WIRELESS POWER TRANSMITTING HIGHWAYS

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ABSTRACT

Wireless power transfer (WPT) is one of the hottest topics being actively studied, and it is being widely commercialized. In particular, there has been a rapid expansion of WPT in mobile phone chargers, stationary charging electric vehicles (EVs), and dynamic charging EVs, also called road-powered EVs (RPEVs). The technology for wireless power transfer (WPT) is a varied and complex process. The demand for electricity is much higher than the amount being produced. Generally, the power generated is transmitted through wires. To reduce transmission and distribution losses, researchers have drifted towards wireless energy transmission. There are separate methods proposed for shorter and longer distance power transmission; Inductive coupling, Resonant inductive coupling and air ionization for short distances; Microwave and Laser transmission for longer distances. The pioneer of the field, Tesla attempted to create a powerful, wireless electric transmitter more than a century ago which has now seen an exponential growth. Electrified transportation will help to reduce green-house gas emissions and increasing petrol prices. Electrified transportation demands that a wide variety of charging networks be set up, in a user-friendly environment, to encourage adoption. Wireless electric vehicle charging systems (WEVCS) can be a potential alternative technology to charge the electric vehicles (EVs) without any plug-in problems. In addition, it also includes wireless transformer structures with a variety of ferrite shapes, which have been researched. WEVCS are associated with health and safety issues, which have been discussed with the current development in international standards.

Keyword : - *Capacitor, Resistors, IC555 timer circuit, Mosfetirfz5, Copper wire 3 Awg 30 turn, Battery 12V(rechargeable), Electrical Motor, Servomotor, RFid-RC52, Arduino, Heat sink Relay module, I2C LCD display, Switch, Solar panel*

1. INTRODUCTION

This project is mainly developed to increase the use of electrical vehicles which leads to the minimal use of petrol and diesel vehicles which is being the major problem in recent times and also in this project the power being transmitted is being generated from solar energy which is a renewable energy source.

1.1 BUILD PRINCIPLE

In this paper, we are considering copper coils (20 turns) in rectangular shape which are used to transmit power. We are placing one coil attached to the car and the remaining coils under the road which is being energised by the battery which is connected to a solar plate. We are using RFID technology in this project which is acting as a toll gate entry pass.

For short range transmission there are three methods available so far:

- Inductive Coupling: To transmit power by electromagnetic induction.
- Resonant Inductive Coupling: To transmit power by induction between coils at resonance.
- Air Ionization : To transmit power by ionizing the medium i.e air.

For long range transmission there are two methods proposed:

- Microwave transmission: To transmit power by long distance power beaming with shorter wavelengths,in microwave range.
- Laser transmission: To transmit power by converting electricity into a laser beam that is then pointed at a photovoltaic cell.

2. PROBLEM IDENTIFICATION

Dynamic wireless charging of electric vehicles on the move with Mobile Energy Disseminators was one of the previous project in which the power transmission is done from one vehicle to another vehicle using wireless power transmitting technology, in this technology we will be having a source vehicle in which the power to transmit is being stored and from which the power is transmitted so, in this project we can't charge the vehicles if there few vehicle as the transmission happens from one vehicle to another vehicle and also a vehicle needed to wait until and unless a power source vehicle to travel on the road so to overcome these problems we developed wireless power transmitting highways so that no vehicle is needed to wait until the source vehicle comes and also even there are few vehicles on the road power transmission is possible and vehicles can travel on road freely.

3. METHODOLOGY

3.1 RFID TECHNOLOGY

We are using 3 RFID cards and a RFID scanner in this project. This RFID scanner is placed in the beginning of the project i.e, when a RFID card is scanned by a RFID scanner then if once a card is given access the gate opens itself if the card is not given the access then the gate won't be opened and also for a easy understanding of this to the user we attached a LCD display connected to the scanner. For the gate setup we are using a servo motor with a prefixed angles and also at the time of coding we allot a particular time slot for the gate so that whenever a vehicle is given the access then the gate will be opened for sometime so that the vehicle can pass through the gate

3.2 WPT TECHNOLOGY

Wireless power transmission technology is the main part of this project. In this paper we are winding the copper cables in rectangular shape upto 30 turns, we are taking 4 coils and one is being attached to the vehicle and the rest are placed under the road. These coils which are under the road are connected to the IC and battery as shown in the below figure. Now the energy which is stored in the battery is being travelled to the copper coils and this energy is being converted into magnetic field and being transferred to the coil placed under the car, now the car is being energized and starts moving without using any other power source.

3.3 PHOTOVOLTAIC ENERGY (SOLAR)

Photovoltaic energy is the converted electric energy from solar energy using solar plates. In this project the battery used to transfer power to coils under the road is being connected to the solar plate, as we use a rechargeable battery the solar energy is being converted and stored in the batteries in this case and used whenever require

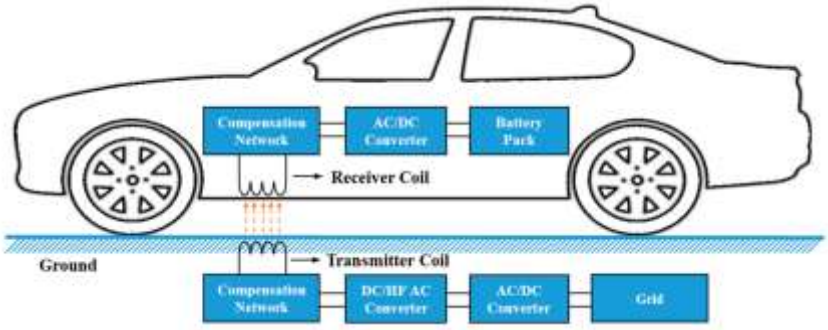

Fig -1 Typical Inductive power transfer system for Electric Vehicle (EV) charging.

4. DESIGN AND SOFTWARE

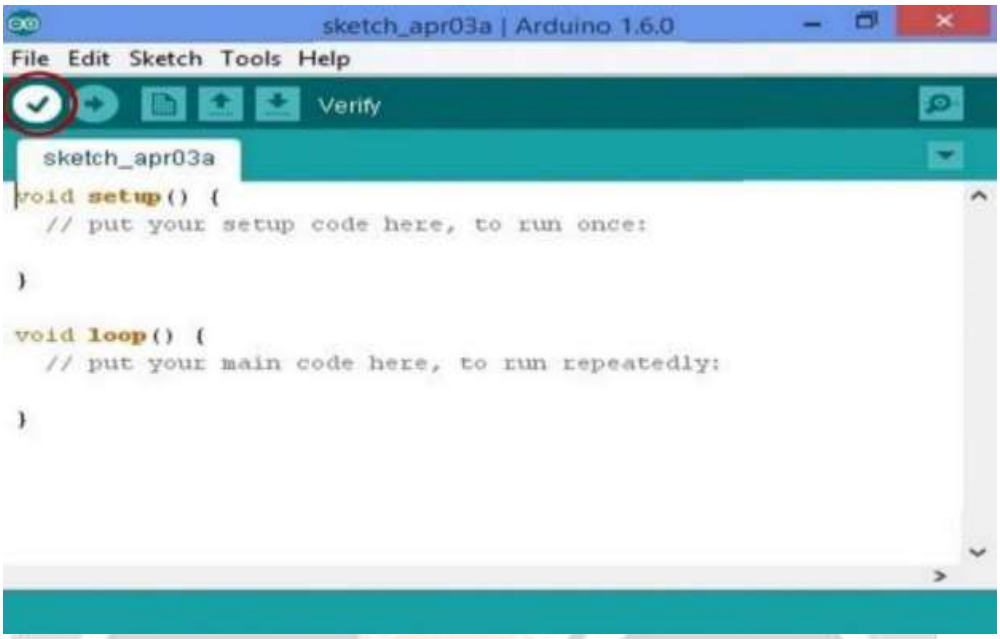

Fig 4.1 Verify In Arduino Software

- RFid module GND(ground) pin is connected to the GND(ground) pin of arduino module
- RFid module SCK pin is connected to the 13th pin of arduino module
- RFid module TX(transmission) pin is connected to the 12th pin of arduino module
- RFid module MOSI pin is connected to the 11th pin of arduino module
- RFid module RX(receiver) pin is connected to the 10th pin of arduino module
- RFid module RST(reset) pin is connected to the 9th pin of arduino module
- Servomotor orange signal/PWM pin is connected to the 8th pin of arduino module
- Switch is connected to the 7th pin of arduino module
- Relay module GND(ground) pin is connected to the 6th pin of the arduino module
- RFid module Vcc pin is connected to the 3.3V output pin of arduino module
- Servo Motor +ve(red) terminal pin and I2C LCD display Vcc pin is connected to the 5V output pin of arduino module
- Servo Motor -ve(brown) terminal pin and I2C LCD display GND(ground) pin is connected to the ground pin of arduino module
- Relay module Vcc pin is connected to the GND(ground) pin of the arduino module
- Relay module IN(input) pin is connected to the input voltage pin of the arduino module
- I2C LCD display SDA pin is connected to the A4 pin of the arduino module
- I2C LCD display SCL pin is connected to the A5 pin of the arduino module

5. RESULTS

The Results which are obtained from the implemented circuit diagram are represented below as follows:

Fig 5.1 Overall Connections

In the above Propose system, the Arduino Uno board with I2C LCD display, Relay module, RFid,servo motor, switch, heat sink,battery,IC555,Solar panel are attached on a wooden board. The Arduino Uno is a Credit card sized single board that operates on the microcontroller. The Programming in Arduino Uno is done in Embedded C language

6. CONCLUSION

By this we want to conclude that wireless power transmission from roads to electrical vehicles can be done and can be handled and maintained easily. Due to this the usage of electrical vehicles also increase and the usage a fuel vehicles like petrol and diesel vehicles decreases which leads in the decreasing of pollution being caused by them.we can control greenhouse effect and also the pollution caused and as we are using non-conventional energy this is also economically very friendly and can be implemented on highways very easily without and difficulty as we need not carry large power lines to transmit power from one end to another end.

7. REFERENCES

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