Integration of Experimental Propulsion in Micro Air Vehicles

Group 3

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**Needs Assessment**

Currently there are a wide variety of Micro Air Vehicle (MAV) designs. The goal of this project is to create three MAVs that integrate experimental propulsion systems. The fuselage design should maximize maneuverability and flight efficiency. The end product will be compact, light weight, and will advance the current flight capabilities of MAVs.

**Project Scope**

**Problem Statement**

The group will research, design, and construct multiple Micro Air Vehicles (MAVs), focusing primarily on the fuselage design and the integration of an Electric Ducted Fan and/or a Micro Turbine engine. The information gained through this study will be used to explore the effectiveness of these systems.

**Justification/Background**

MAVs have been constructed as small as 15 cm. There are three main wing designs being used in conjunction with MAVs: fixed-wing, rotary-wing, and flapping wing. For this project the group will be working with fixed-wing MAVs.

Ducted propellers are often used in MAVs. Ducted propellers can increase thrust, improve efficiency and work well when a limited diameter is a constraint. Limiting the diameter of the ducted propeller and integrating it into the fuselage will be one of the crucial parts of the creation process.

The MAVs will be created for Eglin Air Force Base and used for military purposes in the field.

**Objective**

The objective of this project is to incorporate new means of propulsion that improve the efficiency and flight capabilities of MAVs. Over the next two semesters, the group will apply mechanical design, materials science, thermodynamics, and electronics to create three MAVs to be tested by qualified RWAV volunteers.

**Methodology**

The first step is to conduct thorough research about MAVs and the design currently being implemented. From the pros and cons obtain by the research the group will be able to incorporate positive aspects of other designs. Using these plans, the group will create three MAVs using CAD software that incorporate different propulsion system designs. The CAD designs will then be sent to a machine shop to generate a mold that will be used to create a composite made out of carbon fiber, Kevlar, or fiberglass. After the MAVs are assembled the design will be tested for an increase in flight efficiency and maneuverability.

**Expected Results**

The group will design and construct three MAVs that will be tested for an increase in flight efficiency and maneuverability. There are minimal risks in this project. However the biggest risk is that the final product does not abide by all of the constraints defined. This project will benefit Eglin Air Force Base and the U.S. Military as a whole.

**Constraints (Retained by Customer)**