iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** III **Month of publication:** March 2024

DOI: https://doi.org/10.22214/ijraset.2024.58952

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue III Mar 2024- Available at www.ijraset.com

Hybrid Charging Station

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Abstract: ***In an attempt to decarbonize the transportation sector, among many countries, is option for e-mobility as an optimal solution, to create a greener, cleaner, and more affordable future for everyone. However, it is missing a crucial prerequisite, which is a strong EV charging infrastructure. The various EVCS types, technologies, techniques, and equipment. It also includes the design of a charging station for small EVs for on campus use, with a solar energy system input. Next, a mechanical 3D design for the final product. As well as a proof-of- concept implementation. Lastly, some conclusions, limitations, and recommendations for further research. A solar charging station is meant so that vehicles is fully charged and is environmentally safe. this technique transforms solar power to electricity and stores it in an battery bank. If electric vehicles must be truly imperishable, it's essential to charge them from sustainable sources of electricity, like solar or wind energy. In this paper, the solar charging station that gives the electricity to charge the battery. The charging station has integrated battery storage that allows for off-grid operation. The DC charging uses the DC power from the photovoltaic panels directly for charging the vehicles battery without the utilization of an AC charging adapter.***
Keyword: Sunlight, Solar Panel, Charging Station, EV charging etc.

I. INTRODUCTION

In an attempt to decarbonize the transportation sector, among many countries, is option for e-mobility as an optimal solution, to create a greener, cleaner, and more affordable future for everyone. However, it is missing a crucial prerequisite, which is a strong EV charging infrastructure. The various EVCS types, technologies, techniques, and equipment. It also includes the design of a charging station for small EVs for on campus use, with a solar energy system input. Next, a mechanical 3D design for the final product. As well as a proof-of-concept implementation. Lastly, some conclusions, limitations, and recommendations for further research.

Inverters are widely used in the domestic as well as industrial environments to serve as second line of source in case of power cut form the electricity utility grids. However, due to low capacity of the battery the inverter dies out with the use of heavy load appliances. This project is designed in such a way that it overcomes this limitation by the use of solar energy. Hybrid Inverter with Solar Battery Charging System consists of an inverter powered by a 12V Battery.

This inverter generates up to 110V AC with the help of driver circuitry and a heavy load transformer. This battery gets charged from two sources, first being the mains power supply itself. If the mains power supply is available, the relay switches to the connection using mains power supply to supply to the load.

This power supply also charges the battery for using it as back up the next time there is power outage. The use of solar panel to charge the battery gives an additional advantage of surplus power in case the power outage of mains is prolonging. Thus this inverter can last for longer duration’s and provide uninterrupted power supply to the user.

II. OBJECTIVE OF PROJECT

1) To develop working proto type of Ev charging station.
2) To make a hybrid system for it ie. Powered by solar as well as Ac.
3) Make auto power source shifting mechanism.
4) Make a manual arrangement such that solar plate can get maximum power input and work with full efficiency

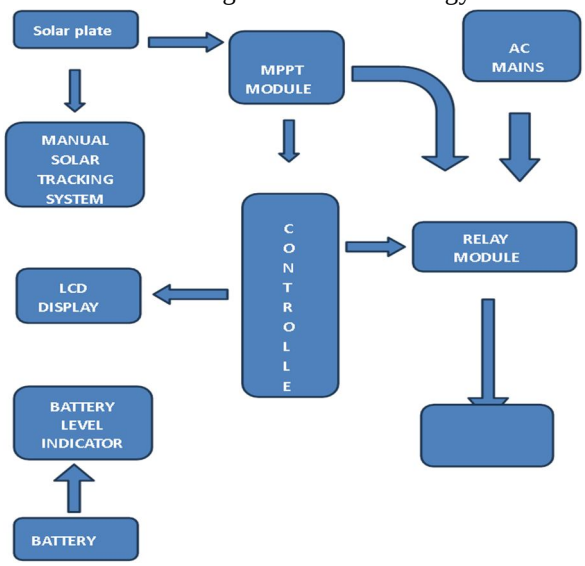
III. FEASIBILITY STUDY

In order to study the feasibility of this work, it is important to take into consideration the following factors technical feasibility: This project relies on knowledge in power electronics field, as well as some knowledge in renewable energies field, more specifically solar energy.

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It's important to know our converter's parameters in terms of output power, voltage and current. As well as its efficiency, dimensions, and values/ratings for the different parts (Inductors, capacitors, transistors, diodes …). In addition, we should also consider the battery's material and nominal voltage and capacity. Environmental feasibility: Since this project uses a solar energy input, which is known to be intermittent, the weather, irradiance and geolocation of the city are important factors to keep in mind. In addition, this project is environmentally friendly due to the fact that it reduces CO2 emissions and petroleum use. Economic feasibility: The economic aspect of this project includes some costs (acquisition and operation) and some savings on the long term; insofar as, the user would be able to save some money, after a certain break-even point, in fuel costs, maintenance costs, mileage etc. Xin Jin et al. proposed a social Spam Guard system depend on users for content contribution and sharing. Feature extractions are extracted based on image content features, text content features and social network features GAD clustering algorithm used for large scale clustering and integrate to avoid duplicates

Block Diagram and Methodology



IV. COMPONENTS REQUIRED

1) ATMEGA328p-pu controller
2) MMPT Module
3) IC
4) Relay
5) Relay Driver IC
6) Voltage Regulator IC
7) IC Socket
8) LCD display
9) Crystal Oscillator
10) Resistors
11) Capacitors
12) Transistors
13) Cables & Connectors
14) Diodes
15) PCB
16) LED's
17) Solar plate
18) MS square pipe
19) MS round pipe
20) Other

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V. WORKING PRINCIPLE

Here in this project, we are going to make Ev charging station. Which powered by solar power. Solar power is arranged in such a way that it will collect maximum power. We make manual arrangement of solar plate adjustment in both axis. Power From solar plate coming at input of MPPT module. Here the power is boosted as per required voltage. The input come over here is feed to controller compare it with rated voltage and switches relay either side as per coding. When solar input is below rated voltage, it will shift automatically towards AC mains solar provision.

At the charging end we put battery level indicator to show battery status. Also, in future we work forhow much power consumed in charging and its tariff visually.

VI. ADVANTAGES, DISADVANTAGES AND APPLICATIONS

A. *Advantages*

1) Use Of free Energy.
2) Getting power source with no cost.
3) Simple Installation.
4) Low Maintenance service.
5) Easily repairable.
6) Used for different bikes.
7) Charge Lead acid batteries too.

B. *Disadvantages*

1) During rainy season solar panel does not operate at full efficiency.

C. *Applications*

1) School/College campus
2) Marriage halls
3) Garden parking
4) Playing ground parking
5) Hospital parking
6) Food court parking

VII. CONCLUSIONS

The main aim behind this capstone project was to design a charging station for small EVs for on-campus use.

This report includes on the state-of-the-art review of electric vehicles and EV charging. It also focuses on the system design and theoretical calculations. Namely, for the Solar energy input and the requirements of our chosen EV, the analysis and design of a DC-DC converter with isolation and a DC-AC Inverter. Furthermore, on the control aspect, it includes both a PWM Control and an Access control using Arduino and RFID. It also contains a 3D design of our final product and a small) scale implementation to concretely apply the design and theory.

VIII. FUTURE SCOPE

It is undeniable that there is still work to be done and further research to be made. The largest challenge or limitation that we faced during this project was the unavailability of some important equipment. In the future, this project can be developed further at a larger scale with the availability of all necessary parts. That being said, this capstone project was an amazing and fun experience overall, it allowed me to put to practice a large array of concepts that I have learnt throughout my degree, as well as to discover some new ones and apply them.

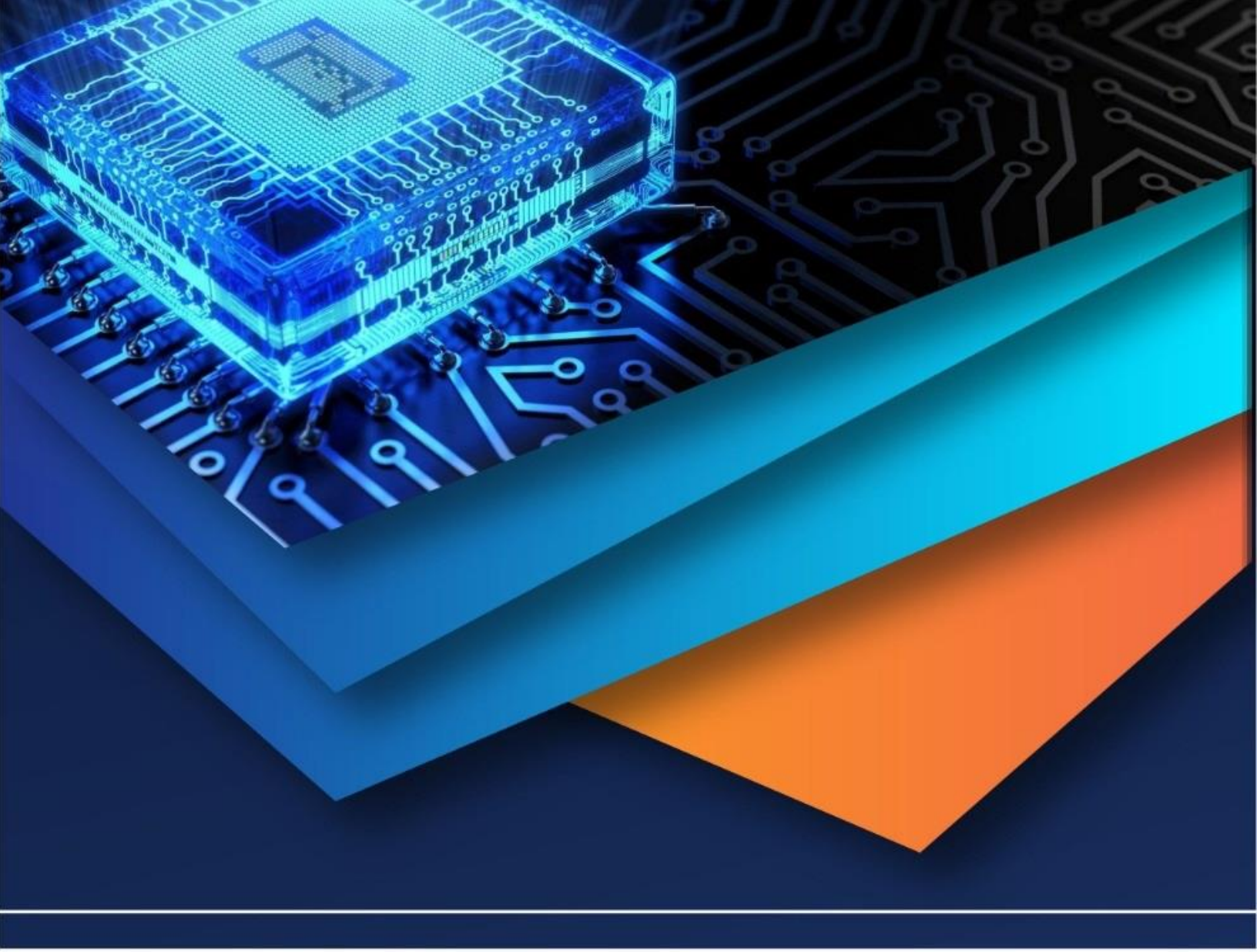
IX. ACKNOWLEDGEMENT

The acknowledgment section for a solar charging station project typically includes recognition of those who contributed to the project's success, such as financial supporters, technical advisors, and research participants. This section may also express gratitude to institutions that provided resources or facilities for the project. Research papers often include this section to give credit to individuals, organizations, or agencies. It is an important part of scholarly writing, highlighting the collaborative nature of scientific work.

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10.22214/IJRASET

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