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Wireless Charging Electric Vehicle with Management Unit

Prof. Vishal Vaidya, Gayatri Narendra Maid, Bhagyashree Bhandwalkar, Swapnali Prataprao Badgujar
Department of Electrical Engineering
Sir Visvesvaraya Institute of Technology (SVIT), Nashik, Maharashtra

Abstract: *Now a day's world is shifting towards electrified mobility to reduce the pollutant emissions caused by nonrenewable fossil fueled vehicles and to provide the alternative to pricey fuel for transportation. But for electric vehicles, traveling range and charging process are the two major issues affecting its adoption over conventional vehicles. Method of dynamic wireless charging allows to keep the vehicle charge while running. To overcome the issue of charging process, a wireless charging & battery management unit for electric vehicle is designed. In this project, a wireless charging system will be implemented. Along with this, a battery management unit will be design, which will show the battery percentage & auto cut the supply when battery get full. For charging stations, an AC to DC converter system is used along with wireless power transmitter. Whereas in vehicle, wireless power receiver system is used. These both transmitter and receiver will be inductively coupled to transfer maximum power. This wirelessly received power will be regulated and given to battery for charging. To measure battery voltage, a voltage sensor is used. Battery voltage will be measured by microcontroller & displayed on 16x2 LCD. It will also display battery low status, whenever battery voltage fall below certain level. To avoid overcharging, microcontroller will turn off the charging trough relay when battery gets full.*

Keywords: Arduino, Ohm's Law, PCB, Capacitor, Relay

I. 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%.[1] 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. Method of dynamic wireless charging allows to keep the vehicle charge while running. To overcome the issue of charging process, a wireless charging & battery management 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 high frequency AC is transmitted from the charger to the secondary side and then is converted to DC power and is supplied to the battery pack [2]. 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. Along with this, a battery management unit will be design, which will show the battery percentage & auto cut the supply when battery get full. Battery voltage will be measured by microcontroller & displayed on 16x2 LCD.

II. METHODOLOGY

1.1 BLOCK DIAGRAM

1.2 BLOCK DIAGRAM DESCRIPTION

In this project, a wireless charging system will be implemented with battery management unit for electric vehicle. Along with this, a battery management unit will be design, which will show the battery percentage & auto cut the supply with the help of relay when battery get full. For charging stations, an AC to DC converter system is used along with wireless power

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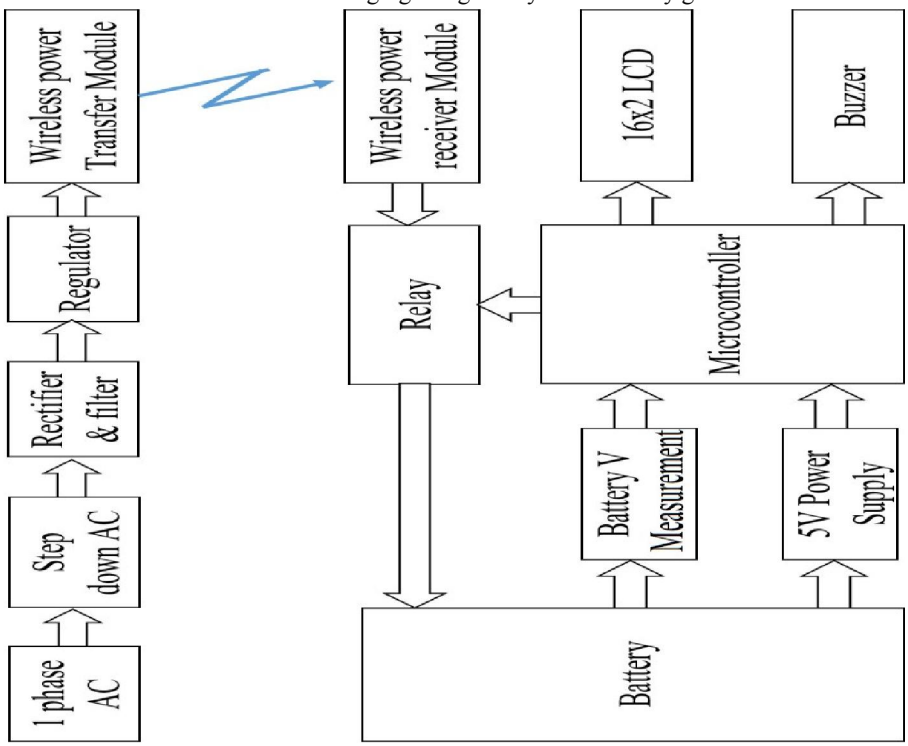

III. RESULT & APPLICATION

1. Hardware Results

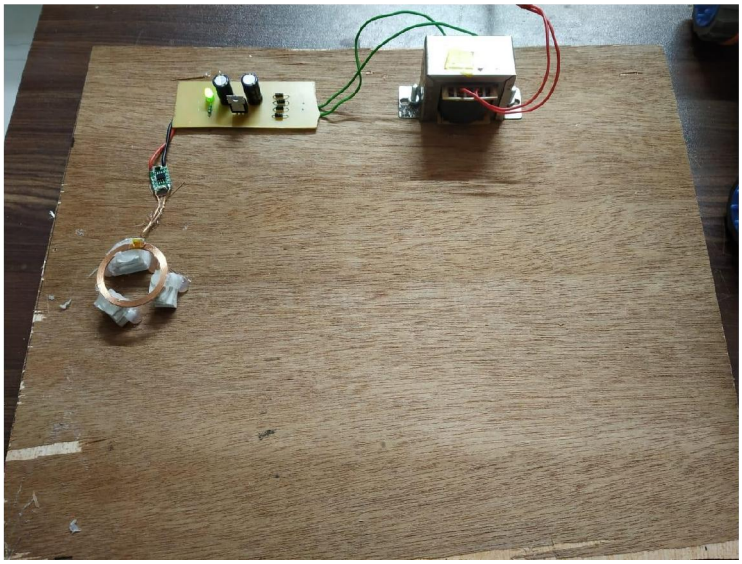

Figure 1: Charging Station

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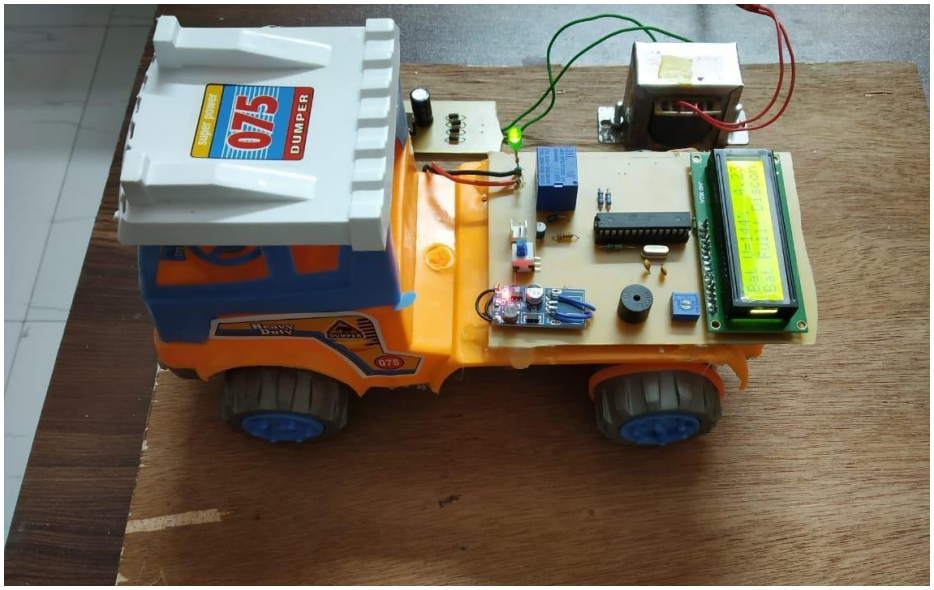

Figure 2: Vehicle Module

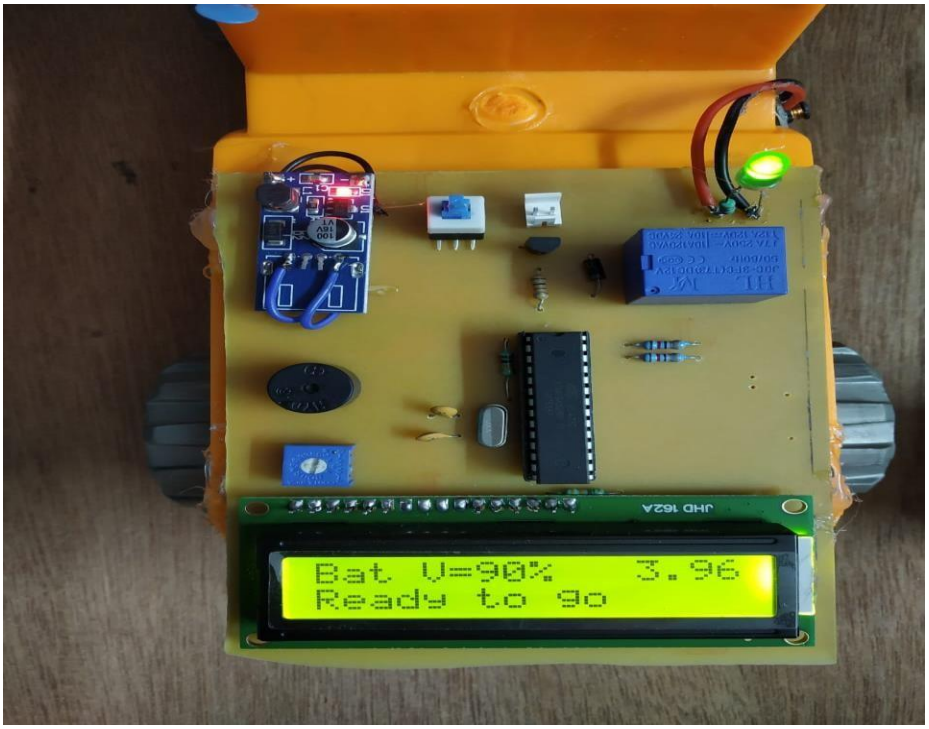

Figure 3: Working of Vehicle Module

APPLICATION

For cars

For public transport

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Transportation is the major concern in the development of any country. Whereas electric vehicle is the future of transportation industry. While a lot of research has been done on this topic in the previous decade, a large part of it is yet to be explored. In this project, a wireless charging system will be implemented. Along with this, a battery management unit will be design, which will show the battery percentage & auto cut the supply when battery get full. Battery voltage will be measured by microcontroller & displayed on 16x2 LCD.

In this project, we studied about different wireless charging methods. By combining all the study we did, we have chosen components & successfully designed cost effective prototype.

IV. APPENDIX

1. ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

2. OHM'S LAW

Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points. Introducing the constant of proportionality, the resistance, one arrives at the usual mathematical equation that describes this relationship:

$$V=IxR$$

Where I is the current through the conductor in units of amperes, V is the voltage measured across the conductor in units of volts, and R is the resistance of the conductor in units of ohms. More specifically, Ohm's law states that the R in this relation is constant, independent of the current. If the resistance isn't constant, the previous equation can't be called Ohm's law, but it can still be used as a definition of static/DC resistance. Ohm's law is an empirical relation which accurately describes the conductivity of the vast majority of electrically conductive materials over many orders of magnitude of current. However some materials do not obey Ohm's law, these are called non-ohmic. The law was named after the German physicist Georg Ohm, who, in a treatise published in 1827, described measurements of applied voltage and current through simple electrical circuits containing various lengths of wire.

V. CONCLUSION

Transportation is the major concern in the development of any country. Whereas electric vehicle is the future of transportation industry. While a lot of research has been done on this topic in the previous decade, a large part of it is yet to be explored. In this project, a wireless charging system will be implemented. Along with this, a battery management unit will be design, which will show the battery percentage & auto cut the supply when battery get full. Battery voltage will be measured by microcontroller & displayed on 16x2 LCD. In this project, we studied about different wireless charging methods. By combining all the study we did, we have chosen components & successfully designed cost effective prototype.

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