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# Development on Self Charging Solar Powered Drone

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**Abstract***: In this regard, the delivery method proved unaffordable, especially for the final mile. Businesses started looking for creative autonomous delivery options for the destination, such as autonomous unmanned aerial vehicles/drones, which are a viable alternative for the logistics industry, in order to stay competitive and satisfy the rising demand. Drone delivery systems have started to take off as a new way to lower delivery costs and delivery times in response to the success of drones in surveillance and remote sensing. Autonomous drone-sharing systems will become a necessary logistical solution in the upcoming years. We recommend a self-charging drone that can be used when necessary for a long period without needing to be charged for a long time. Through the implantation of solar plates, this will be achievable. The solar plates will gather energy from the sun and store it in a battery. The drone can then fly for a long time at night by using the stored batteries as a backup.*

**Keywords:** Solar Energy, Drone, Flight, UAV, Camera, Analysis, investigation, research

## I. INTRODUCTION

As the demand for commercial deliveries increase within the cities, company face a fundamental limitation in surface road capacity. Drone delivery aims to overcome that limitation by exploiting the vertical dimension above the street. This study looks into how the delivery drones are designed, including how well they fly, how much energy they use, how loud they make, and how safe they are—all factors that are essential to the success of the delivery drones. Importantly, key design constraint and expected performance level also speak to the potential scalability of the concept. This drone can be used for a variety of tasks, such as distributing food, medical supplies, immunizations, shooting wedding and pre-wedding party photos, etc.

A common drone charges completely in 60 to 90 minutes when using a USB connector, however it charges faster when placed in a charging hub. Speaking of the flight period, a typical drone can fly for 15 to 20 minutes after being fully charged. However, this is too early and we couldn't do as much during this time, so as a backup, we need something that can be used in emergency situations. We suggest a solar-powered self-charging drone that can recharge the battery using the sun's natural light and store the energy for later use in order to address the problem of early battery draining. The flight time won't be prolonged further, and natural resources will also be used. which is excellent step towards green environment theory.

Drones are also referred to as UAVs and are managed by remote-controlled computer systems. Because batteries and conventional fuel have limited energy and are expensive, the main issues with standard UAVs are flying time and endurance. Solar energy can be used to alleviate this issue with solar cells, extending flight time without enlarging the battery or fuel system. Because it performs well at lower speeds because less Reynolds numbers were chosen, the sailplane aero foil is known as WE3.55/9.3. Finally, it can be said that using solar cells based on gallium arsenide technology won't require an electrical grid. (Sushil, 2017). There is a process for choosing the batteries and flying long-lasting trajectory to assure. Because a solar cell doesn't emit any carbon, it can be used in the future. Vijay Shankar Dwivedi asserts that Sun Power C60 is superior to silicon cells as a solar cell. The flight must be at least 1000 meters above sea level. Unmanned aerial vehicles have an endurance of 20 hours and 30 minutes and can run on batteries with a maximum capacity of 30 amp-hours. (Vijay et al., 2018)

This study by Mohammad R. Hayajneh et al. [1] describes a low-cost and feasible method for independently recharging an unmanned aerial vehicle (UAV) for missions in distant locations.

According to K. S. Rahman et al. [2], a flying quadcopter outfitted with eco-friendly solar energy is created and used in this investigation for observational reasons.

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S According to Sivachandaran et al. [3], the study's conclusion is that it will serve as a foundation for further UAV development, automation, and use in aerial security monitoring while also reporting to authorities the data that will be utilized to sound alerts and improve security.

Hasimah Ali et al.'s [4] study proposed the creation of an IoT-based drone surveillance system for use in industrial monitoring and security applications.

The main goal, according to AurelloPatrik et al. [5], is to create an effective model to handle challenges. for instance, a delivery system.

We give a brief outline of the safety and security-focused application areas that we identified as the primary objectives for industrial and commercial initiatives in Hanno Haildmann et al.'s [6] work, particularly in the context of highly intelligent autonomous systems.

## II. METHODOLOGY

**Problem Statement:**

For the past century, drones have become a piece of technology that has had a pervasive impact on our society whether it be for military, industrial, scientific, commercial, or recreational uses. The major fear of pilot faces in surveillance is that the battery may run out and drones may land on tree or building or some inaccessible area from where it cannot be retrieved and this cannot be charged. This is also the case in military surveillance, the possibility of battery life running out and drone being inaccessible creates limitation for drone pilots during surveillance/monitoring.

**Proposed System:**

The angular momentum of any of the four rotors generates a torque about the inertial center of mass of the vehicle which can be effectively counter balanced by the torque created from the opposing rotor. A solar drone is an Unmanned Aerial Vehicle (UAVs) that is powered by solar energy. It relies on photovoltaic cells to captures solar energy and convert it into electricity, which is used to power the drone's motors and other system.

**The methodology for building the solar drones typically involves the following steps:**

- **Design**: The first step in building a solar drone is to design the drone's structure, including its wings, body, and propulsion system. The design must take into account the weight of the solar cells, battery, and components, as well as the drone's intended use and environmental conditions.
- **Solar cells selections:** The selection of solar cells is critical step in building a solar drone. The cells must be efficient enough to generate sufficient power to keep the drone in flight, while also being lightweight and durable.
- **Integration:** Once the solar cells have been selected, they must be integrated into the drone's structure in a way that maximizes their exposure to sunlight. This involves carefully positioning the cells on the wings and body of the drone and connection them to the drone's electrical system.
- **Battery Selection**: Solar drone also requires a battery to store the energy generated by the solar cells. The battery must be lightweight, durable and able to provide enough power to keep the drone in flight for an extended period.
- **Testing:** Once the drone has been assembled, it must be tested to ensure that it can fly for reasonable amount of time and perform it's intended function, this involves testing the drone in various weather conditions and making any necessary adjustments to it's design.
- **Deployment:** Finally, the solar drone can be deployed for it's intended use, which may include environmental monitoring, surveillance, or other applications.

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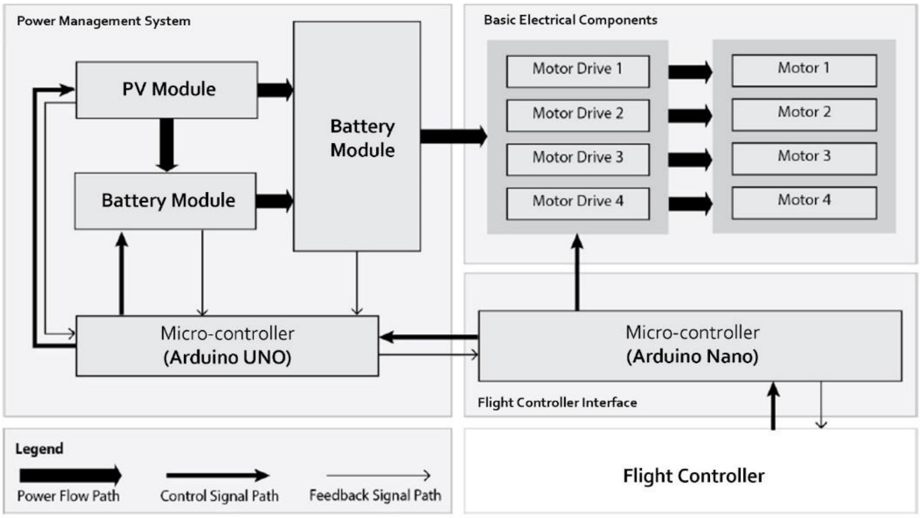

Figure 2.2.1 Proposed System Architecture

**Power Management System**

The power management system refers to the puissance control unit where the potency is stored from the solar plates in the battery. As mentioned in fig. 2.2.1 PV module is a semiconductor material commonly kens as solar panels a web that magnetizes the solar power and transforms it into useable energy. The battery will be utilized as a puissance storage module for further use. All the modules of the puissance control system will be directly connected to the microcontroller (Arduino UNO), which will perpetually pass the signal to other electrical components as well as sensors implemented in the drone.

**Electrical Components**

This section contains 4 motor drivers who are responsible for drone flying, from the battery they will get a potency supply and will work on the injunctive authorizations of microcontrollers and the flight control unit from the ground, which has Arduino nano as its system control unit.

## III. MODELING AND ANALYSIS

**3.1 Requirements:**

Figure 3.1.1 Drone Motor

These motors are responsible for flying the drones and by spinning the propellers in the correct direction. By providing the three-phase current at the given frequency the motor spins with the propeller. Generally, Mundane motors use 20-200 watts/kg to fly.

RC receiver is an electronic contrivance that transmits electrical energy to utilizable information while in the air. It takes 4.8 - 6.0 volts of potency to work.

Figure 3.1.2 RC Receiver

RC controller is built in with a radio transmitter that perpetually reads stick input and transmits the information to the receiver in the drone.


Figure 3.1.3 RC Controller

The propeller hoists the drone by engendering airflow and spinning, resulting in a pressure distinction between the bottom and top surface.

Figure 3.1.4 Drone Propellers

Jumper wires are used to connect the sensors with microcontrollers and other components. It has 3 types M2M, F2M, F2F.

Figure 3.1.5 Jumper Wires

## IV. RESULTS AND DISCUSSION

Figure 4.1 Expected Outcome

## V. CONCLUSION

The addition of solar power to UAVs has the potential to expand the range of applications for these aircraft by increasing their flight time. The main goal of this project is to equip the RC glider 759-2 Phoenix 2000 with a solar power system in order to increase its flight time. In the end, the flight test proved that the project's goal had been accomplished. The installation of the solar power system on the aeroplane results in a 22.5% reduction in the use of battery stored capacity under good experimental settings with suitable weather (solar radiation level exceeding 700 W/m2). The rate of battery voltage declines for the solar-powered UAV ('Sun') is substantially faster when compared to the battery voltage graphs during circuiting.

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