# AHS Micro-Air Vehicle Challenge

Project Sponsored By:

Nancy Squires, Ph.D.

# Problem Statement

Written by:

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**Abstract:**

The AHS Micro-Air Vehicle challenge is a competiton hosted by the American Helicopter Society. This project is sponsored by Nancy Squires Ph.D., and will conclude in May 2018. The Micro-Air Vehicle project proposes to build an autonomous quadcopter capable of meeting the design requirements specified by the AHS competition. If the Oregon State University team qualifies to compete they will travel to Phoenix, AZ and participate in the competiton on May 14-17.

# Problem Definition

Oregon State University will be competing in the American Helicopter Society's 2018 Micro-Air Vehicle Challenge. Our task is to design and build a vehicle to compete in the 2018 challenge located in Phoenix, Arizona on May 14-17, 2018. This vehicle must meet the competition requirements set by The American Helicopter Society. Additionally, this vehicle must be capable of autonomous flight, and support an on-board video system.

# Problem Description

The Micro-Air Vehicle challenge is an annual collegiate competition hosted by The American Helicopter Society. The competition in conducted by the AHS International's Unmanned VTOL Aircraft and Rotorcraft Committee. Competitors are tasked with building a vehicle that is capable of vertical takeoff and landing. This vehicle may compete in either a manual or autonomous flight category. While the 2018 competition rules have not yet been announced, last year's competition included restrictions on size, weight, and movement. Student teams may receive awards based on innovative systems implemented on their vehicles. The competition takes place at Forum 74, an annual convention hosted by AHS International. The forum takes place May 14-17, and the competition will take place on one of those days. The announcement of the competition date, and rules will be announced mid-October.

# Proposed Solution

The Oregon State University Micro-Air Vehicle team will consist of three mechanical engineering, three electrical engineering, and three computer science students. Initially the team will design and build a quadcopter that can be flown manually. When that goal is met, we will begin pursuing limited autonomous flight. This limited autonomous flight should be able to navigate, without human interaction, on a pre-defined flight path. If that goal is achieved, then work will begin on a fully-autonomous flight function that allows us to meet the competition objectives without any human interaction. According to last year's rules, the vehicle must be under 500 grams, and less than 17.7 inches in any dimension. The vehicle must also have some sort of on-board camera system that is capable of streaming video to a computer. This video stream must be capable of 24fps, with a latency less than 150ms. According to last years rules, paper design proposals must be submitted by mid- January, and a final video evidence of competition readiness much be submitted in March (exact dates to be determined).

# Performance Metrics

Project completion will be judged by the following performance metrics:

1. Vehicle Completion:
    - Can the vehicle fly under its own power?
    - Does it weigh less than 500g?
    - Is the vehicle sorter than 17.7 inches in any dimension?
    - Is the vehicle able to maintain a stable flight path?
2. Autonomous Completion:
    - Can the vehicle stream video to a remote station?

- Can the vehicle be controlled remotely from a computer?
- Can the vehicle follow a specific flight plan without human interaction?
- Can the vehicle locate targets and choose a flight plan without human interaction?

3. Competiton Completion:

- The team must submit an intent to compete in the 2018 AHS Mirco-Air Vehicle Challenge.
- The team must submit a design proposal for competition before the mid- January cut-off date.
- The team must demonstrate competition readiness by meeting the vehicle and autonomous requirements prior to the competition date, and submit video evidence to the competition organizers for final selection.
- If selected to compete in the 2018 challenge, the team must travel to Phoenix to participate in the challenge.