E- Vehicle Charging System using RFID

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Abstract- Electric vehicle (EV) wireless charging using radiofrequency identification (RFID) is a novel technology that enables the charging of electric vehicles without the need for wires or cables. The technology utilizes RFID tags that are installed on the EV, which communicate with the charging pad through electromagnetic fields. The charging process is initiated when the RFID reader detects the presence of the EV with the installed RFID tag, and the charging pad is activated. The power transfer is then enabled between the charging pad and the EV, allowing for the charging process to begin. RFID-based wireless charging technology offers numerous benefits over traditional wired charging systems. For instance, it eliminates the need for physical connectors, thereby reducing the wear and tear of components and increasing the convenience of charging. Moreover, the technology is more efficient, with minimal energy losses, and reduces the risk of electrical hazards. It also minimizes the impact of weather conditions and road debris on the charging process, making it suitable for both indoor and outdoor charging application. In conclusion, EV wireless charging using RFID is a promising technology that can potentially revolutionize the EV charging industry. It offers numerous benefits, including increased convenience, efficiency, and safety, and has the potential to significantly reduce the environmental impact of transportation.

Index Terms- RFID,EV, Battery, Arduino, Currency, Power, EV Charger

I. 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 is used to identify the vehicle and initiate the charging process[1]. 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[2]. 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[3].

When a signal came from sensor unit, the microcontroller activates the charger unit for a predefined time after that it will reset to normal case. Driver circuit is used for provide the sufficient input voltage relay. The relay will on to activate the 230V charger, to charge for our E-vehicle. The major action in this system is controlled by transmitter section; this section consists if IR transmitter and IR receiver. Here we need to generate IR frequency continuously. So that, by using a small tiny microcontroller frequency is produced and is connected IR receiver continuously receives the signals from the transmitter. Whenever the light path in between IR transmitter and IR receiver cuts by on obstacle receiver signal gives low to high pulse .by to the IR led to generate IR light rays of 38 KHZ frequency. Connecting the receiver output to the microcontroller interrupt pin, it gives interrupt to the microcontroller immediately the system gives the buzzer and sends the message to the display on LCD.

II. 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]. 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 blockchain implementations for an EV BMS that use blockchain as the network and data layer of the application. The first solution builds smart contracts on top of the Ethereum blockchain, whereas the second builds them on top of the IOTA tangle and a directed acyclic graph (DAG). The two strategies are put into practice and contrasted to show that both systems can offer a workable solution for an effective, partially decentralized, data-driven BMS [4].

Customers accept electrical vehicles because they are simple to use. It has a lot of requirements, one of which is a pleasant charging and parking area. The suggested model combines these two systems to provide an effective solution. The design of a system that can manage free parking spaces and charge schedules is discussed in this article. The parking systems in place today are not capable of handling all kinds of automobiles. There must be parking and a charging station for electric vehicles. The suggested model offers the option to reserve a charging area using a smartphone[5]. The system then controls all associated processes depends upon data which include the arrival time of the car, battery life, etc. Customer manager, vehicle manager, map manager, and lot manager are the key elements. Java Platform and Enterprise Edition (Java EE) is the program in use. Security idea is another thing to consider. User ID, which is also used for the billing process, is necessary.

Electric vehicles will raise gasoline prices while reducing greenhouse gas emissions. In electric cars, transferring electricity over a short distance is the primary function of wireless transmission.

A transmitter and receiver portion that are separated by a short distance make up the wireless power transfer system. An adaptable electromagnetic field is used in wireless transmission technology. The EMF is produced between the coils and transferred to the receiver by this electric field, which is formed in a free environment and carries a fixed quantity of money that generates a magnetic field around it and contains energy. A BMS is a system for managing batteries[6]. We utilize a master battery and a slave battery in EVs. In the BMS, the master battery is given priority. The relay will transition from the master battery to the slave battery whenever the master battery's charge drops automatically.

Introduced energy meters might be electromechanical or electronic. The biggest issue with this technique is that a utility representative must visit each neighborhood individually to read the energy meters and give out the bills. That interpretation claims that the customer paid the invoice. Even when bills are consistently paid, mistakes like an excess billing amount or a communication from the provider are frequently made[7]. We are recommending an IoT-based prepaid energy meter to get around this problem. The ADE7758 meter circuit, Atmega328p microcontroller, and Wi-Fi module make up this system. This meter tracks the amount of unit utilized and transmits both the unit and cost online. If consumption is getting close to the predetermined point, an alarm is given to the user. The mechanism will cut power if usage rises over the predetermined level. The balancing current approach is often used to identify demand theft [2]. Energy is produced naturally and comes in a variety of forms, including solar energy, nuclear energy, and chemical energy from fuels. The study provides solar-powered wireless charging methods for electric vehicles. The gasoline used by current automobiles causes noise, air pollution, and significant environmental effects[8]. But the difficulties with pollution are solved by wireless charging technology. Technology known as Wireless Power Transmission (WPT) is incredibly dependable, effective, silent, and pollution-free. It was suggested to conduct a state-of-the-art study of electric car technology, charging procedures, standards, and optimization methods[9]. The fundamental differences between an electric vehicle and a hybrid vehicle are first explained. The most recent findings on EV charging technologies such as conductive charging (CC), wireless power transfer (WPT), and battery swap stations (BSS) are then presented. The examination of EV standards, including charging rates and their configurations, comes next. The most popular optimization methods for determining the size and location of EV charging stations are then examined. Finally, a number of suggestions are made for additional study based on the learned insights.

According to studies, the demand for a cleaner atmosphere has encouraged the development of affordable green car technologies, such as electric vehicles. Infrastructure for charging electric vehicles (EVs) is becoming more and more crucial as the number of EVs on the road climbs. A greater knowledge of existing EV charging behaviors is necessary in order to enhance the operation and efficiency of the electric car charging system[3]. So, in order to automatically identify users, this article uses RFID (radio frequency identification) technology. In this technique, data from users is transmitted and received via electromagnetic waves. “An Efficient Scheme for Wireless Charging of Electric Vehicles Using RFID with an Optimal Path Planning”, in the year 2022 in IEEE globecom workshop, one of the main reasons for the emergence and acceptance of electric cars (EVs) in contemporary smart cities in recent years is the detection of the harmful CO_2 emissions in the environment from traditional fuel-based vehicles. In this situation, EVs offer a green setting in the contemporary smart city[9]. However, there are several obstacles to using EVs in the contemporary smart city (such as smart charging, route planning, information distribution, etc.). Therefore, new methods and approaches are required to raise the effectiveness of the EVs' current charging system. Keeping these concerns in mind, this study suggests a new method for wirelessly charging electric vehicles utilizing RFID tags. The use of RFID tags placed at various locations across the city is employed in the proposed plan to have an effective payment mechanism while EVs are being charged. An algorithm that offers navigation is also created to demonstrate the suggested scheme[3]. For the purpose of determining the best approach, the effectiveness of the plan is evaluated in light of the EVs' mobility.

III. PROPOSED SYSTEM

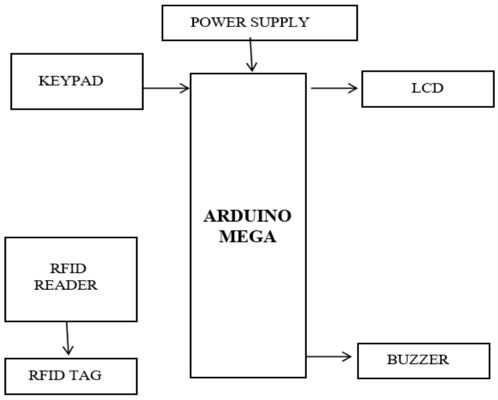

Fig 1. Block diagram of the Proposed System

Fig.1 shows the block diagram of the proposed system. The Coin Acceptor works by comparing the coin that already inserted in this sensor (blue color at sensor) with the coin that is inserted at the front hole. If the coin is the same, the coin will be accepted, but if coin is different, the coin will be rejected. Keypad is used to set timing for charging. Also RFID is used to identify the next time charging and every time remaining amount will be saved in RFID card. So, money alternate time for charging is used. In this project, Arduino MEGA microcontroller is used which acts as brain of our system, hence the entire system program is stored in it. Here the use of the RFID and coin accepter module gives the two option for the payment purpose. The RFID is used to make a payment using card and the coin accepter module is used to make a payment card less. The keypad is used to give the access for the owner of the power station and another option is to change the output timing for a coin. GSM module is used to update payment information for the user. Buzzer give the alert for the start and end of the charging time. Whenever the person completed the payment relay will be turned on and the vehicle is charging. The LCD is used to update all the information of the device.

The system of the design allows voltage differences in the output signal from the receiving coil to be measured as the primary or sole basis for coin identification. Because of the novel geometry of the coils, such voltage differences are indicative of the conductance of the whole coin; not just the conductivity of the alloy composition used to fabricate the coin. In a preferred embodiment, each coil of the design is wound on a substantially rectangular base, such that the width of each coil is slightly less than the diameter of a dime, and the length of each coil is slightly greater than the diameter of a half-dollar.

The dime and half-dollar are selected because they are the smallest and the largest coin in the assortment to be tested. When other coin sets are to be counted, the preferred coil width is substantially equal to the diameter of the smallest coin, and the coil length is substantially equal to the diameter of the largest. The transmitter coil is placed on one side of the coin path, and the receiver coil is placed on the opposite side. Each coil is arranged such that the windings lie substantially in a plane parallel to the coin path, and the length of each coil is perpendicular to the coin path.

Thus, each coin passes between the coils in a direction that traverses the field from one side of the coils to the other side. When the center of a dime reaches the center of the field it momentarily fills substantially the entire width of the field, and therefore the field "sees" only the dime at that instant, and not any significant portion of the coin ahead of it or behind it in the coin path. Each larger coin also interacts with the field across its entire diameter only at the moment its center passes the center of the field, because the length of the coils is substantially equal to or slightly greater than the diameter of the largest coin.
Preferably the distance between the coils is three to five times greater than the minimum required, so that the chance of jamming the slot is minimized. Each coil is wound on an oblong base, which may be either oval-shaped or rectangular. The dimensions of each coil are selected such that the diameter of the smallest coin to be counted, a dime for example, is slightly greater than the width of each coil, and the diameter of the largest coin, a half dollar for example, is slightly less than the length of each coil. The coils are coaxial and aligned such that all corresponding sides are parallel to each other.

IV. SOFTWARE AND HARDWARE OUTPUT

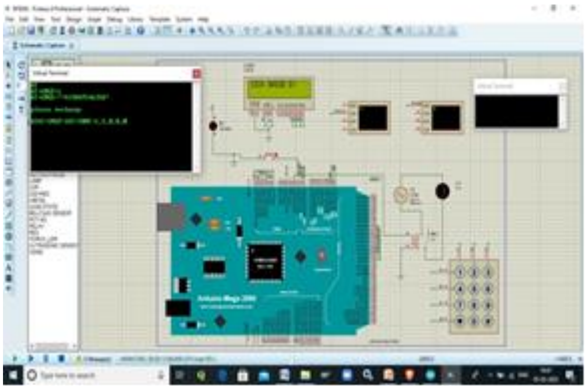

Fig 2. Simulation Result of EV Charging Station

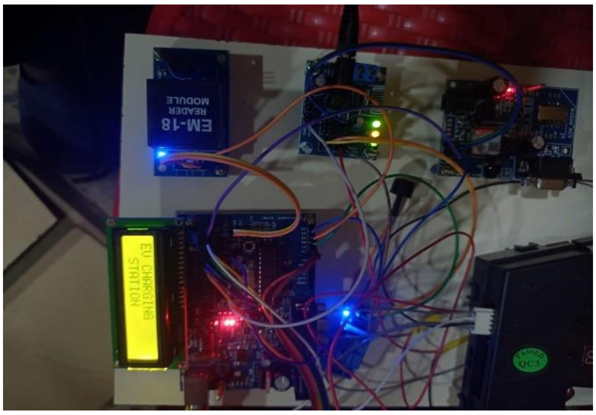

Fig 3. Hardware Result of EV Charging Station

CONCLUSION

In conclusion, electric vehicle wireless charging using RFID has the potential to revolutionize the way we charge our electric vehicles, providing greater convenience, efficiency, and sustainability. The technology offers benefits such as eliminating the need for cables and connectors, remote monitoring and control of charging activities, and integration with renewable energy sources. However, further research and development are necessary to address challenges such as the limited range of RFID communication and the high cost of implementation. With continued innovation and investment, the use of RFID technology in electric vehicle charging systems can contribute to the transition to a cleaner and more sustainable transportation system.

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