

Design and Analysis of High Endurance Fixed Wing Multirotor UAV

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ABSTRACT

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Current work emphasis on research, design and development of a fixed wing multirotor Unmanned Ariel Vehicle (UAV) which operate under V - TOL configuration. In this investigation an effort is made to develop a high endurance and high payload capacity UAV which can have a payload capacity of 15 Kg and which can serve with the endurance of 2 hrs per cycle.

Keywords : UAV, V-TOL, Fixed wing UAV, Solar Hybrid, High Endurance

I. INTRODUCTION

Aerial vehicles have proved their capability in both military field such as patrolling, surveillance as well as reconnaissance, and civil areas including transport, rescue and agriculture of various applications over a hundred years, while enhancing their capabilities over time, and fulfilling ever-changing mission requirements. By means of smaller, safer and lighter platforms, UAVs propose an exclusive set of advantages compared to piloted aircrafts [1]. Military and civil operations are the main areas where these advantages are effectively utilized. In addition, future UAVs are expected to perform much more extended missions with higher aerodynamic performance and higher degrees of automatic flight. There are two prominent categories of mini UAVs; fixed-wing UAVs and multi-rotors. Fixed-wing UAVs are mini UAVs with propelled electrical batteries with longer ranges than UAVs with similar sizes of multi-rotor

systems that require a runway or launcher for landing and knockout [2] [1].

The Fig.1 illustrates the mission profile chosen for the UAV. The multi-rotor UAVs have rotor systems generally carrying three or four propellers that are capable of vertical take-off and landing (VTOL) and hovering over an area while carrying sufficient payload. In addition, they are more maneuverable than fixed wing UAVs with the ability of quickly transition from hover to cruise flight. However, the horizontally mounted rotor system is placed at the wings or the body that results in an enormous increase in drag force opposing the cruise flight. As a result of this decrement in the aerodynamic performance, fixed wing UAVs are more logical to be used to fulfil the missions needed high speed, long range and endurance flight The fixed-wing UAVs has longer flight time and duration, but it is not simple to secure a safe landing space, especially in the city and rugged train areas. VTOL