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RFID BASED SMART WIRELESS CHARGING STATION

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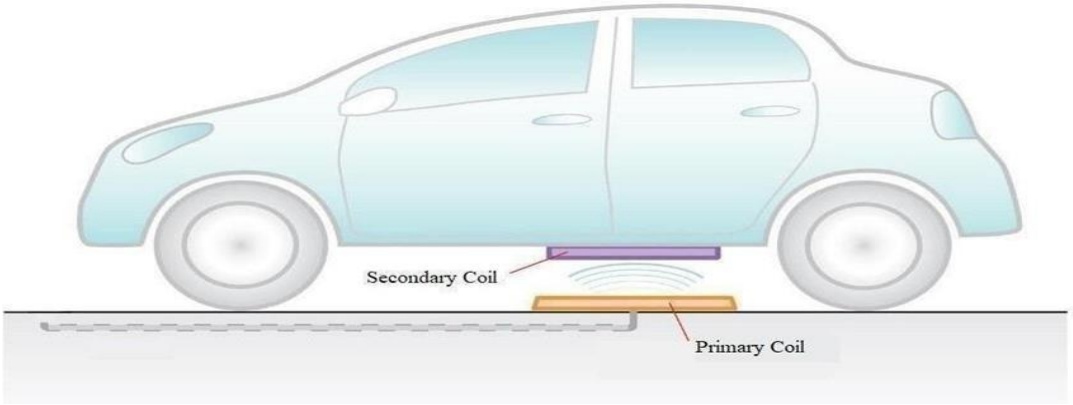
Abstract:
Vehicles using petrol and other internal combustion engines now on the road contribute to air, noise, and greenhouse gas pollution. As electric vehicles are a better alternative to curb the ongoing pollution it is vital to make amendments to the battery charging process to attain greater reliability. In electric vehicles charging batteries through chargers and wire is inconvenient, hazardous, and expensive, therefore we are trying to charge electric vehicle batteries by wireless power transfer at charging stations. The main function of wireless charging is to transmit power by inductive coupling method across a given space. It is possible to use a static or dynamic charging mechanism to perform wireless power transmission. This paper describes the wireless inductive coupling battery charging technology that has been used for electric car batteries. The driving circuit is used between the transmitter coil & receiver coil where MOSFETs, IR sensors, and Relays are used for switching operation. Whenever the vehicle is present or not, the transmitter coil circuit is switched ON or OFF, correspondingly.

Introduction:
Electric vehicle wireless charging using RFID is an innovative technology that allows electric vehicles (EVs) to be charged wirelessly without the need for physical contact between the charging station and the vehicle. RFID stands for Radio Frequency Identification, which is a technology that uses radio waves to identify and track objects. In the context of electric vehicle charging, an RFID reader used to identify the vehicle and initiate the charging process. The RFID tag is installed on the vehicle, and it contains information such as the vehicle's unique identification number and charging requirements. When the vehicle is parked over the wireless charging pad, the RFID reader sends a signal to the tag, which in turn sends back the necessary information to the charging station. This information includes the charging requirements of the vehicle, such as the battery capacity and the charging rate, which are used to adjust the charging process to optimize efficiency and prevent damage to the battery. One of the main advantages of electric vehicle wireless charging using RFID is that it eliminates the need for physical contact between the charging station and the vehicle, making the charging process more convenient and efficient.
Additionally, the technology is safer than traditional charging methods, as there is no risk of electric shock or other accidents. Overall, electric vehicle wireless charging using RFID is an

exciting and innovative technology that has the potential to revolutionize the way we charge electric vehicles, making it easier and more convenient for people to adopt this eco-friendly mode of transportation.



LITERATURE SURVEY:

Due to their numerous benefits, in the transportation sector, internal combustion (IC) engine-powered cars are regarded as being replaced by electric vehicles (EV). Modern electric car batteries should be charged wirelessly whenever possible. This study performs a thorough review of the various wireless EV battery charging methods. There are two alternative ways to wirelessly distribute power to charge an electric vehicle's battery: static EV charging and dynamic EV charging [1]. For power transfer in static wireless EV battery charging techniques, both capacitive and inductive methods are employed; however, in dynamic wireless EV battery charging techniques, only inductive methods are used. This study provides a comprehensive evaluation of these approaches with an emphasis on compensating circuit topologies, magnetic linked inductor core types, and various converters and controllers for wireless power transfer (WPT) systems. In addition, design considerations for a static wireless EV battery charging system are discussed in this work, along with an analysis of its equivalent circuit. This report also explains the difficulties and potential future developments in wireless charging of EV batteries. Due to improvements in battery life and their low emission levels, electric vehicles (EVs) have attracted a lot of attention recently. Similar to how more devices can now be connected because to the growth of the Internet of Things (IoT) [4][13]. The current restricted battery range and the dearth of outlets for charging or battery changing are two main issues for EVs. Building the required infrastructure and having a reliable battery management system (BMS) that can accurately estimate the amount of power left over are two solutions. Battery switching may potentially be an option for some EVs, either at authorized charging stations or even directly from other EV users. In order to provide drivers with information on a successful battery charge or exchange, a network of EV information is necessary[3]. This study presents two block chain implementations for an EV BMS that use block chain as the network and data layer of the application.

METHODOLOGY:

The methodology of RFID wireless charging involves designing the RFID system, developing the charging infrastructure, placing and calibrating the RFID tags, initiating the charging process, and monitoring and controlling the charging process. The first step in implementing an RFID wireless charging system is to design the system itself. This involves selecting the appropriate RFID tags and readers, as well as determining the optimal frequency and power levels for the system. Once the RFID system is designed, the next step is to develop the charging infrastructure. This involves installing the RFID readers and antennas in the charging stations, as well as configuring the system to communicate with the RFID tags. The RFID tags used in wireless charging systems need to be placed in a specific location on the device being charged. This location can vary depending on the device, so calibration is required to ensure that the charging process is efficient and effective. Once the system is calibrated and the RFID tags are in place, the charging process can begin. The RFID reader sends a signal to the RFID tag, which then sends back a signal that is used to initiate the charging process. During the charging process, the RFID system can monitor the charging status and adjust the power levels as needed to ensure efficient charging. Additionally, the system can control the charging process, such as stopping the charging when the battery is full. The technology utilizes RFID tags that are installed on the EV, which communicate with the charging pad through electromagnetic fields.

The transportation landscape is rapidly evolving, and electric vehicles (EVs) are at the forefront of this transformation. While EVs offer significant environmental benefits, range anxiety and charging times remain key concerns for many potential buyers. Enter the Automated Wireless Power Hub, a revolutionary technology poised to revolutionize the way we charge EVs. No fumbling with cables or searching for charging stations. The power transfer happens automatically and seamlessly, just like charging your smart phone. EV charges efficiently while you're parked, running errands, or even at work. The Automated Wireless Power Hub makes this vision a reality. It utilizes cutting-edge wireless power transfer (WPT) technology to eliminate the need for physical connections.

Here are some of its key advantages:

- Unmatched Convenience: Effortless charging experience, eliminating the need to manually plug in.
- Enhanced Safety: No risk of electrical shocks associated with traditional wired charging.
- Faster Charging Potential: WPT technology has the potential to significantly reduce charging times compared to traditional methods.
- Space Optimization: No bulky charging stations cluttering parking spaces, allowing for more efficient land use.
- Improved Weather Resistance: Eliminates exposed charging ports, potentially reducing weather-related damage and malfunctions.

PROPOSED SYSTEM:

While electric vehicles (EVs) are becoming increasingly popular due to their environmental benefits, the current charging infrastructure poses several challenges. Traditional plug-in charging stations require physical connections, leading to inconvenience, limited accessibility, and potential wear and tear on charging cables. To overcome these limitations, a wireless charging solution using

RFID technology needs to be developed. The problem lies in the lack of efficient and user-friendly wireless charging stations for EVs. The existing wireless charging technologies often suffer from low power transfer efficiency, compatibility issues, and inadequate user identification methods. These shortcomings result in longer charging times, reduced charging range, and the risk of unauthorized usage. The proposed solution involves designing an RFID-based wireless charging station that ensures seamless charging experiences for EV owners. By integrating RFID technology, the charging station can identify and authenticate the vehicle, eliminating the need for physical connections. This not only streamlines the charging process but also enhances security by preventing unauthorized access. The key objectives of this project are: 1. Enhance Power Transfer Efficiency: Develop a wireless charging system that efficiently transfers power from the station to the EV, minimizing energy loss and reducing charging times. 2. Improve User Identification: Implement RFID technology to accurately identify and authenticate the EV, ensuring that only authorized vehicles can access the charging station. 3. Enhance Compatibility: Design the charging station to be compatible with a wide range of EV models and manufacturers, enabling widespread adoption and usuability

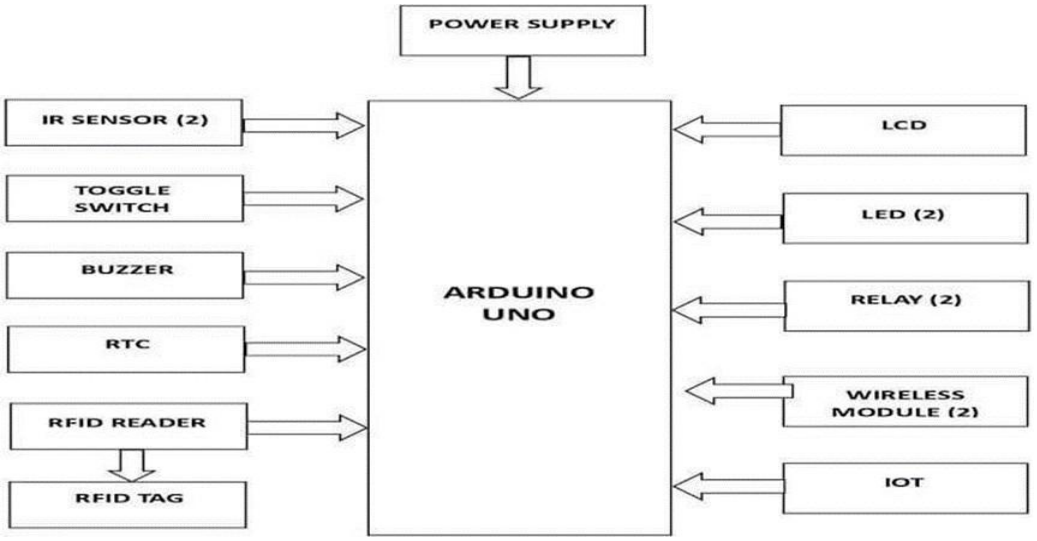
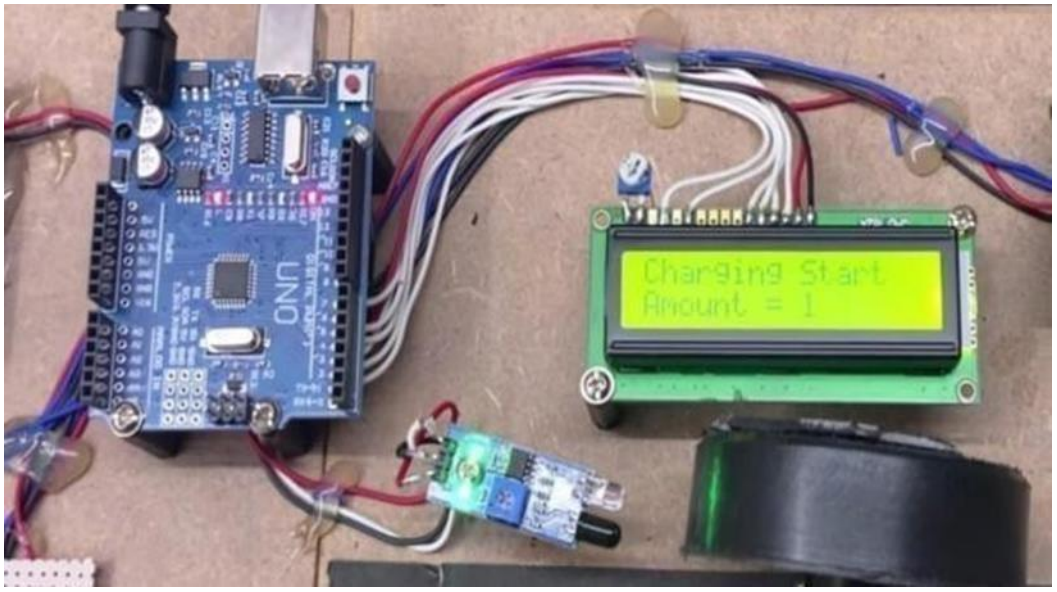


Fig: Block diagram of system

1. Vehicle will be parked on charging spot 1 or spot 2, this will be sensed by the IR sensor and the status will be forwarded to Arduino UNO.
2. Based on the status received by the IR sensor, the Arduino UNO sends the signal to the relay which turns on the supply to the respective primary coil.
3. Primary coil is present under the spot will produce variable magnetic flux.
4. Secondary coil is present at the base of the vehicle when it comes in the vicinity of the flux will get linked and by the principle of mutual induction emf is induced in the secondary coil.
5. This voltage is then given to the battery which will initiate charging. The charging status is displayed on Lcd.
6. In this process, power is transferred from the primary coil to the secondary coil through inductive coupling.

RESULTS:

Electric vehicles (EVs) can be wirelessly charged at up to 20 kW of electricity, or Level 2 charging speed. The charging speed of a 7.2 kW plug-in charger and a 7.2 kW plug- less charger is the same. This indicates that, depending on the EV, an additional 20–25 miles of range are added every hour of charging time. While 11 to 22 kW is the typical output for private EV charging stations, 1.7 kW and 3.7 kW chargers are also frequently found. Mc Kinsey predicts that by 2024 or 2025, a large number of OEMs will have implemented wireless charging technologies



Display of result in LED

CONCLUSION:

With substantial advantages over conventional plug-in charging techniques, automatic wireless power hubs for electric cars (EVs) present an enticing future transportation vision. Wireless charging has the ability to completely change the EV charging experience, offering increased convenience, safety, and aesthetic appeal in addition to possible efficiency advantages. But it's important to recognise that this technology is still in its infancy. Before there can be a general

acceptance, issues including cost, efficiency, and standardisation must be resolved. Research and development efforts continue to show significant promise despite these obstacles. With the advancement of technology, autonomous wireless power hubs could: Simplify and streamline EV charging: Making the process effortless and seamless for users. Enhance the overall appeal of EVs: Contributing to wider adoption and a cleaner, more sustainable transportation future. Unlock new applications: Enabling innovative uses of EVs in various sectors, from public transportation to autonomous vehicles.

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