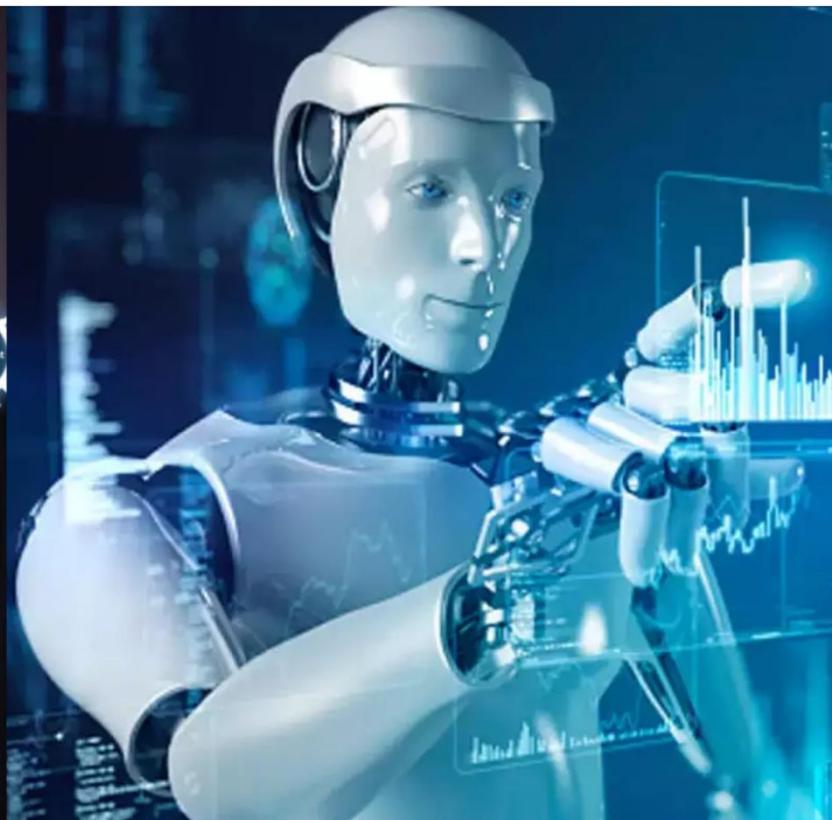




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Portable Mobile & Laptop Charging Station by using Solar & Wind Energy

**Mulik Atharv Ahok¹, Mane Rohan Nagesh², Patil Indrajeet Shripati³, Kambale Samarth Shashikant⁴,
Dhat Ajinkya Deepak⁵.**

Department of Electronics & Telecommunication, Karmayogi Institute of Technology, Maharashtra, India¹⁻⁵

ABSTRACT: The Mobile and Laptop Portable Charging Station using Solar Panel and Wind Mill is a renewable energy-based system designed to provide portable charging facilities in areas where conventional electricity supply is limited or unavailable. The system combines solar energy and wind energy to generate electrical power, which is stored in a rechargeable battery and used to charge mobile phones and laptops. The solar panel converts sunlight into DC electricity, while the wind turbine generates electricity from wind energy. A charge controller regulates the power from both sources to safely charge the battery and prevent overcharging. A DC-DC converter and inverter are used to provide stable output voltage suitable for mobile and laptop charging. The system ensures eco-friendly, cost-effective, and sustainable power generation. This project is suitable for rural areas, outdoor activities, disaster management, and emergency backup systems.

KEYWORDS: Renewable Energy, Solar Panel, Wind Turbine, Portable Charging Station, Hybrid Power System, Battery Storage.

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I. INTRODUCTION

With the increasing use of smartphones and laptops, the demand for portable charging solutions has increased significantly. In many remote areas, electricity supply is unreliable or unavailable. Renewable energy sources such as solar and wind energy provide an effective solution.

Solar panels generate electricity during daytime, while wind turbines can generate power when wind is available. By combining both sources, a hybrid charging station can provide continuous power generation. This project aims to design a portable and eco-friendly charging station that reduces dependency on conventional electricity and supports sustainable development.

II. EXISTING SYSTEM

Currently, portable charging solutions mainly include:

- Power banks that require prior charging from grid electricity.
- Diesel generators which cause pollution and fuel dependency.
- Single-source solar chargers that depend only on sunlight.

Limitations:

- Dependence on a single energy source.
- Limited backup time.
- Environmental pollution (in case of generators).
- Higher operational cost.

III. PROPOSED SYSTEM

The proposed system is a hybrid renewable energy-based portable charging station that uses both solar panel and wind mill to generate electricity.

Working Principle:

1. Solar panel converts sunlight into DC power.
2. Wind turbine converts wind energy into electrical energy.
3. Charge controller regulates voltage and charges the battery safely.
4. Battery stores electrical energy.
5. DC output is used for mobile charging (5V USB output).
6. Inverter converts DC to AC (220V) for laptop charging.

This hybrid approach ensures better reliability and power availability compared to single-source systems.

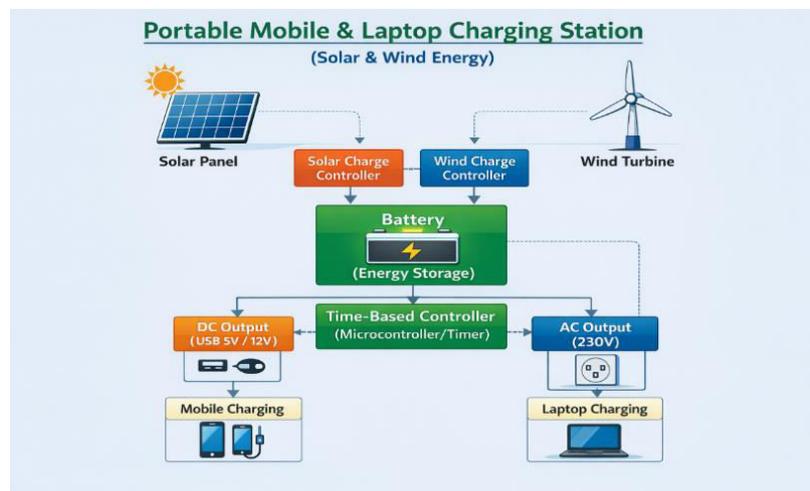
IV. LITERATURE REVIEW

Title: Hybrid Solar–Wind Power Generation System for Portable Applications

Journal: IEEE Conference Proceedings

This paper explains the design of a hybrid power system that combines solar panels and wind turbines to generate electricity. The generated power is stored in a battery through a charge controller and can be used for small-scale applications. The study shows that using both solar and wind energy increases reliability and ensures continuous power supply compared to using only one renewable source.

V. SYSTEM ARCHITECTURE & BLOCK DIAGRAM



VI. OBJECTIVES

- To generate electricity using renewable energy sources.
- To design a portable and eco-friendly charging system.
- To provide mobile and laptop charging in remote areas.
- To reduce dependency on conventional power supply.
- To promote green energy technology among students.

VII. RESULTS AND IMPLEMENTATION

The developed system successfully generates electrical power using solar and wind energy. The battery stores sufficient energy to charge multiple mobile phones and at least one laptop depending on battery capacity.

The hybrid system improves power availability because:

- Solar works during daytime.
- Wind turbine works during windy conditions (day/night).

VIII. CONCLUSION AND FUTURE SCOPE

The Mobile and Laptop Portable Charging Station using Solar Panel and Wind Mill is an effective hybrid renewable energy solution. It provides sustainable, reliable, and eco-friendly charging facilities without depending on grid electricity.

Future improvements may include:

- Integration of MPPT charge controller for higher efficiency.
- IoT-based monitoring system.
- Lithium-ion battery integration.
- Compact and lightweight design.
- Smart power management system.

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BIOGRAPHY



1. Mr. Atharv Ashok Mulik, Currently Studying in Karmayogi institute of technology, Shelve Pandharpur.



2. Mr. Mane Rohan Nagesh, Currently Studying in Karmayogi institute of technology, Shelve Pandharpur.



3. Mr. Patil Indrajeet Shripati, Currently Studying in Karmayogi institute of technology, Shelve Pandharpur.



4. Mr. Kambale Samarth Shashikant, Currently Studying in Karmayogi institute of technology, Shelve Pandharpur.



5. Mr. Dhat Ajinkya Deepak, is currently working as Lecturer in Karmayogi Institute of Technology Shelve-Pandharpur. He pursued his Bachelor of Engineering degree B.E. (Electronics & Telecommunication) from Karmayogi Institute of Engineering, Shelve, Maharashtra, India -413304.



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