



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 13, Issue 4, April 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com



Wireless Charging Station for EV Vehicle with Billing Display

Kalyani Ingle , Snehal Pawar , Rohan Mali, Vaishnavi Pote, A.S. Jaibhai

TSSM BSCOER Students, Department of Electrical Engineering, BSCOER Engineering College, Pune, India

Ass.Professor, Department of Electrical Engineering, BSCOER Engineering College, Pune, India

ABSTRACT: In battery charging technique the absence of programming and its exploration charging framework that should be grown all things considered. The consequence of the charge estimated in the charging EV can be unique in relation to the charge sum professed to be charged in the charging station. The fact that the charge is estimated independently from one another utilizing its brilliant meters. Furthermore, if mechanical estimations are thought to be precise, it is conceivable to lie in one of the EV or charging station. Likewise, charging data can be controlled. To forestall those issues, this paper proposes the IoT based charging framework. The EV and the charging station store the charging data in the IoT based charging frame work after common confirmation and forestall the adjustment. An IoT is a framework wherein all hubs have a similar record, consequently can't be altered in billing. This keeps a client from changing the record subsequent to charging.

KEYWORDS: : Transformer, Rectifier, Relay, Arduino, LCD Display, Buzzer

I. INTRODUCTION

Wireless electric vehicle charging system (WEVCS) technology operates on the principles of magnetic inductance and magnetic resonance. Wireless charging systems have been mostly used in high power applications, including EV's and plug-in electric vehicles. Comparing plug-in electric vehicles with wireless charging, WCS brings more advantage in simplicity, reliability, and user friendliness. The only problem with WCS is that they can be utilized when the car is parked or in stationery modes and also there are some challenges, such as Electromagnetic compatibility issues for example, Limited power transfer, bulky structure, shorter range and high efficiency. To improve these two areas i.e. Range and sufficient volume of battery storage, dynamic mode of operations has been researched. Dynamic charging systems are more time efficient, reliable and user friendly. This charging system can also be implemented in the travel routes, traffic signals and bus stations notable application of Wireless power transfer (WPT) is opportunity charging of electric vehicles whenever they stop for brief while, e.g. at traffic intersections . The two major categories of WPT are Inductive Power Transfer (IPT) and capacitive power transfer (CPT) .Magnetic induction based IPT tends to have poor efficiency when the coils are misaligned. CPT Technology tends to require high switching frequencies that can limit the practically realizable power levels {1}- {3}.For EV Charging applications magnetic resonance based IPT is currently the preferred technology.

II. LITERATURE REVIEW

[1] "Electric Vehicle Charging Station Challenges and Opportunities: A Future Perspective" After the environmental crisis, Electric Vehicles (EV) emerge as the prime alternative to Internal Combustion Engine (ICE) vehicles. However, solely focusing on EVs isn't sufficient; the deployment of Electrical Vehicle Charging Stations (EVCS) is equally vital. Given that these vehicles rely on electricity, there are specific challenges associated with establishing these charging stations. The primary concern is grid overloading and load forecasting, followed by issues such as charging time and managing traffic at these stations. This paper delves into the fundamental terminologies related to charging stations, including the types and levels of charging. Various technologies are explored to address these challenges, alongside a brief overview of lithium ion battery charging strategies and Battery Management Systems (BMS). With the Indian Government' emphasis on fostering an environmentally friendly ecosystem and its mission to reduce carbon emissions in the transport sector, the deployment of EVs and the establishment of EVCS are paramount. Given the government 'initiatives such as tax reductions on EVs and subsidies for charging station installations, this task becomes more manageable. Consequently, this paper discusses specific guidelines provided by the Ministry of Power and the Ministry of Housing (Government of India) to assist individuals in setting up charging stations.

[2] "IoT Remote Control of Plug-in Electric Vehicle Charging Loads for Smart Energy Management of Virtual Power Plants" The paper emphasizes the necessity for a thorough analysis and effective control strategies to ensure the seamless



integration of plug-in electric vehicles (PEVs) into the grid without compromising its electrical constraints. When renewable energy sources (RESs) are accessible, they offer an opportunity to meet the energy demands of PEVs. This study proposes a virtual power plant (VPP) comprising a photovoltaic (PV) power plant and IoT-based remote control of PEV charging. Specifically, it introduces the utilization of Lora WAN for remote monitoring and control of PEV charging loads. Additionally, it presents a hierarchical VPP control (VPPC) system employing the model predictive control (MPC) method for optimal energy management (EM) of the VPP. Initially, EM scheduling of the VPP is based on predicted data, and during real-time operation.

[3] „Wireless Communication Technologies for Billing and Payment Systems in Electric Vehicle Charging Infrastructure“ This paper explores the use of wireless communication technologies for implementing billing and payment systems in electric vehicle (EV) charging infrastructure. It discusses the requirements and challenges of wireless billing systems and reviews existing wireless communication standards and protocols suitable for EV charging applications. The paper also presents a case study of a wireless billing and payment system deployed in a real world EV charging network. Advantages include flexibility and convenience offered by wireless communication technologies, enabling seamless billing and payment transactions. Limitations may include security concerns and compatibility issues with diverse EV charging systems.

III. OBJECTIVE

- The main purpose of this work is to design prototype of the wireless power transfer.
- The fuel based vehicles are mostly responsible for air pollution and carbon emission.
- The sources of natural fuel are limited and will end in near future to avoid the more shortage of fuel in upcoming time and to reduce all harmful effects of other fuel based vehicle EV is the best option.
- The lower the cost operation like plugging in and unplugging or the hassle of leaving your car To reduce manual handling of electric vehicle for charging.
- The system can use direct power supply or solar power to charge the vehicle without contact.
- Quantify the effect of wireless opportunity charging in terms of EV Battery size reduction and range Extension.
- Develop generalized analysis approach using urban driving cycle data and various charging power levels.

IV. BLOCK DIAGRAM & CIRCUIT DIAGRAM

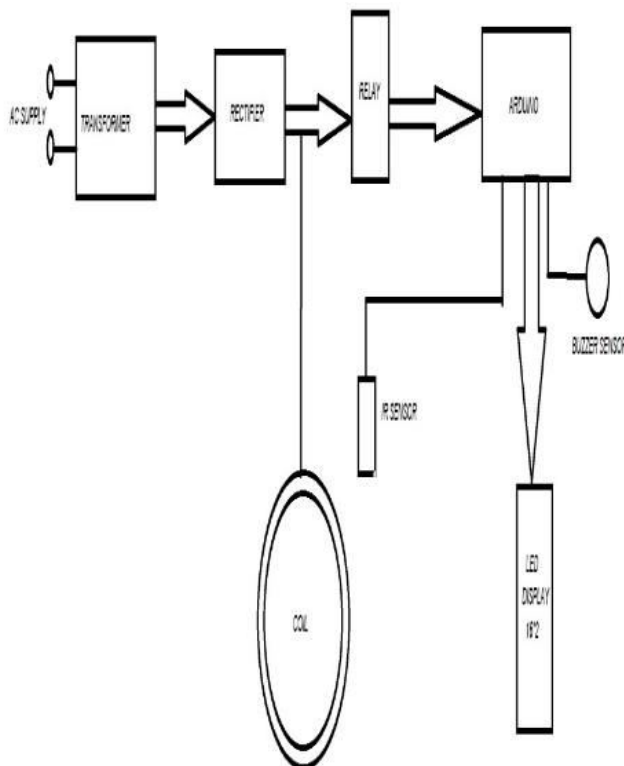


Fig a. Block Diagram

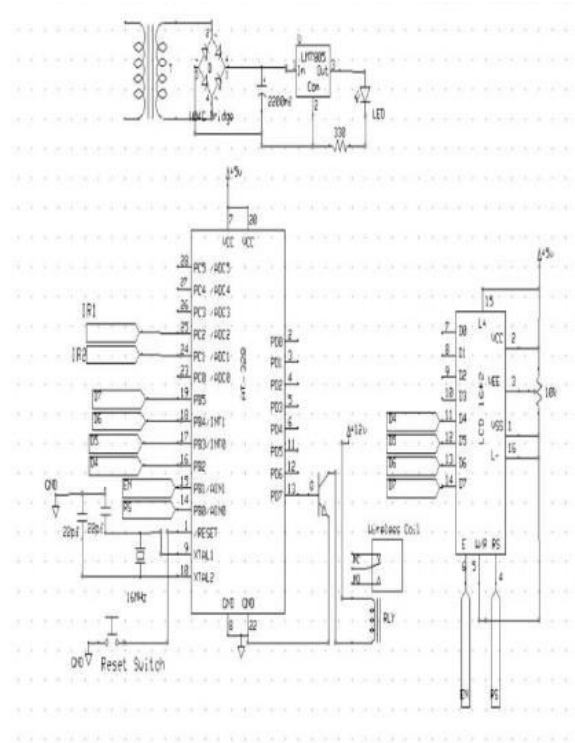


Fig b. Circuit Diagram



Working:

The working principle of a Wireless charging station for EV Vehicle with Billing Display for electric vehicles is based on the concept of inductive power transfer. The system consists of two primary components: the charging pad (or ground pad) and the receiver pad (or vehicle pad). The charging pad is connected to a power source, such as a power grid or a renewable energy system, and is placed on the ground. The receiver pad is installed on the underside of the electric vehicle, and is positioned directly above the charging pad. When the two pads are in close proximity to each other, the charging pad generates an alternating magnetic field, which induces an alternating current (AC) in the receiver pad then converts the AC into direct current (DC) to charge the vehicle's battery. The key to the systems.

V. RESEARCH METHODOLOGY

The methodology for the wireless charging station project begins with an extensive literature review to gain a comprehensive understanding of wireless charging technology, electric vehicle integration, and billing systems. Following this, specific requirements for the charging station are meticulously defined, encompassing technical specifications, safety standards, and user interface preferences. With the requirements in place, a detailed system design is developed, incorporating components such as the charging pad, control unit, communication modules, and billing display, ensuring adherence to regulatory standards. Subsequently, the identified hardware components are procured, and integration begins. Each component is rigorously tested both independently and as part of the integrated system to ensure seamless operation. Safety and compliance testing is conducted to verify adherence to industry standards.

□ Technology – Inductive coupling □

Power – Low & High

□ Range – Medium □

Efficiency – High

□ Useful – Capable of EV Charging

Inductive coupling is an old method based on a simple principle; a source driving the varying magnetic field is connected to primary coil which will induce a voltage across the receiver secondary coil, and transfer the power transfer to load accordingly.

VI. HARDWARE COMPONENTS

- Wireless charging pad/ plate Receiver.
- Coil in the EV Power electronics.
- inverter, converter and transformers Control unit Billing display.
- Payment processing systems Sensors and safety features Communication interface. Enclosure and housing
- Metering and monitoring systems.
- Authentication and authorization systems.
- Power Supply and distribution system.
- Cooling system.
- Arduino.
- IR sensor.
- Buzzer.

VII. ADVANTAGES

- Flexible in parking positioning.
- Aesthetically pleasing.
- Billing display for transparency.
- Monetization & revenue generation.
- 80% reduced operating cost than equivalent gas-powered vehicle.
- A number of EV can charge at a time.



- Electrically safe.
- Charging is convenient.
- Scalability & future- proofing.
- Data collection & satisfaction

VIII.CONCLUSION

In conclusion, the application of wireless charging stations for electric vehicles (EVs) with billing displays presents a range of practical and impactful uses. These stations find relevance in public spaces, residential settings, commercial fleets, and various transportation sectors. They serve to facilitate convenient and efficient charging for EV owners while ensuring transparent billing processes. This technology stands as a pivotal step towards widespread EV adoption and sustainable transportation solutions.

IX.FUTURE SCOPE

Promising future prospects. As the demand for EVs continues to grow, the need for efficient charging infrastructure will also increase. Here are some potential future scopes for this project.

- Expanding infrastructure: As more cities and regions adopt EV-friendly policies, the demand for charging stations.
 - Technological Advancements: With ongoing advancements in wireless charging technology, it could benefit from improvements in efficiency, speed, and compatibility with various EV models.
 - Integration with Smart Grids: Future grid systems will likely incorporate more renewable energy sources. Charging station could be designed to integrate with these smart grids, optimizing energy usage.
 - Autonomous Vehicle Charging: As autonomous vehicles become more prevalent, they'll require seamless charging solutions. Wireless station could be adapted to cater to these vehicles' unique needs.
- Expanding infrastructure: As more cities and regions adopt EV-friendly policies, the demand for charging stations..

REFERENCES

- [1]. Elena Paul, Paulson, rijiobijio,bennyK.K “WIRELESS CHARGING STATION OF ELECTRIC VEHICLE “International Research Journal of Engineering Technology, Vol.6, Issue 6, June 2019.
- [2].AsstProf.SwapnaManuka,HarshadaSatre, Bhagyashree Kolekar, PradnyaPatil, SamidhaBailmare, “WIRELESS CHARGING OF ELECTRIC VEHICLE”, International Research Journal of Engineering Technology, Vol.7, Issue 03, March 2020.
- [3]. Review of static and dynamic wireless electric vehicle charging system, Chirag Panchal, SaschaStegen, Junwei Lu “Engineering Science and Technology, Vol.21, Issue5, October 2018.
- [4]. Proceedings of the Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV 2021). IEEE Explore Part Number: CFP21ONG-ART; 978-0-7381-1183-4.
- [5] Norsuzila Ya'acob, AzitaLaily Yusoff, Suzi Seroja Sarnin,Darmawaty Mohd Ali, Nani Fadzlina Naim, MurizahKassim and Nur Amirah Binti Mohd Azni, “ A cashlesspayment transaction (CPaT) using RFID technology,“Indonesian Journal of Electrical Engineering andComputer Science, Vol. 16, No. 1, October 2019, pp.191~199.
- [6] Vaishali Pande1, Nivedita Hasti2, Anjali Rahate2, KunalTagade2 and Anup Telrandhe2, “Electronic Toll Collection(ETC) of Transportations System with active RFID, International Journal of Scientific Research in Science ,Engineering and Technology, Volume 4, Issue 4, 2018.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



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