**Title:** ***Long Flight Time Buoyant Drone (Barone 2)***

**Problem Statement:**

Although drones are useful tools, they are heavy and thus have limited flight time, which limits their use to short term and short distance applications. By reducing its weight and adding inherent buoyancy, flight time can be increased, allowing drones to have more use cases.

**Purpose & background:**

The purpose of this project is to design a multifunctional drone with prolonged flight time capable of carrying sensors. The main focus is on light weight design, which can be helped with a helium balloon to add buoyancy, without having to use as much power to maintain flight. Currently consumer drones have a limited flight time of around 20-30 minutes on average. *Lighter than air* systems are appealing since the energy required to keep them airborne is small. The lift of the *lighter than air* drone is mainly aerostatic. Consequently, *lighter than air* drones spend the most energy moving and compensating for wind disturbances, rather than trying to keep themselves airborne. By implementing a system that keeps the drone naturally buoyant, the flight time of the drone could be extended from dozens of minutes to multiple hours. Long flight time will allow the drone to be better for data collection and other scientific and commercial purposes.

**Target end user/Client Profile** (No client yet still, doing outreach)**: NASA Ames (in talks),** Search and Rescue/Cal Fire, Geo Surveyors, aerial topologists

**Client Objectives:**

* Multi-hour flight time
* Drone modularity (Stretch goal)

**Challenges:**

* Since a buoyant drone will have a large surface area but a small weight, the sideslip force from the wind will be very large and hard to compensate for.
  + This could be helped by making the drone long and flat
* Having all of the drones programming be done on something small like a raspberry pi zero in order to keep the drone light enough, so the balloon does not have to be huge.
* using a small battery efficiently to keep the drone light but be able to power all sensors and onboard computing for flight duration.
* Keeping drone base weight small so that helium lift bag does not need to be too large
* Remote Design Process

**Team composition:**

* Mechanical design
* Power management
* UAV simulation
* Systems programming for sensors
* Control systems
* PCB design

**Project Location:** Simulation done remotely and manual work 2300 Delaware Ave (Indoor Flight room)

**Potential Solutions:**

* Helium balloon for buoyancy
* Lithium battery
* Solar panels
* Microcontroller (e.g. Raspberry Pi Zero)

**Project Timeline and Major Milestones:**

* Simulations completed by end of winter quarter
* Working product by end of spring quarter