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"Hybrid Energy Generation for Multi Vehicles Charging Station Model"

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Abstract:
The ultimate promise of electric vehicles is a cleaner environment. That cannot be achieved if the strain on the power grid requires additional investment in nonrenewable resources to deliver the energy. That's why renewable energy for EV charging is so critical. Using renewable energy to power the EV charging infrastructure eliminates the strain on the grid and the environment simultaneously, especially when paired with smart EV charging. The combination of solar panel systems, wind energy systems (both), and electric vehicles A charging station brings several benefits and provides a cost- effective way to produce and make use of solar energy, wind energy, or both.
Recently, there has been significantresearch focused on smart cities andhow to use resources efficiently.
Parking space, in particular, is scarce in most metropolitan areas, and intelligent systems are required to coordinate parking. This paper presents a wireless charging system for EVs and a wireless sensor node that determines if parking spots are vacant or not. It was found that the system is highly efficient and has high accuracy, even at long ranges.
1) Keywords: *solar panel, Arduino uno, Relay Module, IR (Infrared Sensor),LCD Screen, RFID Sensor, Servo Motor, Battery, Tesla Coil, Charge controller.*

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I. INTRODUCTION

More than half of the world's population lives in urban areas, so the cities have reached full occupancy. As a result, the number of vehicles in the cities has also increased. Due to this, most people spend their valuable time searching for parking spaces to park their vehicles. It is a hectic job to find parking spaces to park their vehicles. The work proposed in this paper is an attempt to solve the problem mentioned above. A smart parking system is installed where you can charge your vehicles wirelessly in the parking station. There are smart gates. It's connected with an RFID sensor. Just scan the card, the gate will open, and you can pay through the card.

Wind and solar energy are nonconventional sources of energy and are available in abundance. Electricity can be generated with the help of a vertical-axis wind turbine. This project aims to utilize this wind energy in the most effective manner to get the maximum electric output, and therefore we selected a highway as our installation site, where we can take advantage of the moving vehicles on both sides of the road. (For 12 volts, we need to rotate at 7 m/s, or 25 kmph.). Solar and wind energy are stored in the batteries, and this energy is used to charge electric vehicles. The mode of charging is wireless. Wireless charging of electric vehicles (EVs) has been in development for several years in preparation for the growth in adoption of these vehicles. Wireless charging systems today offer an efficient, flexible means of charging EVs from multiple classes and at a range of power levels from a common ground source. Standardization activities are well underway to ensure compatibility between systems across vehicle makers and locations. This paper provides a snapshot of wireless charging technology as applied to EVs.

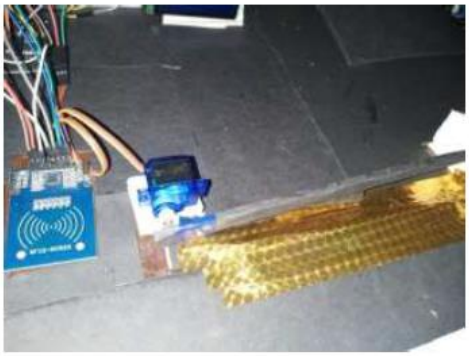
II. Objective

The objective of this work is to design, analyse, and implement a "Hybrid Energy Generation for Multi-Vehicle Charging Station Model". The RFID parking system provides contactless access to the parking

lot. This project's objective is to utilise this wind energy in the most effective manner to get the maximum electric output, and therefore we selected a highway as our installation site where we can take advantage of the moving vehicles on both sides of the road. Generate more energy than separate solar and wind power systems can provide. Hybrid systems can provide owners with improved supply reliability and security, especially if they are the only power source in an off-grid environment. The main goal is to transmit power using resonance coupling and to build the charging systems. The systems deal with an AC source, transmission coil, reception coil, converter, and electric load, which are batteries.

III. METHODOLOGY

3.1 SENSOR BASED GATE



In smart gates, there are three main parts.

1) Arduino: We are using Arduino to operatedifferent operations. In smart gates, the Arduino is connected to an RFID sensor. it isalso connected to a servo motor.
2) RFID sensor: In RFID, a sensor is used to pay money and open the gate with the help ofa servo motor. The RFID sensor detects whether the RFID card is authorized or not. Ifit is authorized, it will check the balance on your card and open the gate.
3) Servo motor: Following the RFID sensor, aservo motor is connected to the Arduino. After checking your information about the card, the Arduino gives the signal to the servomotor, which opens the gate.

3.2 HIGHWAY WIND TURBINE

3.2.1 MOVING VEHICLES

The vehicle moving on the highway has sufficient potential that can be used for generating the DC power by use of vertical axis wind turbine. The vertical axis wind turbine is placed on the highway to generate the power during normal wind flow as well as through the air force due to movement of vehicles on highways

Fins are designed in a similar manner as that of savonious rotor with a slight modification in the shape of upper and lower parts that are sinusoidally designed to increase the air force. The blades are design so as to optimize wind force. It can provide electricity to the streetlights at night hours and can supply dc energy to E-vehicle charging station.

3.2.2 NATURAL WIND

When a high amount of wind is blowing, thewind turbines also generate energy from thenatural wind.

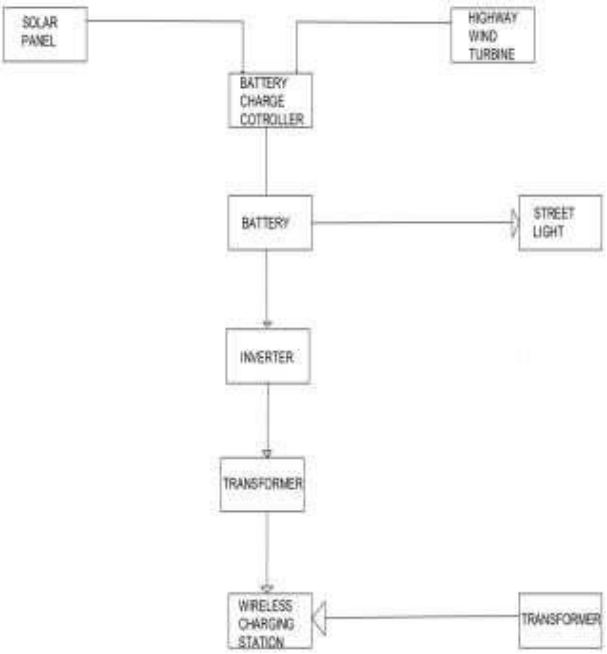
3.3 SOLAR BASED CHARGING

Solar chargers work by taking the energy absorbed through solar panels and using it to charge solar batteries. Multiple solar cells make up the solar panels and work to absorb sunlight and convert it into electricity. The solar batteries then store the energy produced by your solar panels for later use in wireless charging.

3.4 WIRELESS CHARGINGSTATION.

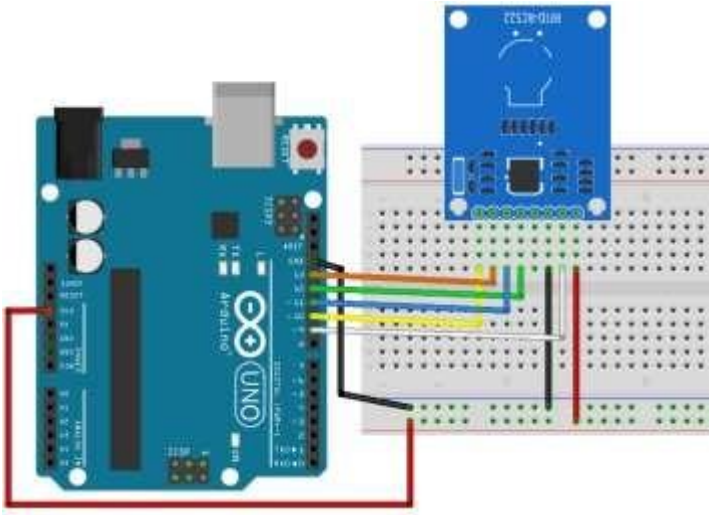
In wireless charging, the car is parked in a parking slot, and an IR sensor detects it, sending an input to the Arduino, which sends an output to the relay, which is connected to the battery and the transmitter coil. The transmitter coil creates a primary EM field extending in all directions. This causes eddy currents to flow in conductive objects. The eddy currents create a secondary field.

IV. BLOCK DIAGRAM

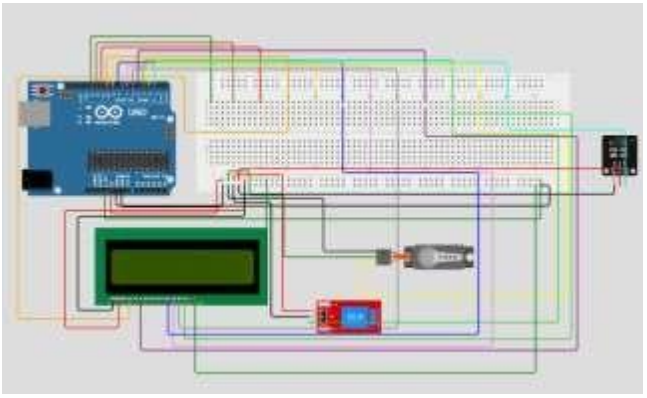


V. Connection Diagram

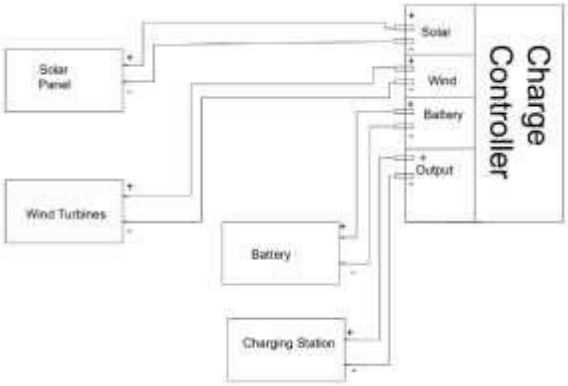
5.1 For RFID



5.2 for the IR sensor, relay, servomotor, and lcd display



5.3 Connection Diagram



VI.RESULT

We accurately designed all the models for individual system and co-simulated in the end. We see that maximum efficiency of the system depends on the resonance and distance between coils to achieve an optimal power transmission.

We successfully generate electricity with thehelp of a vertical wind turbine and solar panels and store it in batteries.

We successfully built the smart parkingstation.

VII. CONCLUSION:

- A wireless charging system of the vehicle is demonstrated using Arduino, IR sensor, and relays. The increased usage of electric vehicles necessitates the development of new technologies that simplify the charging process by making it more autonomous and requiring less humaninvolvement.
- The integration of renewable energy and Evs draws the future mode of transportation. The more penetration of EVs and RCIs means more reduction of carbon emissions and fossil fuel consumption. However , there are some challenges for the deployment of renewable energy- based infrastructures due to their natural fluctuation. For wind turbine, the location and environmental factors are critical issues for installation. Urban areas have been found to be unsuitable because of their noise and requirement for spacious premises. For solar systems, the focus of electricity production is only on the daytime this limits its supply in meeting the significant typical electricity demand.

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