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Real-time Wireless Charging For Ev

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***Abstract*- The ability to wirelessly charge electric vehicle batteries could substitute plugged-in chargers, which have their own set of mechanical and electrical issues because of wires and power connections. Although the technological breakthrough for relatively close non-contact transmitting power is well known and several achievements have been described in scientific articles, the issues with charging time, energy transfer efficiency, system stability under realistic circumstances, and EMC-related issues still hold a significant amount of weight. This study offers a novel localization strategy based on wireless energy transfer for recharging electric cars (EVs) (WPT). Using the recommended method, the wireless charge controller may choose the most efficient coil to transmit power at the EV's placement depending on the detectors the EV's tyres have activated. We utilize a mechanism that determines which transmitting coil should be used based on monitoring the transmission rate of each one to ensure adequate recharge. By selectively activating the coils with the highest transfer efficiency on their own, this improves both recharging efficiency and power loss. The results show that the recommended method can locate the coil with the best transmission efficiency without analyzing documented effectiveness or utilizing real power transfer.**

***Keywords*—** Wireless power transmission, car charging, electrical vehicle, efficiency, sensor network, smart charger.

I. INTRODUCTION

People are experiencing challenges with rising pollution and a lack of electricity globally. The primary source of the aforementioned issues is the extensive extraction and consumption of fossil fuels. Compared to cars that run on conventional fossil fuels, electric cars, which are propelled by batteries, are emerging as a significant energy and environmental problem-solver. Due to its adaptable design and straightforward operation, wireless power transfer is also emerging as a viable EV charging option [1-6].

To enable "charging while driving," the wireless Power Transfer technology for EVs blends wireless charging technologies with the driving road surface. This eliminates the need to take up more lane space. The wireless charging technique of electric vehicles, as opposed to static wireless charging, makes full use of the time and area of the vehicle to recharge the vehicle, increasing the adaptivity of wireless charging of EVs.

Unavoidably, a conversation between plug-in and wirelessly EV battery charges was started by the recent technological breakthroughs and improvements in electric cars (EV) and even autonomous vehicles. Wireless chargers are becoming more and more popular even though plug-in infrastructure is becoming more connected globally and that any connector from an office or home could serve as a plug-in charging source. These benefits include complete human protection (there is no human operator), dependability and ease of use, unrestricted mobility, and potential accessibility across parking lots, gas stations, public, or domestic storage units, among others. [7-12].

Additionally, according to some articles, the dynamic charging concept (charging a car while it is travelling) already exists EP [7,13,14].

Compatibility with wireless EV chargers is a significant problem that is still up for dispute. The Society of Automotive Engineers published several recommendations for best practises in wireless charging. The latest current, which was published in Nov 2017, is meant for stationary systems with achievable capacities of up to 11kW EP efficiency, compatibility, and emission control [15].

For the past several years, WPT technology integration into electric cars has been the focus of research [17], [18]. They could create a system to deliver energy to the EV using capacitive WPT [20] and inductive WPT techniques [19]. Power transmission in both directions is one of the advantages of IPWT [21], [22]. Transmission efficiency has also changed significantly over time. The efficiency of the WPT system can already approach 96 percent, although this is largely reliant on how well the transmitter and receiver loops are aligned [23].

By providing a fresh method for location-based vehicle recharging, this study greatly contributes. Based on the active receptors under the tyres, the charger employs a sensing system to ascertain the direction of the car. The algorithm analyses the dimensions of the automobile when the detectors are enabled and selects the most efficient transmission loop near the current EV site. Interaction among the two is essential

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because the car's detectors are linked to the transmitters via its intelligent charger. The technology will instantly detect any changes and adjust the transmitter coil if the car moves. We show how the suggested location-based intelligent charger lowers the power needed to determine the loops with the highest efficacy, resulting in a low-power array system. Since the location of the vehicle is quickly determined without interrupting with the charging cycle, the recommended security apparatus permits a car to reduce the real charging time.

II. LITERATURE REVIEW

A review of the literature that includes works that have been published. The IEEE Explorer, journals, and works cited in the listed papers were all used in the search.

In a conventional EV WPT charger, the transmitter loop is placed below the electric vehicle, and thus the receiver loop is attached to the bodywork. The parking lot is set up to offer plenty of parking spot and a secure exit for the driver. The WPT transmitter design [24] has a challenge in terms of parking lots' spatial flexibility. According to [25], the minimum parking space for a car is 4.8 meters in length and 2.4 metres broad. Consequently, the WPT charger should be able to transfer power effectively regardless of where the car resides.

In Paper [22], which discusses several strategies for enhancing the geographic flexibility of WPT chargers, a capacitor that provides an energy reserve is attached to the power transmission system. A multi-coil charger had also been investigated in [27-29] to boost receiver flexibility depending on transmitter independent placement. The shown multi-loop transmitter integrates two or even more loop into a single emitter. The transmission outcomes are the focus of the calculation loop utilised to supply power to the receivers. Power may be transferred constantly and as effectively as feasible using this method.

By regulating the recharging power using a DC-DC converter and optimising the transmission efficiency with a Half Active Rectifier, literature [30] suggested a unique secondary-side control approach for power management and efficiency optimization.

The development of DWPT system characteristics regarding performance for the segmented transmitters array D-WPT system was examined in the literature [31]. Additionally, they suggested using a double-spiral repeater to increase efficiency, transmission distance, and misalignment tolerance.

The LCC compensating network was first presented to WPT systems in literature [32] with an application focused on dynamic wireless EV charging.

A unique dynamic WPT technology that combines the benefits of a segmental long coil coupler with a pads array was published in literature [33].

A solution for increasing power and efficiency is suggested in the literature [34] by using a multi-excitation device in the charging process.

III. EXISTING SYSTEM

There is currently no robot with an adjustable arm diameter that can be used to save the kid from the borewell hole. Instead, a human on the outside controls the robot. In the traditional method, a sizable hole is excavated up to a depth near the bore well, trapping the youngster inside for an extended period. The likelihood of saving the infant alive may decrease with even a slight delay in these supplies. There is a low and dangerous probability that the infant will survive if rocks with deep cavities are present near the bore hole. Lack of light and low oxygen levels might be the biggest obstacles to the child's rescue mission. There is currently no such specialized equipment available to free the kid stuck inside the drill hole. The child cannot be saved using any method. If this tactic fails, the army personnel are contacted. It requires a lot of time, effort, and pricey resources that aren't always readily accessible.

IV. EXISTING SYSTEM

In the current setup, a charging station is placed below parking places on open streets. This method's drawback is that an EV can only be recharged while parked in a certain location with a charging connection. Numerous serious problems result from this. In order for the charging station to be used by another EV, an EV must immediately leave the designated parking space after charging. This might not always be true. Second, as the use of EVs increases, building charging stations may be necessary for all parking spaces. The cost of providing charging stations, which may not always be utilised, increases as a result.

V. METHODOLOGY

ROAD SYSTEM

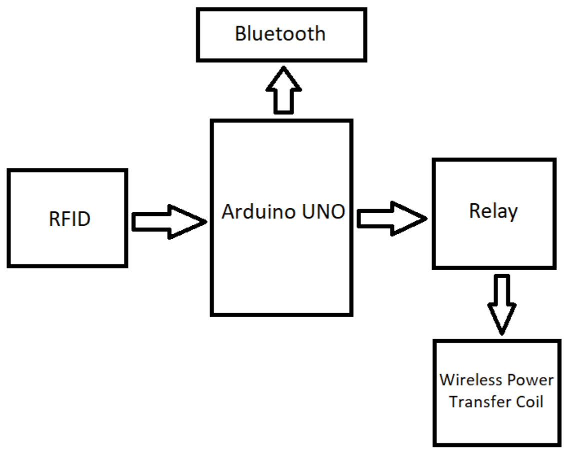

Figure. 1

A. Arduino

Microcontroller board, Arduino UNO with ATmega328P. It has 6 analogue signals, a 16 MHz ceramic resonator, 14 digital I/O pins (six of those are PWM output), a USB port, a power connector, a reset button, and an ICSP header. Everything that you need to operate the

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microcontroller is included; all you need to do to get going is plug it into a computer through USB, an AC-to-DC converter, or a battery.

B. Bluetooth

The effective communication for the wireless component is handled using Bluetooth connectivity. Bluetooth devices allow for wireless data transmission and reception between two devices. The Bluetooth module may collect and send data from a host operating system via the host controller interface. This is used to help the car steer.

C. RFID Module

Radio frequency identification (RFID) employs electrostatic or electromagnetic interaction in the radio frequency area of the electromagnetic spectrum to uniquely identify a thing, an animal, or a person. The RFID unit is a portable or permanently mounted device that connects to a network. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antennae, in which it is processed into data. the internal transponder of the RFID tag. Some of the factors that impact the detection range of RFID tags include the kind of tag, RFID frequency, reader, and interference from other RFID tags and readers.

D. RELAY

A switch that is activated by an electromagnet is called a power relay module. A separate, low-power input from a microcontroller activates the magnets. An electrical circuit can be opened or closed by the electromagnet when it is turned on.

E. Wireless Power Transfer Coil

This coil is employed to transfer power to wireless power receiver coil in CAR SYSTEM. This gets power from Grid and solar panel.

- CAR SYSTEM

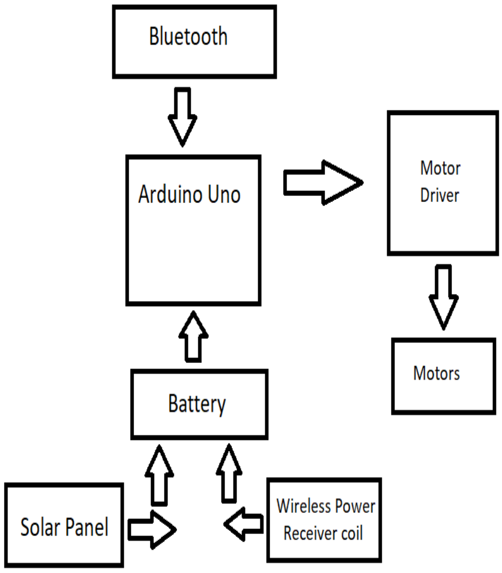

Figure. 2

A. Arduino

The Microcontroller board, Arduino UNO with ATmega328P. It has 6 analogue signals, a 16 MHz ceramic resonator, 14 digital I/O pins (six of those are PWM output), a USB port, a power connector, a reset button, and an ICSP header. Everything that you need to operate the microcontroller is included; all you need to do to get going is plug it into a computer through USB, an AC-to-DC converter, or a battery.

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C. Motor Driver

These drivers act as a conduit connecting control circuits and motors. The controller circuit utilizes reduced current signals to drive the motor, which demands a high current. Motor drivers transform low-current control signals into higher-current signals that can operate motors.

D. Motors

A motor is a useful device that converts electrical energy into mechanical energy. Motors are now found in both household and industrial environments. Ultimately, the motor you select will be determined by your individual requirements.

E. Solar Panel

A collection of photovoltaic cells arranged in a foundation for deployment is known as a solar cell panel, PV (photo-voltaic) module, or solar panel. Solar energy is harnessed by solar panels to provide direct current power.

F. Wireless power receiver coil

This coil is employed to receive the power through the wireless power transfer coil from the road system.

VI. WORKING

This project involves integrating two systems. The following systems are interfaced:

- ROAD SYSTEM

This system consists of RFID Module placed under the car. When the car moves on the road, this detects whether the car is registered or not. If the car is registered, then the relay is automatically turned ON. This in turn activates the wireless power transfer coil transfers to wireless power receiver coil of CAR STSTEM.

- CAR SYSTEM

In this system, the battery that powers the electrical vehicle gets electricity from the wireless power transfer coil of the ROAD SYSTEM and transmits it to the wireless power reception coil. Battery gets electricity from the existing solar panel in addition to the wireless power transfer coil. Here, the car's mobility is controlled by an Arduino board and Bluetooth technology.

VII. CONCLUSION

In this study, a novel wireless charging technique that combines a charging system with wireless communication technology was presented. The system may function as that of the ZigBee and interact without the intervention of a human thanks to wireless communication technology. With the use of a transmitter coil and a receiver coil in static wireless power transfer, wireless charging enables the electric car battery to be charged wirelessly (SWPT). In this single transmission, a single receiver coil is utilised to transmit electricity, and the electric car is parked at a specific charging point.

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