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Wireless EV Charging Station

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ABSTRACT: A Wireless Charging Station using IoT for Electric Vehicles (EVs) involves the integration of Wireless Charging Technology with the Internet of Things (IoT) to provide a convenient and efficient charging solution for EVs. This System aims to eliminate the need for a physical connection between the charging station and the EV, enabling a seamless charging experience. This technology offers benefits such as ease of use, reduced wear and tear on charging equipment, and the potential for smart charging management

KEYWORDS: WPT (Wireless Power Transfer), IoT, EVs, WCS (Wireless Charging System)

I. INTRODUCTION

Energy in the form of electricity plays a very important role in the life of a normal man. Electricity is one of the greatest wonders of science. Next to man, it is the most important and revolutionary creation in this world of ours. It has practically revolutionized the world. The gradual but excessive use of electricity has come to bring about stupendous changes in industry. With it our modern gigantic tools are worked. Computers as also calculators sum up totals and make other calculations with the utmost accuracy. Newspapers and books are printed in millions overnight. There is not a single phase of human life that is not indebted to electricity for its progress. The modern age has, therefore, been truly called the "age of electricity."

We do many things with electricity now days. We warm our homes, we drive the machines in factories, and we run our trains and buses. Electricity has completely revolutionized the methods of travel and transport. It has enabled us to travel in aero planes and fly into cold atmosphere of the sky. We also have electric trains in our country.

The infrastructure element that provides the crucial link between an Electric Vehicle (EV) with a depleted battery and the electrical source that will recharge those batteries is the Electric Vehicle Supply Equipment or EVSE. This report provides a review of the current and emerging EVSE technologies and an assessment of the common codes and standards associated with EVSE. The report also evaluates the barriers and challenges of deploying an expanded

An electrical vehicle battery recharging system composed of a set of photovoltaic solar panels connected to the electrical power grid. Thus, the energy generated by the solar panels is preferably used to recharge the electrical vehicle where the generated energy is injected into the power grid. In things where the generation of energy by the panels is but the demand of the electrical vehicle, the grid complements the specified energy.

An electrical vehicle battery recharging system composed of photovoltaic solar panel connected to the electrical power grid. With the help of Solar panel, energy will be stored into the battery. When vehicle is parked at the charging station, vehicle battery will be charged by charging station battery. After full charging the supply will be cutoff by the relay. Also using NODE MCU, Battery voltage will be continuously monitored on android application through Wi-Fi. LDC is used to display battery voltage and percentage of battery charge.

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II. LITERATURE SURVEY

1. **Electric Vehicle Charging System using Wireless Power Transmission, IoT and Sensors, 2020 International Research Journal of Engineering and Technology (IRJET):** In this paper, a wireless charging system is used to charge the vehicle wirelessly via inductive coupling. The transmission of electrical energy from source to load from a distance without any conducting wire or cables is called Wireless Power Transmission. The concept of wireless power transfer was the greatest invention by Nikola Tesla. Also, an Internet of things-based collection system is designed in which a person can use the RFID to pay the charging charges of that vehicle. The system checks if the person has sufficient balance and then deduct the charging charges and update the balance. The Internet of Things describes the network of physical objects that uses sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems. This system doesn't require any human interaction. The result of this project is we can charge our vehicles wirelessly via inductive coupling and pay our charging charges through RFID tags. Wireless power transmission might be one of the technologies that are one step towards the future. This project can open up new possibilities of wireless charging that can use in our daily lives.
2. **Wireless Mobile Charger Design Based on Inductive Coupling, 2019 International Journal of Trend in Scientific Research and Development (IJTSRD):** In this paper, authors have been proposed wireless charging system by using inductive coupling. There was a growing market to construct the wireless charging system in the various kinds of electronic devices. There were many kinds of methods in wireless charging system. Among them, inductive coupling method was the simplest method. The system used Arduino microcontroller to produce the required frequency for driving the induction coil because it gave more accurate frequency than other controllers. In this circuit, N channel mode MOSFET IRFZ44N was used for driving the inductive coil because of its accurate switching timing and ratings. An important issue associated with all wireless power systems was limiting the exposure of people and other living things to potentially injurious electromagnetic fields. Finally, the wireless charger for mobile phones became an important role of human life style because of its simple design and safety for humans. The most powerful output can be obtained at switching frequency of 100 kHz for the design shown in earlier sections.
3. **A Review Paper on Wireless charging of mobile phones, 2014 International Journal of Engineering Research & Technology (IJERT):** In this paper two methods for wireless charging of mobile phones are studied. Nowadays Mobile communication not only restricted for voice transmission but also used for various multimedia applications like transfer of text, images, videos, playing games etc. Continuous use of mobile phones needs charging of the batteries again and again. Imagine a system where your cellular phone battery is always charged, you don't have to worry if you forget the charger. In this paper two methods are studied first is wireless charging of mobile phones using microwaves which eliminates the need of separate charger for mobiles. In this method the charging of mobile phones is done using microwaves when we talk on that particular mobile. The microwave frequency used is 2.45Ghz.The second method is charging of mobile phones using Bluetooth.
4. **Shared Solar-powered EV Charging Stations: Feasibility and Benefits, 2016 IEEE:** In this paper, we explored the benefits of integrating renewable solar energy with EV charging infrastructure placed at car-sharing service's parking lot. We formulated a Linear Programming approach that maximized both solar energy utilization and customer satisfaction. Comprehensive evaluation of our algorithm was performed using real-world EV charging traces. They demonstrated the feasibility of a grid-isolated solar-powered charging station and show that a PV system proportional to the size of a parking lot adequately apportions available solar energy generated to the EVs serviced.
5. **System design for a solar powered electric vehicle charging station for workplaces, 2018 Applied Energy:**
   This paper analyses the PV system design and EV charging in a holistic manner considering the above aspects. The new contributions of the work compared to earlier works are as follows:
   - Determination of the optimal orientation of PV panels for maximizing energy yield in Netherlands and comparing it with the use of tracking systems.
   - Possibility of oversizing the PV array power rating with respect to the power converter size based on metrological conditions of the location.

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- Dynamic charging of EV using Gaussian charging profile and EV prioritization, which is superior to constant power charging.
- Determination of grid impact of two different types of workplace/commercial charging scenario considering 5 days/week and 7 days/week EV load by running round-the-year simulation.
- Optimal sizing of local storage considering both meteorological data and smart charging of EV.

III. PROPOSED ALGORITHM

In this project, we are going to develop a system using IoT based technology and renewable energy source i.e. solar energy. Whole system will be operated on 12 V supply using battery. Battery will be charged by solar panel. We will be using Node MCU microcontroller for interfacing Voltage sensor and to monitor voltage level.

Voltage sensor gives analog output to node MCU. This controller converts Analog signal into digital form and provides it to LCD and Node MCU. Percentage of battery will be displayed on LCD 16X2. For wireless power transfer, we are using transmitter and receiver coil. The distance between these two coils is less than 5 mm so we get the voltage 5 volt. The transmitter coil requires 9 volt DC supply and at the end of receiver coil, we get the 5 volt supply.

We can have customized control from Android App to ON and OFF the relay for charging the battery with time. If the Relay is OFF then it will turn OFF the transmitter coil supply 9 Volt. If the relay is ON then it will turn ON the wireless transmitter coil supply 9 Volt. So it will save the battery power with the help of Android application and also will increase the battery life because timer function is available in Android application. It provides fully customized and dynamic setting to ON and OFF the relay for EV and mobile charger on time as per battery charging requirement.

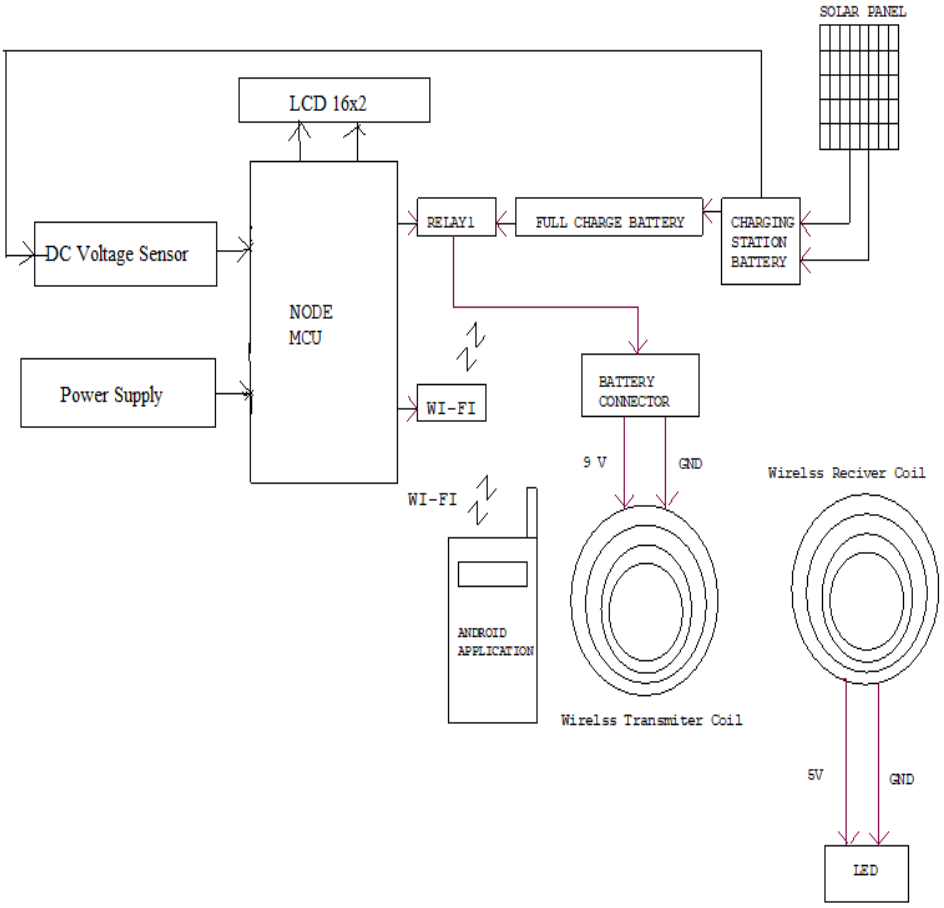

Fig 3.1: Block diagram

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Wireless charging eliminates the need for physical cables and plugs, making the charging process more convenient for EV owners. With wireless charging, drivers can simply park their vehicles over a charging pad, reducing the hassle of plugging and unplugging cables. As autonomous vehicle technology continues to advance, the integration of wireless charging technology can further streamline the process of charging electric autonomous vehicles. Autonomous EVs could potentially drive themselves to wireless charging stations, making the entire process more seamless. In densely populated urban areas, wireless EV charging stations can be integrated into existing infrastructure such as roads, parking lots, and public transportation systems. This integration can support the transition to electric mobility in cities, reducing pollution and congestion. Wireless charging technology can be scaled up to support various applications, including public charging infrastructure, commercial fleets, and residential charging solutions. As the demand for electric vehicles grows, wireless charging stations can be deployed across a wide range of settings to meet the needs of different users.

IV. CONCLUSION

We have successfully studied interfacing of LCD and Voltage sensor with Node MCU microcontroller. We have designed a prototype model for the implementation of EV charging station. The use of hardware and software along with the android app also will be studied. For mobile charging, the interfacing of relay through converter module is done which is very effective wireless mode of charging. Using Node MCU microcontroller having in-built Wi-Fi technology, a project has developed in Blynk app for monitoring and controlling charging of EV and mobile battery as well.

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