IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, June 2025
Impact Factor: 7.67

Wireless Charging Platform for Electric Vehicles

K. Chiranjeevi[1], V. Rekha[2], P. Vyshnavi[3], Y. Naresh[4], K. Rahul Teja[5]
[1]Professor, Dept. of Electronics & Communication Engineering
[2,3,4,5]UG Student, Dept. of Electronics & Communication Engineering
Christu Jyothi Institute of Technology & Science, Jangaon, Telangana, India

Abstract: *The popularity of electric vehicles (EVs) is steadily increasing globally in the current generation. Traditional charging stations, however, face several challenges, including long charging times, wear and tear due to physical connectors, and a lack of smart management systems for monitoring. These issues often inconvenience users and delay the broader adoption of EVs.*
The Wireless Charging platform for Electric Vehicles introduces a seamless and efficient charging system that addresses various challenges. Wireless charging eliminates the need for physical plugs or connectors, reducing wear and tear. The system uses IoT integration for real-time monitoring via a user-friendly mobile application and enhances safety by displaying temperature and humidity levels to detect rapid changes. Additionally, it utilizes solar energy as a natural resource, contributing to power savings and sustainability. By overcoming current challenges, this solution fosters a more accessible and eco-friendlier EV ecosystem, generating new opportunities for the expansion of electric mobility.

Keywords*:* Arduino UNO, ESP8266, IR Sensor, Transmitter &Receiver Coil, DTH11, Voltage Sensor, LCD+I2C

I. INTRODUCTION

Mobility is one of the essential aspects of independence, and individuals with physical disabilities often face challenges in navigating their surroundings. Traditional wheelchairs require manual operation or joystick-based control, limiting accessibility for those with severe movement restrictions. This project aims to address these challenges by developing an Arduino-based smart wheelchair that is controlled using voice commands and hand gestures via a mobile application. The integration of Bluetooth communication between a smartphone and Arduino enhances flexibility and ease of use. Additionally, an IR sensor for obstacle detection ensures safety, and an emergency siren button provides immediate assistance in distress situations. This prototype serves as a cost-effective, accessible, and user-friendly solution, improving mobility for individuals with disabilities, particularly in indoor environments.

1.1 Project Outline:

The wireless charging platform for electric vehicles aims to provide a seamless and efficient solution by eliminating the need for physical connectors, which reduces wear and tear and enhances durability. The system is equipped with IoT technology for real-time monitoring through a mobile application, allowing users to track operations effectively. Safety is ensured by displaying temperature and humidity levels to detect rapid changes, and solar energy is utilized as a sustainable power source to reduce dependence on traditional electricity. This project focuses on enhancing convenience, promoting eco-friendliness, and supporting the widespread adoption of electric mobility.

1.2 Project Objective:

The objective of this project is to develop a wireless charging platform for electric vehicles that simplifies the charging process and enhances user convenience. By eliminating physical connectors, the system reduces wear and tear while improving durability. Integrated with IoT technology, it provides real-time monitoring through a mobile application and ensures safety by detecting rapid changes in temperature and humidity. Additionally, the platform utilizes solar energy as a sustainable power source, supporting eco-friendly practices and promoting the widespread adoption of electric mobility.

II LITERATURE SURVEY

Wireless charging technology has gained significant attention in recent years, especially in the realm of electric vehicles (EVs), due to its potential to simplify the charging process and improve user convenience. Traditional wired charging methods often involve complex setups, prolonged charging times, and wear and tear of physical connectors, which limit their efficiency and durability. Inductive wireless charging, while a step forward, also presents challenges such as limited flexibility and inefficiencies in energy transfer.

Advancements in IoT-enabled systems have provided a pathway for integrating real-time monitoring and control into EV charging platforms. Technologies like ESP8266 are widely utilized to implement Wi-Fi-based monitoring systems, allowing users to supervise charging processes and access data through mobile applications. Furthermore, environmental monitoring, including temperature and humidity detection, is increasingly recognized for its role in ensuring operational safety during charging.

The inclusion of renewable energy sources, such as solar power, has become a crucial aspect of designing sustainable charging platforms. Solar panels enable the utilization of natural energy resources, reducing reliance on conventional power supplies and supporting eco-friendly practices.

By leveraging these technologies, the IoT-Based Wireless Charging Platform for Electric Vehicles builds upon existing research and addresses critical issues faced by traditional and inductive charging methods. This project aligns with current trends in EV technology by promoting sustainability, enhancing safety, and supporting the expansion of electric mobility.

III EXISTING SYSTEM

Wired Charging relies on direct physical connections through cables and charging ports to transfer electricity to the vehicle's battery. This method is generally more efficient than wireless charging, as it minimizes energy losses and allows for faster charging speeds. However, it requires regular maintenance due to wear and tear on connectors and cables. Wired charging stations are widely available and support various charging speeds, from standard home chargers to high-speed DC fast chargers used in public infrastructure.

Inductive Power Transfer (IPT) is a wireless charging technology that uses electromagnetic fields to transfer energy between a transmitter coil in the charging station and a receiver coil in the EV. This method eliminates the need for physical connections, reducing wear and tear while enhancing convenience. IPT can be further improved through Resonant Inductive Charging, which enhances efficiency and extends the range of power transfer, making it suitable for various EV applications.

IV PROPOSED METHOD

The proposed method for this wireless charging platform enhances traditional charging systems by integrating solar energy, real-time monitoring, and safety features like temperature and humidity detection.

In this approach, solar energy is utilized as the primary power source to charge electric vehicles, reducing reliance on conventional electricity and promoting environmental sustainability. This method helps conserve natural resources while making EV charging more efficient and cost-effective. The system incorporates real-time monitoring capabilities, enabling users to track charging status, energy consumption, and system performance remotely via a smart interface. This ensures optimized energy usage, prevents unnecessary power wastage, and enhances overall functionality.

Additionally, the platform features temperature and humidity sensors to detect any potential hazards, such as overheating or unfavorable environmental conditions. These sensors help maintain safe operation by providing alerts and preventive measures, ensuring reliable charging without risks. The integration of smart connectivity further improves efficiency by allowing remote access and automation, making the charging process seamless, safe, and user-friendly.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, June 2025
Impact Factor: 7.67

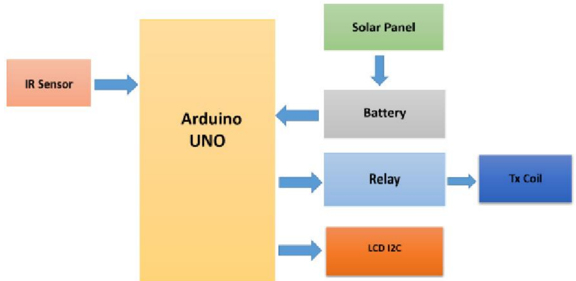


Figure 1(a): Transmitter Block Diagram

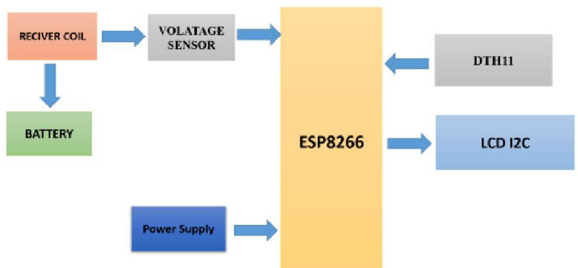


Figure 1(b): Reciver Block Diagram

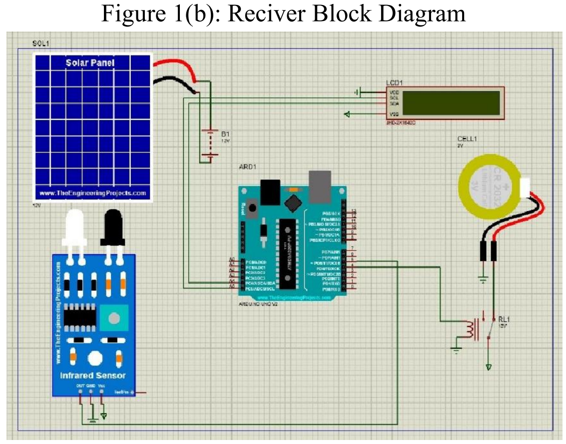


Figure 2(a): Transmitter Schematic Diagram

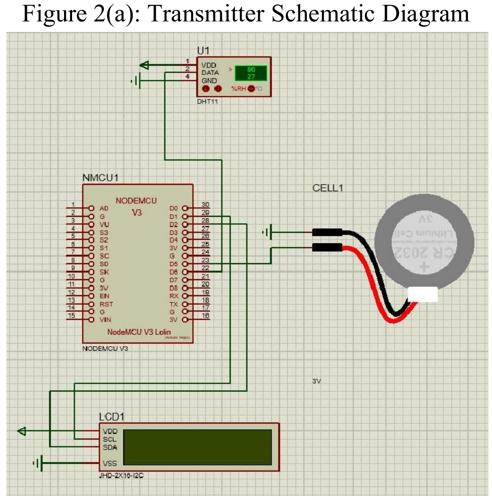


Figure 2(a): Transmitter Schematic Diagram

DOI: 10.48175/IJARSCT-27980

V SOFTWARE EMPLOYED

The Arduino Integrated Development Environment (IDE) plays a crucial role in the development of the solar tracking system. It is used to write, compile, and upload the control program to the Arduino microcontroller. The IDE provides an intuitive, user-friendly interface that simplifies coding in C/C++ for the microcontroller, allowing developers to focus on system functionality rather than complex software setup.

In this project, the Arduino IDE is used to write the code that reads input from the light- dependent resistors (LDRs) and processes the sunlight intensity data. Based on this input, the microcontroller then sends commands to the servo motors to adjust the solar panel's orientation for optimal sunlight exposure. The IDE includes a range of libraries that simplify the coding process, such as those for reading sensor data and controlling motors, ensuring rapid development. Additionally, the IDE's debugging and data visualization, helping developers troubleshoot and refine the system's performance.

The open-source nature of the Arduino IDE ensures that the project is easily adaptable and can be modified or expanded by others. Overall, the Arduino IDE's simplicity, flexibility, and extensive support for various hardware components make it an ideal tool for implementing and refining the solar tracking system.

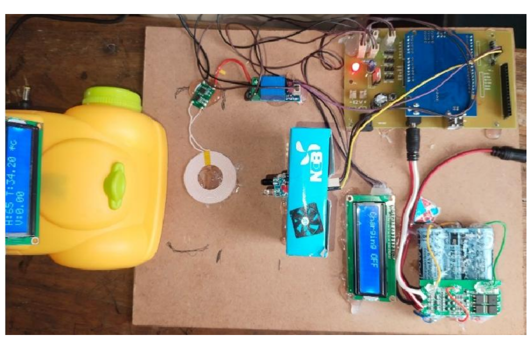
VI RESULTS & DISCUSSION

The wireless charging platform for electric vehicles provides an advanced, efficient, and sustainable solution by utilizing solar energy for power transmission, eliminating the need for physical connectors. This approach not only enhances durability but also contributes to conserving natural resources and reducing reliance on conventional electricity, making the charging process more environmentally friendly. By integrating smart power management, the system optimizes energy usage and minimizes wastage, ensuring a more efficient charging experience.

Additionally, the platform incorporates real-time monitoring features, displaying temperature and humidity levels to detect potential hazards and prevent overheating or system failures. This safety mechanism enhances reliability, ensuring secure operation throughout the charging process. The inclusion of a mobile application provides users with remote access and control, allowing them to track charging status, monitor system performance, and receive alerts for maintenance or efficiency improvements. This smart monitoring capability further enhances user convenience and interaction with the system.

With the adoption of renewable energy sources like solar power, the platform supports greater EV adoption, promoting sustainable transportation while reducing dependency on fossil fuels. By shifting toward a green energy-based charging solution, this project significantly contributes to minimizing air pollution and reducing carbon emissions, creating a cleaner and healthier environment. The system's ability to integrate IoT technologies and automated management ensures optimized performance and scalability, making it suitable for residential, commercial, and public charging stations.

Overall, the wireless charging platform serves as a future-ready solution, paving the way for smarter, more efficient EV infrastructure. With its focus on sustainability, smart functionality, safety, and user convenience, this technology fosters the widespread adoption of electric vehicles, promoting eco-friendly mobility and advancing global efforts toward cleaner energy solutions.



VII CONCLUSION

The wireless charging platform for electric vehicles provides a simple and efficient way to charge without using cables. It uses advanced technology to transfer power safely and steadily while improving performance. The system allows users to monitor charging in real-time. By including solar energy, the platform minimizes electricity waste and promotes sustainable charging. Additionally, it displays temperature and humidity levels, helping to detect any hazards and ensure safe operation. The system also incorporates smart monitoring capabilities, enabling efficient data tracking and remote access to optimize charging performance. With a focus on strength, efficiency, and smart functions, this wireless charging system supports a cleaner and smarter future for electric vehicles.

VIII FUTURE SCOPE

The future scope of the wireless charging platform for electric vehicles is promising, with several advancements expected to enhance efficiency, sustainability, and accessibility. As technology evolves, the integration of solar energy will become more refined, improving energy conversion rates and reducing dependency on conventional power sources. This will further support environment-friendly transportation by minimizing carbon emissions and conserving natural resources.

Additionally, the expansion of IoT-based smart monitoring will enable more precise control over charging processes, allowing users to track energy consumption, optimize charging schedules, and receive real-time alerts for maintenance. Future developments may also focus on dynamic wireless charging, where EVs can charge while in motion, eliminating downtime and making long-distance travel more convenient.

The adoption of AI-driven predictive maintenance will enhance system reliability by detecting faults before they occur, reducing operational costs and improving safety. Moreover, advancements in battery technology will complement wireless charging by increasing storage capacity and reducing charging time.

As governments and industries push for widespread EV adoption, wireless charging infrastructure will likely be integrated into public spaces, highways, and smart cities, making EV charging more accessible and seamless. With continuous improvements in efficiency, cost-effectiveness, and scalability, this project will play a crucial role in shaping the future of sustainable mobility.

REFERENCES

[1]. Yilmaz, M., Krein, P.T.: Review of battery charger topologies, charging power levels, and infrastructure for plug-in electric and hybrid vehicles. IEEE Trans. Power Electron. 28(5), 2151–2169 (2012) Web of Science®Google Scholar

[2]. Zheng, Y., Dong, Z.Y., Xu, Y., Meng, K., Zhao, J.H., Qiu, J.: Electric vehicle battery charging/swap stations in distribution systems: Comparison study and optimal planning. IEEE Trans. Power Syst. 29(1), 221–229 (2013)Web of Science®Google Scholar

[3]. Mohamed, A.A.S., Shaier, A.A., Metwally, H., Selem, S.I.: A comprehensive overview of inductive pad in electric vehicles stationary charging. Appl. Energy 262, 114584 (2020) https://doi.org/10.1016/j.apenergy.2020.114584Web of Science®Google Scholar

[4]. Budhia, M., Covic, G.A., Boys, J.T.: Design and optimization of circular magnetic structures for lumped inductive power transfer systems. IEEE Trans. Power Electron. 26(11), 3096–3108 (2011) Web of Science®Google Scholar

[5]. Ahmad, A., Alam, M.S., Chabaan, R.: A comprehensive review of wireless charging technologies for electric vehicles. IEEE Trans. Transp. Electrification 4(1), 38–63 (2017) Web of Science®Google Scholar

[6]. Macharia, J.: Wireless Inductive Charging for Low Power Devices. Hels. Metrop. Univ. Appl. Sci. Bacherol Eng., p. 31 (2017)

[7]. Hertz'sExperiments (1887). http://people.seas.harvard.edu/~jones/cscie129/nu_lectures/lecture6/hertz/Hertz_exp.htmlGoogle Scholar

[8]. Tesla, N.: Experiments with Alternate Currents of High Potential and High Frequency. WJ Johnston Company, Limited, California (1892) Google Scholar