



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Special Issue 1, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



9940 572 462



6381 907 438



ijirset@gmail.com



www.ijirset.com

Wireless Charging for Electric Vehicles

Anjanadevi.R¹, Sakthi.T², Santhosh Narmal Akash. A³, Sridhar.M⁴, Subburaj.P⁵

Assistant Professor, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering,
Krishnagiri, Tamil Nadu, India¹

UG Scholar, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering,
Krishnagiri, Tamil Nadu, India^{2,3,4,5}

ABSTRACT: Despite plug-in electric vehicle charging's limitations, wireless charging has emerged as a viable alternative. The connectors are convenient, easy to use, and durable, thereby reducing wear and tear. An overview of recent developments in wireless charging technologies for electric vehicles is presented in this article. The article discusses the advantages and disadvantages of different types of wireless charging technologies as well as the progress of standardization efforts and commercialization of electric vehicle wireless charging systems. Finally, we identify future research directions as well as challenges in wireless charging for electric vehicles.

KEYWORDS: Wireless Charging, Electric Vehicles, Magnetic Induction.

I. INTRODUCTION

As EVs reduce greenhouse gas emissions and dependency on fossil fuels, they have gained significant attention in recent years. However, frequent charging of EVs is one of the major challenges preventing their widespread adoption. In addition to its several limitations, plug-in charging is inconvenient, requiring physical connectors, causing wear and tear on connectors, and requiring the vehicle to be plugged and unplugged repeatedly. As a result, wireless charging offers a better solution to overcome these limitations and make EVs more user-friendly.

II. OBJECTIVE

In this article, we review the recent developments in wireless charging technologies for electric vehicles, including types of wireless charging technologies, their technical characteristics, efforts to standardize them, commercialization status, challenges, and future research directions.

III. LITERATURE REVIEW

1) A review of current technologies and directions for smart wireless charging of electric vehicles

Authors: - Ali A. Alahmadi, Mohamed A, and Ahmed A. Abd El-Latif (2019)

Reviewing the current state of the art in smart wireless charging systems for electric vehicles is the purpose of this paper. There is a technical discussion of wireless charging, including the different types of wireless charging technologies and their advantages and disadvantages. A number of challenges associated with the development of smart wireless charging systems are also discussed and solutions are proposed to overcome them.

2) The emergence of smart wireless charging systems for electric vehicles: a review of the communication and power management techniques

Authors: - M. A. Kashem, H. Al Mamun, and A. Islam (2020)

The paper examines smart wireless charging systems for electric vehicles from the perspectives of communication and power management. As well as discussing power management strategies for optimizing the charging process and ensuring system safety, the paper also discusses how they can be used.

3) The development of wireless charging systems for electric vehicles: Recent developments and challenges

Authors: -S. B. Hassan, S. S. Islam, and S. M. Islam (2021)

The purpose of this paper is to provide a comprehensive overview of the recent developments in wireless charging systems for electric vehicles. Various wireless charging technologies are discussed, challenges facing wireless charging systems are described, and strategies that are being used to overcome these challenges are discussed.

4)Introducing Wireless Charging Protocols and Wireless Charging Infrastructure for Electric Vehicles

Authors: -S. S. Kim, J. W. Choi, and S. Y. Kim (2020)

This paper focuses on the smart charging infrastructure for electric vehicles and reviews the different wireless charging technologies and communication protocols used in these systems. It covers the technical aspects of wireless charging, including the different types of wireless charging technologies, their advantages and disadvantages, and the communication protocols used to ensure efficient and safe charging.

5)The development and application of wireless charging technologies for electric vehicles are reviewed in this article.

Authors: - M. C. Kumar and R. C. Singh 2021

An analysis of recent developments in wireless charging technologies for electric vehicles is presented in this paper. In this article, we discuss the various types of wireless charging technologies, their advantages and disadvantages, and their application in different scenarios. A discussion of obstacles to wireless charging system development is also provided in the paper, along with strategies for overcoming those obstacles.

IV. WIRELESS CHARGING TECHNOLOGIES

A wireless charging technology for EVs can be classified as magnetic induction or magnetic resonance. An electromagnetic field transfers energy from a charging pad to a receiving coil in a vehicle through magnetic induction. In contrast, magnetic resonance involves the conversion of energy from one magnetic field to another using a resonant magnetic field. Here we use Magnetic Induction Technology for charging the EVs.

V. TECHNICAL FEATURES

In order to maximize efficiency and safety, wireless charging systems for EVs need to be optimized for several technical features. There are four types of design: the charging pad, the receiving coil, the power electronics, and the communication protocols. Power electronics control the power flow and ensure safety, while the design of the charging pad and receiving coil determines the efficiency of the power transfer. A charging pad and receiving coil must communicate in order to establish a connection and monitor the charging process.

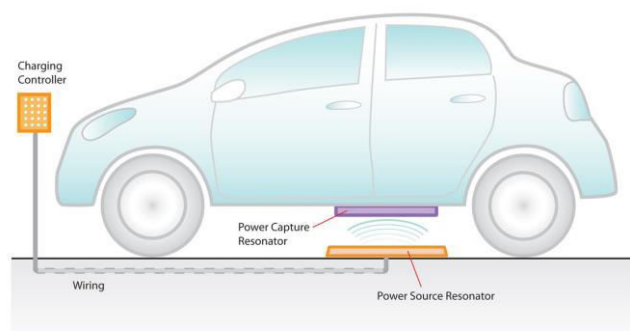


Fig.1.Prototype

VI. WIRELESS CHARGING SYSTEM ARCHITECTURE

In this overview, various components are shown for charging. AC supply serves as the source for high frequency converter (HF) which converts low frequency source to high frequency source. Transmission coils (TX) receive this output. As a result of resonant coupling, the reception coil (RX) is coupled. Using rectified DC, the output of the AC-DC converter charges the battery connected to the load. Using magnetic resonators, the project transmits power wirelessly. By using an HF Converter, a rapidly oscillating current is fed to a coil at a specific resonant frequency. It creates a magnetic field around a transmission coil, and if the reception coil is tuned to the same resonant frequency as the source, it will couple with that resonance anywhere within that region. This response is called coupled magnetic response because it converts oscillating magnetic fields into electrical currents within the reception coil. Charge a battery by feeding power to a load. Multiple loads can share this power.

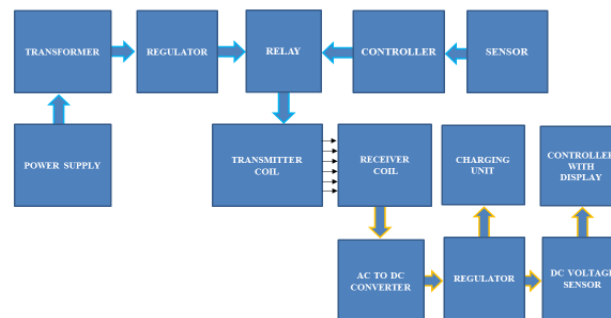


Fig.2. Block Diagram

VII. POWER SOURCE

It represents the source of electricity that produces the high-frequency electromagnetic field. Renewable energy sources, such as solar and wind power, can provide power in addition to the traditional electrical grid. Based on the application and the resources available, the type of power source will be chosen.

VIII. WIRELESS POWER TRANSMITTER

This block is responsible for generating the high-frequency electromagnetic field that will be used to transfer power wirelessly. The transmitter block typically includes a power conversion unit that converts the electrical power from the power source into a high-frequency alternating current. This high-frequency current is then used to energize a transmitting coil, which generates the electromagnetic field. Here, the transmitter coil is to be created by 20-0-20 rounds of 30mm coil thickness.

IX. WIRELESS POWER RECEIVER

Using this block, you can convert energy generated by the transmitter back into electrical power. Reception coils are typically designed to have the same resonance frequency as transmitter coils in the receiver block. By maximizing the efficiency of power transfer, this resonance is achieved. A receiving coil captures the electromagnetic field, which is then converted into electrical power by a power conversion unit that can be used to power an electric vehicle or other electronic devices. Here, the receiver coil is to be created by 40 rounds of 30mm coil thickness.

X. CONTROL AND COMMUNICATION SYSTEMS

Monitoring and controlling the power transfer process is the responsibility of these blocks. In most cases, the control block includes sensors that detect the position and orientation of the receiver in relation to the transmitter. To

ensure efficient power transmission, this information is used to adjust power transmission so that receiver and transmitter are aligned properly. Communication blocks transmit data between transmitters and receivers, such as power transfer status, power level, and error conditions. By using this information, power transfer can be optimized and safe and reliable operation can be ensured.

XI. SENSOR UNIT

Ultrasonic sensors detect the proximity and presence of objects, such as vehicles, by using sound waves. To understand how an ultrasonic sensor works for vehicle detection, here is a detailed description:

Ultrasonic sensors include transmitters that emit high-frequency sound waves (usually above 20 kHz). When an electric current is applied to a piezoelectric crystal, it vibrates and produces sound waves.

A transmitter generates sound waves that travel through the air and bounce off nearby objects, including vehicles. In a receiver, sound waves are detected by being reflected back towards a sensor. An electrical signal is generated by converting the reflected sound waves into a piezoelectric crystal. An ultrasonic sensor receives a signal from the vehicle's receiver, and this signal is processed by the processing unit, which determines how far away the ultrasonic sensor is from the vehicle. This distance information can then be used by the processing unit to trigger an alert, activate a device, or perform other actions. There are several factors that affect the accuracy and range of an ultrasonic sensor, including the frequency and power of the sound waves, as well as receiver sensitivity. Depending on their specific model, ultrasonic sensors can detect distances ranging from a few centimeters to several meters. A wide range of applications use ultrasonic sensors to detect vehicles, including parking systems, traffic management systems, and other applications where detecting the presence and distance of vehicles is important. Also, they can be used in automotive safety systems to trigger warnings or automatic braking if another vehicle or obstacle is detected.

XII. RELAY UNIT

A relay circuit can be used to activate a device or trigger an alert when an ultrasonic sensor detects a vehicle. The following is a detailed description of how a relay circuit can be used to detect vehicles using an ultrasonic sensor

Processing Unit: A processing unit analyses the ultrasonic sensor signal and determines whether a vehicle is within a certain range by analysing the electrical signal.

Relay Circuit: In the event that the processing unit detects a vehicle within the specified range, it can activate a relay circuit to trigger an alert or activate a device. Electrical relay circuits consist of relays, which are electrical switches controlled by electricity, and power sources, which provide power.

Operation: A relay circuit is activated when an electrical signal is sent to the processing unit when a vehicle within the specified range is detected by the processing unit. Based on the circuit configuration, the relay switches the power to the device or alert on or off. In the case of a relay circuit connected to a buzzer, the relay can trigger the buzzer, making it sound.

Reset: When the vehicle leaves the range of the sensor, the processing unit can reset the relay and turn off the device or alert. Based on the ultrasonic sensor input, the relay circuit initiates the activation of a device or alert. When the processing unit determines that a vehicle is present and within range, the relay circuit is to be triggered.

PARAMETER	DESCRIPTION
Transmitter Coil	30mm (20-0-20 Rounds)
Receiver Coil	30mm (30 Rounds)
Bridge Rectifier	2
Inverter	1
Regulator Circuit	5v,12v
Controller	2
Voltage Sensor	25v
LCD	16x2
Jumpers	As Required
Charging Circuit	1
Battery	1
Power Supply	230v AC

XIII. RESULT AND OUTPUT

As a result, Electric vehicles (EVs) can be charged more efficiently and conveniently with wireless charging. It is more expensive and less efficient to install wireless charging systems than traditional plug-in systems. To make wireless charging more widely available, standardization is needed. Efficiencies and cost-effectiveness of wireless charging systems can be improved with further research and development. It is possible that wireless charging will become the norm for charging electric vehicles in the future, making them even easier to use every day.

As an output in our project, ultra-Sonic Sensor will receive the data whenever any EVs presents above the charging pad and trigger the relay unit of transmitter coil to start power transmission wireless and relay unit will automatically get off in the absence of EVs.

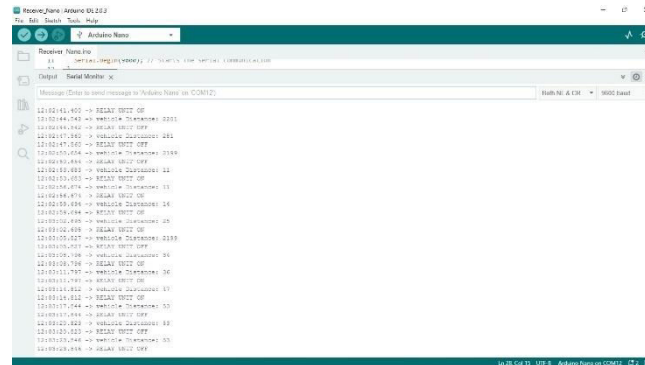


Fig.3. Output

XIV.FUTURE ENHANCEMENT

The dynamic wireless power transfer (DWPT) system uses magnetic resonance technology to wirelessly charge electric vehicles. With this system, vehicles are able to charge while in motion, eliminating the need to stop at charging stations every time. A solar-powered wireless charging system uses wireless charging technology combined with solar panels to provide electric vehicles with a sustainable and renewable source of energy. In parking lots or other locations with adequate sunlight, the system uses magnetic induction or magnetic resonance technology.

An electric charging roadway integrates wireless charging technology into the roadway infrastructure through the use of wireless charging technology. It utilizes magnetic resonance technology to enable electric vehicles to charge while driving, removing the need for charging stations. In particular, the system may be useful for public transportation vehicles, such as buses and taxis.

XV.CONCLUSION

Wireless charging still has a lot of potential in the electric vehicle industry, despite these challenges. It is likely that wireless charging will become more efficient and cost-effective as more research is done and new technologies are developed. Wireless charging may become the norm in the future, making it easier and more convenient to use electric vehicles every day.

REFERENCES

- [1]. C. Shen, C. Liu, and Yu Huang, Wireless power transfer in electric vehicle applications: A review, IEEE Transactions on Industrial Electronics, vol. No. 65, July 2018, pp. 5554-5568, With thanks to Steve Laura.

- [2]. S.K. Kim and W.J. Lee, Wireless charging technologies for electric vehicles [published in Energies] vol. 10, no. 3, p. 281.
- [3]. In addition to W. Lilly Kumar. In Renewable and Sustainable Energy Reviews, vol. 41, pp. 1-14, January 2015, a review of wireless charging technologies and standards for electric vehicles is presented.
- [4]. Hoque, M. A. R. Sarker, M. T. Islam, and M. M. Sandy, "Review of advancements in wireless charging technologies for electric vehicles," IEEE Access, vol. 7(2), pp. 24722-24743, February 2019.
- [5]. Kim, D.W., Park, S.H., and Lee, Y.H., "A review of wireless power transfer for electric vehicles: Prospects to overcome technical and economic challenges," Energies, vol. It was 11,99 in January 2018.
- [6]. Jia Chen, "Wireless charging technology for electric vehicles: A comprehensive review," Journal of Modern Power Systems and Clean Energy (1999), p. 16-47, December 2020.
- [7]. An introduction to wireless charging technologies for electric vehicles: A review, International Journal of Innovative Research in Electrical, Electronics, Instrumentation, and Control Engineering, vol. No. 4, April 2016, pp. 46-50.

BIOGRAPHY



Mrs.R.Anjanadevi
Assistant professor,
Department of Electronics and
communication engineering, Adhiyamaan
college of engineering, Hosur.



Sakthi T
Bachelor of engineering, (student)
Adhiyamaan College of Engineering
(Autonomous), Hosur.



Santhosh Narmal Akash A
Bachelor of engineering, (student)
Adhiyamaan College of Engineering
(Autonomous), Hosur.



Sridhar M
Bachelor of engineering, (student)
Adhiyamaan College of Engineering
(Autonomous), Hosur.



Subburaj P
Bachelor of engineering, (student)
Adhiyamaan College of Engineering
(Autonomous), Hosur.



SJIF: 8.423



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INTERNATIONAL CENTRE



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details