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WIRELESS ELECTRIC CHARGING AND MANAGEMENT UNIT

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Abstract –*In this paper, we expose and discuss the importance of application of recharge systems to an electrical vehicle also overviews novel technique for wireless charging system of electric vehicle in which verifies the developed theory using battery charger application of electric vehicle . In electric vehicle charging of battery through charger and wire is inconvenient, hazardous and expensive. The existing gasoline and petrol engine technology vehicles are responsible for air, noise pollution as well as for greenhouse gases. The implemented wireless charging system of battery for Electric vehicle by inductive coupling method has been presented in this paper. The driving circuit is used between the transmitter coil & receiver coil where MOSFET is used for switching operation. The transmitter coil circuit is turn ON and OFF whenever the vehicle is present and absent respectively. The system is achieves 67% efficiency level while providing safety, reliability, low maintenance and long product life .*

Key Words: 1. Wireless power transfer 2. Electric vehicles 3. Inductive Power Transfer 4.Battery Charging

1 .INTRODUCTION:

In 1891, Nikola Tesla has proposed an idea of wireless power transmission and he demonstrated the first wireless power transfer system for illumination. Sometimes connecting too many wires in small power sockets becomes inconvenient and hazardous. The First electric vehicle practically implemented by Thomas Parker in 1884. Until 1859 rechargeable batteries are not available for storing electricity, French physicist Gaston Plant invented lead- acid battery and reduced the drawback. Electric vehicles are more popular in many countries, the electric vehicles are small or large in size such as buses, car is large and two wheelers, electric bicycles are small. Electric vehicles are same as like normal vehicles, but electric motor is used in electric vehicle for propulsion purpose, for power supply of that motor battery is used [6]. The new types of rechargeable batteries are available which is used because of small in size, as compared to conventional lead acid battery the energy storage capacity is higher, and weight is also less. The charging process is bulky for users in plug in electric vehicle because for charging battery, charger is required which is directly connected from vehicle or sometime battery is removing for charging purpose. By utilizing inductive power transfer technology this difficult charging process is simplified Electric vehicles are the best alternative for transportation to minimize use of petroleum products & reduction in pollution levels caused due to resources used presently.

Wireless Power Transmission (WPT) is thus an approach to noiseless, cost efficient and convenient charging. 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 time, a research on wireless charging & battery management unit for electric vehicle is still going on. 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. Inductive power transfer (IPT) method is design to deliver power wirelessly via magnetic coupling from a static transmitter to one or more movable secondary receiver. In between primary source and secondary load there is a large air gaps. The power supply is either single phase or three phases depending on the power requirement. WPT system generally consists of power supply, transmitter (primary coil), receiver (secondary coil), micro-controller, battery, sensors, matching circuit.

2. NEED-

Since the petroleum resources are limited, it is essential to develop alternative techniques for transportation. Whereas there are multiple resources to power electric vehicles are available But charging electric vehicle is though time consuming. Wireless charging system & Battery Management Unit for Electric Vehicle Transmission is thus an approach to noiseless, cost efficient and convenient charging. Because existing gasoline and petrol engine technology vehicles greenhouse gases are increases. Plug-in Electric Vehicles are implemented to achieve environmental friendlyand reduced extend of greenhouse gass.

There are some battery related problems such as slower charging rate, low energy storage capacity, size, and weight. To reduce battery related problems, greenhouse gases and to resolving the magnetic field radiation problem the concept of Wireless Power Transfer (WPT) system is developed.

3. DESCRIPTION OF THE PROJECT

In this design the hardware components that we use are:

- Microcontroller ATMEGA328
- Sealed Lead Acid Battery
- Wireless Power Transfer Module
- Boost converter Module
- 16 *2 LCD
- Current Sensor
- Relay
- Buzzer

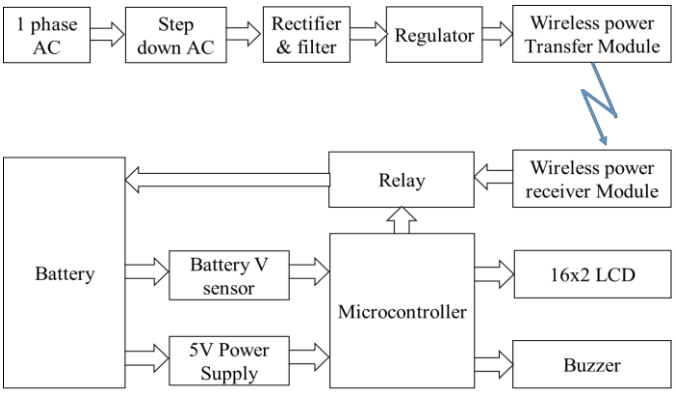


Fig: system block diagram

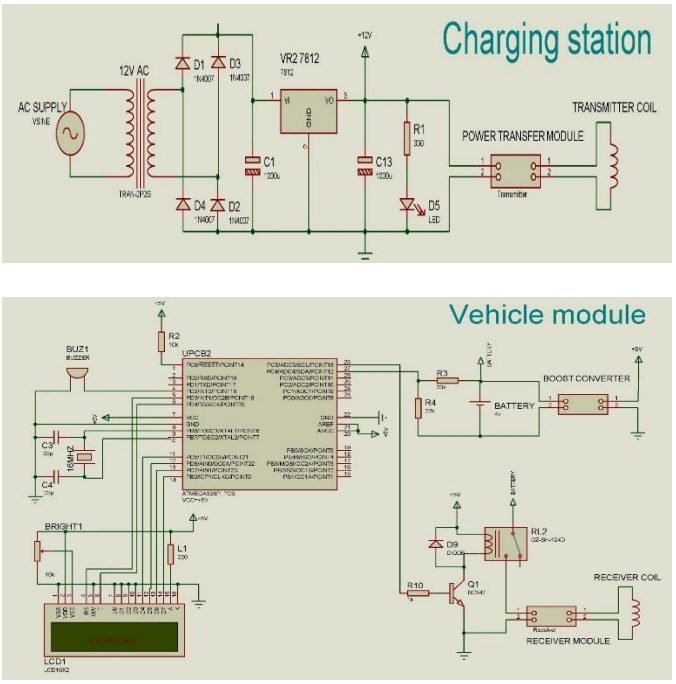
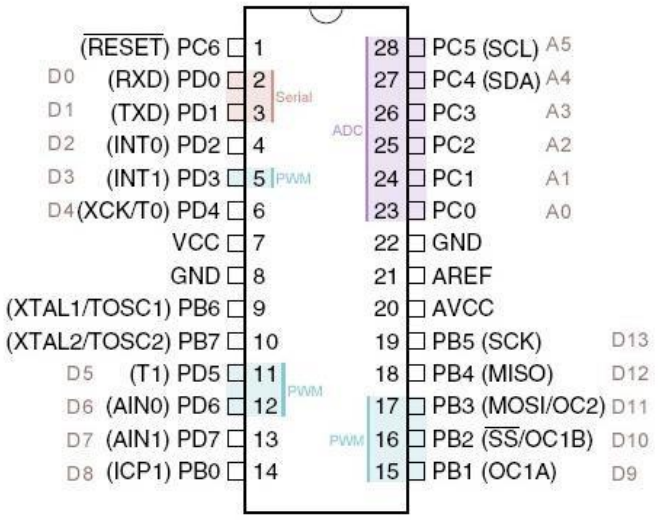


Figure : Circuit Diagram of System

3.1 Microcontroller ATMEGA328



Features:

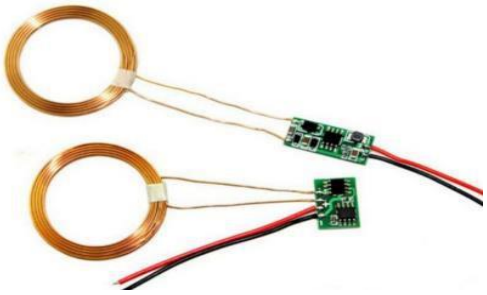
- Works on 5V, 2mA
- 28 pin IC with 20 GPIO pins
- 2 Serial ports
- 32 General purpose registers
- 2kb SRAM, 1kb EEPROM
- Programming Board: Arduino Uno
- Programming Software: Arduino IDE
- Programming Language: C

3.2 Sealed Lead Acid Battery :

Features :

- 4v, 1AH rechargeable battery
- Charging voltage required: 5v
- Long service life, float or cyclic
- Maintenance-free operation.
- Low self-discharge.
- Low cost

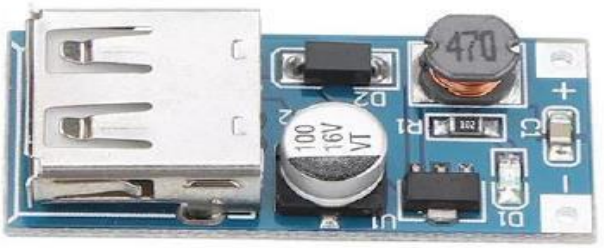
3.3 wireless Power Transfer Module :



Features:

- Transmitter Module Input voltage : 9-12 Volts
- Receives the output voltage : 5V
- Receiving the output current : 350-500mA
- Receiving usual distance : 3- 20mm
- No-load current : 40mA or so

3.4 Boost Converter Module



Features:

- Input voltage: 0.9-5V DC
- Output voltage: 5V DC
- Output Current: 500-600mA
- 96% conversion efficiency
- On board power led indicator

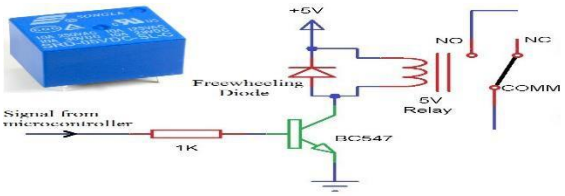
3.5 16*2 LCD :

Features :

- Operating voltage: 5V DC
- Operating current: 50mAmp
- Display capacity: 2 lines of 16 character each.
- Communication type: Parallel
- Memory storage: EEPROM inbuilt

Maximum operating temperature: 45 Degree Celsius

3.6 Relay :



Features :

- Operating voltage: 5v
- Operating current: 100mAmp
- Switching supply capacity: 12V DC, 30Apm & 250V AC, 10Amp
- Operating Temperature: 0-70 Degree Celsius

4. 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 prototype 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 and finalized specifications for project. By combining all the study we did, we have chosen components for designing the system prototype. In next phase we will start hardware implementation . A prototype practical system is developed with efficiency level of 67 % and results are verified. The system provides reliability, long life and safety

5. REFERENCES

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