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Solar-Powered Wireless E-Vehicle Charging

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Abstract: Bicycles are the predominant mode of transportation for people in the 20th century. Since the invention of gasoline and diesel engines a few decades ago, fewer people are experiencing physical stress from their vehicles. Nevertheless, the world's petroleum reserves are about to run out in a few decades. As a result, the cost of gasoline and diesel is rising, which is the problem we are currently dealing with. People must explore more choices, such as hydrogen. Engine: An electronic car with solar panels is one of the finest possibilities; it will undoubtedly be expensive, but it mostly uses free natural resources. The newest technology, wireless charging, allows you to charge your car while you drive, saving you a ton of time. It is employed in a wide range of applications, including e-bikes, four-wheelers, two-wheelers, ambulances, and more. Among the many alternatives available, a wireless electronic vehicle charging system is one of the most expensive. We are implementing an Arduino-based e-vehicle charging system as a project in this work. While driving, this gadget can be used to remotely charge electronic vehicles. The automobile battery is charged by coils and a solar panel that is fixed into the road whenever the vehicle passes a national highway or road. This technique has a wide range of uses outside of the luxury market. However, the same idea is also applied in applications where saving time and non-renewable energy is crucial. This allows an electric car to be charged wirelessly while in motion or while parked.

Additionally, utilizing the provided microcontroller, displays, and coils reduces charging time significantly. Roads and highways are suitable for using this device. The ATmega controller microcontroller is at the center of this system. This charging mechanism finds extensive use in the luxury car industry, where robustness and longevity are crucial attributes. Circuitry for a regulator that regulates voltage as needed. Additionally, the vehicle will not wait to charge and will always be in a state of continuous charging to reach its maximum capacity.

Keywords: ATmega328, Arduino, wireless charging, controller

I. INTRODUCTION

An electronic vehicle (E-Vehicle) uses a wireless charging system because it is needed in many different locations [1]. Despite their apparent simplicity, these are actually rather massive and intricate. Programming is utilized in embedded systems along with a variety of controllers, coils, regulator supplies, and other electronics components [2]. Since coils are one of the most crucial parts of a wireless charging system, their prices are rising. Here, we outline the ideal solution that makes use of an ATmega microcontroller-based system with induction coil transmitter and receiver units placed close to one another. This microcontroller is comparable to the widely used 8051 microcontroller and is extremely easily accessible at a reasonable cost [3–7]. These systems have a lot of power for certain uses. To reduce the cost of the system, a low-cost 8- or 16-bit microcontroller can also be utilized.

This system was created with a variety of applications in mind [8]. The human future lies in electronic vehicles in the twenty-first century. By not releasing any dangerous or destructive gases, such as carbon dioxide, nitrogen, sulphur, etc., it protects people from the dangerous greenhouse effect and global warming [9]. A solar panel, battery, transformer, regulator circuits, copper coils, AC to DC converter, ATmega controller, and LCD display are used in this technology to construct the system. The technology shows how charging electric cars may be done while driving, obviating the need to pull over and start up again. Through the utilization of solar panels, induction coils are used as transmission and receiving coils to transfer energy to the battery [14].

Coils then transmit energy to a battery so that it can be stored. The charging system is necessary. As of right now, there are no fuel and diesel stations for charging. With the newest in technology, wireless charging allows you to charge your car while you drive, saving you a ton of time. It is utilized in a wide range of applications, including E-bikes, four-wheelers, two-wheelers, ambulances, and more. Among the many choices, a wireless electronic car charging system is one of the most expensive [15–20].

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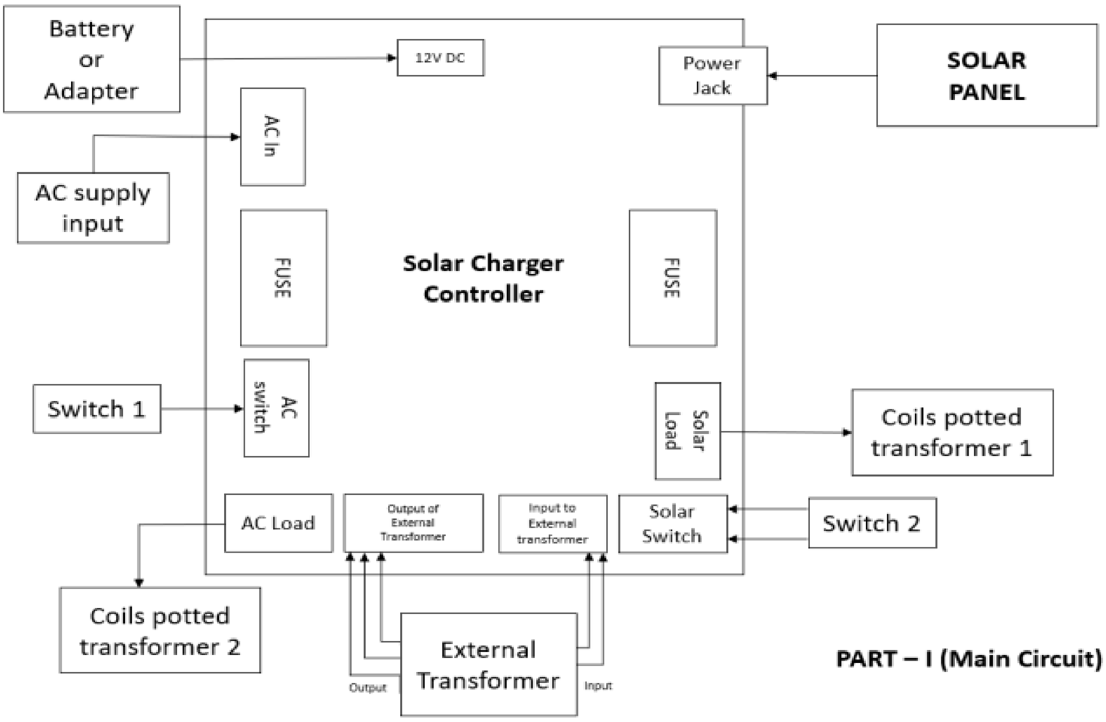
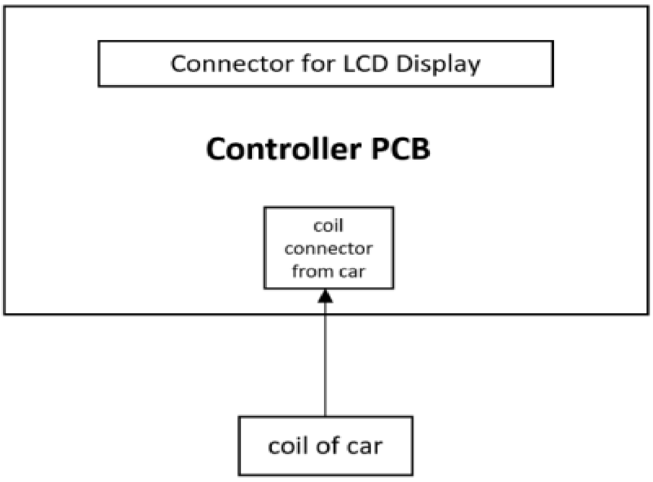
II. METHODOLOGY



(a)



(b)

Fig.1.(a) Solar Charger controller PCB connection block diagram (b) connection block diagram of microcontroller PCB

The printed circuit board for the project is referred to as the solar charger controller, as seen in figure 1. It is employed to regulate the charging portion in order to manage excess or insufficient current originating from the external supply or solar panel [33]. It is connected to the solar panel using a power jack. This circuit is capable of operating with both DC and AC voltage. Two switches (Switches 1 and 2) function in the same way as a safety device. The other circuitry is directly coupled to these connections. Because of this, the coils are made safer because of their high cost. It incorporates safety features like a fuse that will blow if too much current flows through it. Subsequently, the fuse breaks the connection. This PCB is also connected to the primary and secondary windings of the external transformer. It merely facilitates conversion. The copper coils are directly linked to both the AC and DC loads.

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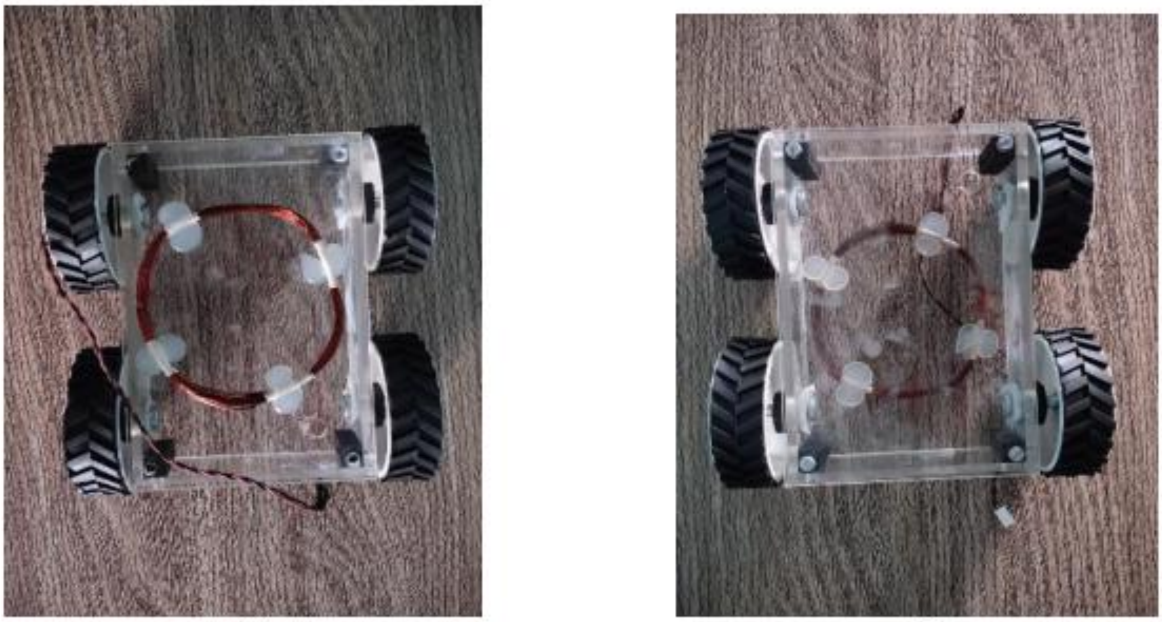
The way the car receives electricity wirelessly is depicted in figure 2. The embedded circuit system and fixtures in the car serve as a display. The connections between the liquid crystal display and Arduino controller are described in a block diagram. Additionally, resistors are employed to alter display contrast. Its ATmega controller allows it to display data in accordance with how the voltage and charging progress. Additionally, coils were added as a receiving component.

III. EXPERIMENTAL RESULTS

The liquid crystal display turns on when the car moves off the coil track once the circuit and connections are successfully completed in accordance with the circuit schematic, as seen in the accompanying image. The printed circuit diagram for the solar charger controller, as well as the embedded circuit or microcontroller display circuit, is displayed in Fig. 2. Additionally, the assembled automobile with the coil is shown in Fig.3. The vehicle is seen cruising over the coil track in the final diagram. Its display then begins to reflect an increase in voltage. As our project shows, batteries can be charged wirelessly. As a result, we obtain the desired output.

(a) (b)

Fig.2. Printed Circuit Board (a) Controller for Solar Charger (b) PCB for Microcontroller



(a) (b)

Fig. 3: Coil installation a) Vehicle backside (b) Vehicle top side

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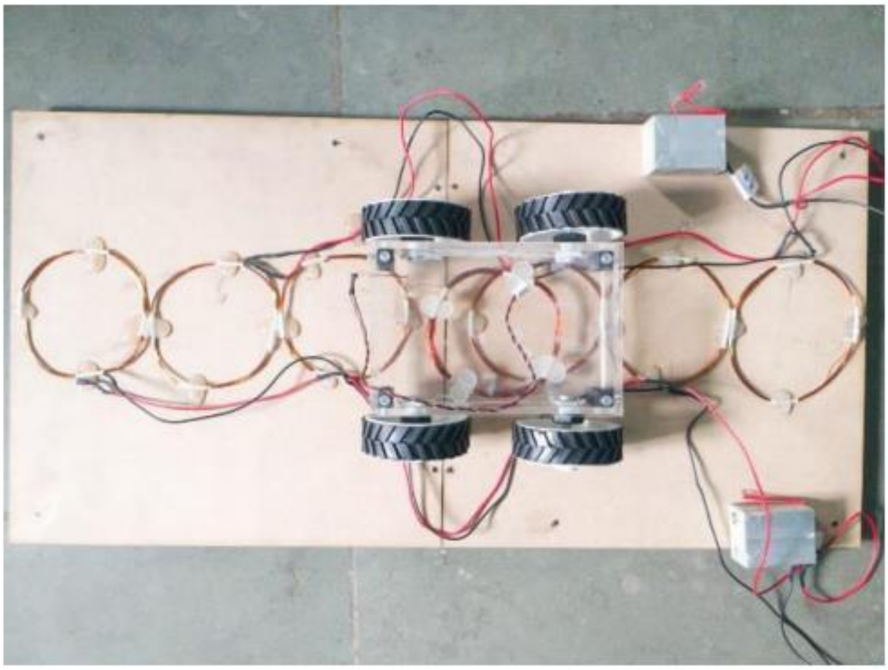

Fig. 5(a): Track-implemented Copper Coil

IV. CONCLUSION

In conclusion, the project's goals have been fulfilled. People utilize e-vehicles everywhere in the world. This project makes use of batteries. It conserves the non-renewable energy we now use, which is almost depleting. Therefore, for anything that uses sunlight, we may use renewable energy, which is completely free. According to our findings, the user finds it convenient to charge the EV in a short amount of time, which also saves time when traveling. This project's benefit is that it can be used in airports to save time by detaining people while they wait for their cars to charge. Because of the system's efficacy and ease of usage, it might be used on heavily trafficked roadways such as highways, four-lane, eight-lane, and subway systems. Compared to dynamic charging, static charging improves system performance by lowering loss. Compared to fuel-based charging, this technique of charging is thought to be more efficient because the source is electricity. The usage of wireless charging technology lowers the possibility of tripping issues brought on by plug-in charging. more effectiveness than plug-in charging for electric cars by lowering the risks associated with the former. ensuring the least expensive and most effective method of charging. There will be less health issues from air pollution as a result of improved air quality. Static electric car charging that is high-performing, safe, and economical has the potential to completely transform road transportation.

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