- [2] Organization of the Petroleum Exporting Countries. World Oil Outlook, Report No.: ISBN978- 3-9502722-6-0. Helderstorferstrasse17, A-1010 Vienna, Austria: OPEC; 2013.
- [3] Yimin Zhou, Xia Oyun Li, “Vehicle to Grid Technology: A Review”, Proceedings of the 34th Chinese Control Conference July 28-30, 2015, Hangzhou, China
- [4] Dale Hall, Nic Lutsey, “Literature review on power Utility best practices Regarding electric vehicles”, ICCT White Paper 2017.
- [5] Vehicles Ebrahim Mortaz, Jorge Valenzuela, “Microgrid energy scheduling using storage from electric vehicles”, 2016.
- [6] Chiao-Ting Li, Changsun Ahn, Huei Peng, and Jing Sun, “Integration of Plug-In Electric Vehicle Charging and Wind Energy Scheduling on Electricity Grid”, IEEE 2011.
- [7] Dhara G. Rangani, Nikunj Tahilramani” Coin based mobile battery charger with high security” in IEEE conference, 2017.
- [8] Mr. C V Raja Reddy, Uzoigwe Daniel, Rupesh Rai, Balaji R” Coin Based Cell Phone Charger with Solar Tracking system”, ISSN:2455-7137, Volume-02, Issue05, May 2017, PP-46-53, IJLERA.
- [9] Nupur Khera” Design of charge controller for solar P.V. Systems” ICCICCT, 2015.



INNO  SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.317



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

 9940 572 462  6381 907 438  ijareeie@gmail.com



www.ijareeie.com

Scan to save the contact details