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WIRELESS CHARGER FOR ELECTRIC VEHICLE

G. A. Bongale
Asst Prof. at Department of Electrical Engineering,
DYPTC Talsande, Kolhapur, Maharashtra.
gaurav.bongale04@gmail.com

Megha K. Badave
BTech in Department of Electrical Engineering
DYPTC, Talsande Kolhapur, Maharashtra, India
meghakbadave04@gmail.com

Akanksha N. Chile
BTech in Department of Electrical Engineering
DYPTC, Talsande Kolhapur, Maharashtra, India
chileakanksha18@gmail.com

Priti V. Desai
BTech in Department of Electrical Engineering
DYPTC, Talsande Kolhapur, Maharashtra,
Indiachimudesai@gmail.com

Namrata S. Patil
BTech in Department of Electrical Engineering
DYPTC, Talsande Kolhapur, Maharashtra, India
namratapatil5242@gmail.com

ABSTRACT

Nowadays world is shifting towards the electric vehicle to reduce pollution as well as the use of fossil fuel which is reducing day by day, due to conventional vehicles. But there are some major issues in the electric vehicle like charging process, traveling range etc. to adapt the electric vehicle over the conventional vehicle. It is estimated that the losses occurred due to wire is about 20-30%. So, to overcome the issues in conventional charging process, a wireless charging system is designed. It uses a wireless power transfer module. In which there is use of transmitting and a receiving module, transfer the power wirelessly.

Apart from wireless power transfer (WPT), for fast and easy operation of charging microcontroller, encoder, decoder, transistor, LCD, RF transmitter and receiver are used in this system. Hence the detailed information about the wireless charging system is explained in this paper.

Keywords: Wireless power transfer (WPT), Electric vehicle(EV), Microcontroller, RF transmitter and receiver, Wireless charging.

INTRODUCTION

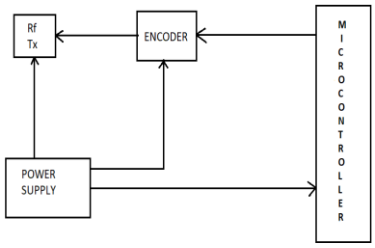
Due to limited availability of resources, it has become essential to develop alternative methods to generate energy. Wireless Power Transmission (WPT) is thus an approach to noiseless, cost efficient and convenient charging. It is estimated that losses incurred due to wires is about 20-30%. Hence WPT attempts to minimize these losses along with reduction in pollution levels caused due to resources used presently. But for electric

vehicles, traveling range and charging process are the two major issues affecting its adoption over conventional vehicles. To overcome the issue of charging process, a wireless charging unit for electric vehicle is designed. The basic working principle of inductive WPT Charging is that there are two parts of the inductor. One part of the inductor acts as a primary winding and the other half acts as a secondary winding of the transformer. The role of the charger is to convert the low frequency AC power to high frequency AC power. The most famous wireless technology is the Tesla tower made by Nikola Tesla where he attempted wireless electricity transmission. In this project, a wireless charging system will be implemented. Battery percentage will be measured by microcontroller & displayed on 16x2 LCD.

The main component used is wireless power transfer for wireless transmission which consist of RF transmitter and Receiver. We choose this component because there are many limitations using other ways like WIFI, Bluetooth, GSM etc.

Wireless power transfer (WPT) Module consist of two coils one is transmitter coil and another is receiver coil. It works on the principle of inductive coupling.

3.BLOCK DIAGRAM



Fig(a) TRANSMITTER

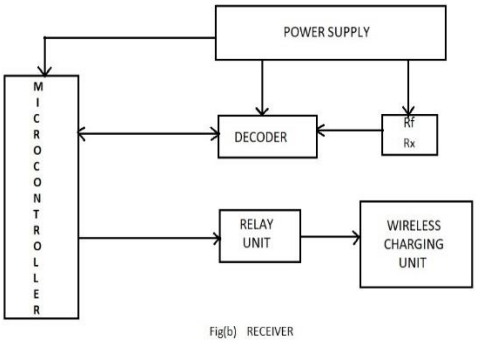
Block diagram for transmitter is as shown in fig above. In the transmitter a RF (radio frequency) transmitter, an encoder and a microcontroller is used.

Firstly, the power supply is given to the all the equipment. When we push the push button manually, code is sent to the micro-controller and then this code will be sent to encoder where encoding of the given data is taking place and the resulting data will send to the transmitter.

RF transmitter consist of a antenna which will transmit the data so that receiver could receive the data.

The transmitter is used for data conversion from parallel to series. The data received by encoder is in series form.

Next part of the system is Receiving side. The block diagram for Receiver is as shown in the fig(b) below. It consists of an RF receiver, Decoder, micro controller, relay unit etc.



Fig(b) RECEIVER

As shown in fig above the receiver receives the data from transmitter through antenna and these data will then give to the decoder. The Encoded data in encoder will decode by decoder and these data will give to the micro controller where the code will be processed and according to that data it will send signal to the relay unit.

When we push the relay button the charging process will start as it is connected to wireless charging unit.

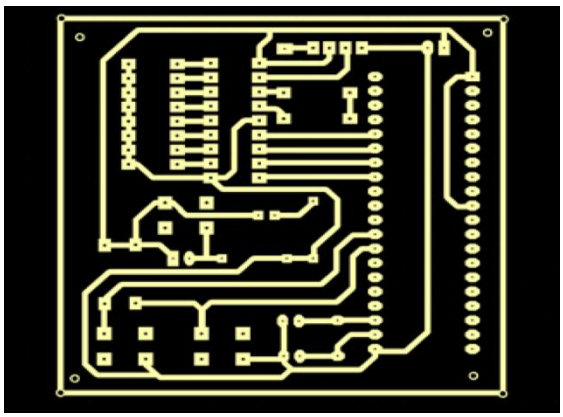


Fig (c):PCB Design

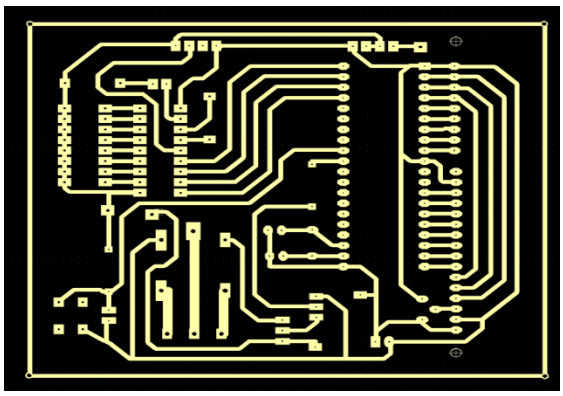


Fig (d): PCB Design

4. HARDWARE CIRCUIT DESIGN

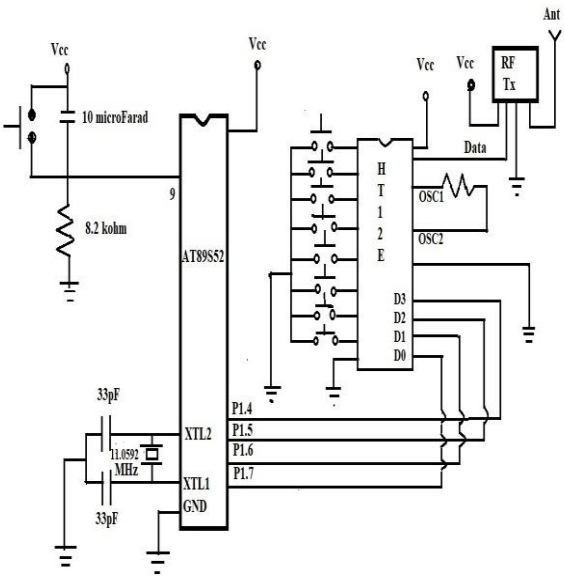


Fig (e): circuit diagram of transmitter side

Fig shows the hardware circuit design of model. Most important parts of the proposed technique model are as shown. The circuit divided into two section referring Transmitting and Receiving side.

A. Transmitting Section

This section consists of RF transmitter, Encoder and a micro controller.

Micro controller consists of 40 pins which serves different functions. The description of required pin in the transmitter section are as follows:

The micro controller used is AT89S52 with range of 8KB ROM and 256byte RAM.

Pin 9 is a reset pin. It is used to reset the microcontroller.

Pin 18 & 19 are used get system clock for the interfacing of external crystal.

Pin 20 of microcontroller is used to provide ground to the system and pin 40 is used to supply the power.

Two switches are connected to the P3.2 & P3.3 pins of micro controller. Once we push one of the switches the code will sent to the controller.

Micro controller has 4 data lines which sent the data in the parallel form to the encoder.

Encoder used is HT12E. It is having18 pins. In which the Pin 10 to 13 are data pins which receives the data from microcontroller.

Pin 1 to 7 are 8-bit address bits. These pins are used to match the data of encoder and decoder to pair them together.

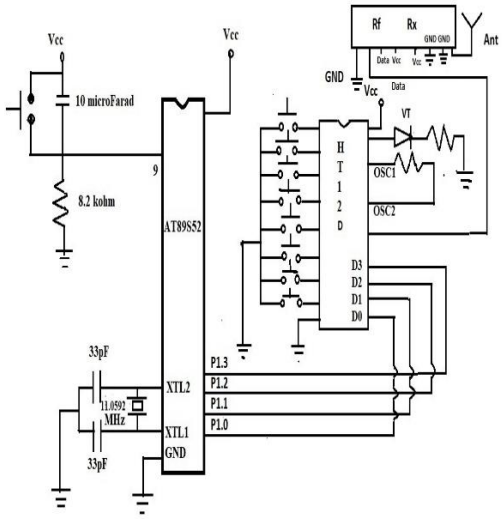
Pin 14 is TE which is used to enable the transmission. If it enables then data will send to output pin (17) and then it gives input to data pin of RF transmitter.

Pin 15 & 16 have a in built oscillator. These can be used by connecting these 2 pins through a resistor.

The frequency of RF Transmitter used is of 434mhz. This is having 4 pins listed as VCC, Ground, Data and antenna.

First pin VCC is supply the 5V power the transmitter. Data pin is used to receive data from encoder. The data received by data pin is in the serially and then these data will then send antenna, where through the antenna data will transmit the received data.

B. Receiving Section:



Fig(f): Circuit diagram of receiving side

Circuit diagram of receiving section is as shown in the above fig. this section consists of an RF Receiver, decoder and a micro controller.

The RF receiver used to receive the data transmitted from transmitter. These receiver is having 8 pins which consist of 3 ground pins, 2 data pins, 2 VCC pins and 1 antenna.

VCC pins are used to power the decoder and antenna is used to received the transmitted data from transmitter. 3 grounds are shorted together. Antenna pin will receive the data from transmitters antenna.

Data pins are short with each other to get one output. These pins takes data from transmitter And give it to decoder as its input.

Decoder used is of 18pins. It decodes the data from transmitter and give that decoded data to the microcontroller.

Data pin 14 takes the data serially from HT12E. And Pins 10 to 13 are decoding the data and send it parallelly to the micro controller.

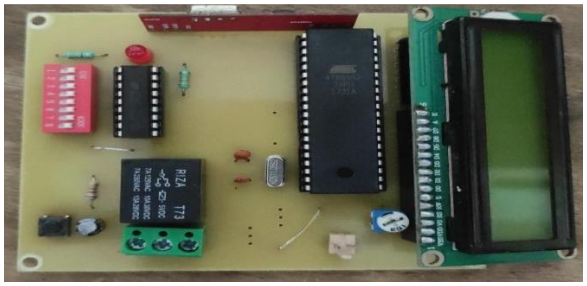
VT Pin is enabled when data is received.

The micro controller takes the data from decoder. Further when we start the relay unit it
will send signal to charging system and hence charging process will start.

The relay used is of Darlington pair. The use of Darlington pair causes high current output which is required for the system.

5.Model Section

Fig(e):Transmitter section



Fig(f): Receiving section

6.ADVANTAGES

- To charge the EV wirelessly.
- Display battery charging % on LCD
- Indicate or provide alert when battery % become low
- Cut the supply automatically when battery charges fully avoid over charging

FUTURE SCOPE

Since the medium for energy transfer is air, there are some losses in wireless charging .These losses need to be eliminated or minimize in future

CONCLUSION

In this project, A wireless charging system for EV will be implemented .Along with this ,LCD will now the battery percentage & auto cut the supply when battery get charged to desired value .Battery percentage will be measured by microcontroller & displayed on 16*2 LCD.

In this project we studied about different wireless charging method & finalized specification project by combining .al l the study we did we have chosen components.

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