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Wireless Charging of Electric Vehicle

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Abstract: The paper overviews novel method for wi-fi charging gadget of electrical automobile. As the battery of the electrical automobile is charged wirelessly through inductive coupling technique which may be very handy considering the fact that excessive ability battery isn't always required and it is able to get replaced with the aid of using small battery of decreased weight. Considering the exploitation of the traditional sources the provision of current fuel and petrol is depleting . This paves the improvement of electrical automobile. In electric powered automobile charging of battery via charger and twine is inconvenient, dangerous and expensive. The carried out wi-fi charging gadget of battery for Electric automobile with the aid of using inductive coupling technique has been offered on this paper. The popular generation of wi-fi EV battery charging is primarily based totally at the Inductive Power Transfer (IPT) among coupled coils, one linked to the electric grid and the opposite one linked to the rechargeable battery. The transmitter coil circuit is flip ON and OFF on every occasion the automobile is gift and absent respectively. Through IPT, the electrocution hazard usually springing up from energy cords is averted and the battery charging operation can routinely start. Using the RFID (Radio Frequency Identification) sticky label affixed at the wind display of the electrical automobile which permits the clients to make the charging price at once from the account linked.

Keywords: Wireless Power Transfer; Electric Vehicles; Inductive Power Transfer; Battery Charging; Radio Frequency Identification

1. INTRODUCTION

Over the closing decade the expertise of environmental troubles has grown. Car producers - OEMs attempt to lessen gas intake and pollution. In order to fulfil those objectives new technology were released and rolled out like: Plugin Hybrids Vehicles (PHEV) and Electric Vehicles (EV).In 1891, Nikola Tesla has proposed an concept of wi-fi energy transmission and

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he established the primary wi-fi energy switch machine for illumination. Sometimes connecting too many wires in small energy sockets turns into inconvenient and hazardous. Electric automobiles are identical as like everyday automobiles, however servo motor is utilized in electric powered automobile for propulsion purpose, for energy deliver of that motor battery is used. The new varieties of rechargeable batteries are to be had that's used due to small in size, in comparison to traditional lead acid battery the electricity garage ability is higher, and weight is likewise much less. The charging procedure is cumbersome for customers in plug in electric powered automobile due to the fact for charging battery charger is needed that's without delay linked from automobile or someday battery is casting off for charging purpose. By utilising inductive energy switch era this hard charging procedure is simplified[1]. Inductive energy transmission allows the energy from an alternating contemporary in a single circuit to be coupled from one circuit into another. As wires aren't required for the switch among circuits, inductive energy transmission is a wire-much less shape of era[2]. WPT machine normally includes energy deliver, transmitter (number one coil), receiver (secondary coil), micro-controller, battery, sensors, matching circuit. The AC contemporary is generated withinside the transmitter coil through the energy deliver at a completely low frequency. Via magnetic fields unmarried number one coil and a couple of secondary coils are coupled. The regular frequency contemporary withinside the coil is growing a robust and controllable magnetic discipline for WPT. Advancement in energy electronics era have found many new software primarily based totally on IPT machine like wi-fi energy deliver for expert instrument, wi-fi battery charging for electric powered automobile over huge air gaps, cloth coping with those are excessive energy software of IPT machine. The mutual coupling of IPT machine is normally week. The receiver coil is electrically remoted from transmitter coil and circulate alongside an extended transmitter track.

Proposed Method

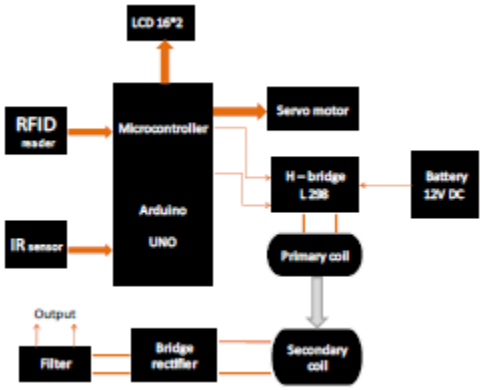

Fig1.Wireless power transfer system block diagram

ATmega328 is an eight-bit and 28 Pins AVR Microcontroller, synthetic with the aid of using Microchip, follows RISC Architecture and has a flash kind software reminiscence of 32KB. It has an EEPROM reminiscence of 1KB and its SRAM reminiscence is of 2KB. It has eight Pin for ADC operations, which all combines to shape Port A (PA0 - PA7).

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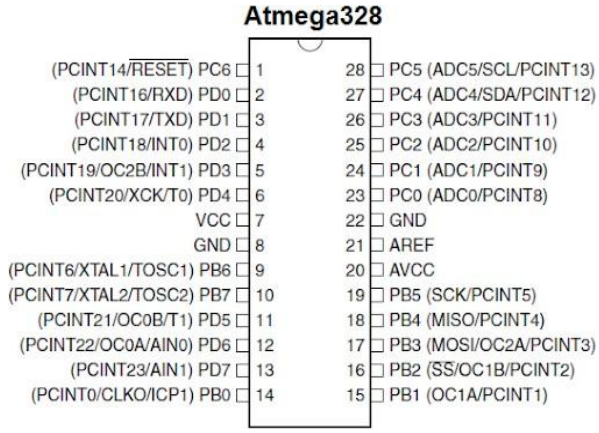

L298 Dual H-Bridge Motor Driver. L298 is a excessive voltage and excessive contemporary motor pressure chip which gets TTL common sense signals. They are ordinarily used when. It is wanted to function exclusive hundreds like cars and solenoid and so forth wherein an H-Bridge is required. High strength motor motive force is required.

The LCD monitor is an electronic display module that uses liquid crystals to produce a visible image. The 16×2 LCD is a very basic module that is commonly used in DIYs and DIYs circuits. 16×2 converts a display of 16 characters per line into 2 such lines. In this LCD, each character is displayed in a 5×7 pixel matrix.

ATMEGA 328 microcontroller, which acts as a processor for the arduino board. Nearly it includes 28 pins. From those 28 pins, the inputs may be managed through transmitting and receiving the inputs to the outside device. It additionally includes pulse width modulation (PWM).

Circular coils are broadly utilized in EV wi-fi charging structures because of its compact layout and set up flexibility. The transmitter coil and receiver coil is the important thing a part of the entire machine[3]. The coils are tightly coupled in the event that they have the equal length and equal configuration. In a proposed machine tight coupling configuration with small distance energy switch machine is used to reap excessive performance for electric powered automobile application. System includes coils tuned on the equal frequency. Transmitter and receiver coils had been built the use of electrically accomplishing copper tube.

The EM-18 RFID Reader module running at 125kHz is an less expensive answer for your RFID primarily based totally application. The Reader module comes with an on-chip antenna and may be powered up with a 5V strength supply. Power-up the module and join the transmit pin of the module to obtain pin of your microcontroller.EM18 RFID Reader is a module which reads the ID records saved in RFID TAGS. This ID records is precise for each TAG which can not be copied.

An infrared (IR) sensor is an digital tool that measures and detects infrared radiation in its surrounding environment. Active IR sensors act as proximity sensors, and they may be typically utilized in impediment detection systems (including in robots).A proximity sensor is a sensor capable of hit upon the presence of close by gadgets with out any bodily contact.

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A proximity sensor regularly emits an electromagnetic discipline or a beam of electromagnetic radiation (infrared, for instance), and appears for modifications withinside the discipline or go back sign. An IR proximity sensor works through making use of a voltage to a couple of IR mild emitting diodes (LED`s) which in turn, emit infrared mild. When the sensing unit will become active, it sends a corresponding sign to the output terminal that can then be used to prompt any quantity of devices.
The SG90 micro servo motor. In the heritage is a rotary attitude sensor module and a potentiometer. Both may be used to govern the servo motor. The SG90 is this type of servo motor which could rotate about 180°.

Circuit Diagram

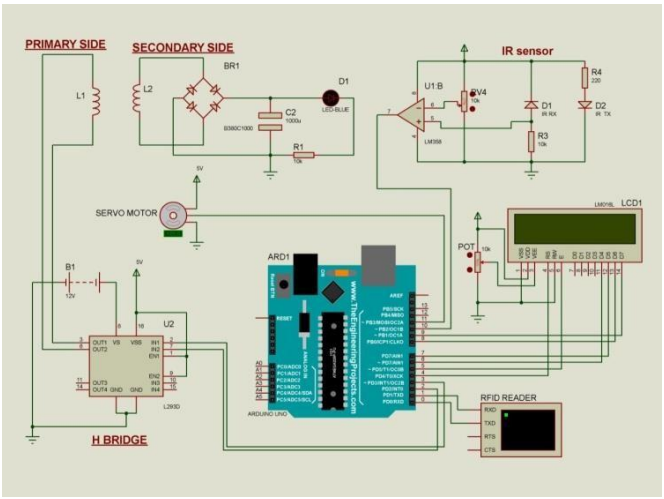

Fig 2. Circuit diagram

When the automobile methods the charging station, RFID reader reads the RFID tag connected to the electrical automobile. The transmitter and receiver pin of the RFID reader is attached to the zeroth and primary pin of the microcontroller respectively. If the RFID tag is valid, the servo motor allows the outlet of the gate of charging station. The sign pin of the servo motor is attached to the 11th pin of the micro controller. Once the automobile reaches the charging factor the infrared sensor experience the presence of the automobile thereby the micro controller and H bridge act because the transfer which excites the number one coil with the aid of using the deliver from the battery. The enter pin (2 and 7) of the H bridge L298 is attached to the second and third pin of the microcontroller to have the switching operation. Since the DC voltage is saved withinside the battery B1 an oscillator (H bridge) is used to transform the DC voltage to the specified frequency to excite coil L1.Secondary coil withinside the automobile receives excited with the aid of using the number one coil because of the precept of mutual induction. After being excited the AC voltage is transformed withinside the DC with the aid of using a rectifier. In order to put off the ripples clear out out C2 is used. Hence the battery of the automobile shops the charge. Once the motors get completely charged the LED connected to the automobile glows blue.

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2. EXPERIMENTAL RESULT

By initializing wi-fi electricity switch gadget, transmitter segment transfers electricity wirelessly to receiver segment. In receiver segment obtained electricity recharges the battery and runs an electric powered automobile. The end result of the proposed gadget may be found on a virtual garage oscilloscope. The waveform of transmitter coil and receiver coil is received respectively. Since air middle is used a few losses going on on the receiving coil reduces the general performance of the complete gadget. Results in calculated and applied electric powered automobile display excellent correlation. According to the end result of the prototype gadget, as the space will increase the obtained voltage decreases. It way as distance growth performance decreases. The overall gadget performance 55% is done via way of means of thinking about all losses and electricity supply.CONCLUSION

The IPT idea is carried out for wi-fi charging gadget that is used to recharge an electric powered car battery. The using circuit is used among the transmitter coil &receiver coil in which micro-controller operates as a transfer[3]. Power transferred is authorized via way of means of flip ON the transmitter circuit whilst the car is present, and flip OFF electricity switch whilst the car is absent to triumph over the power waste and to keep away from the magnetic discipline radiation problem. The proposed using circuit makes use of an ac transfer which manipulate the gadget electricity transferred. The implementation of an inductive electricity switch gadget is verifies via way of means of the use of battery charger utility of electrical car. A prototype realistic gadget is advanced with performance stage of 55 % and effects are verified. The gadget gives reliability, lengthy existence and safety.

3. REFERENCES

1. S. Asheer, A. Al-Marawani, T. Khattab, and A. Massoud, “Inductive power transfer with wireless communication system for electric vehicles,” in GCC Conference and Exhibition (GCC), 2013 7th IEEE, 2013, pp. 517–522.
2. D.M. Vilathgamuwa and J.P.K. Sampath “WirelessPower Transfer (WPT) for Electric Vehicles (EVs)- Present and Future Trends”PowerSystems, DOI 10.1007/978- 981-287-299-9_2, SpringerScience+Business Media Singapore 2015.
3. Shital R. Khutwad , Shruti Gaur ,"Wireless Charging System for Electric Vehicle",in International conference on Signal Processing, Communication, Power and Embedded System (SCOPES)-2016.
4. V. Boscaino, F. Pellitteri, L. R. R., and C. G., “Wireless battery chargers forportable applications: design and test of a high-efficiency power receiver,”IET Power Electronics, vol. 6, pp. 20–29, 2013.
5. J. Sallan, J. L. Villa, A. Llombart, and J. F. Sanz, “Optimal design ofICPT systems applied to electric vehicle battery charge,” IEEE Trans.Ind. Electron, vol. 56, no. 6, pp. 2140–2149, Jun. 2009.
6. A. Dukju and H. Songcheol, “A study on magnetic field repeaterinwireless power transfer,” IEEE Trans. Ind. Electron., vol. 60, no. 1,pp.360–371, Jan. 2013.

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7. C.-S. Wang, O. H. Stielau, and G. A. Covic, "Design considerations fora contactless electric vehicle battery charger," IEEE Trans. Ind.Electron.,vol. 52, no. 5, pp. 1308–1314, Oct. 2005.
8. S. Bhattacharya and Y.K. Tan. 2012. Design of static wireless charging coils for integration into electricvehicle, Proc. IEEE ICSET, Nepal.
9. M. Cederl. 2012. Inductive Charging of Electrical Vehicles, Master Thesis, Stockholm, Sweden.