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Wireless Solar Based E-vehicle Charging Station

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Abstract: *The integration of solar panels with wireless Electric Vehicle (EV) charging systems presents a promising solution for sustainable and autonomous energy transfer in electric mobility. By harnessing solar energy, these systems can generate clean, renewable power to charge EVs wirelessly, reducing dependency on the grid and promoting eco-friendly transportation. Solar-powered wireless EV charging systems typically combine photovoltaic (PV) technology with inductive power transfer (IPT) for energy delivery, offering a cleaner alternative to conventional charging methods. This technology enables the deployment of charging stations that not only provide energy to EVs but also contribute to reducing carbon footprints by utilizing renewable energy. Key challenges include optimizing solar energy conversion efficiency, ensuring effective energy storage, and addressing variability in solar power generation due to weather conditions.*

Keywords: Renewable power, Carbon footprint

I. INTRODUCTION

Reliance on traditional energy sources but also contributes to lowering carbon emissions and promoting renewable energy usage. As the demand for electric vehicles A solar-based electric vehicle (EV) wireless charging station represents a groundbreaking approach to sustainable transportation. By integrating solar energy with cutting-edge wireless charging technology, these stations offer a convenient and eco-friendly solution for charging electric vehicles.
The system typically consists of solar panels that capture sunlight and convert it into electricity, which is then stored or used to power the charging process. Wireless charging, or inductive charging, eliminates the need for physical connectors, allowing EVs to charge simply by parking over a designated charging pad. This innovative solution not only reduces continues to rise, solar-based wireless charging stations stand out as a forward-thinking option that enhances convenience for users while supporting a cleaner environment.

II. LITERATURE SURVEY

[1]**. Safak Bayram; Michael Devetsikiotis 2014:** The work includes also a summary on possible types of Energy Storage Systems (ESSs), that are important for the integration of EVs fast charging stations of the last generation in smart grids. Finally a brief analysis on the possible electrical layout for the ESS integration in EVs charging system, proposed in literature, is reported. Development of Electric Vehicle Charging Station Management System in Urban Areas Prasetyo Aji; Dionysius Aldion Renata; Adisa Larasati; Riz 2020

[**2]. Oliver Marcincin; Zdenek Medvec 2014:** This paper is about active charging stations for electric cars. Active charging station is usually part of modern electrical grids, known as a Smart Grids or Micro Grids.This paper also includes an executive summary existing knowledge about the structure and service of electricity distribution network, analysis of electric car industry and its potential impact on the electrical network and also conceptual solution charging stations electric cars with minimal effects on the power network.

[3]. Md Sohail Tanveer; Sunil Gupta; Rahul Rai; Neeraj Kumar Jha; Mohit Bansal 2019: This paper investigates the possibility of charging the battery of electric vehicles at a various working place like offices, colleges, hospitals, universities etc in Delhi, India using solar energy.

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III. PROBLEM DEFINATION

The global shift towards electric vehicles (EVs) as a more sustainable alternative to traditional internal combustion engine vehicles is gaining momentum. This transition is driven by the increasing concerns over air pollution, climate change, and the depletion of fossil fuels. However, the widespread adoption of EVs is still hindered by challenges related to the availability and accessibility of efficient charging infrastructure, especially in urban and remote areas.

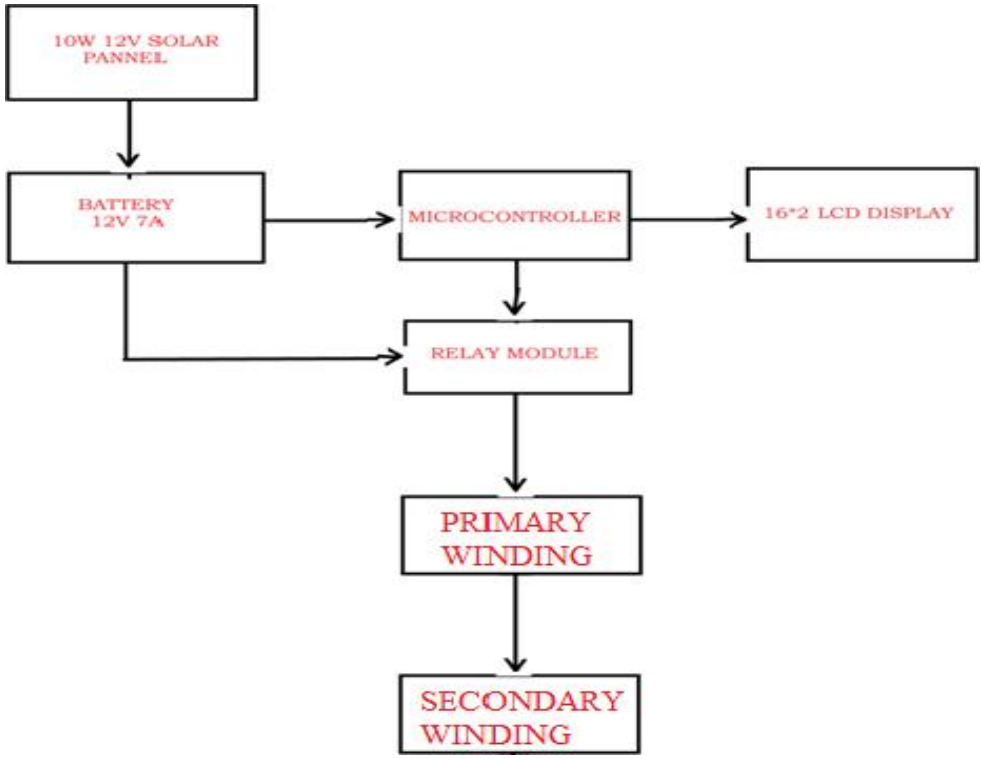
At the same time, the global energy landscape is also shifting towards renewable energy sources, with solar power emerging as a highly viable solution due to its abundant availability, low environmental impact, and decreasing cost of solar technology. Combining solar power with EV charging stations presents a unique opportunity to address both energy sustainability and the growing need for efficient, accessible EV charging infrastructure.

The current EV charging infrastructure is often reliant on the existing grid, which can be both energy-inefficient and dependent on non-renewable sources of power. This dependency leads to higher operational costs, carbon emissions, and grid congestion, especially in urban areas. Moreover, there is a need for a more decentralized, eco-friendly, and reliable EV charging solution that reduces the strain on the conventional electricity grid while promoting the adoption of electric vehicles.

Objective:

- Design a Solar-Powered EV Charging Station
- Integrate Energy Storage Systems
- Develop an Efficient Energy Management System

Block Diagram



IV. PROPOSED METHODOLOGY

The Main purpose of this project is to reduce the use of electrical power and convert it into a sustainable energy and become more eco-friendly.

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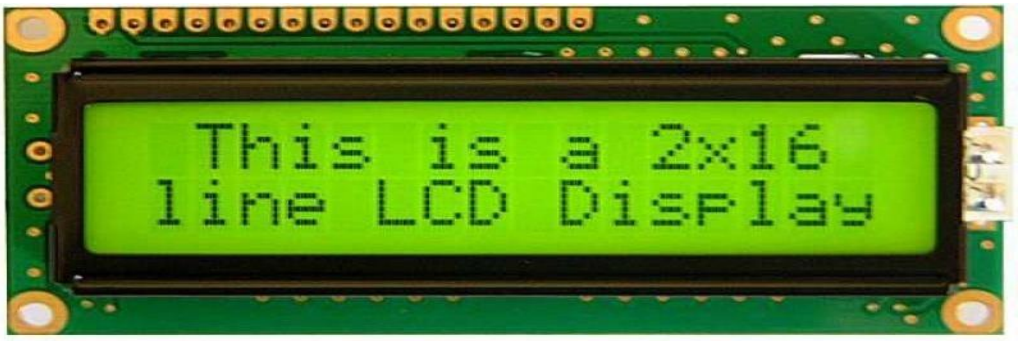
System Components

16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD

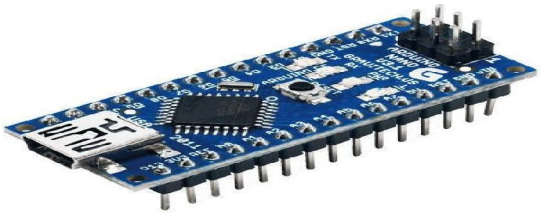


Relay

A **relay** is an electrically operated switch.Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

Arduion

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.



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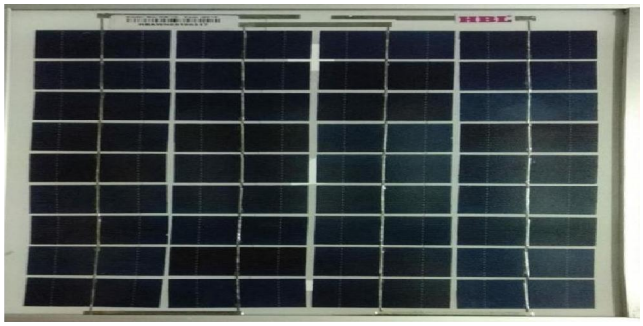
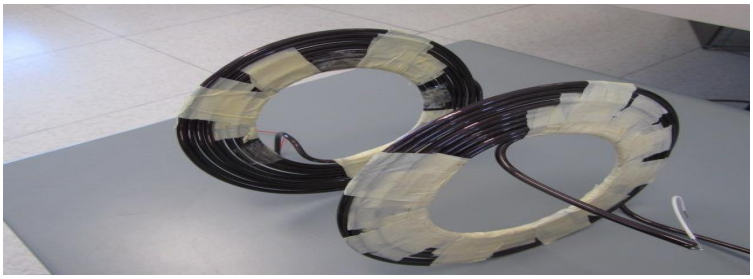
Solar Panel

Solar panels are devices that convert sunlight into electricity



Winding Coils

The Inductive Power Transfer is implemented through the magnetic coupling between two coils. For the experimental prototype, two circular coils have been use



Lead Acid Battery

The electrical energy produced by the system is need to be either utilized completely or stored. Complete utilization of all the energy produced by the system for all the time is not possible. So, it should be store rather than useless wasting it.

V. CONCLUSION

- With these we come to following fact that no of expected vehicles doubling on the road in the near future the need for this alternative energy is very evident and has promising returns.
- Important to produce vehicles that do less, have a longer range buse less energy.
- Lower our toxic emissions and localize greenhouse effects.
- Increase the overall energy efficiency of vehicles.

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