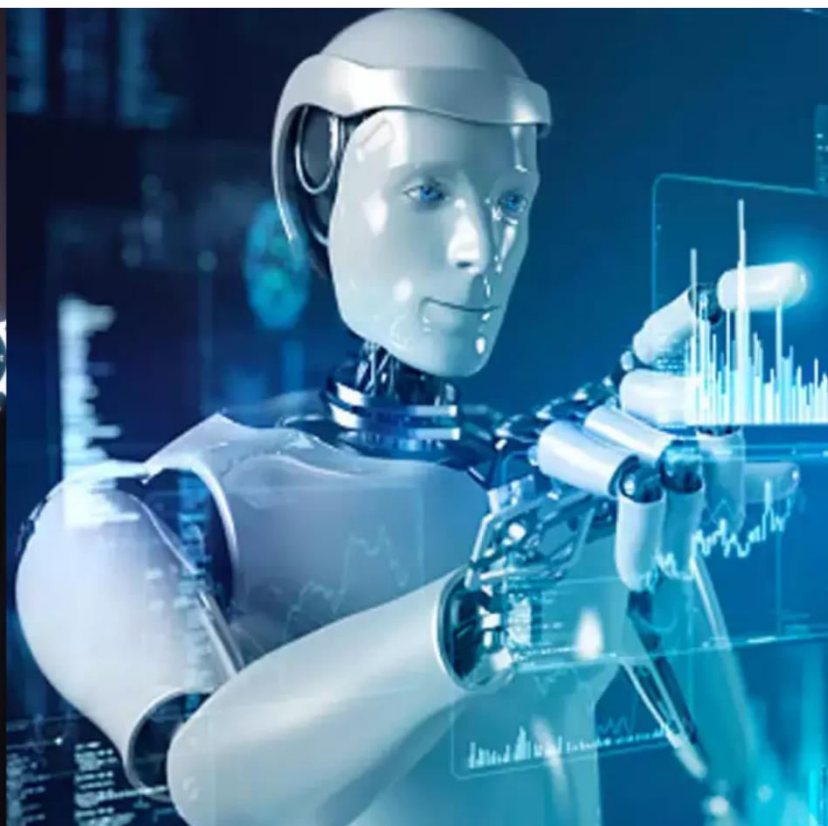




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# Solar based Electrical Vehicle Charging Station

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**ABSTRACT:** The move to electric portability requires maintainable charging foundation to address the natural impacts of fossil powers. This paper proposes a solar-based electric vehicle (EV) charging station that utilizes photovoltaic vitality combined with vitality capacity to convey clean and renewable control to EVs. The framework coordinating sun powered photovoltaic boards, battery banks, control gadgets for AC/DC change, and keen charging controllers to supply Level 1, Level 2, and Level 3 charging capabilities. By killing reliance on framework power from non-renewable sources, this approach altogether diminishes nursery gas emanations and advances vitality independence in urban and farther locales. Exploratory assessments and recreation considers illustrate the achievability and adequacy of solar-based EV charging for feasible transportation.

**KEYWORDS:** Solar Vitality, Electric Vehicles (EVs), Photovoltaic Frameworks, Charging Station, Remote Control Exchange, Renewable Energy.

## I. INTRODUCTION

The transportation division is among the biggest donors to nursery gas outflows around the world. With the quick appropriation of electric vehicles, the request for dependable, economical, and fast-charging arrangements has developed considerably. In any case, the ordinary charging framework depends intensely on network power, which is overwhelmingly produced from fossil fuels.

Indias plenteous sun oriented assets offer an opportunity to coordinated sun oriented vitality into EV charging stations, lessening the carbon impression and lightening lattice stretch. This paper presents the plan and improvement of a solar-powered EV charging station able of conveying numerous charging levels and supporting both inactive and energetic charging modes. The framework points to make strides charging comfort, advance renewable vitality utilization, and contribute to the objective of a cleaner transportation ecosystem.

## II. LITERATURE OVERVIEW

### Smart and Economical Remote Electric Vehicle Charging Methodology with Renewable Vitality and IoT Integration:

Sheeraz Iqbal et al. created a remote EV charging framework joining renewable vitality sources and IoT advances for optimized vitality administration [1].

### Solar Charging Station for Electric Vehicles:

Ram Vara Prasad et al. Displayed a solar-based charging station utilizing photovoltaic boards with battery capacity to bolster off-grid EV charging [2].

**Dynamic Remote Control Exchange:** Sujit Kumar et al. explored energetic remote control exchange frameworks empowering EVs to charge whereas moving, diminishing battery capacity prerequisites [3].

### Levels of Charging Infrastructure:

SAE J1772 standard classifies EV charging into Level 1 (AC 120V), Level 2 (AC 240V), and Level 3 (DC Quick Charging) [4].

### Impact of Coil Measurements on Remote Charging:

Bareli et al. examined how coil geometry impacts effectiveness in energetic remote control exchange [5].

### III. METHODOLOGY

**The proposed solar-based EV charging station comprises of the taking after components:**

Sun oriented Photovoltaic (PV) Cluster: 18 kW PV framework introduced on housetops or canopies.

**Vitality Capacity Framework:** Battery bank planned to store overflow sun based energy.

**Power Conditioning Unit:** MPPT charge controllers, inverter, and DC-DC converters.

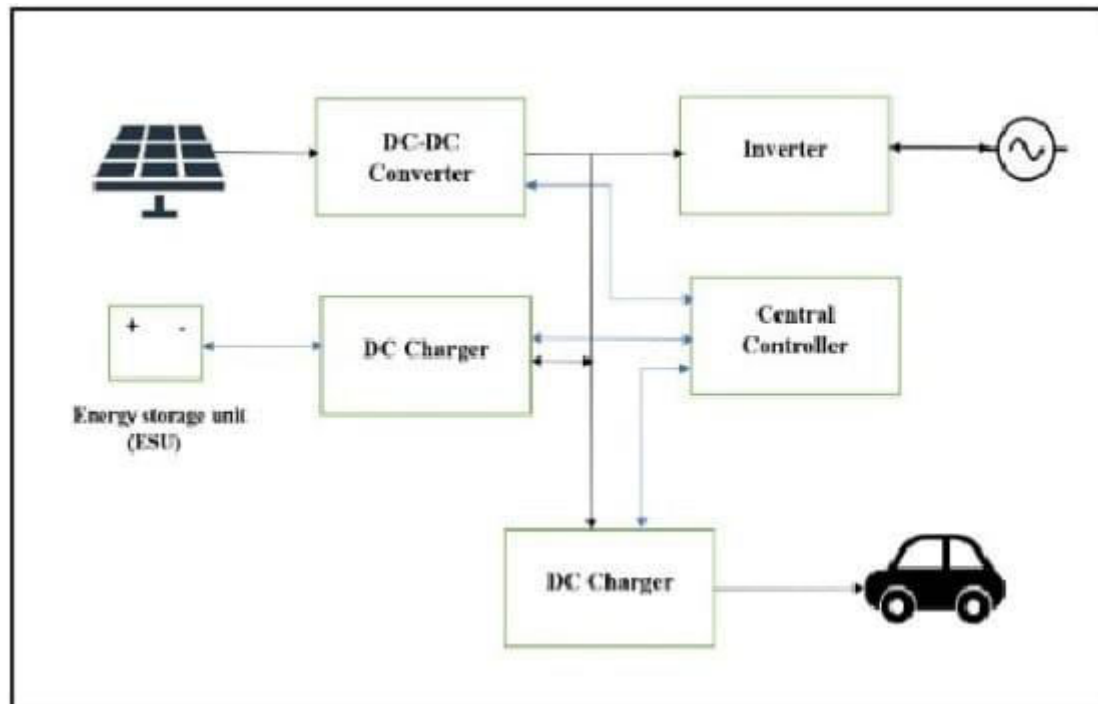
**Charging Interfaces:**

Level 1 (120V AC, ~1.4 kW) Level 2 (240V AC, ~7.8 kW)

Level 3 DC quick charging (up to 50 kW)

Wireless Control Exchange Module: Inductive coils beneath stopping spaces.

Microcontroller-based ,Monitoring: Arduino/ESP32 and LCD show.



### IV. EXPERIMENTAL RESULTS

Prototype and simulation results showed:

Solar PV output: 18 kW peak during midday.

Battery capacity: 60 kWh daily load.

Level 1 charging: ~1.4 kW.

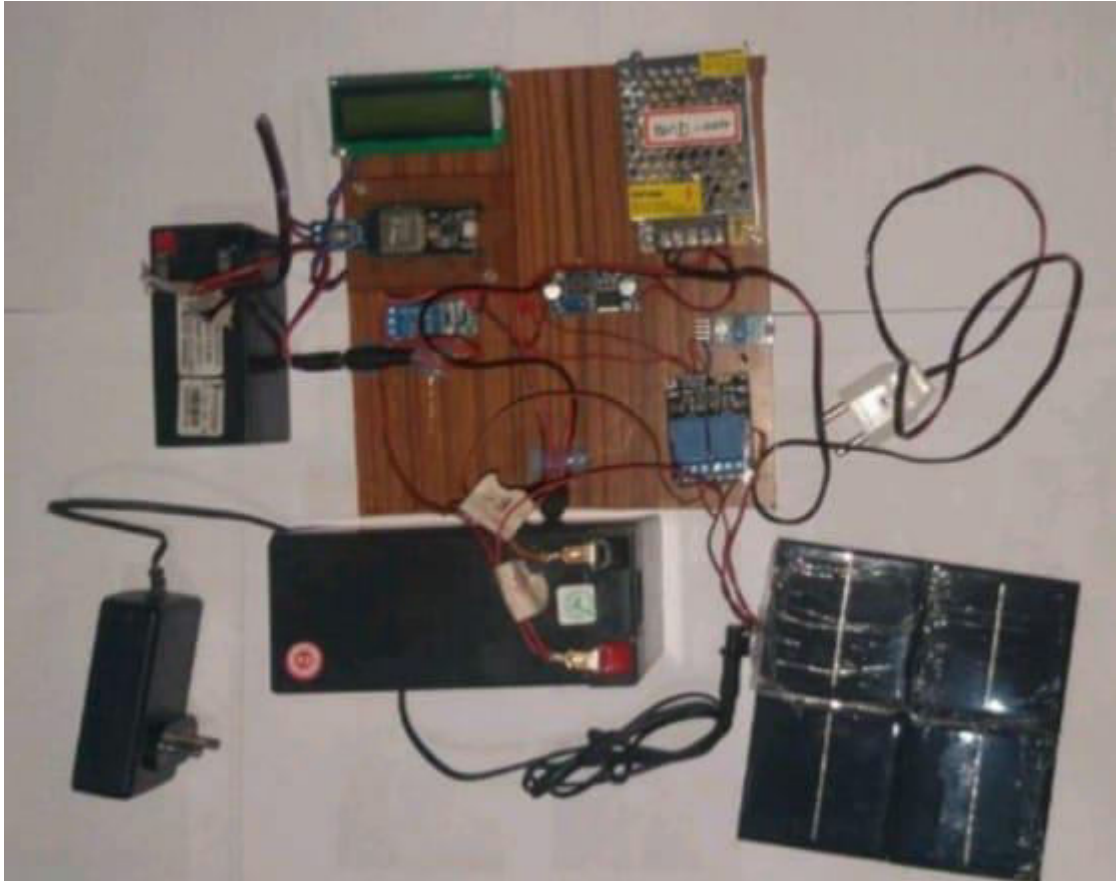
Level 2 charging: ~7.8 kW.

Level 3 charging: ~50 kW DC fast charging.

Wireless charging: ~0.1 W in prototype coil tests.

Real-time monitoring displayed accurate charging data.





## V. CONCLUSION

Solar-based EV charging stations are a promising solution for sustainable transportation. By harnessing clean solar energy and integrating advanced power electronics and wireless charging technologies, this system reduces dependence on fossil fuels, lowers operational costs, and supports grid resilience. Future work will focus on optimizing dynamic wireless charging efficiency and predictive energy management.

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