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Wireless Charging Station for Electric Vehicles

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***Abstract*: As we all know charging electric cars is a key point in boosting energy shift, many solutions are encountered along with electric charging stations. Wireless charging is one such solution. Wireless car charging is an upgraded version of smartphone charging with some differences. This type of charging allows an electric vehicle (EV) to charge automatically without any cables. The creation and research of wireless charging systems for electric vehicles is the subject of this paper.**

***Keywords*: Arduino Nano, LCD, Power MOFSET, Relay, Vehicle detector.**

1. Introduction

Wireless electric vehicle charging system (WEVCS) technology operates on magnetic inductance and magnetic resonance principles. Wireless charging systems have been mostly used in high power applications, including EVs. When we compare both plug-in electric vehicles and wireless EV charging, wireless comes with the advantage of simplicity and is also very reliable and friendly to the user.

The only difficulty with WCS is that they can only be used while the car is stopped or in stationary mode, and there are a number of issues to be addressed, including range and appropriate battery storage volume.

Traditional charging techniques are less time-efficient, dependable, and user-friendly than dynamic charging systems. This charging gadget is also suitable for usage at bus stops, traffic lights, and travel routes.

In the event of maintenance, we only need to charge the vehicles. Wired charging is used in this case just like smartphones. But as wireless charging is adapted into smartphones then why not automobiles.

It is both safer and more convenient than dealing with high-current cables. Our goal is a branch of luxury and convenience rather than a need. Also, moving people from a high-risk to a low-risk situation. When opposed to cable charging, there are numerous environmental benefits.

Another severe issue with the existing plug-in cable for electric vehicles is that if the cable system is destroyed, individuals can get an electrical shock. This scenario can be avoided with a wireless charging strategy for electric vehicles because no wire or cable is necessary and data is transferred in electromagnetic form.

Electric vehicles can currently only be charged via a plug-in connection due to current technology. The issue arises when the user has to locate a charging point but the charging cord is missing or damaged. This project's purpose is to develop a wireless power transfer system for electric vehicles. The principles of this research can be applied to any electric vehicle, such as buses, cars, and light trains. Rather than using the standard plug-in connection, it will design a more convenient method of charging electric vehicles' batteries. When wireless power transfer WPT is used to charge an electric car, there is no physical connection or contact between the vehicle and the power supply. The process is completely automated and does not require any human participation.

2. Components

A. Relay Module

The relay is a controlled device that can turn on and off an electrically actuated switch by opening and closing it. It consists of a device that has a set of input terminals for a single or multiple control signals, and also a set of contact terminals functioning. A relay can have any number of contacts, which can be in the form of making contact, breaking contact, or combination contact. The circuit can be controlled by a relay with a low pass signal, or multiple circuits can be controlled by a single signal. The relay may accept signal from one circuit and transfer it to another circuit when used as a long-distance signal repeater telegraph.

B. Arduino Nano

The Arduino circuit board and Arduino IDE can read analogue or digital input signals from various sensors, drive a motor, turn on/off LEDs, and do a variety of other tasks. The Arduino Nano's majority of functionalities are handled via sending serial instructions to the board's ATmega328 main microprocessor via the Arduino IDE Voltage regulator, Power USB, crystal oscillator, voltage pin (3.3v,5v, gnd, Vin), A0 to A5 analogue pins ices pin., power led indicator, Tx & Rx LEDs, 14 digital input/output pins, Aref, and Arduino reset are all included on the Arduino board.In 2003 it began as a programme.

C. MOSFET

The metal–oxide–semiconductor field-effect transistor (MOSFET, MOS-FET, or MOSFET) is a type of insulated-gate field-effect transistor that is manufactured via controlled oxidation of a semiconductor, commonly silicon. The electrical

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conductivity of a device is determined by the voltage of the covered gate; this ability to adjust conductivity with applied voltage can be used to amplify or switch electronic signal.

D. IR Sensor

An infrared sensor is a light-producing electrical gadget that detects objects in the environment. An infrared sensor can both detect motion and measure the temperature of an object. Infrared heat radiation is emitted by almost everything. These types of radiation are undetectable to the naked eye, but they can easily be detected by an infrared sensor.

E. LCD

The LCD (Liquid Crystal Display) screen is a type of electronic display that can be used for a variety of purposes. A 16x2 LCD display is a relatively basic module that can be found in many types of diagrams and circuits. These modules are preferred over seven-segment and other multi-segment LEDs. The following are the reasons for this: LCDs are inexpensive, easy to programme, and allow for the display of unique or customized characters (unlike seven segments), animations, and other effects.

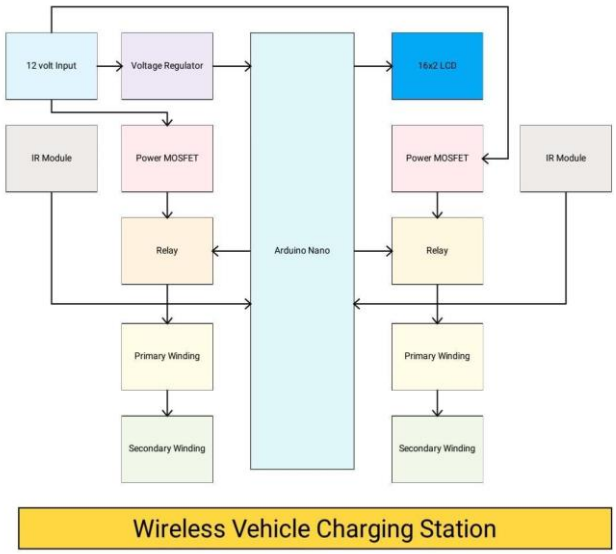

Fig. 1. Block diagram

When an electric car is parked in a charging slot equipped with wireless charging technology, the vehicle's battery begins to charge. Coils installed beneath the parking space provide an alternating magnetic field, allowing for wireless charging. Coils would be fitted in an electric automobile with wireless charging to create electricity from the alternating magnetic field.

The vehicle is parked above the charging station, which is equipped with a wireless charger. The wireless charging station then receives high-frequency electricity.

As a result, alternating magnetic fields form, inducing electricity in the nearby coils of the automobile. A rectifier (AC-DC converter) converts the generated electricity to DC, which subsequently charges the battery.

3. Methodology

The figure (Fig. 4) depicts the circuit diagram of an electric vehicle charging system. The microcontroller is a device that controls the functions of other devices that are connected to it. A current sensor detects the amount of current flowing through a wire and produces a signal proportional to the current. The output signal can be used to display the current obtained using an ammeter or for further analysis. Another important sensor is the Voltage Sensor, which is directly proportional to the voltage and is used to convert voltage measured into a physical signal. Connection V, a physical signal port, is used to output the measurement result.

Its capacity to detect the existence of a voltage without establishing metal contact is its unique feature. In a low-inductance casted resin, a resistive voltage divider and integrated resistors are encased. This is how everything fits together. This is the system's core component or heart, depending on the requirements.

An Arduino nanochip and Embedded C programming are used to construct the described system. The picture depicts the various sensors that are employed in the system.

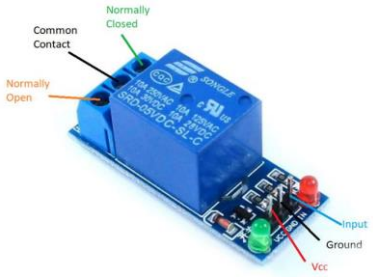

Fig. 2. Relay module

Fig. 3. Arduino Nano

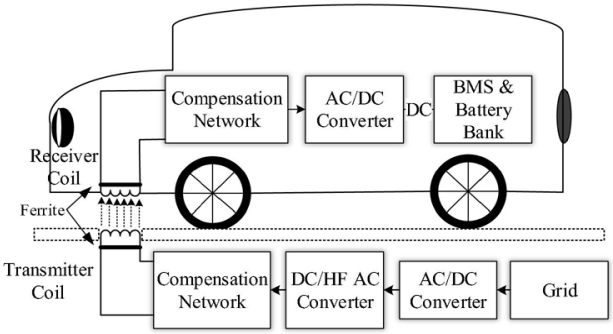

Fig. 4. Circuit diagram of electric vehicle charging system

4. Conclusion

We'd like to come to the conclusion that it is our collective and individual responsibility to protect and care for the globe in which we all live, and that we can contribute to the environment by doing so. The future of transportation is electric cars (EVs), and the future of EVs is wireless charging.

Design and analytical experiments for a wireless power transmission and charging system were carried out in this study. We meticulously constructed all of the models for specific systems before co-simulating them. In order to ensure efficient power transmission, we can observe that the system's maximum efficiency is controlled by the resonance and distance between coils.

References

[1] Lawrence Ulrich, "Wireless Charging Tech to Keep EVs on the Go"
[2] Elena Paul, Nimmy Paulson, Rijo Bijoy, Benny K. K, "Wireless Charging of Electric Vehicles"
[3] Swapna Manurkar, Harshada Satre, Bhagyashree Kolekar, Pradnya Patil, Samidha Bailmare, "Wireless Charging of Electric Vehicles," in *International Research Journal of Engineering Technology.*
[4] Chirag Panchal, Sascha Stegen, Junwei Lu, "Engineering Science and Technology"
[5] S. Bhattacharya and Y. K. Tan, "Design of static wireless charging coils for integration into electric vehicle".
[6] M. T. Thompson, "Inductive Calculation Techniques - Part II Approximations and Handbook Methods Power Control and Intelligent Motion," 1999.
[7] P.S. Sniak, "Three-Phase AC–AC Power Converters Based on Matrix Converter Topology, Power Systems," *Springer-Verlag,* 2013.
[8] M. B. Shamseh, A. Kawamura, I. Yuzurihara, and A. Takayanagi, "A wireless power transfer system optimized for high efficiency and high-power applications", *Proc,* 2013.