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FABRICATION & PERFORMANCE ANALYSIS OF FLOATING & SUN TRACKING SOLAR PANEL

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ABSTRACT:

This project is a fabrication of floating and sun tracking solar panel monitoring. The integration of solar energy systems has become increasingly crucial in addressing global energy needs while mitigating environmental impact. This abstract presents an innovative approach to enhance solar panel efficiency through the fabrication of floating solar platforms equipped with sun tracking mechanisms for optimal energy harvesting. Normal solar panels have average efficiency 15%-22% and most times can be maximized.

INTRODUCTION

In the past ten years, many residents around the world used electric solar power system as a power at their houses. This is because solar energy is an unlimited energy source, set to become increasingly important in the longer term, for providing electricity and heat energy to the user. Solar energy also has the potential to be the major energy supply in the future. Solar tracker is an automated solar panel that follows the sun to increase the power.

The difficulty was in finding the best light detecting circuit part. An important criterion for this would be being able to adjust voltage levels based on the smallest amount of rotation of the components while mounted to the solar panel.

The sun position in the sky varies both with the equipment over any fixed position. One well-known type of solar tracker is the heliostat, a movable mirror that reflects the moving sun to a fixed location, but many other approaches are used as well active trackers use motors and gear trains to direct the tracker as commanded by a controller responding to the solar direction. The solar tracker can be used for several applications such as solar cells, solar day-lighting system, and solar thermal arrays.

The solar trackers are very useful for devices that need more sunlight for higher efficiency such as solar cells. Many of the solar panels had been positioned on a fixed surface as a roof. As the sun is a moving object, this approach is not the best method. One of the solutions is to actively track the sun using facing the panel, the maximum energy can be absorbed, as the panel is operating at their greatest efficiency.

DISADVANTAGES:

Higher Costs: Floating and sun-tracking systems often require specialized materials and more complex engineering compared to fixed-tilt installations. This can lead to higher upfront costs.

Durability Concerns: Floating solar panels need to withstand harsher aquatic environments, including waves, wind, and biofouling (organism growth). Developing durable materials and mooring systems adds complexity to fabrication.

Sun-Tracking Mechanisms: The mechanisms for tracking the sun can add complexity and potential points of failure to the system.

Monitoring:

Remote Data Acquisitions: Since floating solar panels are often located on water bodies, accessing them for maintenance or data collection can be more challenging. Reliable remote monitoring systems are crucial but add cost.

Data Security: Wireless data transmission from floating solar panels introduces cybersecurity risks that need to be addressed.

Environmental Monitoring: In addition to solar panel performance, environmental factors like water quality and wave action may need to be monitored, adding complexity to the system.

ADVANTAGES:

Increased Energy Production:

Floating solar panels experience cooler temperatures due to the water, which leads to higher efficiency and energy production.

Sun tracking systems can maximize sunlight exposure throughout the day, further increasing energy output.

Land Use Efficiency:

Floating solar panels can be deployed on reservoirs, lakes, or other bodies of water, utilizing non-arable land and avoiding competition for valuable real estate.

Water Conservation:

Floating solar panels can help reduce evaporation from bodies of water,

particularly beneficial in areas with water scarcity.

Environmental Benefits:

Floating solar panels can create habitat for fish and other aquatic life by providing shade and cooler water temperatures.

Reduced Maintenance Costs:

Floating solar panels are less susceptible to dust, snow accumulation, and animal grazing compared to ground-mounted systems, potentially reducing maintenance needs.

Real-time monitoring allows for early detection of performance issues and optimization of system operation. This can identify problems like panel malfunction or misalignment of sun trackers.

Data collected from monitoring can be used to improve system design and maintenance practices for future installations. For example, monitoring data might reveal that a particular sun tracking mechanism is less reliable than expected in high winds.

LITERATURE SURVEY

Marco Rosa-Clota etal2017

Floating photovoltaic plants Skimming photovoltaic plants and squandering water bowls. The likelihood to coordinate PV plants with the current bowls for wastewater treatment was investigated.

Assem Kumar sharma2016

Floating solar photovoltaics Sunlight costs in April 2016 based on PV capacity in hazardous supplies in India. This paper to test FAPV capacity in large reserve in India.

Alok Sahu etal2016

Floating photovoltaic power plant.This paper features the idea of costing PV framework introduced on still water bodies, for example, lakes, dams, stores

Divya Mitta etla2017

Floating solar photovoltaic systems.The idea of skimming sunlight- based PV plant is later and can expand the framework intuitive sun-oriented force without extra land prerequisite. Use of following framework or concentrators can additionally build the proficiency of the framework

RELATED WORK

Voltage: The nominal voltage of a 1200mAh Li-ion battery is 3.7 volts.

Chemistry: The chemistry used in a Li-ion battery is Lithium-ion.

Capacity: The capacity of a 1200mAh Li-ion battery is 1200 milliampere-hours, which means it can deliver a current of 1200mA for one hour.

Charging time: The charging time of a 1200mAh Li-ion battery can vary depending on

the charger and the charging rate. Typically, it takes around 2-3 hours to charge a 1200mAh Li-ion battery using a standard charger.

Discharge time: The discharge time of a 1200mAh Li-ion battery depends on the device it is used in, and the current drawn from the battery. For example, if a device draws 600Ma current, the battery will last for 2 hours.

Cycle life: A typical 1200mAh Li-ion battery has a cycle life of around 300-500 cycles. A cycle is defined as one complete charge and discharge cycle.

Operating temperature: The operating temperature range for a 1200mAh Li-ion battery is usually between -20°C to 60°C.

Weight: The weight of a 1200mAh Li-ion battery is typically around 20-25 grams.

Fabrication Considerations:

Material Selection:

Lightweight and buoyant: The platform needs to float securely but limit weight to maximize energy production.

Durable: Materials must withstand constant sun exposure, wind, waves, and temperature fluctuations.

Structural Design:

Stiffness: The structure needs to be rigid enough to support the solar panels and resist deformation during movement and harsh weather.

Wind and wave loading: The design must account for wind gusts, currents, and waves to ensure stability.

Manufacturing Process:

Cost-effective: The chosen process should balance affordability with producing a durable system.

Scalability: The manufacturing needs to be scalable to meet potential large-scale deployment needs.

Integration of Motors and Sensors:

Reliable and waterproof: Motors and sensors need to function flawlessly in a humid environment and withstand potential submersion.

Data transmission: Consideration for how the motors and sensors will communicate with the monitoring system.

Results Considerations:

Accuracy of Floating Position Measurement:

The system should precisely measure the platform's position to maintain optimal alignment with the sun.

Tracking Efficiency Under Varying Sun Angles:

Evaluate how efficiently the system tracks the sun throughout the day and across different seasons to maximize power generation.

Power Generation Impact of Panel Movement:

The energy used by the motors for movement shouldn't significantly reduce the overall power generation.

SAMPLE RESULTS

CONCLUSION

Today in the world of rampant productivity, energy is the fundamental source upon which the whole civilization is based upon. As it is said that energy can neither be created nor be destroyed and, in that response, it can be signified that it can somehow be stored.

The attempt towards making such goal substantiated, this project has been endeavored towards unravelling the path of such objectivity. It is quite natural that constant utilization of energies somehow opens the door of scarcity as per as earthly sources are concerned.

Sun, in the stand of which, the tallest source, spiked over for age's right from the origin of the whole universe, through which life has been conceived, is the basic and the mother source of all the energies.

Considering the very fundamental from the viewpoint of storing such energy, the project has been unraveled. Energies other than from the Sun, are produced through the burning of various materials, involving emission of a large amount of pollution, causing the environment and the atmosphere decay day by day.

Fastness and smartness of the world's current behavioral visibility, where easy access of every sphere of life needs the acute comfortability, every day is a new challenge of hatching something new and unique which makes an energy to be the ultimatum source behind all the hard work exists.

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