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ijrset@gmail.com

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Wireless Charging of Electric Vehicles

Mr.D.V Kamble¹⁾, Rushikesh Mane²⁾, Shubhangi Benade³⁾, Snehal Patil⁴⁾, Atharv Mangave⁵⁾

Professor, Dept. of Electronics and Telecommunication Engineering, Sanjay Ghodawat Institute, Atigre, India¹

Student, Dept. of Electronics and Telecommunication Engineering, Sanjay Ghodawat Institute, Atigre, India^{2,3,4,5}

ABSTRACT: In recent years with the rapid development of the electric vehicles (EV) of new energy Industry, higher requirements are put forward for convenience, safety and reliability of the Electric Vehicles. Wireless power charging is done by inductive coupling. Inductive coupling can be done in both stationary and dynamic conditions. By reconfiguring the transformer and low energy loss and fewer demands on the primary circuit. Sufficient power for the battery can be transferred by the primary to the secondary without sufficient energy loss. Electric power is then transmitted to the chargeable battery which is electrically coupled to the secondary circuit through the air core transformer.

KEYWORDS: WIRELESS CHARGING OF ELECTRIC VEHICALS

I. INTRODUCTION

Wireless power transfer (WPT) has recently started to gain traction. This recent interest stems from the idea of smart cities, electrical cars and lack of power sockets. This system has no rigidity and can be stimulated to be used in any situation required. Inductive coupling is a method through which this can be carried out. Inductive coupling involves transfer of power without the use of the conventional wire system. A study carried out at the Massachusetts Institute of Technology involved conducting experiments on mid-range distances and they finally arrived at a non-radioactive method to increase its efficiency. The idea of WPT began when Nikola Tesla proposed to use the Earth's ionosphere to wirelessly transfer power over long distances.

II. LITERATURE SURVEY

1) John M. Miller, JNJ Miller plc Xiaodong Shi; Proposed:

The field of wireless charging of plug-in and battery electric vehicles (PEV) has grown exponentially in recent years to the point that today several companies offer commercial wireless chargers as aftermarket products for integration into light duty passenger vehicles [1]. Wireless power transfer (WPT) can be viewed as a revolutionary step in PEV charging because it fits the paradigm of vehicle to infrastructure interconnection and communication – wirelessly. Benefits of WPT are well known as a convenient, flexible, safe, and potentially automated means of passenger vehicle charging that has the potential to completely eclipse today's conductive charging. There are no cables to trip over, no heavy plugs and cabling to wrestle with during inclement weather, and no concerns about inadvertent disconnection or theft.

2) Staff Editor and Joachim G. Taiber;

Drivers of electric vehicles should be able to charge their car in the future while they are driving. This shall be enabled via inductive charging. Hereby, alternating current generates a magnetic field within a charging plate, which induces the current into the vehicle. The alternating current is transformed into direct current and is fed into the battery. Elektrobörse Smart house talked to Prof. Dr. Joachim G. Taiber, professor of the Clemson University International Center of Automotive Research (CU-ICAR) and technical expert of the IEEE Transportation Electrification Initiative, about the current state of this technology.

3) Grant Covic and John Boys;

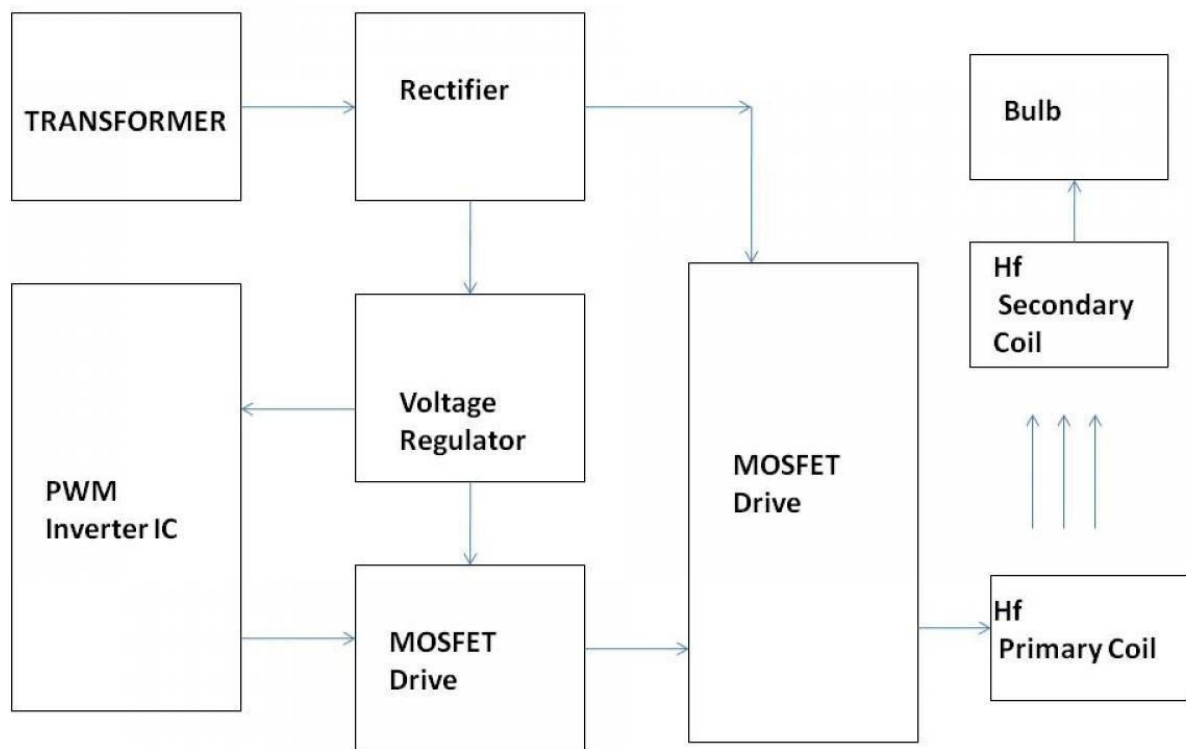
The development of wireless charging systems for electric vehicles has gained significant momentum over the past decade. Part of this is based on the desire of cities to push away from petrol and diesel powered vehicles to help provide cleaner cities, given the intense urbanization which is occurring globally, and partly because electric vehicles are

becoming more efficient and cost competitive. With wireless charging systems properly integrated into vehicles, and situated strategically around a city as well as at owners’ homes there should be no need to ever plug in their vehicles. Drivers should simply park as usual over a coil placed on the ground or buried in it.

Problem Definition

The proposed results provided strong evidence that the further development of wireless charging of EV. This would find wide variety of applications. Mainly systems such as wireless charging system of electronic machine. In such case this research will work out practically satisfying the need of the day efficiency Objective:

Block Diagram



Proposed Methodology of Solving Identified Problem

All publications (excluding conference articles and patents) on Wireless Power Transfer were downloaded from the respective database internet link of the Web of Science and Scopus and the following elements were stored: journal name, year of publication, paper title, amount citations, authors name, author’s affiliation and country. In this survey, only were considered. To assess the impact of the, information on citation was downloaded during August 2013, from respective databases. The collected data for bibliographic analysis was preprocessed by crediting each paper to all authors. This means that if a has more than one author, then the is credited to all authors.

III. SYSTEM COMPONENTS

A) TRANSFORMER

Transformers convert AC electricity from one voltage to another with a little loss of power. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high voltage to a safer low voltage.

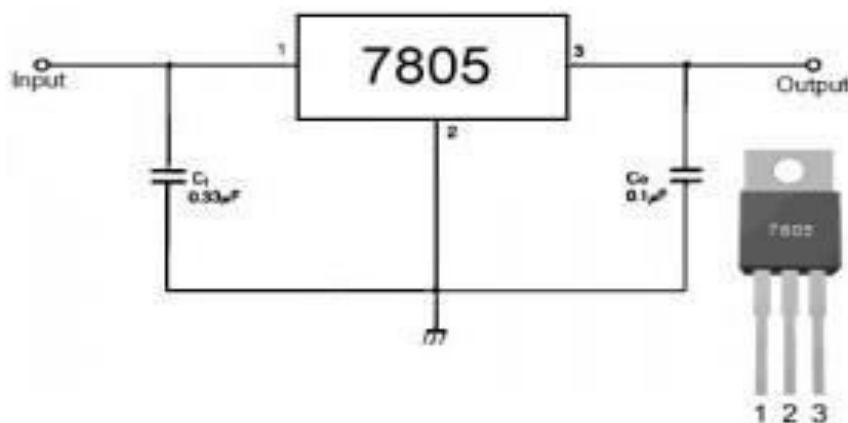
The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. The two lines in the middle of the circuit symbol represent the core. Transformers waste very little power so the power out is (almost) equal to the power in. Note that as voltage is stepped down and current is stepped up.



B) VOLTAGE REGULATOR 7805

Features

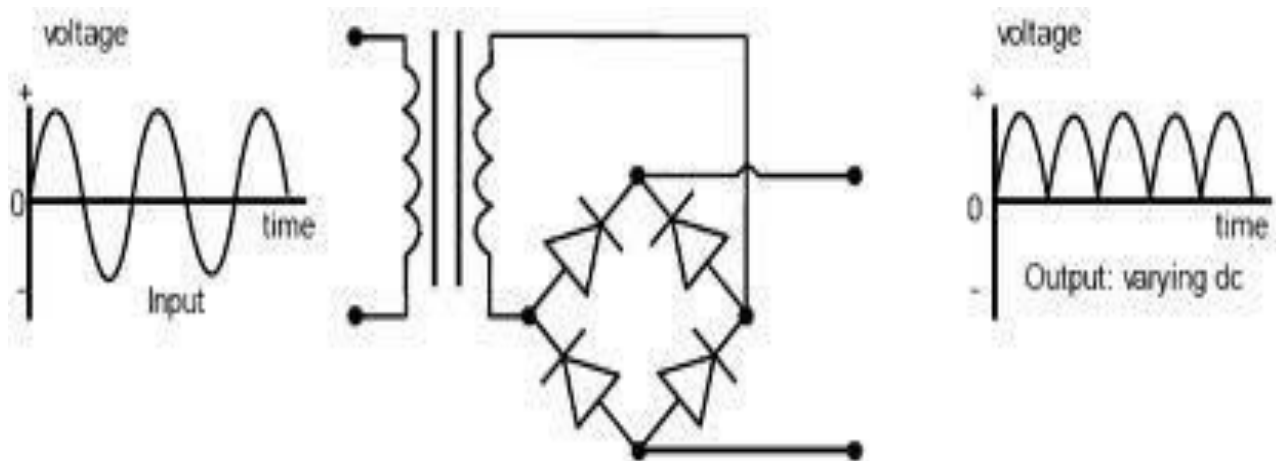
- Output Current up to 1A.
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V.
- Thermal Overload Protection.
- Short Circuit Protection.
- Output Transistor Safe Operating Area Protection.



The LM78XX/LM78XXA series of three-terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a Wide range of applications. Each type employs internal current limiting, thermal shutdown and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output Current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

C) RECTIFIER

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), current that flows in only one direction, a process known as rectification. Rectifiers have many uses including as components of power supplies and as detectors of radio signals. Rectifiers may be made of state diodes, vacuum tube diodes, mercury arc valves, and other components. The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification. In positive half cycle only two diodes (1 set of parallel diodes) will conduct, in negative half cycle remaining two diodes will conduct and they will conduct only in forward bias only.



D) PWM INVERTOR IC

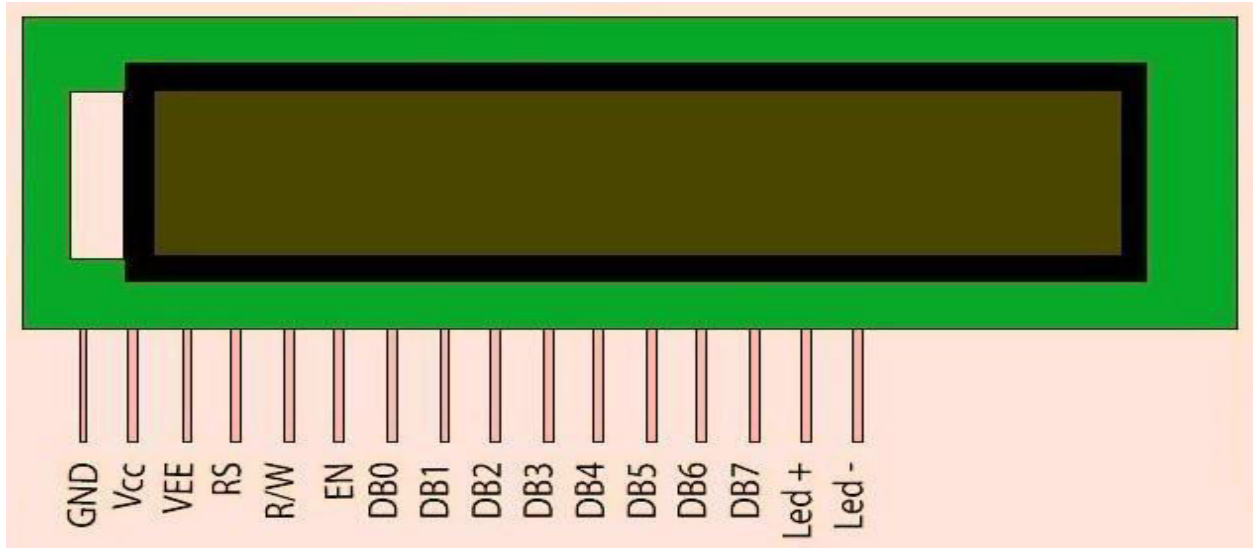
PWM (Pulse Width Modulation) signal based inverters are produce output as pure sine wave and it can be used for any electric appliance that meets the inverter output range. Simple and powerful PWM inverter circuit diagram designed with IC **SG3524** (Regulating Pulse Width Modulator) gives up to 230V AC from 12V DC supply.

E) LCD DISPLAY

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.



F) LED

LEDs are semiconductor devices. Like transistors, and other diodes, LEDs are made out of silicon. What makes an LED give off light are the small amounts of chemical impurities that are added to the silicon, such as gallium, when current passes through the LED, it emits photons as a byproduct. Normal light bulbs produce light by heating a metal filament until it is white hot. LEDs produce photons directly and not via heat, they are far more efficient than incandescent bulbs.

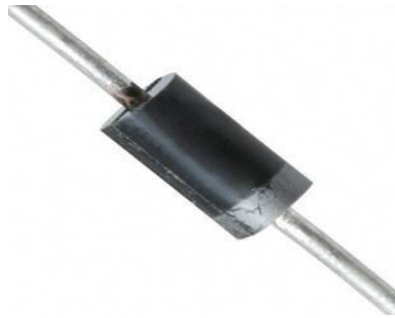


H) MOSFET DRIVE

A MOSFET driver is a type of power amplifier that accepts a low-power input from a controller IC and produces a high-current drive input for the gate of a high-power transistor such as an Insulated-Gate Bipolar Transistor (IGBT) or power MOSFET.

G) 1N4007

1. Maximum forward current capacity.
2. Maximum reverse voltage capacity.
3. Maximum forward voltage capacity.



Diodes are used to convert AC into DC these are used as half wave rectifier or full wave rectifier. Three points must be kept in mind while using any type of diode.

Advantages

1. Small electronic equipment charging.
2. Electronic equipment charging.

Disadvantages

1. The transmission distance is short.
2. The technology is not mature.

IV. CONCLUSION

This project leads to conclusions in different regions. Some of the important regions are considered here. Different coils are used to show the change in transmitted power. Wireless Power Transfer emerges as a suitable alternative to replace the conventional wired systems. As automobile application is considered, the fuel requirement will also reduce which will in turn reduce the cost and save the fuel reserves. Despite the large installation cost the wireless power transfer can be used for a large number of applications. The circuit is very simple to implement, so circuit complexity is also less as compared to wired systems. This assessed the state of Wireless Power Transfer based on the publications in the most important science and technology journals during the decade of 2001- 2013. USA, South Korea, China, and Japan lead Wireless Power Transfer. The ten most cited papers have an average of 7.3 and 9.3 citations per year respectively in Web of Knowledge and Scopus.

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Sr. No	Books	Author Name
01	The Internet of Things”	Samuel Greengard
02	Learning Internet of Things.	B. H. Choi



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