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ONLINE ROUTING AND CHARGING SCHEDULE OF ELECTRIC VEHICLE

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ABSTRACT

Io EVs (IoT-Based electric cars) will replace other public transportation options in smart cities as electric vehicle and IOT (Internet of Things) technology advance. The electricity grid and transportation network will be significantly impacted by the Io EV's growing market share. The goal of this work is to investigate the routing and charging scheduling issue for Io EV under the power limit restriction. The primary difficulties of wireless power transmission for electric vehicles employing set down transformer are charging time and power transfer efficiency. In this study, the transformer induction theory and adaptive robotics are used to address both problems. a receiving coil-carrying high efficiency WPT system for charging electric vehicles The suggested design's viability is evaluated using a prototype, which can achieve unity power factor over an air gap of 8 cm and a maximum sliding distance of 10 cm under a variety of power settings while producing an output voltage of around 15 V.

Keywords— wireless power transfer, inductive power transmission, transmitter, receiver.

INTRODUCTION

WPT technology has received a lot of attention in the last ten years and has been proposed to apply to a wide range of applications, from low power biomedical implants to railway vehicles with efficiency up to 95% or higher in some prototype systems. WPT technology has a number of inherent advantages over conventional means of power transfer. Electricity is transferred between two or more magnetically connected coils over a large air gap in magnetic WPT devices via magnetic field coupling. This paper describes the design, construction, and testing of a wireless charging system for a lightweight electric car.

WIRELESS POWER TRANSFER

The transmission of electrical energy from a power source to an electrical load, such as an electrical power grid or a consuming device, without the need of discrete man-made conductors is known as wireless power transfer (WPT), wireless energy transmission, or electromagnetic power transfer. A broad phrase used to describe a variety of power transmission techniques that make use of time-varying electromagnetic, magnetic, or electric fields is known as "wireless power."

In wireless power transfer, a wireless transmitter that is connected to a power source transmits the field energy to one or more receivers over a distance between them, where it is changed back into an electrical current and consumed.

When running cables between electrical equipment would be difficult, dangerous, or impossible, wireless transmission is a valuable alternative. The two primary types of wireless power technologies are non-radiative and radiative. Power is delivered via capacitive coupling between metal electrodes or magnetic fields utilizing inductive coupling between coils of wire in near field or non-radiative ways. The most common wireless technique is inductive coupling, which is also used to power or charge electric trains and buses as well as implanted medical devices including artificial cardiac pacemakers, RFID tags, smartcards, and electric toothbrush chargers.

The development of wireless systems to power portable and mobile computing devices like smartphones, digital music players, and portable computers without being connected to a wall outlet is a current area of interest. Power is transported via electromagnetic radiation beams, such as microwaves or laser beams, in far-field or radiative techniques, commonly known as power beaming. Longer distance energy transmission is possible with these methods, but the recipient must be the target. Solar-powered satellites and wirelessly propelled drone aircraft are two potential uses for this kind of technology.

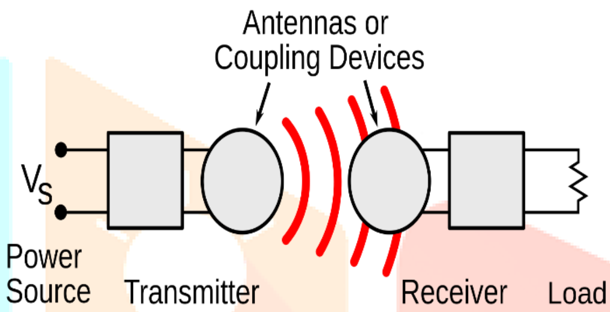


Figure 1: Block Diagram of a Wireless Power System

WPT technology has numerous inherent advantages over conventional means of power transfer, thus has received much attention in the past decade. It has been proposed to apply to a wide range of applications, ranging from low power biomedical implants electrical vehicle charger to railway vehicles with efficiency up to 95% or higher in some prototype systems. Magnetic WPT systems rely on magnetic field coupling to transfer electric power between two or more magnetically coupled coils across relatively large air gap.

Remaining paper is organized as Literature Survey in Section II, Section III consists of proposed system, Section IV concludes.

LITERATURE SURVEY

Paper [1] the technique of capacitive power transfer (CPT) is a viable and significant replacement for the widely used inductive power transmission (IPT). The benefits include a benefit of decreased price and weight. Drawbacks include the identification of foreign objects, electric field emissions, and high voltage stress.

In paper [2] In order to examine the benefits of reducing the vertical distances between WPT resonance tank efficiency's, the following For owners of electric vehicles (EVs), the system provides a safe, practical, and intelligent charging option, but there are some downsides, including reduced efficiency, case dependence, and potential inapplicability non other WPT installations.

[3] describes a novel design approach and control scheme for bidirectional in light-duty electric vehicles (EVs) that operate at both the 40 kHz and 85 kHz resonance frequencies. drawback include Convenience Constraints include battery cost, battery longevity, slow charging speed, effective charging methods, and poor energy density despite advantages like safety and reliability.

In paper [4], an analytical model of asymmetrical circular spiral coils examines the relationship between the coupling coefficient and the mutual inductance of the coil system. Improved coupling coefficient and misalignment tolerance are benefits. The drawbacks are dependent upon turn count, separation, and turn distance.

In paper [5], an efficiency assessment methodology is proposed for assessing closed-loop control methods. A maximum efficiency point tracking (MEPT) control technique is further suggested. The benefits include a favourable trade-off between efficiency and power transmission distance. negative aspects are Power transfer distance is rather lengthy, and more dc/dc converters result in more power loss.

EXISTING SYSTEM

This mechanism to charge an electric car from a charging station is a prototype for the entire system. The station can pinpoint the precise location of each battery module that has to be switched out in the case of a battery swap utilizing a mix of computer vision and cable connection. In the study, the findings are examined and debated. A verified model of this kind can be used to determine whether and under what circumstances it is more practical to employ a structure rather than two separate devices. Substantial power losses and a complicated switching procedure are drawbacks.

PROPOSED SYSTEM

As a more modern small load system with an advanced wireless charger was created. With the solution that is being suggested, wireless power charging for electric cars is done using microcontrollers. Inductive coils, a vehicle prototype module, an Arduino and a Mosfet make up this system. The primary coil of the inductance road receives power from a 230v AC source. automobile with a secondary coil.The car may be charged automatically if it moves along the coil. We will be able to lessen both the need for petroleum goods and air pollution as a result.

Two pads, one on the ground and the other under the car, are used in magnetic induction charging to exchange energy. The receiving coil (on the automobile) is encased in a compact gadget, but the charging transmitter coil (on the ground) is around 1m long. The infrastructure comprises of an induction charging station in addition to the pad that may be put on the vehicle.

TRANSMITTER BLOCK

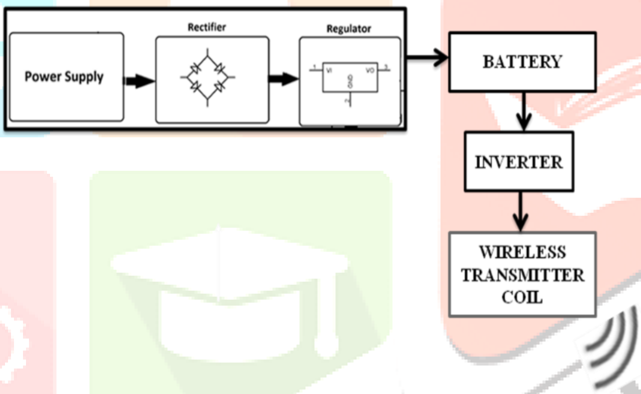


Figure 2: Block diagram of transmitter

The car is equipped with a receiving coil, and multiple transmitter coils are buried in the road surface. The latter is given electrical power. It operates as follows: By using electricity, the coils in the pavement create a magnetic field. The coil on the car receives this and may convert it back into electrical energy thanks to the magnetic field. The battery that powers the motor is charged using the energy that was created.

RECIEVERBLOCK

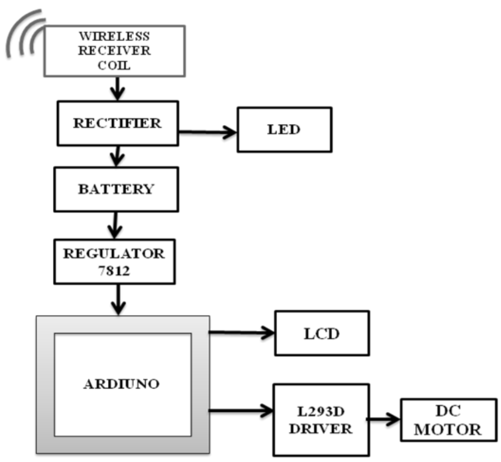


Figure 3: Block diagram of receiver

SOFTWARE AND HARDWARE REQUIREMENTS

The programming language used is embedded C.

ARDUINO IDE

The compiler is Arduino Ide 1.8.3 is shown in Fig 4.

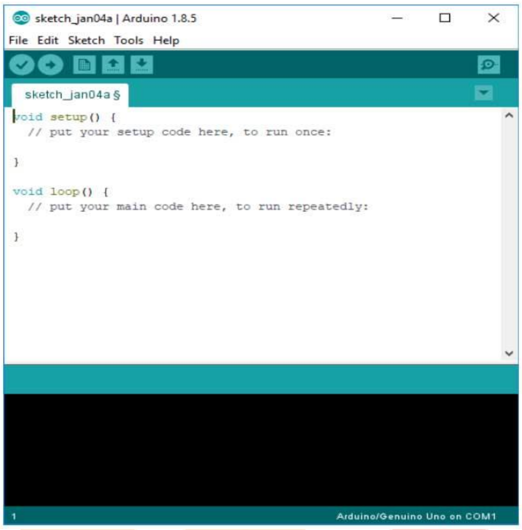


Figure 4: IDLE of Arduino

Java was used to create the cross-platform Arduino integrated development environment (IDE), which is available for Windows, macOS, and Linux. Writing and uploading programmes to an Arduino board are done using it. An open-source electronics platform called Arduino is built on simple hardware and software. A motor can be started, an LED can be turned on, and anything may be published online by using an Arduino board to receive inputs like light on a sensor, a finger on a button, or a tweet. By delivering a set of instructions to the board's microcontroller, you may direct your board's actions.

PROTEUS

Simulation tool used is Proteus before being implemented into a real-time application.

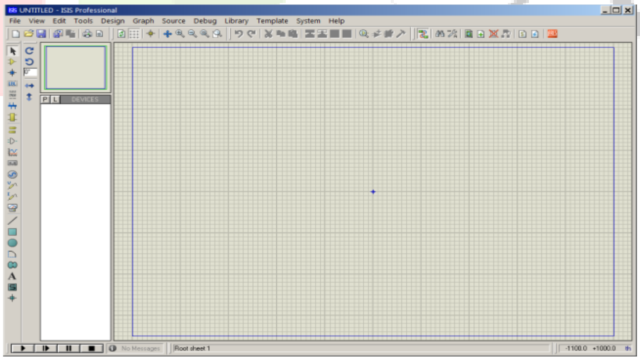


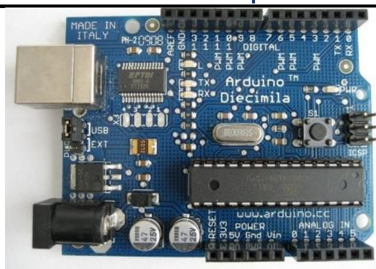
Figure 5: Proteus Application

Labcenter Electronics created Proteus, a simulation and design tool for electrical and electronic circuit design. The simulation function of Proteus. Proteus' many parts can be virtually recreated. There are two ways to simulate: Run simulator or go through frames one at a time.

The option "Run simulator" simulates the circuit at regular speed (If the circuit is not heavy). The "Advance frame by frame" option skips to the following frame and waits until you click this button again. When troubleshooting digital circuits, this is helpful. The proteus idle is as shown in figure 5.

ARDUINO UNO

Arduino is a free and open-source hardware and software prototyping platform. A motor can be started, an LED can be turned on, and anything may be published online by using an Arduino board to receive inputs like light on a sensor, a finger on a button, or a tweet. Sending a set of instructions to the board's microcontroller will instruct your board what to do. You achieve this by using the Arduino Software (IDE), which is based on Processing, and the Wiring-based Arduino Programming Language.



Figur 6: Arduino Uno Board

LCD DISPLAY

An electronic display module called an LCD (Liquid Crystal Display) screen has several uses. A 16x2 LCD display is a very fundamental module that is frequently included into many different devices and circuits. These modules are preferable over multi-segment LEDs with seven segments and additional segments. The explanations are that LCDs are inexpensive, easily programable, and have no restrictions on showing unusual and even customised characters, animations, and other content.

On a 16x2 LCD, there are 2 lines that can each display 16 characters. Each character on this LCD is presented using a 5x7 pixel matrix. The Command and Data registers on this LCD are its two registers.

Figure 7: LCD (16X2)

DC GEAR MOTOR

Continuous actuators that transform electrical energy into mechanical energy are electrical DC motors. This is accomplished by the DC motor by creating an ongoing angular rotation that may be utilised to turn wheels, pumps, fans, compressors, etc. There are linear motors that can provide a continuous liner movement in addition to traditional rotary DC motors.

MOTOR DRIVER

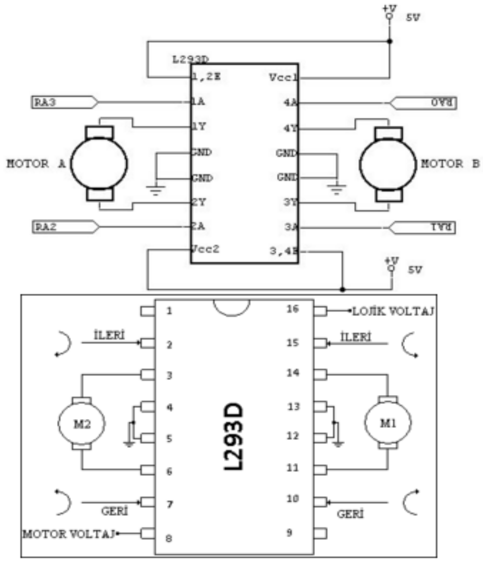


Figure 8: Schematic diagram of motor driver

BATTERY

To power electrical gadgets like torches, cellphones, and electric automobiles, an electric battery is a device made up of one or more electrochemical cells with specified external connections. A battery's positive terminal serves as the cathode and its negative terminal serves as the anode when it is supplying electricity.

BRIDGE RECTIFIER

Four individual diodes can be used to create a bridge rectifier, however the four diodes needed can also be found in specific packages.
As it makes use of the complete AC wave, it is known as a full-wave rectifier (both positive and negative sections). Each diode needs 0.7V while conducting, and there are always two diodes conducting, hence 1.4V is consumed in the bridge rectifier.

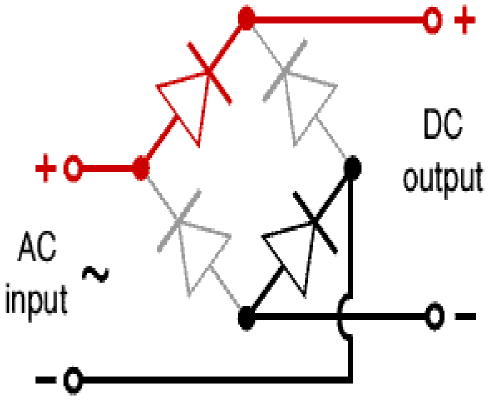


Figure 9: Bridge Rectifier

CONCLUSION

For the purpose of charging electric vehicles, a high efficiency wireless power transmission system is proposed. A thorough analysis and discussion of system setup and design factors was conducted. For the 716 IoEVs that need the best routing and charging, we suggest a clustered rolling architecture in this study. We consider both the power grid's power limit and the consumers' waiting times (717, 718) To fulfil the energy restrictions of the power grid, we define the rectangle packing problem 726 for IoEV charging dispatch in a limited amount of time.

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