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Solar Based Ev Wireless Charging System

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Abstract:

This paper describes the design of solar powered charging station for charging of electric vehicle describes design of solar powered charging station for charging of electric vehicle that solves the key downside of fuel and pollution. Electric vehicles have now hit the road worldwide and are slowly growing in numbers. Apart from environmental benefits electric vehicles have also proven helpful in reducing cost of travel by replacing fuel by electricity which is way cheaper. Well here we develop an EV charging system that solves with a unique innovative solution. This EV charging of vehicles without any wires, No need of stop for charging, vehicle charges while moving, Solar power for keeping the charging system going, No external power supply needed. The 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. The system demonstrates how electric vehicles can be charged while moving on the road, eliminating the need to stop for charging. Thus the system demonstrates a solar powered wireless charging system for electric vehicles that can be integrated in the road.

I. INTRODUCTION

Electric Vehicles (EVs), represents a new concept in the transport sector around the world. It is expected that the market share of EVs will exponentially grow, comprising 24% of the U.S. light vehicle fleet in 2030, representing 64% light vehicle sales in this year. In this context, the EVs battery charging process must be regulated to preserve the power quality in the power grids. Nevertheless, with the proliferation of Ev's a considerable amount of energy will be stored in the batteries, raising the opportunity of the energy flow in the opposite sense. In the future smart grids, the interactivity with the EVs will be one of the key technologies, contributing to the power grid autonomous operation. The concept of the on-board bidirectional charger with V2G and V2H technologies is introduced due to lower carbon dioxide emission and raising fossil fuels. However, the EV was not widely adopted into the market due to some limitations such as high vehicle cost. limited charging infrastructure and limited all electric drive. EVs are vehicles that

are either partially or fully powered on electric power. Electric vehicles have low running costs as they have fewer moving parts for maintenance and are also very environmentally friendly as they use little or no fossil

II. PROBLEM STATEMENT

The current charging system for electric vehicles involves the use of cables and plugs, which can be inconvenient and messy, especially when charging vehicles. The goal of this project is to develop a wireless charging system for electric vehicles while running that eliminates the need for stopping vehicle for charging, cables and plugs, making the charging process more convenient and efficient.

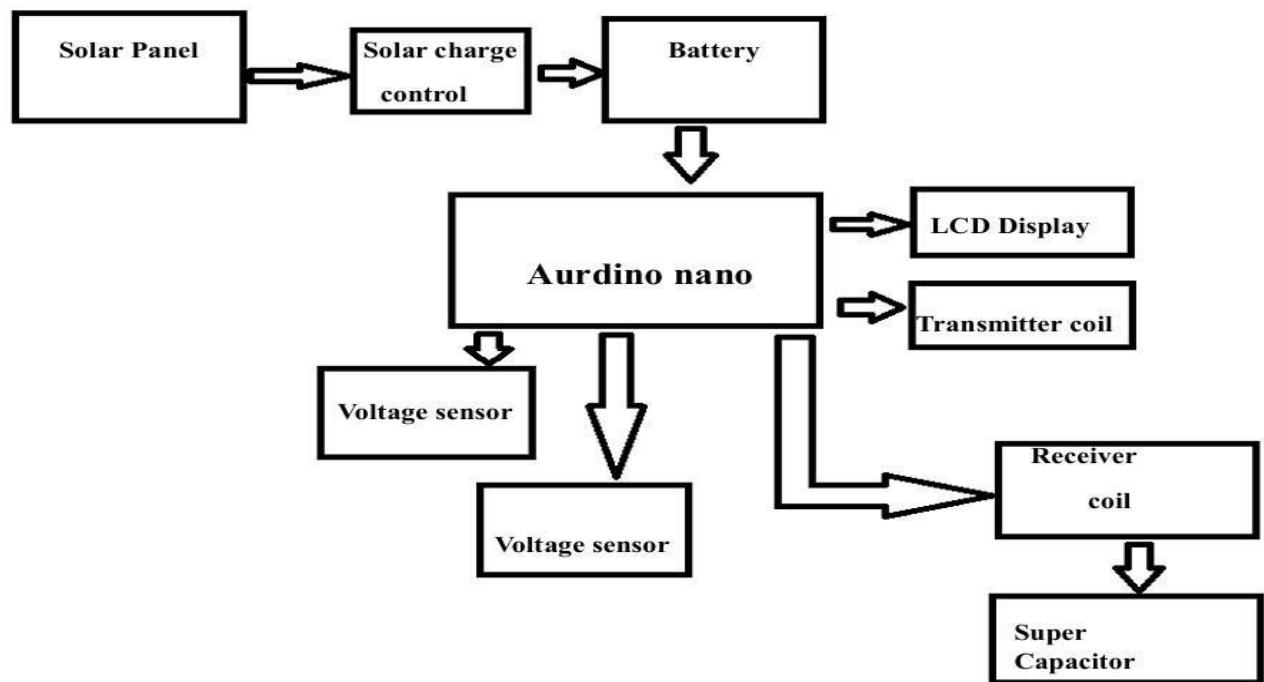


Fig.1.Block diagram

III. WORKING MODULES

The system makes use of a solar panel, battery, transformer, regulator circuitry, copper coils, AC to DC converter, at mega controller and LCD display to develop the system. The system demonstrates how electric vehicles can be charged while moving on the road, eliminating the need to stop for charging. 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 a 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. When the vehicle is driven over the coils energy is transmitted from the transmitter coil to ev's coil. Please note the energy is still DC current that is induced into this coil.

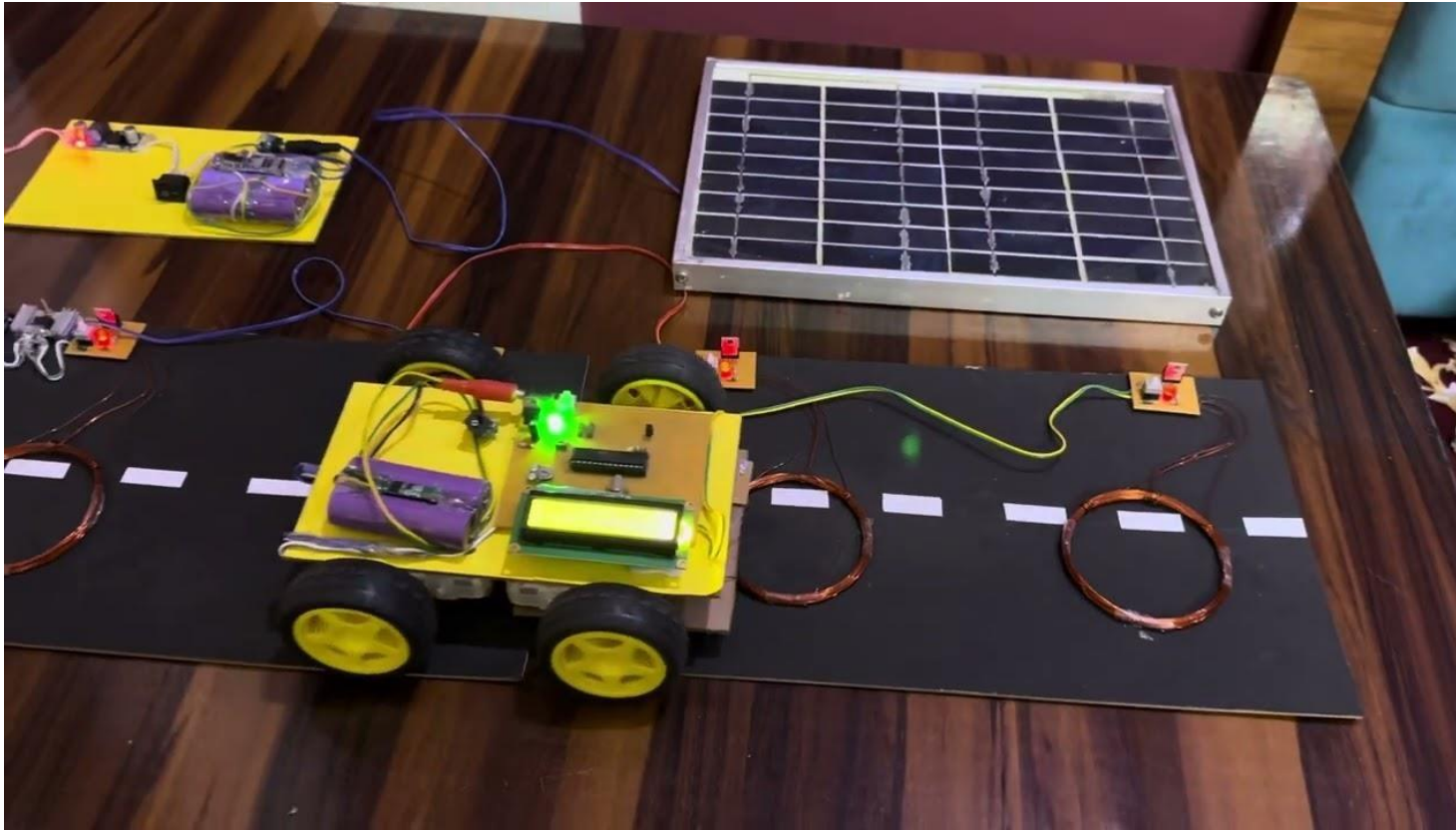


Fig.2. Working module

IV. MERITS

- A solar wireless electric vehicle (EV) charging system offers several advantages, including utilizing renewable energy, eliminating the need for cables, and potentially enabling charging while driving, all contributing to a more sustainable and convenient EV charging experience.
- By using solar energy, these systems contribute to a cleaner environment by reducing the need for traditional power grids and minimizing pollution.
- Eliminates the need for cables and plugs, simplifying the charging process and improving user convenience.
- Wireless charging solutions eliminate the risk of electric shock or trip hazards associated with traditional charging cables.

V. CONCLUSION

The integration of solar energy with wireless charging technology for electric vehicles (EVs) presents a sustainable and efficient alternative to conventional charging methods. This paper has explored the design, implementation, and evaluation of a solar-based EV wireless charging system, emphasizing its potential to reduce dependency on grid electricity and fossil fuels. The combination of photovoltaic panels and inductive power transfer ensures a clean, contactless, and user-friendly charging solution.

Experimental results and simulations validate the system's performance under varying solar irradiance conditions, demonstrating that sufficient energy can be harvested and transferred wirelessly to charge EV batteries effectively. Furthermore, the proposed setup reduces carbon emissions and enhances the feasibility of deploying eco-friendly charging infrastructure in urban and remote areas.

Future work may focus on improving power transfer efficiency, implementing dynamic charging capabilities (on-the-go), and integrating smart IoT-based monitoring for optimal energy management. Overall, the solar-based EV wireless charging system contributes significantly toward green mobility and aligns with global efforts to combat climate change.

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