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Solar Photo Voltaic Panel based Wireless Electric Vehicle Charging and Monitoring System

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Abstract
The Hybrid Electric vehicle charging system can be powered by two supplies i.e., Mains and Solar power supplies. An AC adapter comprises of a transformer, a rectifier, and an electronic filter. The voltage from the external mains supply is stepped down by the transformer and is converted from Alternating Current to Direct Current using a rectifier and for Solar Supply we have used a 6W Solar panel for Charging of Lithium Battery

KEYWORDS: Solar Panel, Hybrid Electric Vehicle, Wireless Power Transfer Module, 230v AC power supply,Boost Converter. Lithium Battery,ATMEGA16 Microcontroller

INTRODUCTION

We use both the combination of solar energy and WPT solar energy which helps the user. In an EV, the battery is too difficult to design because of its high power and energy density. In recent times there are many forms of batteries used in instruments but lithium-ion batteries deliver the most suitable solution for electric-powered vehicles. Recently the WPT has been a most effective topic in the transportation system. An overview of the WPT system and it includes the High-frequency power output, Magnetic induction principles, Existing and Proposed system, Solar panel and a few different issues like Protection considerations. By introducing the latest achievements in WPT, we hope that this will achieve in all around the world.

Wireless battery charger can be used in many battery powered products likely smart watches, smart phones, and a host of other small electronic products. Originally the technology focused at small products. Now a days wireless charging technology is used for larger applications which include cars batteries and many other items. Wireless charging usually works on principal of power transmission from one circuit to another via inductive coupling between two circuits. Since no electrical connection directly is implemented it is very easy and does not depend on contacts that may wear out and become unreliable after many charging cycles. Wireless battery charging works by transferring electricity between two objects, often coils, using the magnetic induction or magnetic field principle.

What is EMBEDDED C?

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems

Why EMBEDDED C is important?

Embedded C is a programming language that is used in the development of Embedded Systems. Embedded Systems are specialized systems designed to perform very specific functions or tasks. Embedded System is the combination of hardware and software, and the software is generally known as firmware which is embedded into the system hardware. Embedded C is used to program a wide range of microcontrollers and microprocessors. Embedded C requires less number of resources to execute in comparison with high-level languages such as assembly programming language.

LITERATURE SURVEY

The significance of renewable energy sources and the rising demand for electric vehicles are covered at the outset of the presentation. The authors next give an overview of the various wired and wireless EV charging techniques that are available. They highlight the ease and safety benefits of wireless charging as well as the possibility of using solar energy to charge EVs. The authors then go into the different aspects that influence the design and functionality of a WPT system, including the operating frequency, the separation between the transmitter and reception coils, the size and shape of the coils, and the system efficiency. They detail the mathematical model utilized to enhance the system's performance and go through the fundamentals of resonant WPT.

The report provides a review of prior research on solar energy and EV charging stations. The authors stress how crucial it is to have a dependable and sustainable charging infrastructure for the increasing number of EVs. They go over the advantages of using solar energy for EV charging stations as well as the difficulties in developing them, such as the fluctuation in solar energy production and shifting weather patterns. The suggested mathematical model accounts for the EVs' wireless charging, battery storage, and solar energy production. The writers also take into account how the system's performance is impacted by environmental factors like temperature and humidity. The simulation findings demonstrate that the suggested system may offer EVs efficient and dependable charging services while reducing environmental impact.

The article comes to the conclusion that wireless charging technologies have the potential to revolutionize transportation by offering a practical, secure, and environmentally friendly substitute for conventional charging systems. The author’s stress that considerable obstacles still need to be solved before wireless charging for EVs can be a useful and widely used technology. The overall assessment of wireless charging solutions for EVs in this study is helpful and emphasizes both the advantages and disadvantages of various technologies. The results of this study can be a helpful resource for academics and industry professionals studying EV charging infrastructure.

EXISTING SYSTEM

One important goal is the transportation sector consumes around 33% of all primary energy, reducing primary energy demand and increasing the use of renewable sources are two key objectives of the climate pledge. The government is being exhausted just as the world's resources. In order to cut carbon emissions and combat climate change, agencies and NGOs promote a greener option through the use of

solar and wind energy sources for transportation and electric power generation. Earlier charging of Electric vehicles is done by direct connection of vehicles with charger. This require a external cable to connected to the vehicles for charging.

PROPOSED SYSTEM

The Aim is to Design a cordless charging system for electrically powered vehicle with home as energy station. The goal is to put in place a system for EV wireless charging. i.e., to transport power across a certain space via an electromagnetic field. Electric Vehicles are a superior solution for reducing current pollution. To achieve improved reliability, the battery charging procedure must be modified. Wireless power transfer is a technique used and is capable of charging an Electric Vehicle battery. 12v Solar based source is used to charge the battery wirelessly along with Microcontroller based system is used to monitor the battery voltage with LCD Module.

A proposed system for solar photovoltaic (PV) panel-based wireless electric vehicle (EV) charging and monitoring leverages solar energy to power EV charging wirelessly, eliminating the need for physical cables and promoting sustainability.

SOFTWARE

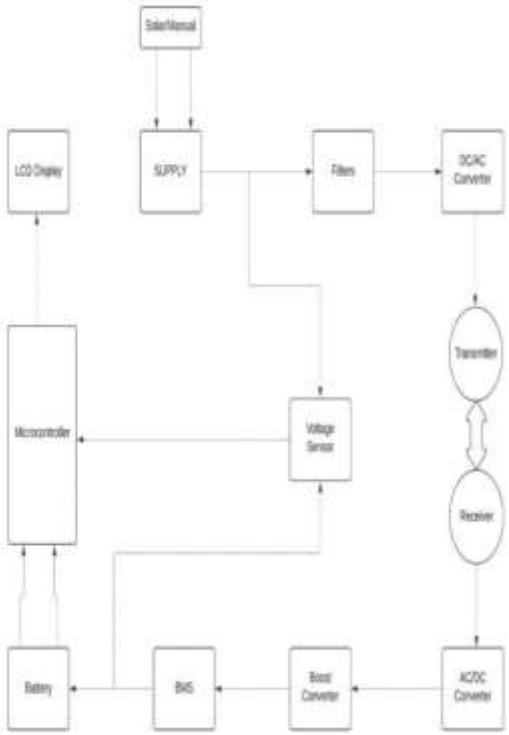
AVR studio is an Integrated Development Environment (IDE) developed by ATMEL for developing different embedded applications based on 8-bit AVR microcontroller. Before the installation of AVR Studio you have to install the compiler WinAVR. By installing WinAVR allow AVR Studio to detect the compiler.

METHODOLOGY

The principal used to achieve solar wireless charging system is IPT (Inductive Power Transfer). The fundamental idea behind IPT is that by running an alternating current through a coil, a magnetic field is created. Another coil that is close to the first coil experiences a current due to this magnetic field. The device linked to the second coil can then be powered by the induced current. The receiving coil is normally positioned on the underside of the car in an electric vehicle charging system, charging pad is typically installed on the ground. The two coils are aligned and the charging process starts when the vehicle is parked over the charging pad. The IPT system is made to be reliable, effective, and practical. When a vehicle is there, the system immediately recognizes it and starts charging.

This innovative system is designed using Solar Energy as power source and Wireless inductive coupling module. In this system the project activity introduces a wireless battery charging system with a charging device. The proposed method transmits power without any physical connection between the transmitter and the receiver side. The AVR family microcontroller's of Atmega 16 which are used for proposed system constantly measures the Charging Voltage of the Battery. The charge of the battery is displayed on the LCD screen (Voltage). BMS Circuit is attached with this system along with Boost Up circuit (XL6009) to constantly safely charge the battery at optimum Voltage Range. User can charge the Battery from any available source using Solar Energy. Same battery voltage is used to power the Monitoring Circuit using Voltage Regulators and filter Capacitors.

BLOCK DIAGRAM



The output from the inverter is given to the transmitter coil. Energy transfers by electromagnetic induction to the receivers are via inductive coupling. The inductive coupling is used because the antenna to wireless power is brought from the transmitting to the input of a receiver. The receiver unit, the bridge rectifier is used to transform ac voltage to dc voltage and convey dc output. A capacitor is covered in a circuit to behave as a filter out to reduce ripple voltage .wireless energy transmission is the transmission of electrical energy from a power source into electric load in absence of man- made conductors. WPT transmission the usage of solar power is WPT is inconvenient, no hazardous and inexperienced technology. A WPT electricity transmitter emits a magnetic area with assistance of the coil with the same frequency emitted through the wireless power receiver. For finest impedance, cable reels are used on each aspect. PWM (pulse width modulation) is a way by means of which we definitely manage a virtual output sign by using switching it on and stale right away, with the aid of varying the width of the on/off period, it's going to supply the effect of various the output voltage

ADVANTAGES

- Increased Accessibility
- Power savings
- Improved Safety
- Flexibility and Convenience
- Cleanliness

APPLICATIONS

We categorize the applications into four application domains:

1. Smart Phone
2. Laptops
3. EV

4. Public Infrastructure

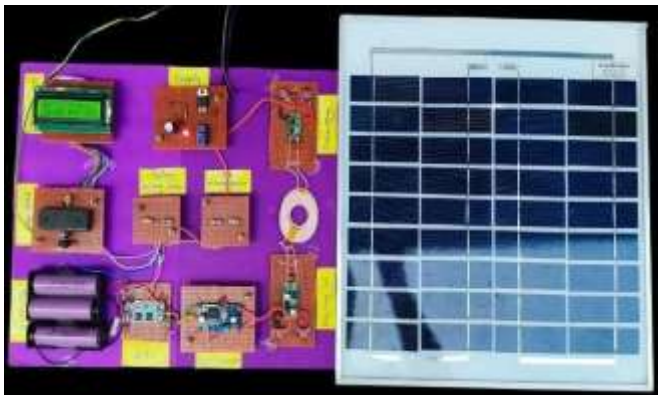
EXPERIMENTAL RESULT

The implementation of a *Solar Photovoltaic Panel-based Electric Vehicle (EV) Wireless Charging and Monitoring System* presents a sustainable and efficient solution for the future of e-mobility. By harnessing solar energy, the system reduces dependency on conventional power sources, promoting clean and renewable energy utilization. The integration of wireless charging eliminates physical connectors, enhancing convenience, safety, and durability.

Overall, this project demonstrates the feasibility and practicality of solar-powered wireless EV charging, paving the way for greener transportation solutions. Future advancements could focus on improving charging efficiency, scalability, and integration with smart grid technologies for widespread adoption.

BEFORE THE SUPPLY

AFTER THE SUPPLY



CONCLUSION

The solar wireless electric vehicle charging system, in summary, is a promising innovation that has numerous advantages over conventional cable charging methods. It lessens dependency on fossil fuels and enables quick and easy charging of electric vehicles without the use of bulky wires or connectors. A clean and renewable source of energy, the solar panel on the charging pad can generate electricity by using the sun's energy. Since there is no need for physical contact during the wireless power transfer between the charging pad and the vehicle, there is less chance of electrical hazards and damage to the charging cables. The battery is charged securely and effectively thanks to the employment of AVR microcontroller and other electronic components, which enables efficient and intelligent management of the charging process

FUTURE SCOPE

Further this system can be interfaced with an IOT based monitoring system, using it users can view the charging status from anywhere using Blynk based cloud applications. Node mcu Wi-Fi module is used in this system for internet connectivity.

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