WIRELESS CHARGING STATION

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Abstract

System for charging electrical vehicles such as cars. Wireless charging is based on inductive charging, whereby power is created by passing an electric current thrugh two coils to create an electromagneric field.When the receiving magnetic plate on the car comes into contact with the transmitter or at least within the specified range, the magnetic field generates an electrical current within the device.

The battery of 12 volt is used for supply and the output of this battery is given to the regulator IC which convert this 12 volts dc into5 volts dc and the output of this regulator IC is given to the two IC's called IC 555 or timer IC and op-amp LM 358 the output of the IC 555 is given to the input of LM 358 and the output of LM 358 operational amplifier is given to IGBT the output of this IGBT is given to the transmitter coil and this transmitter coil produce magnetic induction which is received by receiver coin and the input is given to the bridge rectifier which convert it into pure DC and input of this bridge rectifier is given to the filter capacitor and output of this capacitor is given to the vehicles battery regulator IC is also connected which convert this voltage into 5 volts dc and this 5 volts dc is given to you pic microcontroller which is connected to LCD

Literature Review

Vast work has been done at National and International level but a specific information not been publishing or not available in detailed. Following are the generalized review about the work done at National and International level related to the topic of this project.

[1] Sarita C Singh ET Bureau, "Government plans new policy to promote electric vehicles''.
According to this research paper the government is giving a fresh proposal which will first creating favourable ecosystem in various polluted cities according to their population of over four million and gradually moves the operation towards less populated cities. The government is preparing a fresh policy of electric vehicles, which will start at small scale for smoother operation to make people aware about electric vehicle and technology. Form this paper it is clear that government is taking action towards electric vehicle and technology.

[2] Ronak Shah, "Government finally wakes up: Sets a realistic goal of 30% vehicles by 2030 from existing 100% target".
Form this paper India is likely to issue a new tender to meet the growing demand of electric vehicles. And the India's national E-mobility program aims to provide a momentum to entire E-mobility ecosystem which includes electric vehicles manufactures, charging infrastructure, fleet operators, service providers etc. Form this paper it is clearly indicating that India require a rigid system to run the entire E-mobility ecosystem.

[3] Bhanvi Arora, "India's Sputtering Electric Vehicle Ambition Need Direction".
Form this research paper we came to know that how much percentage of vehicles is using how much amount of fuel, and according to this survey the Indian government will push the electrification in the country. Which show that which automobile will come first and last in electrification.

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[4] Manoj Kohli, "Global electric vehicle revolution by 2020".
According to this paper every automaker is developing or has developed the electric vehicle for launch in future. The transportation sector emitter 25% of greenhouse gasses making it second largest contributor of house gasses. The greenhouse gasses emission has been increased by 30% in last several decades. To cut greenhouse gasses emission and maximize the use of renewable energy adaptation, the replacement of internal combustion engine with electric vehicle is required.

[5] Sarwant Singh, "Global Electrical Vehicle Market Looks to Power Up in 2018".
This paper indicates the fast in electric vehicle technology and also the problems associated with this technology. The batteries used for smoother and high performance of vehicle has been discussed and also the need for more charging station which shows that optimization of charging station is required and a strong technology is required for charging of electric vehicle batteries.

[6] Muhammad Saad, "Feasibility of Energy Efficient Wireless Power Transmission in Electric Vehicles''.
This paper provides the use of future technology called wireless power transfer technique. The wireless power transfer works on the principle of electromagnetic induction. The electric vehicle can be charged by creating resonant coupling between electromagnetic field of road embedded transmitting coil and vehicle embedded pick up coil. The main advantage if this technique is that the vehicle can be charged in motion also.

[7] James f. Miller, Urs Muntwyler, "International Cooperation on Public Policies and Strategies for Hybrid and Electric Vehicles under the International Energy Agency".
This research paper is based on a technology collaboration program established by the international energy agency has 29 member countries and runs 39 collaborative research programs. The aim is to speed up the technical and non- technical problem solving in the field of technology for energy efficiency and use of renewable energy to refuse greenhouse gas emission. And one of the key technologies is motorized traffic. And this agency is working on optimization of charging station.

[8] Dale Hall, Nic Lutsey, "Emerging Best Practices for Electric Vehicle Charging Infrastructure".
This report provides a global assessment of charging infrastructure deployment practices and challenges. It finds outs the installation of charging point at various point like public and private places. And gives us the idea about the barriers which come across in installation of charging point or charging station.

[9] Global Data Energy, "Electric vehicle market gaining momentum in India".
On the basis of this paper the number of electric vehicles is increasing fast and Indian government uses a policy showing strong commitment for use of electric vehicle technology, charging station and service for charging.

[10] Malyaban Ghosh, "How India fares in the electric vehicle race".
This paper clearly indicate that India is aiming to reduce the cost and bills which are related to overall use of oil and overall reduction of pollution. Form this paper it is clear that electric vehicle will play important role to achieve this goal.

Scope of work
After reviewing the research work carried at National and International level it is been observed that a huge scope with respect to following areas is available for research.

- Optimization of charging system.

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- Using wireless power transfer technique.
- Using Application based system.
- Reduction in environmental pollution

INTRODUCTION

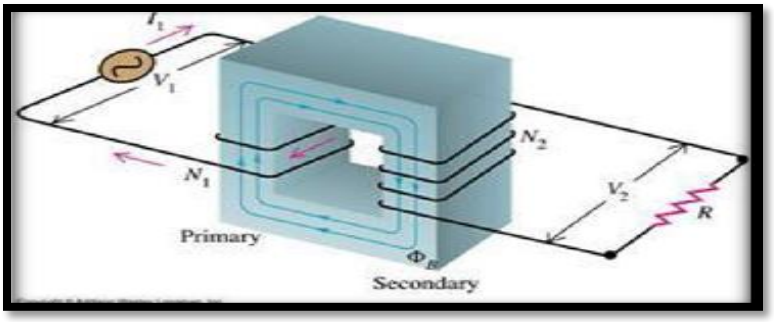
The wireless solution is increasingly spreading as method of battery charging for Electric Vehicles. The standard technology of wireless EV battery charging is based on the Inductive Power Transfer (IPT) between two coupled coils, one connected to the electrical power supply and the other one connected to the rechargeable battery. Charging of an electric vehicle can be performed by either conductive (or wired) charging or wireless charging. Wired charging uses connection means between electric supply and charge inlet of the vehicle. Even though wired charging is popular, the problems with messy wires and safety matter in wet environment are a major drawback of this charging. Wireless charging of the EV batteries offers a number of advantages compared to the wired counterpart; indeed, wireless charging makes it) unnecessary any plug, cable or outlet, ii) friendly the charging process, iii) fearless the transfer of energy in any environmental condition, and so on. For these reasons, WPTSs are expected to play a major role in the future charging process for the EVs.

WIRELESS CHARGING

Wireless charging is a method of charging batteries without the use of cable or Physical connection with the device specific AC adaptors. Essentially wireless charging (wireless power transfer or Inductive Charging or Cord-less Charging) uses electromagnetic fields to safely transfer power from a transmitting source to a receiving device for the purposes of wirelessly charging (or recharging) a battery. As the name suggests, it does so without the use of a physical connection.

INDUCTIVE CHARGING

Inductive charging works on the principle of transformer. A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors—the transformer's coils. A varying current in the first or primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic field through the secondary winding. This varying magnetic field induces a varying electromotive force(EMF) or "voltage", in the secondary winding. This effect is called mutual induction.



Basic Transformer

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Electrostatic induction

The "electrostatic induction effect" or "capacitive coupling" is an electric field gradient or differential capacitance between two elevated electrodes over a conducting ground plane for wireless energy transmission involving high frequency alternating current potential differences transmitted between two plates or nodes. The electrostatic forces through natural media across a conductor situated in the changing magnetic flux can transfer energy to a receiving device (such as Tesla's wireless bulbs). Sometimes called "the Tesla effect" it is the application of a type of electrical displacement, i.e., the passage of electrical energy through space and matter, other than and in addition to the development of a potential across a conductor.

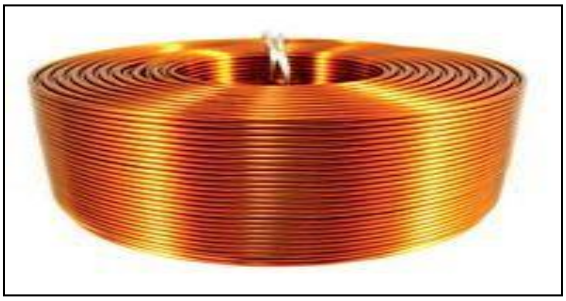
Transmitter Coil

Power supply is given to the primary coil. It acts as the Transmitter. Copper coil is wound into number of turns as per the requirement .when the power is supplied to Transmitter the coil energizes and results in the magnetic coupling. Hence the power is transferred.

Transmitter coil

Receiver Coil

Receiver coil is similar to that of transformer primary coil. The secondary receiver coils are similar designs to the primary sending coils. Running the secondary at the same resonant frequency as the primary ensures that the secondary has a low impedance at the transmitter's frequency and that the energy is optimally absorbed. To remove energy from the secondary coil, different methods can be used, the AC can be used directly or rectified and a regulator circuit can be used to generate DC voltage.



Receiver coil

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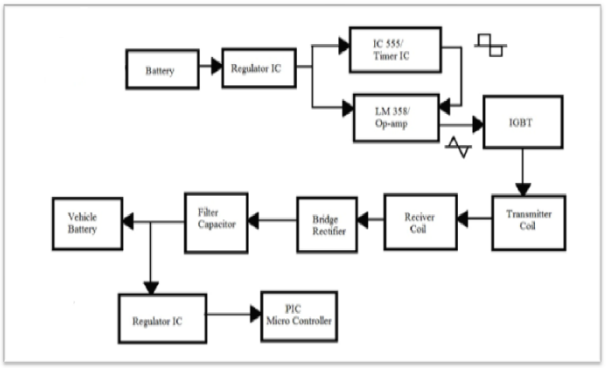
BLOCK DIAGRAM



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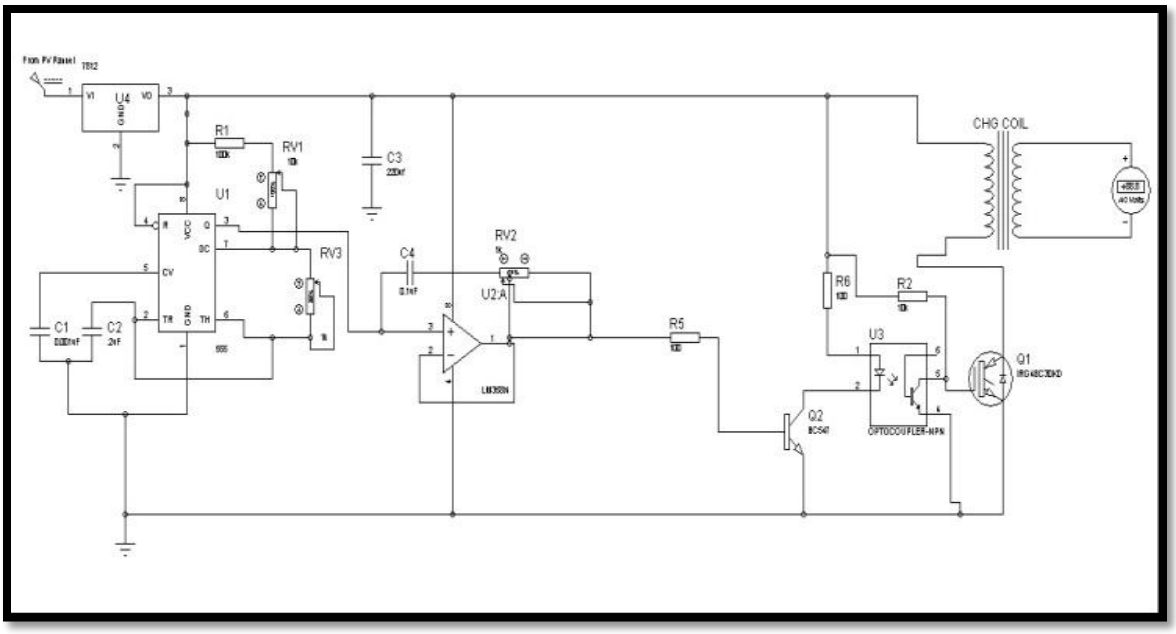
CIRCUIT DIAGRAM



Transmitter Circuit Diagram

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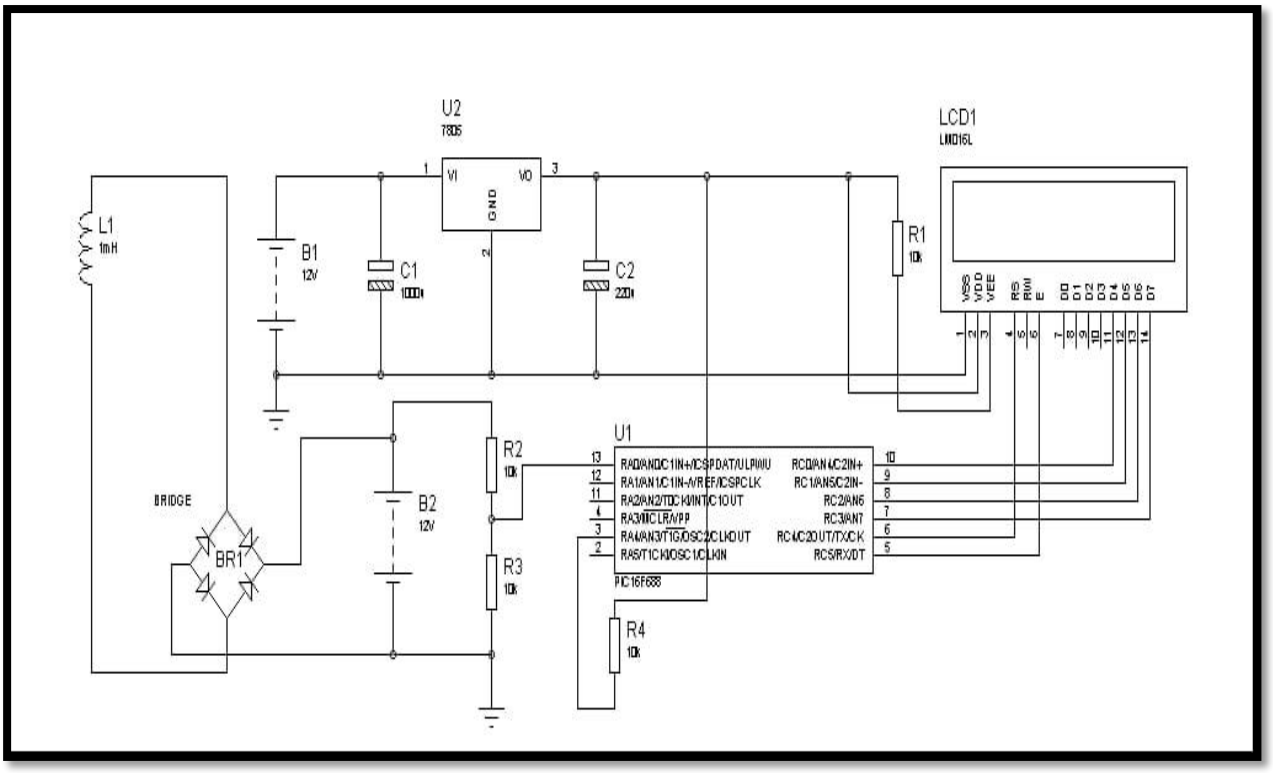

Reciever Circuit Diagram

Circuit Working

A 12 volts D.C supply is given to the circuit and this 12 volts D.C is converted into 5 Volts through regulator IC and this 5 volts D.C is given to the timer and wave shaper. The first IC is IC555 which is used as timer and it generate continues clock pulses which are also called as PWM pulses. A 0.22 Microfarad capacitor and 10k ohms resistor are used for generation of 5 kHz frequency by this IC. Two potentiometer are used which control ON and OFF time. Duty cycle is maintained in such a way that one will work on positive half cycle and another one will work on negative half cycle. Output of this IC is given to the wave shaping IC which is an operational amplifier LM358, Which gets the input in form of square wave and it convert this square wave into triangular wave. And angle of these triangular waves can be adjusted through variable potentiometer. The output of operational amplifier is given to the gate of IGBT and between drain and source the transmitting coil is connected which continuously get on and off which produce EMF in transmitting coil this EMF is transferred to secondary coil through air core induction. The EMF generated are AC signals because the pulses in transmitting coil are triangular and for charging any battery a DC voltage is used, so that a bridge rectifier is used to get pure DC Signal. The output of this bridge rectifier is stored in a filter capacitor and 38 volt dc supply is taken as output and this output is taken out for charging the battery. Same battery is used to power the whole circuit, the reason behind in making of the circuit is to check the power generated. A pic microcontroller is used in the circuit, battery is of 12 volts but pic microcontroller works on 5 volts a regulator IC is used which convert 12 volts into 5 volts and power up the microcontroller and LCD. A storage capacitor is used which stores 5 volts and to maintain input fluctuation another storage capacitor is connected. Three resistors are used from which two are used for pull up and one is used to maintain the contrast of LCD which is used for monitoring of voltages.

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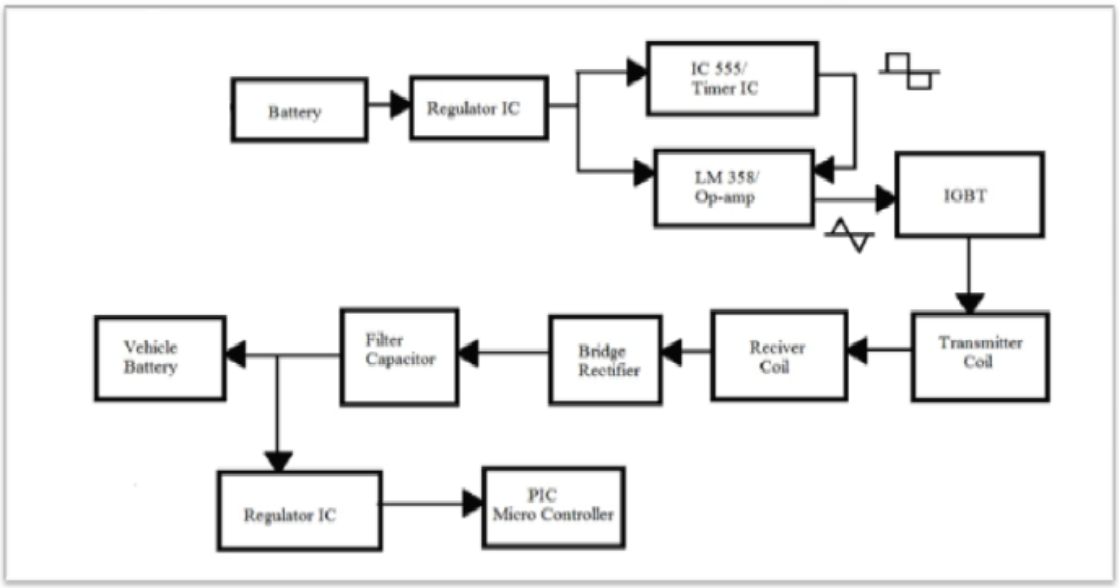
CONCLUSION

In this project wireless charging through inductive coil has been performed.Using solar panel as the source of energy, first the battery has been charged and the energy stored in the battery has been given to PWM circuit which gives power to transmitting coil,the power through transmitting coil is received by receiving coil which is placed inside the vehicle. Battery of this vehicle get charged through this power and the charging voltage can be seen on the screen. The charging ports for particular vehicles can be removed by using this technology. This wireless charging can be installed at various bus stand to change the bus by parking it properly.



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