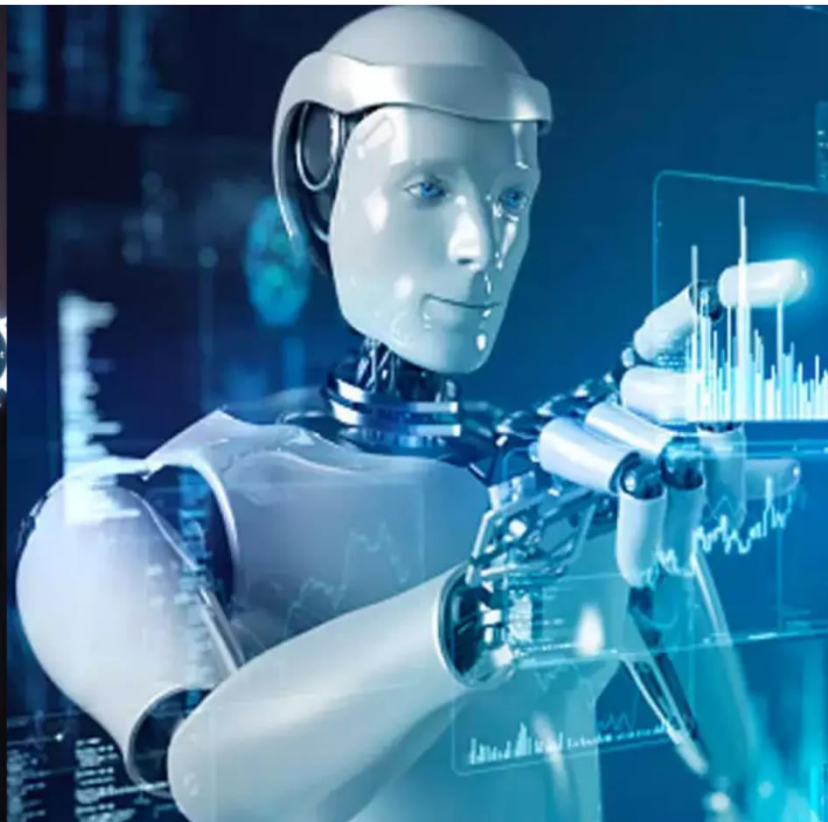




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# **Solar Electric Vehicle Charging Station along the Roadways**

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**ABSTRACT:** The world is shifting towards a more sustainable and environmentally friendly mode of transportation, and electric vehicles (EVs) are at the forefront of this revolution. EVs are powered by electric motors, using electricity from batteries or other energy storage devices, and offer a cleaner, quieter, and more efficient alternative to traditional internal combustion engine vehicles. With the increasing concern about climate change, air pollution, and energy security, EVs have become an attractive option for consumers, policymakers, and industries alike. This abstract provides an overview of the current state of EV technology, its benefits, and challenges, as well as the future prospects of EVs in the transportation sector. We discuss the advantages of EVs, including reduced greenhouse gas emissions, lower operating costs, and improved performance, as well as the challenges, such as limited range, high upfront costs, and charging infrastructure. We also examine the current market trends, government policies, and technological advancements that are driving the adoption of EVs. As the world continues to urbanize and the demand for transportation grows, EVs are poised to play a significant role in shaping the future of transportation, and this abstract provides a comprehensive overview of the current state of EVs and their potential to transform the way we travel.

**KEYWORDS:** Renewable Energy Source , Energy Storage , Fast Charging , Sustainable

## **I. INTRODUCTION**

A solar electric vehicle charging station is a facility that uses solar panels to generate electricity to charge electric vehicles (EVs). These stations are designed to provide a convenient and sustainable way to charge EVs, reducing reliance on fossil fuels and lowering greenhouse gas emissions.

The use of electric vehicles (EVs) as a dependable substitute for conventional gas-powered automobiles is growing in popularity. Batteries power these vehicles. Solar powered EV chargers are becoming more and more popular, even though grid-based EV charging has long been the standard. Because EVs don't emit any pollutants, these chargers help to preserve the environment by giving EVs access to clean electricity. The creation of creative charging infrastructure has been fueled by the growing need for renewable energy sources and the allure of electric cars. The goal of this project is to set the standard for building cutting edge solar-powered charging stations for electric vehicles. Its primary goal is to charge electric cars using solar energy, offering a cost-effective and environmentally friendly option. Key components of this project include the integration of solar panels, energy storage systems, charging infrastructure design, and smart grid connectivity. The program seeks to combine electric vehicle technology with renewable energy sources to foster a more eco-friendly and sustainable transportation ecosystem. The project's abstract underscores its significance in tackling pressing issues related to energy sustainability and reducing the transportation sector's carbon footprint.

## **II. METHODOLOGY**

In the construction of an efficient solar charging station, several key components play a vital role.

These components ensure the optimal generation and management of clean energy for electric vehicles. Let's delve into each of these components to understand their significance in the system.

1. Solar Panels

The solar panel serves as a charging module for EVs using a renewable energy source, which is solar energy. We planned to install monocrystalline solar panels on top of our electric vehicle. Photovoltaic cells convert sunlight into electricity that can be used to charge an electric car. The same will be used in a solar charging station.

2. Charge Controller

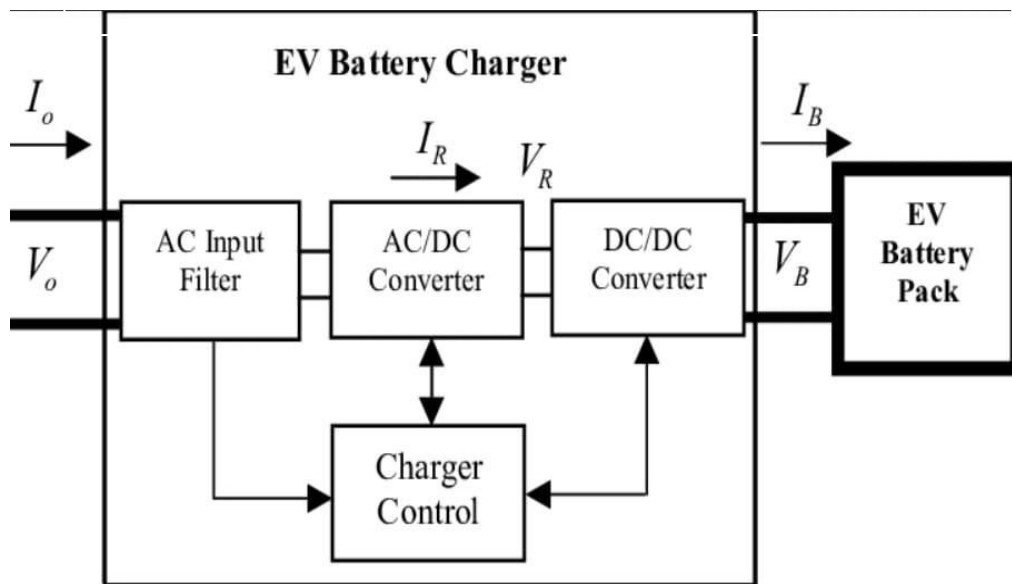
A solar charge controller acts as a regulator for your solar battery, preventing it from overcharging and overheating. Batteries are rated for a specific voltage capacity and exceeding this voltage can lead to permanent battery damage and loss of functionality over time.

3. Solar Tracker

The use of Solar Tracker systems increases the amount of solar energy received by the solar collector and improves the energy output of the electricity produced. The solar tracker will increase the output of the solar panels by 20-30%, which increases the system economics of the solar panel project.

4. Inverter

It is a combined solar inverter and EV charger that can be charged directly from rooftop solar panels. Integrating the charger with the solar inverter is a smart solution that eliminates the need for a separate EV charger as well as additional wiring and possible electrical grades.



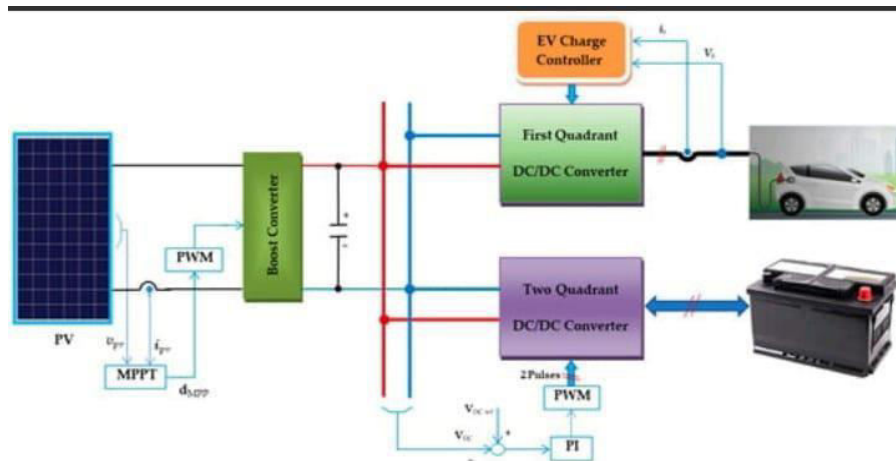
DC Charger

The battery uses direct current for charging. A DC charger is an external module that converts mains power into DC power for charging an electric vehicle. It works in parallel with the solar panel when connected to the charging station and charges the battery.

**III. DIFFERENT SOLAR CHARGING SCHEME**

In the realm of solar charging stations, different charging schemes and systems are employed to efficiently harness renewable energy for electric vehicles. These schemes encompass a variety of innovative approaches, each designed to cater to specific needs and environmental conditions.

Let's explore the diverse solar charging schemes and their unique attributes in the following sections.



Standalone PV charging system: In off grid station, energy is provided to EV's batteries without any connection of grid [Bagher et al., 2015]. The charging system is connected with an Energy Storage Device unit (ESD) for to deliver power continuously to the EV battery during night period [Chen et al., 2016].

#### IV. CONCLUSION

This paper studied mobile charging stations in the state-of-the-art literature. Different types and technologies of MCSs have been classified in this paper, and various research aspects, such as their architecture, benefits, challenges, and open research topics, have been studied. Furthermore, information on technical reports and papers working on this topic have been reviewed in detail to explain the role of MCSs in the EVSE market. Although several charging companies and automakers are

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