RENEWABLE ENERGY DRIVEN SPY VEHICLE

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Abstract - *Renewable energy is inexhaustible. Renewable energy harvesting and typical use reduces the environmental problems and they are highly efficient and effective solutions for sustainable development. Moreover, they do not cause pollution or global warming. Unmanned aerial vehicles have increased the ease of life. It helps to observe, plan, deliver etc. There are certain problems associated with flying UAV's for longer periods. one of them is the risk of the UAV losing connectivity with its controller. Our project utilizes solar energy to power a quadcopter which reduces the need for them to return to their base for charging. With the right combination of solar technology and storage, a quad copter is made to run for longer distances, which means less time on ground regardless the purpose it is serving. Also, the solar energy is used for cameras and other purposes, which means spending no money on drawing electricity from the grid to power the quadcopter.*

Key Words: Inexhaustible, Sustainable development, increased the ease, longer periods, right combination, less time on ground.

1. INTRODUCTION

Unmanned Aerial Vehicle (UAV) or commonly referred to as drones, is a sort of aircraft without a person's pilot on board, but controlled autonomously by computers and/or taking commands from remote stations. The UAVs are perfect for tasks that are dangerous for humans. For example, patrolling along boarder lines, wild preparation, aerial surveillance etc. These applications require longer flight time and reliable power supplies. However, current UAV designs utilizing traditional battery or fuel cells usually struggles to satisfy.

1.1 Problem statement

Drones are now common all over the world and they find application in various fields, there remains the underlying factor of maximum flight time. This limits the range and extent of application. Thus, the need to find a sustainable provision of energy that will go a long way in breaking the shackles of limitation in the application of energy. Bearing this in mind coupled with the need for preservation of the environment there is a need to develop a way of harvesting energy that will be clean and self-sustaining. In addition, the need for law and order cannot be over emphasized.

1.2 Objective

We aim to supply an innovative solution to the present problem by introducing the current popular photovoltaic system into the UAV power grid design. It focuses on the electrical system design and therefore the product is going to be a platform for future development on solar powered UAVs. The design is to be modular for straightforward upgrade and replacement. It is a prototype that showcases the need for combination of renewable and non-renewable energy resources for better efficiency and to meet today's energy demand. The UAV chosen here is quadrotor, for its benefit as being easy to configure and having space for solar array placement.

2. METHODOLOGY

The solar cells used are photovoltaic cells which is monocrystalline in nature. When sun rays fall on the solar panel it converts solar energy into electrical energy. When sun rays fall at an angle of 90 degree, the efficiency is more. Solar panels generate direct current energy then converting it into usable alternating current energy with the help of inverter technology. Solar cell is connected to MPPT. MPPT is an algorithm used in charge controller to extract maximum available power because the solar energy we are getting is not continuous. It converts high voltage dc output from solar panels to lower voltage to charge battery.
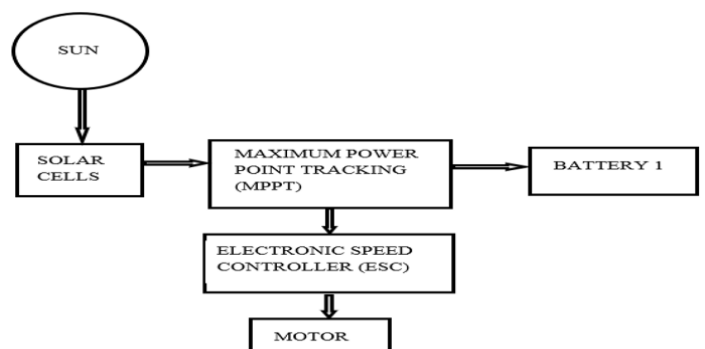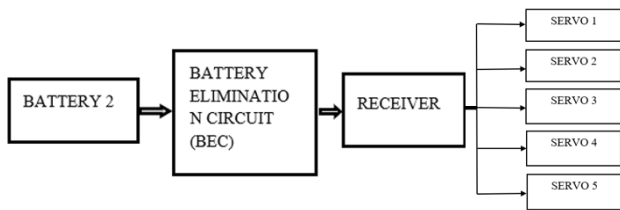

Fig -1: Block diagram

Fig -2: Block diagram

The battery we have used is Li polymer battery, it is rechargeable and it provides specific energy and small in size. ESC is an electronic circuit that controls and regulate the speed of electric motor. Drone needs thrust in the air to float. we need powerful motor so we use brushless dc motor. It provides high torque, increase reliability, reduce noise, longer life time because no erosion between brush or commutator. Battery eliminator circuit is designed to supply electrical power without the need for multiple batteries. It drops a big voltage down to smaller voltage. It allows us to run our receivers, servos and other accessories from main battery without using separate lower voltage one. ESC also have built-in BEC servos converts the electrical signal into linear movement. When signal is transmitted, this signal is decoded and sent to servo. According to this signal the servo will rotate to its drive shaft.
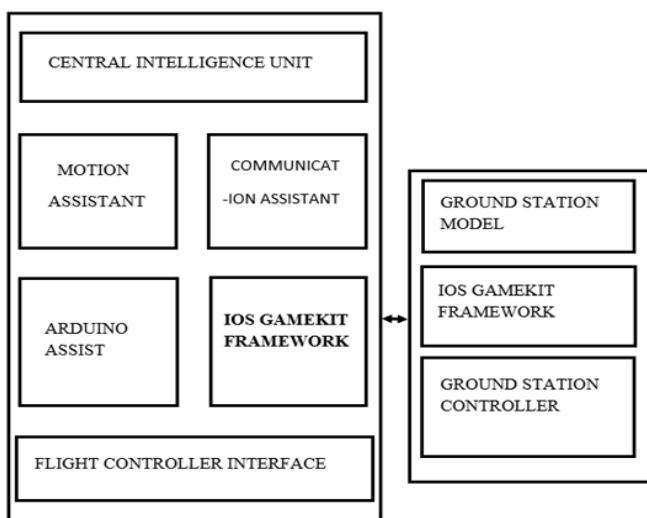

Fig -3: Flight controller

The flight controller we have used is FC-X (flight controller xenon). A flight controller is a small circuit board of varying complexity and its function is to direct the rpm of each motor in response to each input by the pilot. Command from pilot is fed to the motors by flight controller which determines how to manipulate the motors accordingly depending on the rpm. Flight controller is built on an iOS platform based on linux2.6 open source.

Four main objects are constructed

1) Central intelligence unit
2) Motion assistant
3) Communication assistant
4) Arduino assistant

All object operates independently while occasionally communicating with each other if necessary.

Communication assistant receives the data from the pilot this procedure is called obtaining the data. From there on the data obtained is utilized to generate stable input through feedback loop mechanism, from the stable inputs mix control inputs are generated which is later converted into throttle values. These throttle values are fed to the motors via serial cable. Thus, the information flow in the flight controller happens from motion assistant to flight controller interface through Arduino assistant. GSM is required during the flight time. GSC is used by the UAV to return back to its default setting after finishing its flight time. Like any electro mechanical vehicle the sensor work is done by the pilot, the work of an ECU is achieved by the flight controller and the actuators are replaced by the motors in our prototype.

Table -1: Properties of prototype

Sl.no	Properties	Prototype
1.	Solar panel	Monocrystalline cells
2.	Withstanding temperature	400 degree Celsius
3.	Operating temperature	20-65 degree Celsius
4.	Flight time	4+ hours

3. CONCLUSION

As mentioned throughout, the long endurance UAV's with a combination of a renewable source of energy and a non-renewable source of energy as a paved way for supporting the major drawback of solar technology that is its non-availability after sunset. Our UAV has a large potential whether it is in case of studying natural disaster, weather surveillance or fire direction. Our solar power-driven UAV design is a 6axis stabilized system with a wingspan of 360 degree, flying height 150m, weighing about 350 gm, range 25m, is more than enough to fulfil the criteria for all surveillance activities and by different body frames it can be used very well as a spy device. The advances in solar technology have made it so the concept of solar powered UAV'S and MAV's is not just a theory anymore. Thus we like to conclude usage of renewable source is a necessary step we as a society should take to shift towards renewable energy, at a single point it isn't an effective solution instead we should step towards a combined technology of renewable and non-renewable energy sources which will help us to

overcome the efficiency issues. Let us aim for a greener society step by step to make it a sustainable development.

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