Review paper of Solar Powered UAV

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Abstract- As all the technology giants these days are battling to extend their influence and to find new users in all the corners of the world not only on land but also expanding beyond sky. Withthe solar-powered drones that will beam broadband Internet access to the entire developing regions whichhouses many newly growing web users across untouched areas on which these companies want desperately want to get their hands on.What these future satellite-style drones are able to do with help of modern technologies is pretty amazing, these types of drones will on only be effective in commercial but also plays a major role in defence of a country. The primary function of these commercial drones will be to send Internet to the places with a speed of 1gigabit per second, that's pretty amazing, which overcomesthe speed of fiber-delivered Internetand outranks many developed countries in internet speed. They are used to take high-quality images in real-time which we can do by maps initiatives. They can contribute to things like relief in disaster and indicating in pollution effected areas, holes in ozone, deforestation. They can also be used in military for various purposes in battlefield.

Keywords- *Solar powerdrones, drone Technologies, UAV, Internet Access, Commercial Drones, modern war Technology*

I. INTRODUCTION

In today's world there are more than 11,000 UAVs in service (or planned for future services) by the Military for various purposes. Although these UAVs provide various benefits, they fall short on performance due to their power restrictions;i.e. they must either land to be recharged or land for another UAV to complete the mission. By having the UAV returning every hour for recharge is extremely costly and can be dangerous for the war fighters, if used on the battlefield [1].

Increasing size of the battery or the number of batteries cannot solve these problems due to the weight restrictions; weight is inversely proportional to the flight time of the UAV. With the implementation of solar cells on UAV, the UAV would be able to collect and store solar energy by the sun to be used for the flight, and thus does not require returning to recharge (R/R) requirements. Again efficiency would play a major role; all the electronic sub-systems must be lightweight and efficient enough to support the overall weight of the UAV.

Now a days UAVs are mainly working on wartime capabilities and in the commercial field. The UAV technology is combined with interchangeable batteries can become a powerful source for commercial applications; also can shape the future of aviation in almost every field. There are hundreds of

applications in UAV technology in the civilian sector as well as in defence sector, horticulturalists. Here UAV features with compact, lightweight and with the ability to carry a multiple interchangeable instruments to suit its application.

II. UAV HISTORY

Unmanned Aerial Vehicles, or sometimes been referred as UAVs, have only been in service form the last 60 years.The Modern UAVs have come fromlong way since the unmanned drones used by the US Air force in the 1940s.**The Defense Advanced Research Project Agency (DARPA)** is a federally funded program dedicated to sponsoring UAV development for military purposes. In the 1960s, the US started to develop 'drones', which were unmanned Arial vehicles developed for spying and reconnaissance.

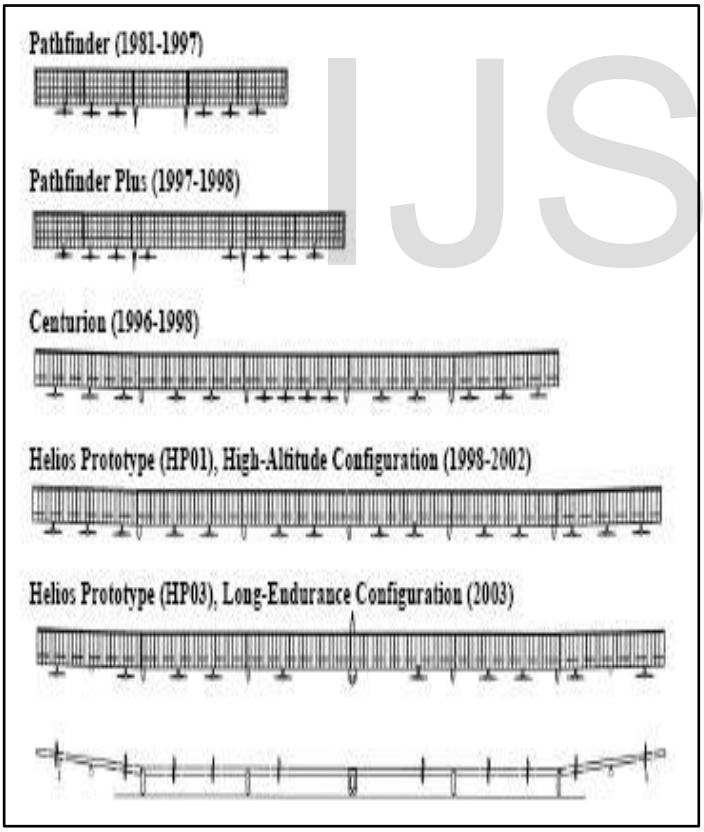

Fig 1. Size of Wings

The first such type of drone was the 'Firebee' drone; it was a jet propelled by an engine made by Ryan Aeronautical a US based Company. They initially used them heavily over Communist China in the year of 1960s, when major flaws were discovered and made corrected [1-3]. UAV technology was first used in 1964 during the Vietnam War. UAVs are now playing an important role to many countries air defenses [1, 2].

And with the passing time technologies has updated themselves a lot, there are different types of UAV's for task specifics such as Mini/Micro UAV's, Technical UAV's, Strategic UAV's, and special UAV's. Increasing endurance of the UAV's in air is the major goal of today's world, and this could be only done by the concepts of interchangeable batteries.

With the implementation of solar cells on UAV, the UAV would be able to collect and store solar energy by the sun to be used for the flight. In order to increase the flight time solar cells were increased, as a result of Which wingspan size also increased from a mere six inches to nearly two hundred feet in past few years.

III. HIGHT CONCEPT

These solar powered UAV's have capabilities to fly from 50000 to 95000feets.In 1995; NASA's UAV- Pathfinder set an altitude record for solar aircraft by climbing to 50,500 ft. The latest of the larger NASA fundedaeroVironment solar planes was Helios. Helios set an impressive altitude record of 96,480 ftin year of 2001.

First of all, these are autonomous robots that are of nearly the size of a commercial jet; these drones can fly up to continuous 5years without even a single landing, surviving only on solar energy.

Think about that. Some 3,000 photovoltaic cells on the drones' 50-foot wingspan fuels the motor and charges up the batteries to

power the drones at night. NASA's Pathfinder could produce a maximum of 8,000 W from solar cells, weighed 486lbs, and had a wingspan of 98 ft. [4]

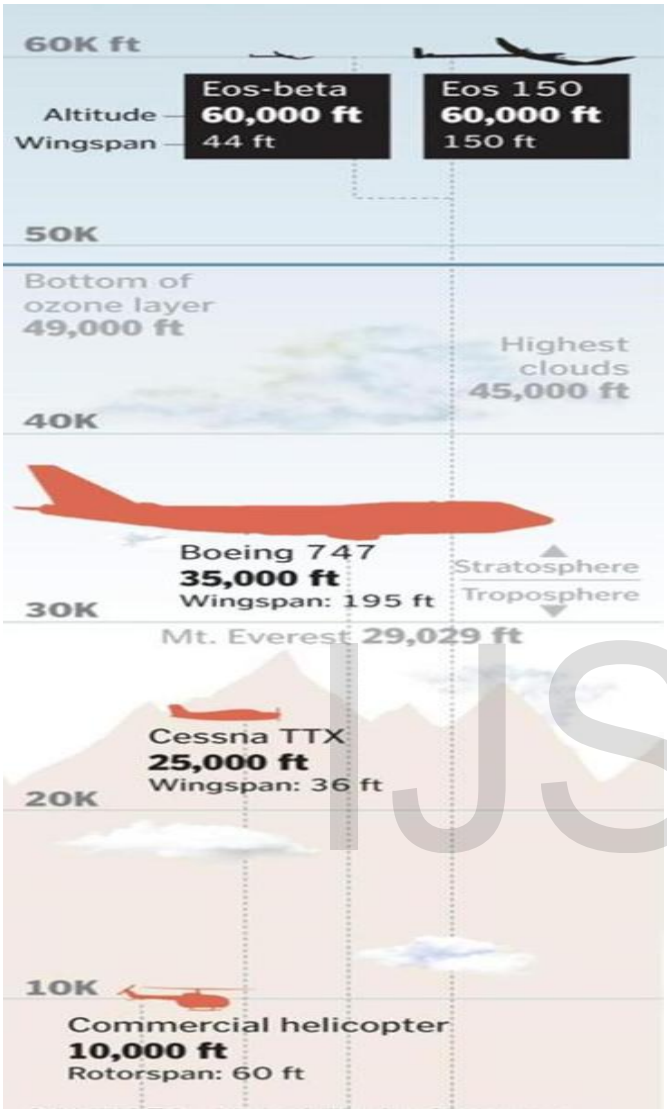

Fig. 2. Height Concepts

IV. SETUP PROCEDURE

Setup involves all process from that a solar UAV undergoes from drones takeoff to landing of drone.[6]

Step1: UAV motor will turn on.

Step 2: Take off at 4AM.

Step 3: After six hours of climbing, the UAV will cruise at 50,000ft.torecharge batteries enough to make the final climb.

Step 4: After three hours of direct sunlight (between 10AM and 1PM), The UAV will begin to climb to cruise altitude of 75,000ft.

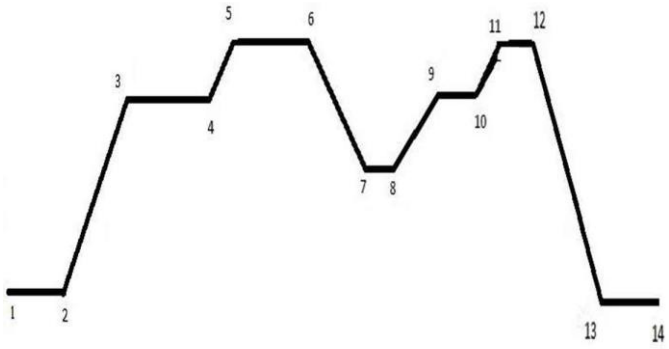

Fig. 3. Take off to landing Procedure

Step 5: UAV at cruise altitude at 4PM. At cruise, the UAV will use the rest of the day to charge batteries.

Step 6: UAV begins descent at 9PM. UAV will rely on onboard batteries to stay in air.

Step 7: At 5AM, the UAV cruises at an altitude of 40,000 ft for three hours to charge the batteries partially.

Step 8: At 8AM, UAV begins climb to 50,000 ft.

Step 9: At 12PM, UAV cruises for two hours. This will recharge batteries during direct sunlight.

Step 10: At 2PM, UAV begins to climb at 75,000 ft.

Step 11: At 4PM, UAV cruises at 75,000 ft. until sundown to charge Batteries.

Step 12: At 9PM, after four consecutive days in flight, UAV beings descent back to ground only using minimum power.

Step 13: At 8AM, UAV lands on runway.

Step 14: UAV powers down.

The steps from 3 to 12 are repeated till the duration drone is in action; these autonomous robots can stay aloft for five years running on solar power.

V. CONCLUSION

As the desire for a greener society is increasing day by day in today's world, an alternative source of energy for aircraft's are needed. There are many other alternative energy sources that are present including bio-fuel and hydrogen fuel cells, but nothing is as limitless as compared to solar technology.

Some applications of high altitude long endurance UAV that can potentially be very large, whether it is in weather surveillance, studying natural disasters, or fire direction, & internet providing drones. The solar power UAV design discussed weight 1136lb, has a large wingspan of about 224ft, and hold up to 100lb of electronic payload, which is enough for all the surveillance and autopilot instruments. To attain the maximum height we just need maximum power for longer duration of time. This requires larger amount of electric charge from solar cells. For large amount of electric charge we require large no of solar cell, either the size of the solar cell or efficiency of these cells should be increased or number of solar cells places on a single UAV should be increase.

There are about 3000 photovoltaic cells on drones` 50-foot wingspan fuels the motor and charges up the batteries to power drones at night, if we increase this numbers every factor improves automatically.

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