



# WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM

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**ABSTRACT:** *Electric Vehicles came into existence as world is shifting towards electrified mobility to reduce the pollutant emission caused by non-renewable fossil fuel vehicles. Electric Vehicles can be charged either by wired or wireless connection. With wireless charging systems properly integrated into vehicles, and situated strategically around a city as well as at owner's homes, there should be no need to ever plug in their vehicles. Drivers should simply park as usual over a coil placed on the ground or buried in it at the garage, or even while driving. The science behind this innovation is electromagnetic induction and this will increase the use of electric vehicles and also make them reliable and usable for large distances. This paper presents the prototype of charging Electric Vehicles using RFID.*

**KEYWORDS:** *Arduino UNO, Wireless Charging, Energy Efficiency, Enhanced User Experience, RFID, Power Supply, Battery, Switches.*

## I. INTRODUCTION

Electric vehicles have a lower cost of ownership compared to equivalent conventional gas vehicles while also helping to reduce environmental footprint. Apart from environmental benefits, electric vehicles have also proven helpful in reducing cost of travel by replacing fuel by electricity which is way cheaper. Wireless electric vehicle charging system (WEVCS) technology operates on the principles of magnetic inductance and magnetic resonance. Comparing plug-in electric vehicles with wireless charging, WCS brings more advantage in simplicity, reliability, user friendliness.

## II. OBJECTIVE

The project's main objective is to charge electric vehicle with a valid ticket to be allowed to charging point. The project is implemented using RFID card and Arduino. In this system passenger will carry RFID cards which will be scanned at respective stations and automatically charges the device, which is being parked on the slot.

## III. LITERATURE SURVEY

B. S. Kim and D. H. Cho et.al., implemented the Wireless power transfer for electric vehicles, an overview of wireless power transfer (WPT) technology for electric vehicles (EVs), including the different types of WPT systems and their advantages and disadvantages. The paper also discusses the current status of WPT technology and the challenges that need to be overcome for widespread adoption [1].

H. Li and W. Zhang, implemented the recent advancements in wireless charging of electric vehicles, provides the recent advancements in wireless charging technology for EVs, including the different types of wireless charging systems and working principles [2].

G. A. Uddin, M. A. Hannan et.al., proposed wireless power transfer for electric vehicles and market analysis where it provides a comprehensive review of WPT technology for EVs, including the different types of WPT systems, their advantages and disadvantages, and their market potential. The paper also discusses the current status of WPT technology and the challenges that need to be overcome for widespread adoption [3].

S. A. M. A. Haidar et.al., implemented a review of wireless charging technologies for electric vehicles, an overview of the different wireless charging technologies for EVs, including magnetic resonance, inductive power transfer, and capacitive power transfer. The paper also discusses the technical challenges and future prospects of wireless charging technology [4].

M. J. Baynham, J. R. Smart, proposed Wireless charging for electric vehicles, provides comprehensive review of the different types of wireless charging systems for EVs, including the technical challenges and future prospects of wireless charging technology [5].

S. Babic, B. H. Cho, implemented wireless charging for electric vehicles, reviews the current status and future trends of wireless charging technology for EVs, including the different types of wireless charging systems and their technical and economic feasibility [6].

M. A. Alam, M. R. Islam et.al., proposed wireless power transfer for electric vehicles, provides a comprehensive review of the different types of wireless power transfer (WPT) systems for EVs, including the technical challenges and potential solutions [7].

H. Shen, Y. Chen et.al., implemented wireless charging technologies for electric vehicles, a comparative review where it compares the different types of wireless charging technologies for EVs, including magnetic resonance, inductive power transfer, and capacitive power transfer, in terms of their efficiency, safety, and cost [8].

A. Elbaset et.al., developed wireless charging systems for electric vehicles, provides an overview of the recent developments in wireless charging systems for EVs, including the different types of WPT systems and their technical challenges and future prospects [9].

J. F. Gieras, J. M. Stephenson et.al., implemented wireless power transfer for electric vehicles, reviews the progress and challenges of WPT technology for EVs, including the different types of WPT systems, their technical challenges, and their potential solutions [10].

The authors explained the advantages of RFID cards about its low cost, it also explains how a RFID Reader will be there in the station. A database is created which is used to hold unique RFID Card number issued to a EV driver. RFID cards and reader is used to read card number which is send to database and vehicle gets charged.

## IV. IMPLEMENTATION

The Arduino Uno is an open-source microcontroller board based on the microchip ATmega328 microcontroller and developed by Arduino. The board is equipped with sets of digital and Analog input/output pins that may be interfaced to various expansion boards and other circuits. The board has 14 digital I/O pins, 6 Analog I/O pins, is programmable with Arduino IDE (Integrated Development Environment), via a type-B USB cable. The word "uno" means "one" in Italian and was chosen to mark the initial release Arduino software.

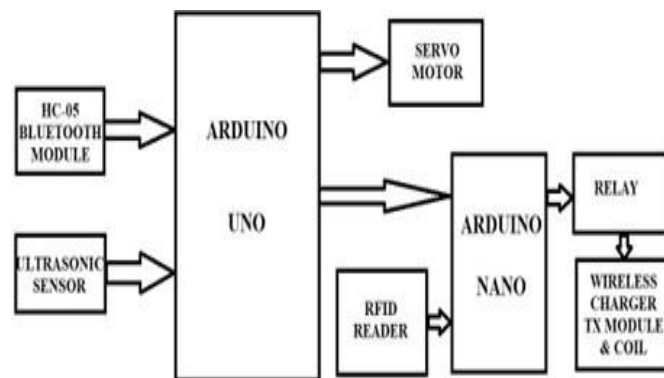


Fig 1: Block Diagram

The ATmega328 on the board comes pre-programmed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. RFID Reader will be there in the station which is connected to main server. While tapping the RFID Tag into the RFID reader, after placing the vehicle in the slot, it sends specific value in the tag after that the signal passes through the Arduino controller that switches the particular relay coil. Finally, the EV system gets charged for particular time duration. A database is created which is used to hold unique RFID Card number issued to a EV driver.

## V. RESULT

This system works upon RFID cards system. After an EV Driver had issued a RFID card. He / She only had to scan this card under RFID Reader attached at the entry of charging station.

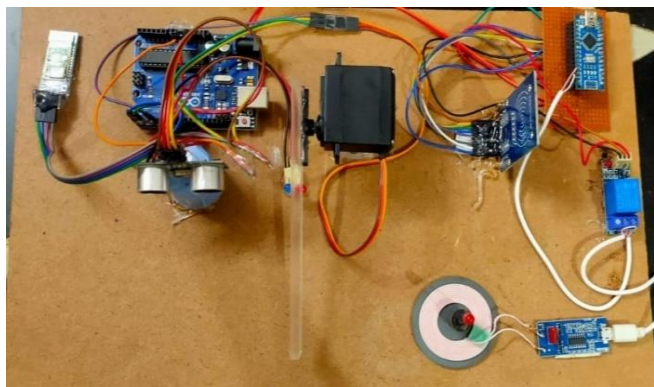
This technology eliminates the need for physical cables and connectors, making the charging process more convenient and efficient. EV can provide greater cost and energy savings in the long run. More subsidies and charging stations can be set up to encourage consumers to switch to EV in our country.

The web server will authenticate the EV Driver and if authenticated, then their particular vehicle will be given access for charging and led will indicate that the charging

process has begun.

## REFERENCES

**Fig 2: Top View of Proposed Prototype**



## VI. CONCLUSION AND FUTURE SCOPE

### CONCLUSION

Wireless electric vehicle (EV) charging using IoT is a promising technology that has the potential to revolutionize the way we charge our EVs. This technology eliminates the need for physical cables and connectors, making the charging process more convenient and efficient. EV can provide greater cost and energy savings in the long run. Overall, wireless EV charging using IoT has the potential to make electric mobility more convenient, efficient, and environmentally friendly. As the technology continues to evolve, we can expect to see more widespread adoption of wireless charging infrastructure in the near future.

### FUTURE SCOPE

Wireless electric vehicle (EV) charging is a promising technology that has the potential to revolutionize the way we charge our EVs. This technology eliminates the need for physical cables and connectors, making the charging process more convenient and efficient. EV can provide greater cost and energy savings in the long run. More subsidies and charging stations can be set up to encourage consumers to switch to EV in Our country. As the technology continues to evolve, we can expect to see more widespread adoption of wireless charging infrastructure in the near future.

[1] B. S. Kim and D. H. Cho et.al., "Wireless power transfer for electric vehicles: A comprehensive review," *Energies*, vol. 9, no. 6, pp. 448-469, 2016.

[2] H. Li and W. Zhang, "Recent advancements in wireless charging of electric vehicles: A review," *Energies*, vol. 11, no. 6, pp. 1384-1411, 2018.

[3] G. A. Uddin, M. A. Hannan et.al., "Wireless power transfer for electric vehicles: Technology review and market analysis," *Energies*, vol. 10, no. 12, pp. 2079-2101, 2017.

[4] S. A. M. A. Haidar, S. E. Ahmed et.al., "A review of wireless charging technologies for electric vehicles," *Renewable and Sustainable Energy Reviews*, vol. 69, pp. 136-150, 2017.

[5] M. J. Baynham and J. R. Smart, "Wireless charging for electric vehicles: A review of the technology and its challenges," *Renewable and Sustainable Energy Reviews*, vol. 51, pp. 1351-1364, 2015.





[6] S. Babic and B. H. Cho, "A review of wireless charging for electric vehicles: Present status and future trends," *IEEE Access*, vol. 6, pp. 3669-3683, 2018.

[7] M. A. Alam, M. R. Islam et.al., "Wireless power transfer for electric vehicles: A review of the technology and its challenges," *Applied Sciences*, vol. 7, no. 7, p. 668, 2017.

[8] H. Shen, Y. Chen et.al., "Wireless charging technologies for electric vehicles: A comparative review," *Energies*, vol. 11, no. 3, p. 530, 2018.

[9] A. Elbaset, R. P. Martins et.al., "Wireless charging systems for electric vehicles: A review of recent developments," *IET Power Electronics*, vol. 11, no. 3, pp. 438-450, 2018.

[10] J. F. Gieras, J. M. Stephenson et.al., "Wireless power transfer for electric vehicles: A review of progress and challenges," *IEEE Transactions on Industrial Electronics*, vol. 64, no. 7, pp. 4987-4998, 2017.

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