solar converter

by Meivel S

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FORM 2

THE PATENTS ACT,

1970 (39 of 1970)

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THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(See Section 10; rule 13)

TITLE OF THE INVENTION

Design and Development of Automated Solar drone for long travelling

APPLICANTS

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The following specification particularly describes the invention and the manner in which it is to be performed.

Field

Solar drones use integrated solar panels to generate DC electricity, but a converter system is needed to optimize power supply. The Maximum Power Point Tracker (MPPT) monitors lighting conditions and enhances drone efficiency. Other converters include voltage regulators and inverters, combining electrical engineering, renewable energy, and control systems expertise.

Background of the Invention

- A trained person can be used for Testing solar panel using Spying drone and This product can Tracking power data with specified payload using power sensors.
- The power sensor or current sensors module calculated the power value and send this value through power monitor using IoT Drone. It can save Battery life for long distance travelling with protection
- The potential markets are Solar Manufacturers, ARMY, NAVY, DRDO and ISRO. They are only capable of selling this Solar drone product.
- Unique features of the type of IoT solar drone are small, less weight up to 1000 grams, compactness, and Folded materials.
- The demand of the product is specified based on drone frame materials, current sensor, Folded and less weight solar panel, pivot joint link, Rotor Gimbal module and Circuit and Interface to Controlling device using IoT.
- Customers can afford and use the product while handling the drone.
- This product can use power detection of Drone flying life and Realtime power monitoring. A drone designed based on payload 1000 gram carry on power sensors and its mechanism.

- Solar panel dealers and customers of Industrialist is motivated for smart work of power detection, how to avoid power loss and how to save Battery life for long distance travelling with protection, when marketing the product to government.

Objective of the invention

- The converter in a solar drone is crucial for managing and optimizing the energy harvested from solar panels, ensuring a stable power supply for the drone's electrical systems. Its primary objective is to maximize the amount of energy extracted from sunlight, ensuring the drone operates at its maximum power point. This is essential for applications like surveillance, environmental monitoring, and communication.
- The converter also plays a key role in adjusting to varying environmental conditions, ensuring consistent energy supply. It employs advanced algorithms to track fluctuations in sunlight intensity and adjust electrical parameters accordingly.
- The converter also protects electronic components by regulating voltage supplied to the drone's electronic components, ensuring the drone's longevity and reliability. It also enables seamless integration with drone systems, providing a versatile power source that meets the diverse needs of the drone's components.
- The converter also aims to improve energy efficiency by optimizing power output from solar panels and minimizing energy losses during conversion and regulation processes. It also facilitates autonomous operations by ensuring a continuous and stable power supply, essential for applications like long-duration surveillance, agriculture monitoring, and infrastructure inspection.

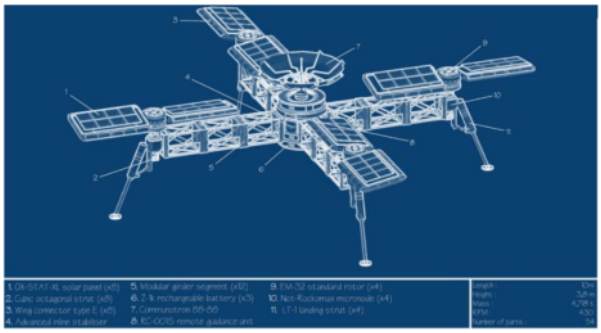
- As technology advances, the converter system will likely lead to further improvements in the capabilities and efficiency of solar drones, contributing to their widespread adoption across diverse industries.

Summary of the Invention

- The converter in solar drones is a crucial component that optimizes energy harvesting from solar panels, ensuring they operate at their maximum power point. This allows the drone to extract maximum power under varying environmental conditions, enhancing overall energy yield. Adaptability to varying environmental conditions is another key objective, as the converter's MPPT tracks fluctuations in sunlight intensity and adjusts electrical parameters accordingly.
- This ensures consistent performance and robustness in diverse settings. Voltage regulation is essential, ensuring consistent and regulated power delivery to the drone's electronic components. Inverters within the converter facilitate seamless integration with the drone's systems, converting DC power into AC power, ensuring efficient solar energy utilization.
- The converter also contributes to the overall energy efficiency of solar drones, enhancing sustainable and eco-friendly operations by reducing reliance on traditional power sources.

- As technology advances, the refinement of converter systems will likely lead to further improvements in the capabilities and efficiency of solar drones across various applications.

Brief Description of the Drawings



CAD design of Solar Cell Setting up mechanism

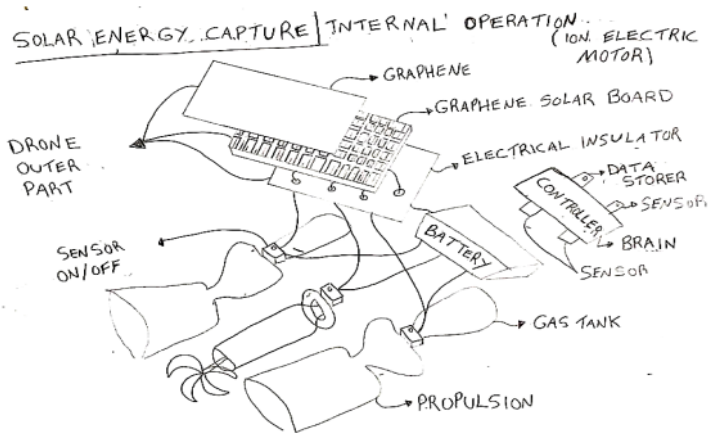


Figure 3: Basic Elements of Solar Drone

The result for the issue of wires was found by supplanting sensors (Frequency transmitters and recipients), therefore, the directions sent would be deciphered between the airplane proficiently. By catching energy through solar panels, we could supply a battery, which together with a hydrogen tank, would have enough vitality to make the (electric)

propellers work. The engines, yet the entirety of their electrical parts. The material to be utilized for its outside covering would be graphene, as it is one of the most grounded and lightest materials at any point discovered is a waterproof material and up to multiple times more grounded than steel. Another piece of the test is identified with space investigation. The mission likewise expects to examine the historical backdrop of the Red Planet, searching for indications of past microbial life. Notwithstanding looking to the future, gathering data for human campaigns to our neighbor. The automaton's essential capacity is aiding space missions on Mars, an elective that may maybe offer Martian surface mapping as it is intended to withstand dust storms and low temperatures. What's more, the plan was intended to be completely modifiable inside with the goal that it could adjust to different climates and situations, including water submersion. Our test is to fly remotely. We need to make an automaton made of sun oriented fueled graphene. The reason for existing is to enlist and illuminate. The unmanned automaton will be controlled remotely.

Detailed Description of the Invention

Introduction:

The pursuit of sustainable energy solutions has driven innovation in the field of solar energy converters, leading to a transformative leap toward a cleaner and more environmentally friendly future. Solar energy converters play a crucial role in harnessing the abundant and renewable power of the sun, converting sunlight into electricity with remarkable efficiency. As the world moves away from fossil fuels and takes on climate change, these devices are at the forefront of the renewable energy revolution. They represent a technological marvel and hold the promise of a more sustainable future. Through research, innovation, and widespread adoption, solar energy converters are positioned to shape global energy systems, promoting a cleaner and more sustainable world for future generations.

Challenges with current models:

Current versions face cost-effectiveness issues, a lack of energy storage, material costs, durability, and technical advancements and manufacturing processes.

Our innovation:

We introduce a solar convert in very effective manner with high technology of less weight and usage of battery power will be low and cover long distance of network.

The technology:

We use convertors to convert the low solar energy to high electrical energy by using multipliers, invertor. This makes it as high effective. A solar converter, often referred to as an inverter, plays a crucial role in solar power systems by converting the direct current (DC) generated by solar panels into alternating current (AC) that can be used to power electrical devices and be fed into the electrical grid.

Applications of this technology:

Our technology is versatile and can be used in various scenarios. It can be implemented on a drone where the electrical energy is replaced with solar energy, and it will be very useful in many sectors like agriculture fields, medical fields, and many more, which will be more useful.

Performance Metrics:

The performance of a solar converter (inverter) is assessed using various metrics that gauge its efficiency, reliability, and overall effectiveness in converting solar energy into usable electricity. Evaluating a solar converter based on the performance metrics can help determine its suitability for a specific solar power system and ensure optimal energy production and system reliability.

Challenges and Improvements:

- **Challenge:** Some users may find the interfaces of solar inverters complex or challenging to understand. This can hinder their ability to monitor and optimize the performance of their solar power system.
- **Improvement:** User-friendly interfaces, intuitive dashboards, and mobile applications can enhance the user experience. Clear and simple visualizations of energy production, consumption, and system status can empower users to make informed decisions.

  By addressing these user-centric challenges and implementing user-friendly improvements, solar converter manufacturers can enhance the overall experience of adopting and managing solar power systems. This, in turn, contributes to greater user satisfaction and the widespread adoption of clean energy.

The Importance of Semantic Segmentation:

Semantic segmentation is vital in the solar converter domain as it enables precise identification, monitoring, and analysis of various components within a solar power system. Insights provided by semantic segmentation contribute to improved performance, maintenance efficiency, and overall effectiveness of solar energy harvesting systems.

Architecture of Semantic Segmentation Networks:

- **Interface with Monitoring Systems:** The output of the segmentation model needs to be integrated into the solar converter's monitoring and control systems for actionable insights.

- **Real-Time Feedback:** The system may provide real-time feedback based on segmentation results, such as alerts for potential issues or suggestions for maintenance.

The specific architecture may vary based on the size of the dataset, the complexity of the segmentation task, and the computational resources available. Semantic segmentation models for solar converters need to be trained and evaluated on relevant datasets that capture the diversity of environmental conditions and potential challenges in the field.

Feature Fusion:

In these networks, the conversion of DC power to AC power with the low power to high electrical energy by using multimeter is used here as the fusion to show the overall model performance.

System Overview:

Our system, introduces a MPPT efficiency which is used to identify the amount of extraction of energy form the solar light and convert it into the electrical energy.

Maximum Power Point Tracking (MPPT) Efficiency:

MPPT efficiency measures how well the solar converter can track and maintain the optimal operating point of the solar panels to maximize power output. A high MPPT efficiency is important for extracting the maximum energy from the solar array.

Converter Solar Drone

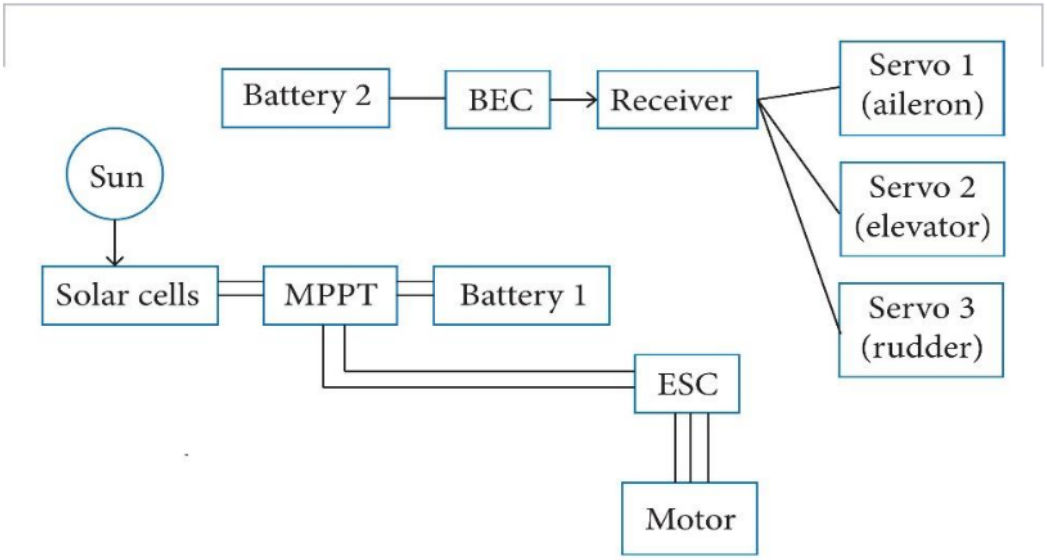
The "Converter for Solar Drone" project methodology is a methodical process that includes many phases. In order to comprehend the current technologies, difficulties, and advancements in solar-powered drones and converters, a thorough literature research is first carried out. This serves as the basis for determining important design elements and

performance indicators. The project next moves into the design stage, when the solar drone converter's parameters are established. This entails choosing the right power electronics parts, including voltage regulators and inverters, while taking into account things like weight restrictions, energy efficiency, and environmental adaptability. The smooth integration of the converter system with the drone's overall architecture is another task for the design process. After the design phase, the project moves on to the testing and prototype phase. A set of rigorous tests are carried out to verify the functionality, efficiency, and reliability of the solar drone converter prototype, which is constructed in accordance with the design parameters. This covers evaluations under various sun irradiation circumstances, endurance testing, and simulated flight tests. Iterative modifications to the converter design are informed by the test results. The project moves on to the implementation stage when the prototype has been validated satisfactorily. Real-world flying tests are carried out on an integrated converter system-powered drone to evaluate the system's performance in various operating conditions. In this phase, information on energy harvesting, conversion efficiency, and overall system dependability are gathered.

Block Diagram

Drones are something we call as UAV (unmanned Aerial Vehicles) an aircraft without a human pilot. UAVs are basically a ground-controlled system means they are fully Autonomous. Application of Drones are expanding from commercial, scientific, recreational, agricultural, and other applications.IT can be used in Land ways, waterways, airways or in space. The advantage of Saucer shape is that is more aerodynamic as compared to other shapes and as it has only one rotor its quite difficult to fly. Due to is shape it having some angle 30 to 60 degree when the drone is parallel to ground. The use of solar here to increase the endurance of the flight by transferring power to the Rechargeable battery. Well, it's difficult to obtain the optimum amount of voltage and

current (V= IR). This product can be saving Battery life for long distance travelling with protection. Incorporating solar-based energy into present-day aircraft innovation has been a point of intrigue and has gotten a great deal of consideration from analysts in the course of the most recent two decades. A couple among the numerous potential uses of this innovation is simply the probability of persistently supported trips for purposes, for example, data hand-off, observation and checking. This proposition examines the elevation and payload mass, as autonomous parameters, and their impact on the size and structure of the airplane. To evaluate accessible solar oriented force, two unique models have been displayed; one for low heights and the other for high elevations. A designing ground model was worked to reproduce the force and drive framework more than 24 h of nonstop activity. The proposition shows information from tests performed to date while managing the development of the building ground model just as changes that can be made to improve the structure.



BEC: Battery eliminator circuit.

Potential uses of the Unmanned Aerial Vehicle (UAV) incorporate military and arranged reconnaissance flights where little airplanes are hard to be identified by radars. Logical applications incorporate ozone checking, and an assortment of information for climate and an Earth-wide temperature boost contemplates. Business applications incorporate aeronautical looking over, land and geographical mapping, and correspondence joins. Solar oriented controlled UAV can be utilized in a large number of the previously mentioned missions because of its cost viability, ecological proficiency, and because it can do long continuance flight and doesn't require a lot of support. The proposal has been distributed to present the reasonable structure and ground tests of solar oriented controlled UAV. There is no away from the impact of height on factor parameters of the airplane, for example, the weight, the wing angle proportion, required push, and most extreme battery charging. Also, the impact of payload weight, required for a specific strategic the sensible height and voyage speed for a specific application has not been examined previously. Assessing the size of the Solar based boards, required to deliver enough capacity to continue the framework at various heights and characterized payloads, is the best test in this sort of structure.

This proposition targets exhibiting the impact of changes in elevation and payload on different parameters, for example, complete weight, solar-powered board region, the viewpoint proportion of the wing, greatest battery charging and required push. These parameters can influence both the expense and weight of the airplane. To gauge accessible Solar based force, two unique models have been exhibited; one for low elevation and the other for high height. A designing ground model was worked to reenact the force and impetus framework more than 24 h of persistent activity. The Proposal information from tests proceeded just as changes that can be made to improve the structure

Topology Section

A boost converter topology could be used to increase the voltage from 12V to 48V. Applications where the output voltage must exceed the input voltage are ideal for a boost converter.

Power Electronic Components

Select high-efficiency power electronic parts to reduce losses during the voltage conversion process, such as MOSFETs or other high-frequency switching devices. Choose parts that have a low on-state resistance to increase overall effectiveness.

Controller and Monitoring System

Incorporate a control system based on microcontrollers to oversee the functioning of the converter. In addition to monitoring input and output voltages and real-time adjusting the converter settings, this controller should carry out the MPPT algorithm.

Voltage Regulating and Filtering

In order to keep the output of 48V steady, use voltage regulation. Incorporate filtering elements to lessen voltage fluctuations and provide a reliable and pure power source for the drone's electronics.

Lightweight and Compact Design

With drone uses in mind, design the converter with the least amount of weight and space possible. To attain a small form factor, use lightweight materials and cutting-edge packing techniques.

Heat Dissipation

In order to control temperature, rise during operation, include an effective heat dissipation system. This is essential to preserving the converter components' dependability and lifetime.

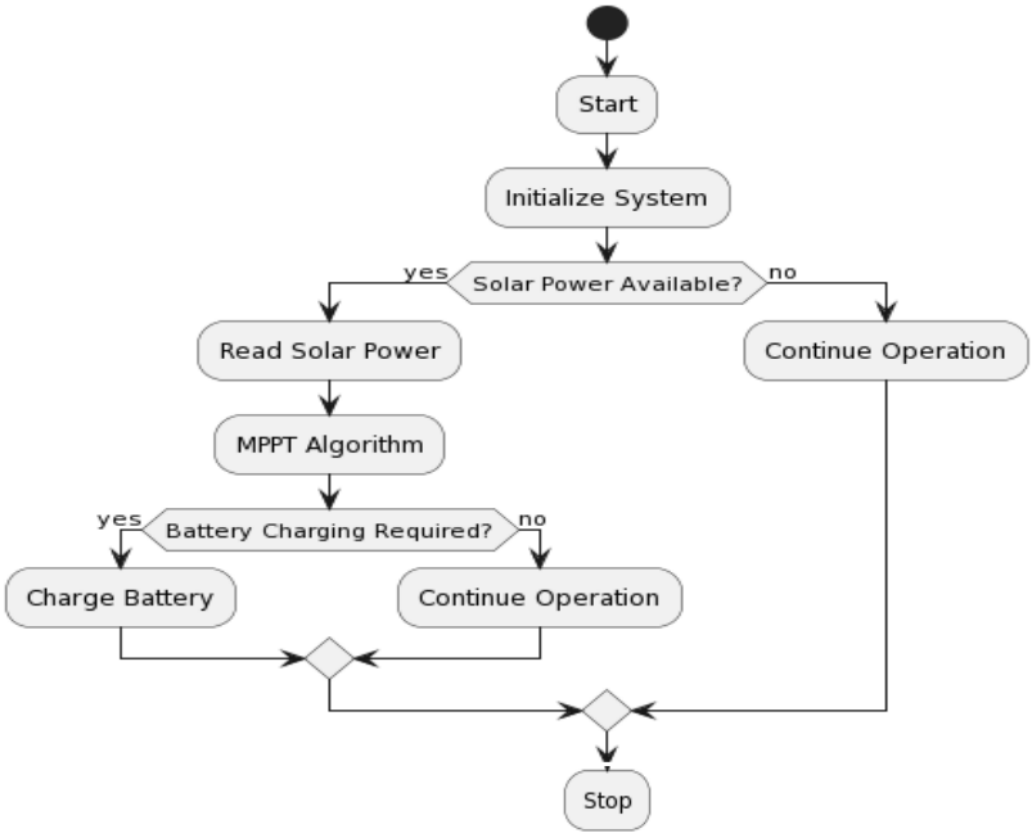
Safety Features

Incorporate safety measures like short-circuit, undervoltage, and overvoltage protection to protect the converter and other linked systems from any malfunction.

Algorithm for Converter

- Determine the starting points for significant factors such the power requirements of drones, battery voltage, solar panel voltage, and solar panel current. Watch the solar panels and go through the data they produce to determine the current voltage and current.
- Use the MPPT method to determine the solar panels' maximum power point. By appropriately modifying the operating point, voltage and current levels may be adjusted to maximize power production.
- Verify the battery voltage on a regular basis. If the battery voltage drops below a certain point, the battery elimination circuit may be activated to stop using the battery and power the drone directly from the solar panels.
- Install a system that keeps track of the system's parameters, including power consumption, solar radiation, and battery condition. Adapt the power distribution and conversion settings dynamically to the current situation. To identify issues including unstable battery conditions, component failures, and power fluctuations, use fault detection technologies.
- Install appropriate error-handling procedures to ensure system resilience. Create a shutdown strategy that will allow you to safely and prolong the life of the components by carefully shutting down the drone and converter system in the event of a system failure or when a critical battery level is reached.
- Adjust the system's configuration iteratively in response to performance feedback. by modifying the power conversion parameters and MPPT algorithm in response to changing environmental conditions.

Flow Chart:


Start
Initialize System
yes
Solar Power Available?
no
Read Solar Power
Continue Operation
MPPT Algorithm
yes
Battery Charging Required?
no
Charge Battery
Continue Operation
Stop

Claims

I/We Claim,

- The converter optimizes the electrical operating point to maximize solar panel power output, reducing power system usage and enhancing energy harvesting efficiency and drone lifespan.
- Solar drones often use rechargeable batteries, which are maintained by a converter that regulates charging and voltage, ensuring optimal battery health and reducing frequent battery replacements.
- The MPPT's dynamic adjustments protect the drone from sunlight damage, enhancing its resilience and reducing wear and tear, making it ideal for long-term, reliable operation.
- The converter system efficiently reduces stress on the drone's electrical components, reducing maintenance needs, reducing malfunctions, and extending maintenance sessions, enhancing its overall longevity.
- The converter ensures a steady, reliable power supply for the drone's systems, preventing component failures and promoting stability and longevity.

Abstract

This study examines the planning and execution of a custom converter system for solar-powered drones, focusing on the key to capturing solar energy and integrating it into the drone's power architecture. The converter system is detailed, including its design factors, integration with the drone's system, and testing and modeling approaches. The subsystem for solar power generation is explained, including solar panel selection, positioning, and dynamic tracking techniques for energy harvesting. The converter is also explained in detail, including its architecture, parts, and fundamental ideas for effective energy conversion. Extensive simulations and real-world experiments were conducted to verify the system's effectiveness. The outcomes show efficiency benefits, performance measures, and potential areas for development. The study also discusses difficulties encountered during the design and testing stages, providing insights into the complexities involved in implementing such a system. The findings provide a foundation for enhancing the sustainability and operational capabilities of solar drones, fostering innovation in renewable energy applications for autonomous aerial systems.

solar converter

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