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WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM IN ROADWAYS USING SOLAR POWER

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Abstract: Solar power generation has emerged as one of the most rapidly growing renewable sources of electricity. Solar power generation has several advantages over other forms of electricity generation. We have designed solar roadways which harvest electricity using solar panels. The electric vehicles using solar energy will be running on these Solar road ways, in which power generated by solar energy is being transferred from solar roadways using wireless power transmission concept. This system makes use of a solar panel, battery, transformer, regulator circuitry, copper coils, AC to DC converter, Atmega controller and LCD display to develop the system.

Keyword: . Solar panel, Copper coils, AC to DC converter.

I. INTRODUCTION

Nowadays, electric vehicles (EVs) deployment is growing, which can be considered as the next generation vehicles. This is due to their zero tailpipe emissions where the low carbon society is met. They are more energy efficient compared with the traditional internal combustion engine vehicles (ICEVs). Moreover, the running and maintenance cost are much lower. Charging system for EVs can be both conductive (wired) and wireless. The heavy cableand bulky mechanical plug are needed in the conductive charger. In contrast, wireless chargerrequires no physical contact which provides safety (from electric shock or spark) and convenient to the user. Furthermore, it is weatherproof, which can be used in hostile environment. Figure 1 shows typical EVs wireless charging system. High frequency current produced by an inverter circuit is supplied to the transmitter (Tx) coil to create the high frequency magnetic field. When this field cuts through the receiver (Rx) coil, the voltage is induced. This voltage is rectified which is then sent to charge the battery. To compensate for the reactive power needed by the coupled coil, resonant networks are connected to both Tx andRx coil. In order to obtain the best magnetic coupling, Tx and Rx coils must be placed at the aligned position where both coils share the same center. However, the misalignment between Tx and Rx coil can be occurred in practical operation, which also be seen in Fig. 1. This causesthe system efficiency to diminish due to the deterioration of the magnetic coupling. To make both coils locate at the aligned position where the system efficiency is maximized, the position detection system has been added in previous research effort. The positioning method based on the radio frequency identification (RFID) and magnetic field coupling technique is reported in.Although it achieves high accuracy, its associated circuit and control is sophisticated. The misalignment-sensing coils, used to exploit magnetic-field symmetry to give a measurement ofmisalignment direction and magnitude, are presented in. This method is difficult to

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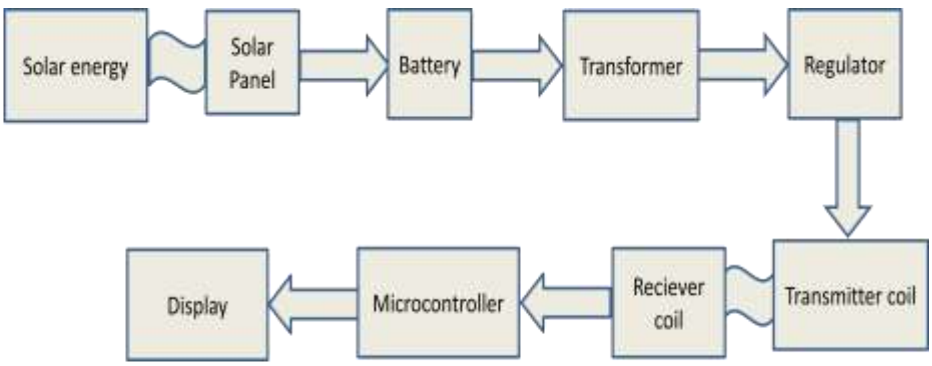
implement and requires extra circuits like rectifier and filter. In, coil-misalignment detection approach based on tunneling magneto resistive (TMR) sensor is introduced. The limitation of this sensoris that it cannot be used at high magnetic field strength due to the nonlinearity and saturation. In this paper, the aligned position between Tx and Rx coil is detected by using the retroreflective photoelectric sensor. The proposed technique is straightforward, precisely, and reliable. Additionally, the system is monitored and controlled online through IoT platform. After the aligned position is detected, the controller starts charging the EV's battery. Real-timebattery status can be accessed anywhere and anytime through Blynk applications.

II. METHODOLOGY

- The solar panel is used to power the battery through a charge controller, the battery is charged and stores dc power. The DC power now needs to be converted to AC for transmission. For this purpose we here use a transformer.
- The power is converted to AC using transformer and regulated using regulator circuitry.This power is now used to power the copper coils that are used for wireless energy transmission. A copper coil is also mounted underneath the electric vehicle.
- In this a single phase AC supply of 230V, 50Hz is provided to step down transformer of voltage ratio 230/12 V, 1A, 50Hz so that it can be converted to DC voltage and regulated.
- The diode rectifier is used to convert the 12V ac to 12V dc voltage. The rectified dc voltage is provided to 5V and 12V Voltage regulator.
- The 5V regulated voltage is provided to Arduino micro controller which generates thepulses according to the control strategy.
- The 12V regulated dc supply is provided to driver circuit so that it can able to drive the Power Electronic switches of the proposed system as per the gate pulses generatedfrom the controller.
- In this a single phase AC supply of 230V, 50Hz is provided as supply for Control circuit which consists of microprocessor to generate the pulses and driver circuit which drives the gate of power electronic switches using the pulses generated fromthe process
- When the vehicle is driven over the coils energy is transmitted from the transmitter coil to ev coil. Now we convert this to DC again so that it can be used to charge the EV battery.



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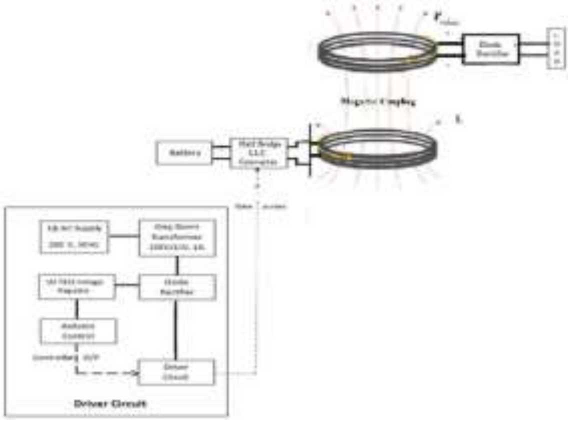

Figure 1: Block diagram.

Training the Model

• **Support the wireless electic viechle charging:** Wireless charging can be installed in residential and commercial locations to provide a convenient and efficient way for EVowners to charge their vehicles. This eliminates the need for cables and plugs, and allows for charging to happen automatically when the vehicle is moving on road using solar power.

Testing

When the electric vehicle goes on the road which has been implemented the copper coils the electric vehicle will charge using the other electric coil which is fixed under the vehicle by this we can easily charge the vehicle while moving and we don't want to stop for charging. This project helps to travel long distance travel and the rural areas.

III. FLOWCHART

The solar panel is used to power the battery through a charge controller. The battery is charged and stores dc power. The DC power now needs to be converted to AC for transmission. For this purpose we here use a transformer.The power is converted to AC using transformer and the regulated using regulator circuitry. This power is now used to power the copper coils that are used for wireless energy transmission. A copper coil is also mounted underneath the electric vehicle.When the vehicle is driven over the coils energy is transmitted from the transmitter coil to ev coil. Please note the energy is still DC current that is induced into this coil. Now we convert this to DC again so that it can be used t charge the EV battery.We use AC to DC conversion circuitry to convert it back to DC current. Now we also measure the input voltage using an atmega microcontroller and display this on an LCD display. Thus the system demonstrates a solar powered wireless charging system for electric vehicle that can be integrated in the road.

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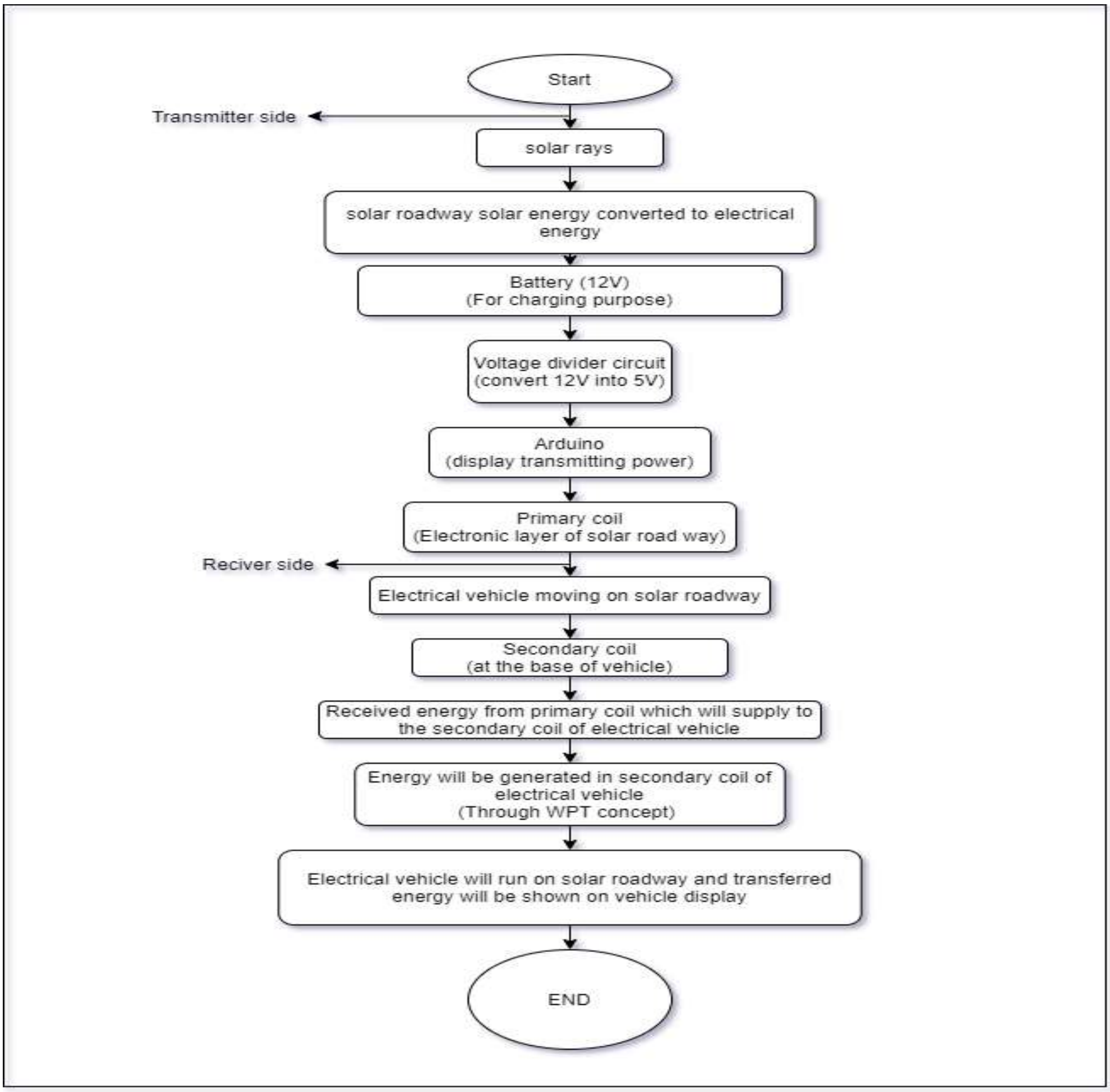

Figure 2: Flow chart of Face Detection and Recognition.

IV. RESULT ANALYSIS

MisalignmentDistance(mm)	Output voltage(V)	Input voltage(V)	Efficiency %
0	11	12	91.666667
0.1	10.99	12	91.583333
0.2	10.985	12	91.541667
0.3	10.95	12	91.25

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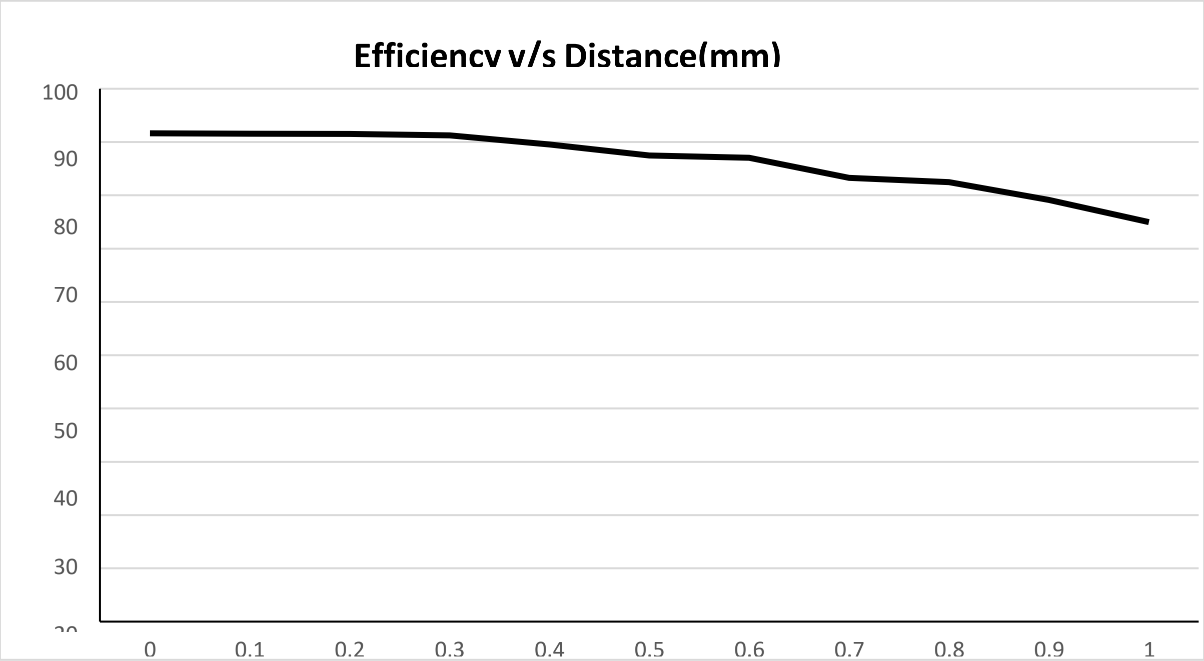
0.4	10.75	12	89.583333
0.5	10.5	12	87.5
0.6	10.45	12	87.083333
0.7	10	12	83.333333
0.8	9.9	12	82.5
0.9	9.5	12	79.166667
1	9	12	75

V. RESULT GRAPH



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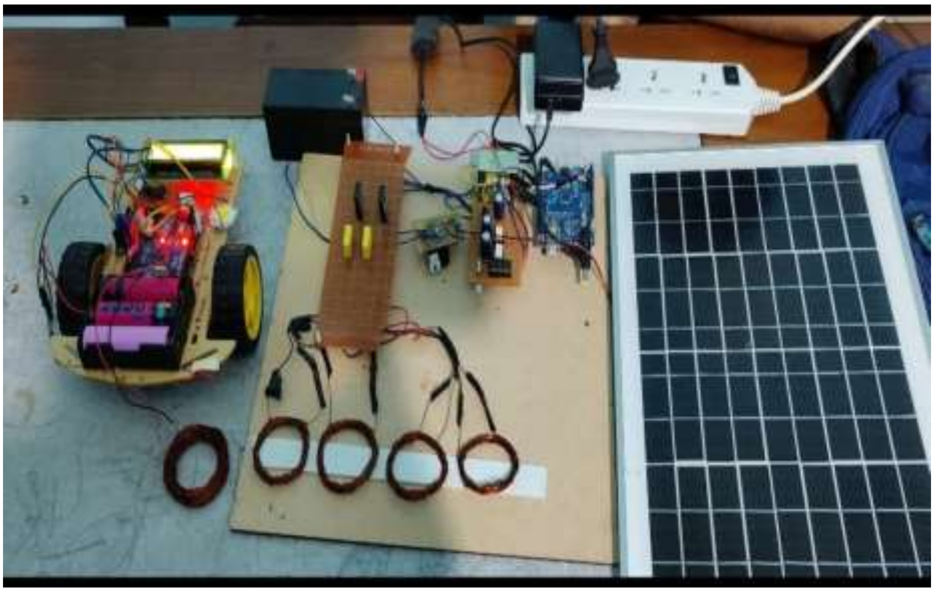
VI. FIGURE OF MODEL



CONCLUSION

The technique to detect aligned position between transmitter and receiver coil, used in the wireless charging of electric vehicles, is presented in this paper. The IR (Infrared Radiation) sensor is adopted. The experimental results show that system efficiency can be increased with the proposed method. Moreover, online monitoring of battery status and notification of fully charged battery have successfully achieved through IoT platform. The proposed system is simple, accurate, and easy to implement. Future research direction will be the analysis and design of the system to improve overall efficiency.

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