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Fabrication of Portable Green Energy Hand Device Charging Station

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ABSTRACT: The fabrication of a windmill solar-powered laptop charging station represents an innovative approach to providing sustainable portable energy solutions for electronic devices by integrating both solar panels and verticalaxis wind turbines the system harnesses with limited access to conventional power grids the design includes features such as 5v dc usb ports for mobile phones and a 230v ac socket for laptops catering to various charging needs an inherent dc to ac charge controller manage the energy distribution while safety measures like sudden charge cutoff and security alarms enhance the systems reliability and security the portability of the station facilitated by its wheeled design allows for deployment in diverse locations such as parks campuses and rural areas promoting environmental sustainability and energy accessibility this project not only addresses the growing demand for eco-friendly charging options but also serves as a practical demonstration of renewable energy applications in everyday life sources.

KEYWORDS: -solar, wind, components, Block Diagram, Hardware Requirement

I. INTRODUCTION

The fabrication of a windmill and solar-powered laptop aims particularly in areas with limited access to conventional energy sources by harnessing renewable energy from both solar panels and wind turbines the system ensures a continuous power supply mitigating the intermittency associated with individual energy sources this hybrid approach not only promotes environmental sustainability by reducing reliance on fossil fuels but also enhances the reliability of the charging station designed with portability in mind the station can be deployed in various settings such as parks campuses and remote locations offering flexibility and convenience to users safety features including automatic charge cutoff and anti-theft mechanisms are integrated to protect both the devices being charged and the station itself overall this project embodies a practical application of geothermal energy technologies contributing to energy accessibility and environmental conservation sources.

II. LITERATURE SURVEY

[1]Alireza Zendehboudi's research attempts to Because of the expanding human population, conventional fossil fuels are running out every day. Prior studies have demonstrated that renewable energy sources, particularly wind and solar, can be a good substitute for traditional energy sources in order to meet world demand and preserve the atmosphere. [2]In this study, Ali Mostafaeipour provides an assessment of Iran's wind energy development and production status. A synopsis of current offshore energy research worldwide, including the most recent studies, is also provided, along with information on Iran's possible offshore wind energy resources. [3] Author Antoni Dmowski has spent a number of years developing a stand-alone hybrid solar wind turbine power plant to feed telecom equipment. [4] According to Binayak Bhandari, a number of aspects need to be taken into account before implementing a full-phase power generation system that uses renewable energy sources. Before making any decisions on the implementation of such a system, long- term necessary data should be gathered (for a year, if at all possible). [5] Coxa Kevin This research developed the structural characteristics of a 70-meter-long blade for an upwind, horizontal-axis wind turbine that can be used in an area with high wind speeds. A lightweight design with a low tip deflection was produced by combining



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glass and carbon fiber plies to create a hybrid composite.

III. PROPOSED METHODOLOGY

The fabrication process began with a detailed analysis of the project requirements focusing on power needs for laptop charging and evaluating the availability of wind and solar energy in the target environment after establishing the energy demands appropriate components were selected including a solar panel a small-scale wind turbine a rechargeable battery a hybrid charge controller and necessary output modules such as usb or dc jacks the next step involved designing the overall system layout including the structural support for mounting the solar panel and wind turbine as well as the electrical configuration for connecting all components once the design was finalized fabrication was carried out by constructing a durable frame securely mounting the solar and wind units and assembling the internal wiring by safety and efficiency standards the solar panel and wind turbine were connected to a hybrid charge controller which in turn charged the battery and regulated power to the output terminals after assembly the system was rigorously tested under various environmental conditions to ensure stable power generation and battery charging any issues found during testing were resolved through troubleshooting and optimization including adjusting the panel angle or turbine positioning in block diagram.



IV. BLOCK DIAGRAM

The block diagram illustrates the architecture of a composite solar and wind-powered laptop charging system integrated with a microcontroller-based monitoring unit the system begins with two renewable energy sources a solar plate and a wind turbine both feed into a dc-to-dc converter to stabilize their varying voltage outputs the converted power is then boosted using a step-up converter to meet the input requirements of the battery which serves as the central conserving unit from the charge can either be routed through an inverter to supply ac loads or directed to usb charging outputs for devices like laptops or phones at the heart of the monitoring system is an atmega328p microcontroller which continuously receives input from three voltage sensors the solar voltage sensor the wind voltage sensor and the battery voltage sensor these sensors allow the system to track the real-time performance of both energy sources and monitor battery health the microcontroller processes this data and sends output to an led display which provides the user with visual feedback on system status this setup ensures that the system is both self-sustaining and intelligent capable of providing reliable off-grid power while also allowing users to monitor and optimize energy usage effectively.



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V. IMPLEMENTATION AND WORKING

The hybrid windmill and solar-powered charging station is implemented by integrating two renewable energy orign solar and wind into a single system designed to provide reliable off-grid electricity for laptop and device charging the system begins with the installation of а solar panel and а wind turbine both of which generate dc electricity these outputs are passed through a dc-to-dc converter to stabilize the voltage followed by a step-up converter to match the voltage required to charge a rechargeable battery the battery acts as the energy storage unit ensuring continuous power availability even when sunlight or wind is not present to supply power to devices the battery output is connected to an inverter for ac loads and to usb or dc ports for direct charging a microcontroller typically the atmega328p is integrated into the system to monitor voltages from the solar panel wind turbine and battery using dedicated sensors it processes the data and displays system status through an led display users to monitor real-time performance the systems design allowing ensures energy efficiency environmental sustainability and suitability for remote or rural applications where conventional power sources are unreliable or unavailable the system operates automatically with the charge controllers and voltage regulators managing power flow and protecting components from overcharging or voltage surges safety mechanisms such as fuses diodes and grounding systems are integrated to protect against electrical faults.

Text to Speech Conversion (TTS)

Converts extracted text into clear and understandable speech and achieves 97.8% accuracy in pronunciation and fluency. Table II. 3.Currency Recognition



VI. RESULT



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VII. CONCLUSION

The development of a hybrid wind and solar powered laptop charging station presents promising opportunities for feasible energy solutions as advancements in renewable energy technologies continue future versions of this system can be made more compact effective and affordable enhancing energy storage with best battery technology and integrating smart features such as remote monitoring or auto-adjusting power management can improve performance and user convenience this concept also holds great potential for deployment in remote or off-grid areas educational campuses outdoor workspace and emergency response scenarios helping to reduce dependence on conventional power sources.

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