SOLAR WIRELESS EV CHARGING

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ABSTRACT

The design of a solar-powered charging station for electric car charging is discussed in this study, which addresses the two major drawbacks of fuel and pollution. The number of electric cars on the road today is steadily increasing. In addition to the environmental advantages, electric vehicles have demonstrated usefulness in lowering travel expenses by substituting energy for petrol, which is significantly less expensive. Well, in this case, we create an EV charging system that offers a special, original answer. In addition to not requiring any cables, stopping to charge, or an external power source, EVs may now be charged while they are in motion thanks to solar power. Solar panels, batteries, transformers, regulator circuits, copper coils, AC to DC converters, atmega controllers, and LCD displays are all used in the system's construction. The method shows how electric cars may be charged while driving, doing away with the requirement to pull over for recharging. As a result, the technology shows how an electric car wireless charging system powered by solar energy may be incorporated into the road.

Keyword: *Atmega controllers, AC to DC converters, regulator circuits, LCD displays.*

1.0 INTRODUCTION

The future of transportation will be electric automobiles, which will increase the effectiveness of charging stations. The process of charging electric vehicles will be crucial. The absence of a charging infrastructure is the main barrier to increasing EV demand in the market. By using renewable energy to speed up charging, we looked at the portable EV charger. The hybrid power system used in this work's development of the vehicle battery charging station enables it to provide a special service to road users who want to drive long distances in an electric car. For these customers to refuel their automobiles between freeways, there are no electric charging facilities. The wireless EV charger is the best option for people to use to charge their electric vehicles.

The world's most pressing issue right now is the desire for energy. Nuclear energy, sunlight, water, wind, and other natural sources of energy are all used to create electrical energy. Sun energy is now the most popular source of energy from these sources for the production of electrical energy. One of the fastest-growing technologies for power transfer without wires in the last two to three years is wireless power transmission (WPT).
This brand-new, cutting-edge technology is incredibly dependable and effective. Today, wireless power transfer has become essential for the continued operation of electric vehicles, making it profitable.

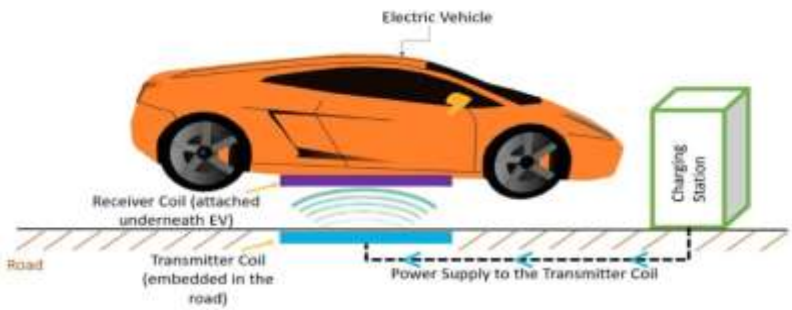
2.0 TYPES OF WIRELESS CHARGING SYSTEM

Wireless charging systems for EVs may be divided into two groups depending on the use.
I. Static Wireless Charging
II. Dynamic Wireless Charging

I. Static Wireless Charging

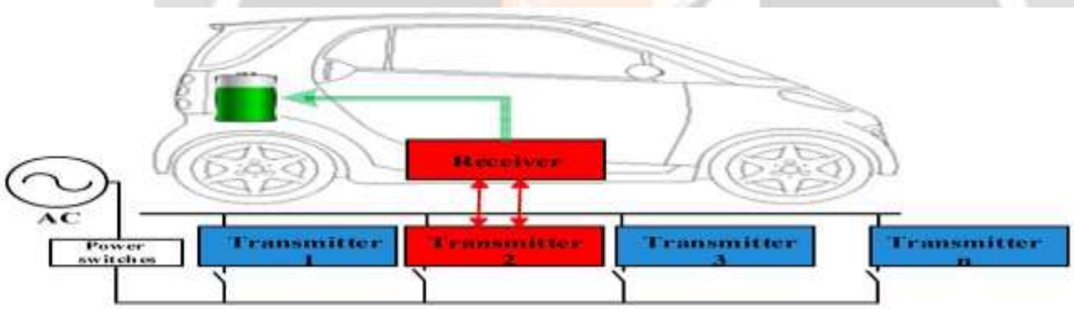
The car charges when it is stationary, as the name suggests. Therefore, we may easily park the EV at the designated parking space or in a garage that integrates with WCS. The receiver is set up in a vehicle's undercarriage, while the

transmitter is installed underground. Align the transmitter and receiver before leaving the car to finish charging. The distance between the transmitter and receiver, the size of their pads, and the AC supply power level all affect how long it takes to charge.
It is advisable to construct this SWCS in locations where EVs are frequently parked for extended periods of time.

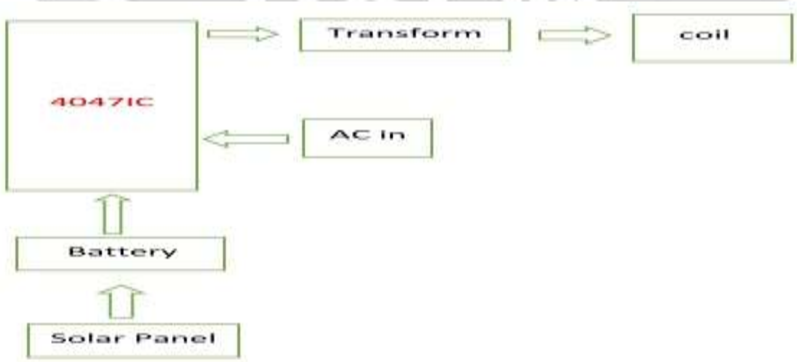


II. Dynamic Wireless Charging

As the name suggests, here a moving vehicle is charged. A stationary transmitter transmits electricity over the air to the receiver coil in a moving vehicle. With the use of DWCS, an electric vehicle's range might be increased by continuously charging its battery while it travels on roads and highways. By reducing the necessity for massive energy storage, the vehicle's weight is further decreased



3.0 BLOCK DIAGRAM



4.0 COMPONENTS

1. Atmega 328p
2. 4047 IC
3. 1N4007
4. Coil
5. LED
6. 16*2 LCD display

1.Atmega 328p

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core. ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed.

Fig -1: Atmega328

2.4047IC

One type of multivibrator with a high voltage is the CD 4047 IC. This IC may be operated in two modes: monostable and astable. To control the output pulse width in the monostable mode and the o/p frequency in the astable mode, this IC needs an external resistor and capacitor. This IC works with voltages of 5, 10, 15, and 20 volts. A CMOS multivibrator with two operating modes—monostable and astable—is the 4047 IC. Applications for the 4047 IC span a wide spectrum, such as sine wave generating, pulse wave creation, and DC signal to AC signal conversion, among others.

Fig.2:4047IC

3. 1N4007

A PN junction diode, that is. Combining two distinct semiconductors, such as P and N, can create a diode. A junction between semiconductors of the P and N kinds is known as a PN junction. A PN junction rectifier diode is the 1N4007. Only one path of electrical current may pass through these sorts of diodes. Therefore, it may be used to convert AC electricity to DC. Since it is electrically compatible with other rectifier diodes, 1N 4007 may be used in place of any 1N400X series diode. Real-world uses for 1N-4007 include freewheeling diodes, general-purpose rectification in power supply, inverters, converters, etc.

Fig 3:1N4007

4. Coil
A circle, a series of circles or a spiral made by coiling. A long thin piece of material that is wound into circles

Fig 4: Coil

5. LED

A light-emitting diode (LED) is a semiconductor gadget that uses electricity to generate light. LEDs are durable and don't shatter easily (compared to incandescent lightbulbs). They have a wide range of colour production. They are effective because most of the energy is converted to light instead of heat.

Fig 5: LED

6. 16*2 LCD display

A type of flat panel display known as an LCD (Liquid Crystal Display) operates primarily on liquid crystals. Since they are often used in cell phones, televisions, computers, and instrument panels, LEDs offer a wide range of applications for consumers and enterprises.When compared to the technologies they replaced, such as light-emitting diode (LED) and gas-plasma displays, LCDs represented a significant advancement. Compared to cathode ray tube (CRT) technology, LCDs permitted screens to be far smaller. As opposed to LED and gas-display displays, LCDs operate on the idea of blocking light rather than generating it, which results in a significant reduction in power consumption. The liquid crystals in an LCD use a backlight to form a picture where an LED emits light**.**

Fig 6: LCD

6.0 WORKING

In a wireless power transmission system, an electrically powered transmitter device creates a time-varying electromagnetic field that transfers power over space to an electrical load through a reception device. By doing away with cables and batteries, wireless power transfer technology can improve an electronic device's portability, use, and safety for all users. Electrical equipment can be powered wirelessly in situations where running cables would be difficult, dangerous, or impossible.

The electromagnetic induction technique is used in wireless charging to send electrical power through the atmosphere as a magnetic field. It may also be referred to as inductive charging or wireless inductive charging. In essence, electricity causes a current to flow through a coil of copper wire and emits that current at a certain frequency, most likely one close to FM radio frequencies. An oscillating magnetic field is produced as a result, and another copper coil subsequently picks it up. Wireless charging may be made viable for EVs without wasting too much energy by fine-tuning the signal based on the spacing, with assistance from capacitors, and certain fundamental physics concepts like the concept of resonant frequencies.

9.0 FUTURE SCOPE

Driving and powering at the same time On-street/dynamic controlling of EVs is a requirement for future improvements in EV charging technology. By providing capacity to moving or stationary cars at stoplights (semi-dynamic charging), the limited range of EVs may be adjusted. In this case, charge cushions are reused throughout a large portion of the highways, and energy is traded for the time that the cars are over the charge cushion. However, distributed IPT frameworks suggest having tracks outside that are powered by an inverter. These frameworks have typically found use in programmed guided vehicles (AGV), and material handling frameworks reliant on distributed IPT frameworks are also present. The ability to charge EVs from nearby, effective energy sources is another benefit of on-street charging. Wide-ranging research has been done using IPT framework to recreate the highway driving cycle with power levels ranging from 10 to 60 kW and inclusion levels of 10 to 100%. A significant finding was that driving distances may be reached with 20kW electricity and either 50% street inclusion or 20% street inclusion. Additionally, a particularly high driving range may be achieved for power greater than 20 kW for inclusion greater than 50%.

10.0 CONCLUSIONS

Any nation's growth must take transportation into account. In contrast, electric vehicles are the way of the future for the transportation sector. Although this subject has been the subject of much research over the past ten years, much of it remains unexplored. We draw the conclusion that our group has created a wireless charging system from our project. Additionally, a battery management system is created that displays the battery voltage. The microprocessor determines the battery voltage and displays it on a 16x2 LCD. For wireless power transmission, we have employed inductive coupling technology, although it is only effective in low power applications and in locations where the distance between the receiving and sending coils is short**.** However, the power consumption is significant for real-world applications, and the separation between the receiving and transmitting coils should also be widened. Magnetic Resonant Coupling technology is hence acceptable and adequate for this purpose. Additionally, we draw the conclusion that compared to other charging methods, the wireless charging technique takes longer to charge a battery. Our concept merely serves as a working prototype for automation in electric car wireless charging systems.

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