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WIRELESS ENERGY TRANSFER ON THE ROAD FOR ELECTRIC VEHICLE

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Abstract: **In this study, we have analyzed the wireless charging system, which consists of two main parts, one on the road and the second in the vehicle. The perfect control of the main electric motor or the perfect control of the battery charging system helps to reduce the loss of the vehicle's power system. The charging tools improve the range and the overall efficiency of the vehicle. These experiments focus on the hybrid charging system that uses two power sources inside the vehicle. Wireless charging has long been common in purely electric vehicles and should also enable charging while driving. In the proposed system, receiver coils were added to maximize charging power using a dynamic mathematical model that describes and measures power transfer from the source to the vehicle even when moving. This is one of the most widely used techniques that is suitable for charging electric vehicles. Wireless charging technology is becoming increasingly popular on the roads as it is useful to improve the autonomy of electric vehicles where pure and hybrid electric vehicles are commonly used. However, the benefit of wireless charging technology for battery electric vehicles is evident as there is no solution to charge the vehicle while driving. Some of the existing models do not include a wireless charging solution. The work presented involved the development of a new type of high-efficiency EV battery charging. This kind of charging tool looks like a serious challenge that can reduce the load on the network. Wireless charging has long been common in purely electric vehicles and should also enable charging while driving. The mathematical representation of this reloading tool has been widely discussed and various representations have been developed in the literature. This leads to a method of improving the performance of the dynamic wireless charging system. The improved value of the mutual inductance determines the efficiency.**

***Keywords*- Wireless Charging, Transmitter Coil, Receiver Coil, Dynamic System, EV, Mutual Inductance**

I. INTRODUCTION

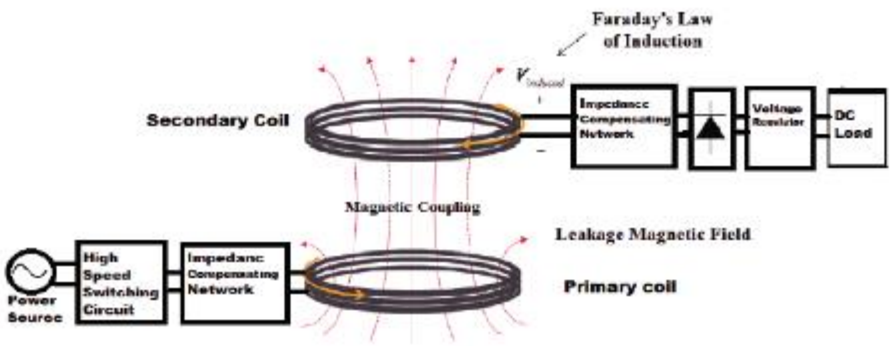

Fig.1 Mechanism for the wireless transmission

The environmental results of shipping are tremendous due to the fast shipping is a main person of electricity, and burns a maximum of the world's petroleum. Fossil fuels produce huge portions of carbon dioxide whilst burned. Carbon emissions lure warmness withinside the surroundings and result in weather alternate. This creates air pollution, together with nitrous oxides and particulates, and is a tremendous contributor to international warming via the emission of carbon dioxide. Electric strength garage is likewise one of the essential studies subjects those days. Technological advances in electric electricity garages have culminated in enough mass density of electricity and strength to fulfill car needs. Wireless inductive charging lets in an electric-powered automobile [EV] mechanically fee without the want for cables. EV charging calls for lots better voltage, strength, and quantity of electricity transferred. Therefore, the technology, protection, price, and environmental demanding situations are lots greater severe. The excessive voltage and excessive strength vital for EV charging convey extra demanding situations concerning the protection and the price of wi-fi charging systems. Wireless charging additionally calls for a further charger to be included in the automobile, which will increase the automobile price. The set up of EV wi-fi chargers in public locations is likewise related to many demanding situations. The improvement of a wi-fi charger via way of means of more recent technology is greater complicated than the case of a stressed charger. Autonomous charging is regularly supplied as a type of handy or maybe computerized charging. This comprises a sturdy autonomy document withinside the current fashions of electrical vehicles. Some researchers have paid interest to the charging equipment to enhance the automobile's international autonomy and performance. There are one-of-a-kind methods to "refill" an automobile with electricity, together with battery charging, battery swap, and hydrogen refueling. The 'cord' or 'wire' charging answers are and could remain, the mainstream charging answers for EVs withinside the foreseeable future. To keep away from the demanding situations related to shifting each excessive cutting-edge via charging cables and connector answers had been evolved specifically for electric powered bus charging. Wireless charging calls for each an infrastructure investment (transmitter pad) and an automobile investment (receiver pad). The wi-fi charging method has been studied to discover an answer this is greater solid and beneficial. A number one circuit, known as a transmitter, generates a time-various magnetic field. A secondary circuit gets this field, known as the receiver, that's related to the tool to be powered. The maximum critical parameters to recollect are sincerely the gap between the 2 circuits and their alignment. Poor alignment and a tremendously huge distance degrade overall performance and make electricity switch inefficient. Hence, the evaluation might be correct best if the 2 elements have been set within the proper alignment and steady (now no longer in motion). But if any such additives continue to be in motion, the evaluation accuracy might be changed. The method for wi-fi electricity switch turned into supplied withinside the literature, which includes inductive strength switch. This technique is one of the maximum broadly used strategies that turned into discovery appropriate for charging the EV. The mathematical illustration of this recharge device turned into broadly discussed, and numerous representations have evolved withinside the literature. The charging is controlled in addition to the cutting-edge charging strategies via a stressed charger, even though the EV's battery control system. the fee control may also alternate barely relying on the strength output situations of the wi-fi charging tool. the authors have studied the dynamic situation, in which they are trying to explain the connection between the receiver and the transmitter coil role deviation. The calculation of the strength output and the worldwide performance issue turned into made. The inner parameters – the resistance, inductance, and the pitch perspective among the 2 coils – have been worried about inside the take a look and the mathematical version. This paper offers the opportunity of the usage of receiver coils and compares this method to the conventional method, primarily based totally on the best he t receiver coil. This looks primarily based on a brand new mathematical illustration of the wi-fi strength transmission system. In the brand new proposed version, the performance of the recharge device turned into investigated given all of the parameters referred to earlier, in which resistance, inductance, coil dimensions, the gap among the coils, and the receiver coil displacement velocity have been investigated. This new version enables to discover the vital records at the proper wide variety of wi-fi coils to fee the automobile if it's far on a chargeable road. Wireless charging is simpler and is nearly obvious to the person. It additionally furnished beneficial findings demonstrating the effectiveness of the bodily equations used. It has been performed in methods: first, whilst the automobile is in forestall mode, and 2nd whilst the automobile is in motion. This evaluation additionally places wi-fi receivers withinside the vehicle for testing, and the consequences acquired display how beneficial this proposed version is. As the automobile's velocity changed, the site of the receiver regarding the transmitter turned into invested, and the outcomes of the automobile's autonomy have been addressed and discussed. These findings are as compared to cing-edge methodologies. Thus, the consequences found int on this paper in the effectiveness of getting receivers beneath the automobile.

Fig.1 Demonstration of a setup for wireless charging

II. METHODOLOGY USED

In "WIRELESS ENERGY TRANSFER OF ELECTRIC VEHICLES ON ROAD", we design a controllable wireless charging station that optimizes energy consumption. A prototype is being developed that demonstrates the idea behind a vision revolution.

The development of a vehicle includes the following steps-

1. Power Generation
2. Vehicle detection
3. Switch Action
4. Wireless Power Transfer to coil
5. Battery Action
6. Vehicle Demonstration

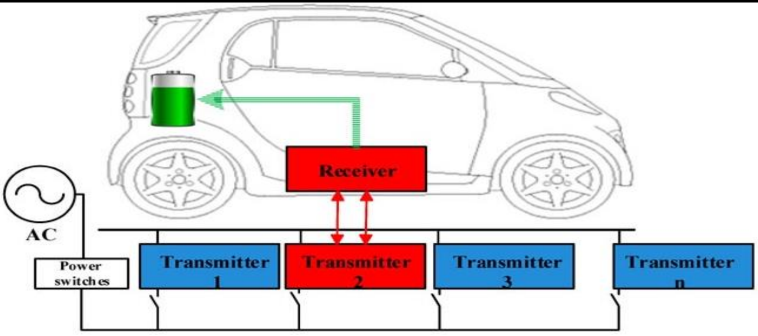

Fig.2 Representation of the model we used for charging

2.1 Power Supply Generation

Components used:

- Transformer
- Full wave rectifier
- LM 7805

The 230V, 50Hz AC power is fed to the step-down transformer 12V, 500mA, main supply is down to 5V reduced. The 5VAC. Shown on the secondary side is the RMS value. This voltage is then fed to a full-wave rectifier. In both half-waves, the current flows through the resistor in one direction only. Although the voltage across RL is unidirectional, it still contains few AC components. This is filtered and smoothed with a capacitor that filters out the maximum AC component. A resistor is then used to set the output voltage. The LM7805 regulator is used to regulate the voltage output to +5V. With this, we have successfully generated a 5V DC supply.

Fig.3 Power Supply Generation Circuit

2.2 Vehicle Detection

Components used:

- IR Proximity sensor
- LM 358
- IR sensor

an electronic device emits light to detect the vehicle on the road. Active infrared sensors can measure up to 15 meters. The IR sensor is powered by the generated 5V supply. Each time a vehicle approaches the sensor, the infrared light emitted by the infrared transmitter hits the vehicle, which is then reflected and received by the infrared receiver. The sensor output is sent to the LM358 comparator IC. The LM358 IC receives a signal from the sensor and compares it to the reference voltage. Then this IC decides if the voltage is higher or lower than the reference voltage, giving a high or low output. Since we are using 3 sensors, 3 outputs from 2 comparators are used.

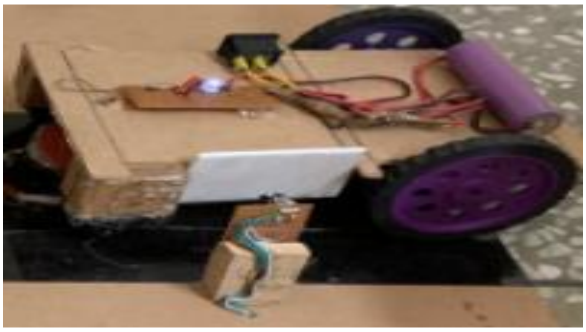

Fig.4 Vehicle is detected with sensors

2.3 Switching Action

A signal is sent to the super alpha pair which is then passed to the relay driver circuit which uses a 5V supply. A control signal is used to activate the relay. When it receives the signal it tries to switch and turns on the supply for the other section.

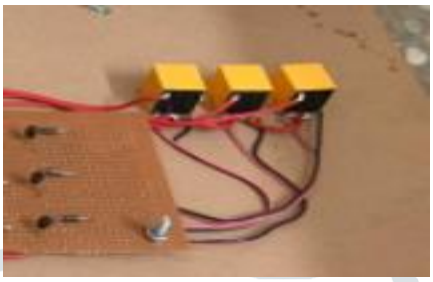

Fig.5 Relays for switching operation

2.4 Wireless Power Transmission to coil

The 5V supply generated at this end is fed to the CTC 1351 (transistor/mismatch). It is used both as a switch and as a linear power amplifier. The power is then transferred to the drive coil, which has 30 turns. Every time a vehicle is parked, energy is transferred to the receiving coil due to mutual induction. This is then fed to the battery via the charging circuit.

2.5 Battery Action

The battery used in the Li-ion, 4 V, 2000 mAh. The battery is used to drive the car. The battery is charged by a charging circuit using an induction mechanism. Due to a flux change, EMF is induced in the vehicle, which is then used to charge the battery and run the vehicle. The motor used for this is the DC geared motor (60 rpm).

2.6 Vehicle Demonstration

To achieve the result the entire model is assembled and demonstrated.

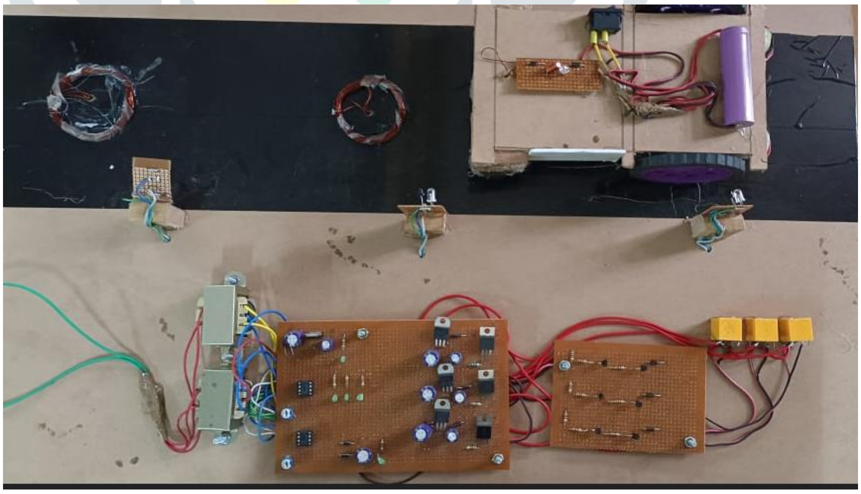

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Fig.6 A prototype of the whole model

III. CONCLUSION

The use of WPT systems for EVs was the focus of this paper. A proposed circuit of the WPT system was conducted. The presented work included developing a new type of WPT EV to ensure high-efficiency EV battery charging. A dynamic system for charging EVs is used here which can save the time people as well as the long queue at charging stations since vehicles can be simply charged by passing through a lane while moving. The whole methodology of charging EVs is discussed in this paper as well as future scopes for such EVs are also listed'.

This method has a major potential of becoming the future in the field of the transportation system while saving this planet from immense calamities caused by global warming due to petrol-driven vehicles. In the coming days, there is a possibility that electric vehicles could replace fossil fuels in the transportation sector. Compared to the last few years, the cost of electric vehicles is falling rapidly. It is predicted that in the coming years, there is a possibility that electric vehicles could compete directly with petrol-driven cars in terms of cost and it can lead to a brighter and cleaner future. Apart from that, there are also some disadvantages of electric vehicles. It can be difficult to meet future energy needs to charge electric vehicle batteries from sources that cannot harm our environment while being renewable. There is a risk to the long-term sustainability of the critical material resources used in electric vehicle batteries.

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