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IoT Based Wireless EV Charging Station using RFID

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Abstract— ***As the automobile industry enters a new era, it is transitioning quickly from IC engine vehicles to electric vehicles. The demand for electric vehicles is rising, which also causes a rise in the number of charging stations. In this concept, the automobile is wirelessly charged by inductive coupling using a wireless charging system. The automobile only needs to be parked on the charging location. One of the technologies that may be one step ahead of us is wireless power transmission. This technology may lead to new wireless charging applications that we can utilize on a regular basis.***

I. INTRODUCTION

We live in a technologically advanced world. Every day, new technologies are developed to simplify our lives. Despite this, we continue to utilize the traditional wire system to charge low- and mid-power electronics like laptops and everyday low-power gadgets like mobile phones and digital cameras. When multiple gadgets need to be charged at once, the traditional wire method is a mess. Additionally, it consumes a lot of electrical outlets, not to mention that each device has a charging connector with a unique design. There might be a question at this moment What if these gadgets could be charged simultaneously by a single device without the need for cords and without making a mess? We thought about it and developed a concept. All of these problems can be resolved using inductive coupling, a quick and efficient method of wireless power transfer.

Without the use of wire or any other material, wireless power transmission (WPT) is the effective transfer of electric power from one location to another across a vacuum or an environment. This can be applied in situations when instantaneous or continuous energy transfer is required but conventional cables are prohibitively expensive, cumbersome, risky, undesirable, or impossible. Inductive coupling, resonant induction, and electromagnetic wave power transfer are all viable options for transferring power over short, medium, and long distances. WPT is a technology that makes it possible to deliver power to places that would otherwise be difficult or impractical to reach. The next big thing could be using inductive coupling to charge electric vehicle batteries.

In order to wirelessly transmit electricity through space and charge an electric vehicle's battery, the goal of this article is to develop an electric vehicle wireless charging station and charging platform. To transmit electricity from a transmitter to a resistive load or batteries of an electric vehicle, the system will use inductive coupling.

If successful, it would make charging the battery of an electric car simpler and easier by eliminating the need for cords.

II. OBJECTIVES

1. To build a Prototype of a wireless Charging Station for EV.
2. To Use RFID sensor for payment purpose.
3. To use a cloud-based technology to store the data from the sensor.

III. METHODOLOGY

Wireless charging systems for electric vehicles can be categorized into four types based on their operating techniques. These include the Capacitive Wireless Charging `System, Permanent Magnetic Gear Wireless Charging System, Inductive Wireless Charging System, and Resonant Inductive Wireless Charging System.

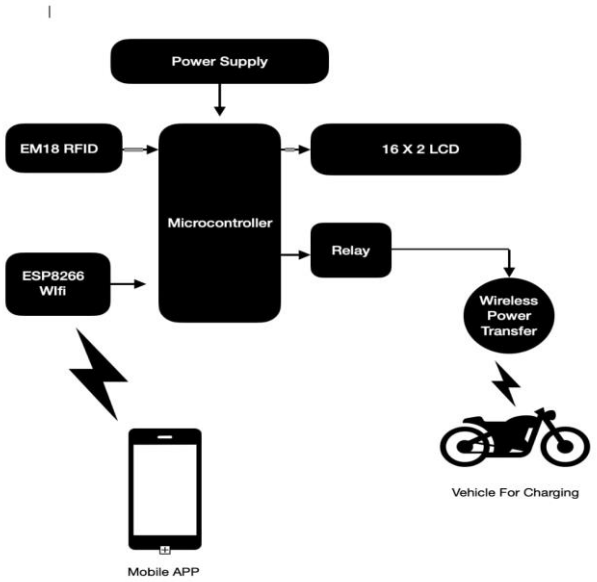
The Inductive Wireless Charging System operates based on Faraday's law of induction. It uses the mutual induction of magnetic field or flux between the transmission and reception coil to transmit power wirelessly. When an AC supply is applied to the transmitter coil, it creates an AC magnetic field that passes through the receiver coil. This magnetic field moves electrons in the receiver coil, causing AC power output that is then rectified and filtered to charge the battery of an electric vehicle. The amount of power transferred depends on the frequency, mutual inductance, and distance between the transmission and reception coil. The operating frequency of the Inductive Wireless Charging System ranges from 19 to 50 kHz.

However, there are some limitations to the Inductive Wireless Charging System. The harmonic current can cause heating in a conductor, leading to an increase in current value higher than expected. This mechanism leads to losses in the distribution of current in the conductor, including the skin effect and proximity effect.

The skin effect is caused by the surface current that does not penetrate far into the conductor's body but travels along its surface. Therefore, in a large diameter conducting wire, most of the cross-sectional area of the wire is not used to conduct the current. This effect increases the wire's resistance in the coil, which may already have a high resistance due to its length and small diameter.

The proximity effect is caused by the conductor's magnetic field, which disrupts the current distribution in adjacent carriers.

IV. BLOCK DIAGRAM



V.RESULTS

HARDWARE IMPLEMENTATION:

The simulation produced the anticipated outcomes, which are as follows: first, the car would arrive and then stand in a particular location with a primary coil at the bottom. Next, a person would scan an RFID card to complete the transaction, after which the vehicle would begin to charge. This information about the transaction, the charging location, the charging spot, the charging time, the charging cost, and all other related information would be recorded.

VI.CONCLUSION

The purpose of the project was to develop and put into service an electronic charger through resonance inductive coupling. A circuit has been developed and implemented after an analysis of a complete system step by step in order to optimise it. The results from the experiment have shown that significant improvement has been made in power transfer efficiency. The resonant inductive coupling method, which allows a wireless transfer of power from the source coil to the load coil and is able to be charged with an inexpensive charging device, has been defined and demonstrated.

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