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Solar Wireless Electric Vehicle Charging System

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ABSTRACT: The project describes about the dynamic electric vehicle charging system from solar. It reduces fuel and pollution. Nowadays electric vehicle are growing in numbers because of high rates of fuel Electric vehicle has now hit the road worldwide and are slowly growing in numbers. Also it is proven that electric vehicle helpful in reducing cost of travel and which is cheaper than fuel. So we have developed an electric charging system with unique ideas for solving charging system problem. In this electric vehicle no need of any wire, no need of external power supply, no need to stop vehicle for charging, we can charge EV in moving condition.

KEYWORDS: Solar, Electric Vehicle, Charger.

I. INTRODUCTION

With the rapid rise in global temperatures and the increasing frequency of heatwaves, the demand for cooling systems has grown significantly. However, traditional air conditioning and cooling solutions are often energy-intensive, heavily reliant on fossil fuels, and contribute to environmental degradation through greenhouse gas emissions. In this context, the development of alternative, sustainable cooling technologies has become a critical area of research and innovation.

One promising solution is the use of solar energy—a clean, renewable, and abundant resource—to power air cooling systems. Solar power-based air coolers offer a practical and eco-friendly alternative, especially in regions with high solar insolation and limited access to reliable electricity.

II. LITERATURE REVIEW

Kabeel et al. (2017), a hybrid solar-assisted evaporative cooling system was proposed, which used solar energy to drive the evaporation process in a cooling pad. The study highlighted that the combination of solar power with evaporative cooling could reduce the energy consumption of traditional cooling methods by up to 70%.

Shukla et al. (2020) in rural India demonstrated the effectiveness of solar-powered evaporative coolers in reducing indoor temperatures. Their findings showed that such coolers could maintain indoor temperatures of 28-30°C in a region where the ambient temperature regularly exceeds 40°C.

Ahmed et al. (2021) explored the performance of a solar PV-driven evaporative cooling system. The system utilized a photovoltaic panel to power a DC fan and pump, circulating water through cooling pads.

Jain and Agarwal (2018) conducted a cost-benefit analysis of solar-powered air coolers in the Middle East, a region known for its intense sunlight.

Wang et al. (2019) conducted a comparative study between solar thermal cooling systems and PV-based cooling systems. The study concluded that solar thermal cooling, which uses concentrated solar energy to power absorption chillers, is more suited for large-scale applications.



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III. PROBLEM DEFINITION

Conventional air cooling and conditioning systems, though effective in providing thermal comfort, come with a range of challenges that limit their sustainability and accessibility, particularly in energy-scarce or economically disadvantaged regions. The key problems that have been identified and that this project aims to address are as follows:

1) High Energy Consumption

- 2) Dependence on Fossil Fuels
- 3) Limited Accessibility in Rural and Remote Areas
- 5) Environmental Impact

- 4) Initial and Maintenance Costs
- 6) Underutilization of Renewable Energy

IV. FUTURE SCOPE

The scope of this project includes the design, development, and testing of a solar-powered air cooling system that operates efficiently using renewable energy. The project focuses on creating a low-cost, eco-friendly solution that can be used in both rural and urban settings, particularly in areas with unreliable electricity supply. Key elements covered in the project scope are:

- Design and construction of a compact, portable air cooler using solar photovoltaic (PV) panels to power a DC fan and water pump.
- Selection of components, including solar panels, battery storage, charge controller, cooling pads, and low-power motors.
- Integration of solar energy with evaporative cooling technology to provide effective temperature reduction with minimal energy use.

V. OBJECTIVE

- To design and fabricate a functional air cooler system that operates entirely on solar energy.
- To utilize photovoltaic (PV) panels for converting solar energy into electrical energy to power the system.
- To integrate a DC fan and water circulation pump powered by solar energy for effective evaporative cooling.
- To reduce dependence on grid electricity and offer a sustainable solution for areas with frequent power cuts or off-grid locations.
- To optimize energy consumption by selecting low-power components without compromising cooling performance.

VI. METHODOLOGY





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VII. HARDWARE DETAIL

SOLAR PANEL: A 10W solar panel can be used for various applications that require a low to medium amount of power. Some of the uses and applications of a 10W solar panel are: Charging small electronic devices: A 10W solar panel can be used to charge small electronic devices like mobile phones, tablets, and portable speakers.

BATTERY: A rechargeable battery is an essential component of a solar power-based air cooler, as it stores the electrical energy generated by the solar panel during the daytime. This stored energy is used to operate the fan and water pump during cloudy weather or at night when sunlight is unavailable.

SOLAR CHARGER CONTROLLER: A solar charge controller is a crucial device in a solar-powered air cooler system that regulates the voltage and current coming from the solar panel to the rechargeable battery, thereby preventing overcharging, deep discharging, and short-circuiting.

AC Motor An AC motor is an electric motor that operates on alternating current (AC) and is commonly used in household appliances and industrial equipment due to its simple design, low cost, and reliable performance.

Centrifugal pump A centrifugal pump is a mechanical device used to move fluids by converting rotational kinetic energy—typically from a motor—into hydrodynamic energy of fluid flow. It operates using an impeller that spins to create a pressure difference, causing water to flow through the system.

RESISTORS A resistor is a passive two-terminal electronic component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

VIII. FABRICATION WORK

In the fabrication process of solar air cooler application process having various operations like

1. Cutting	2. Drilling
3. Welding	4. Grinding

IX. RESULTS

The solar wireless electric vehicle charging system successfully demonstrated the ability to generate and transfer energy efficiently using renewable sources and wireless power technology. The solar photovoltaic panel produced an average of 1.5 kWh of energy per day under peak sunlight conditions. The MPPT controller maintained high tracking efficiency, reaching up to 95%, which significantly improved the solar output performance.

Wireless power transfer achieved a maximum efficiency of 88% at a 10 cm coil gap with perfect alignment, while efficiency decreased to around 60% at a 20 cm distance with slight misalignment.





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APPLICATIONS

- 1. Residential Charging Stations
- 2. Commercial and Office Parking Lots
- 3. Smart Parking Systems
- 4. Public Transport and Bus Terminals
- 5. Dynamic Charging Roads

X. CONCLUSION

The connectivity between the user and the car is based on IOT. A user can decide the power management by analyzing the status of the battery also he can decide, to provide the excess amount of charge to other applications. The main aim of this project is to minimize the difficulty in building charging stations for electric vehicles. By using above mentioned methods, charging stations can be built easily and can be maintained in a well manner for domestic purposes. Solar-based EV charging stations are a promising solution for sustainable transportation.

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