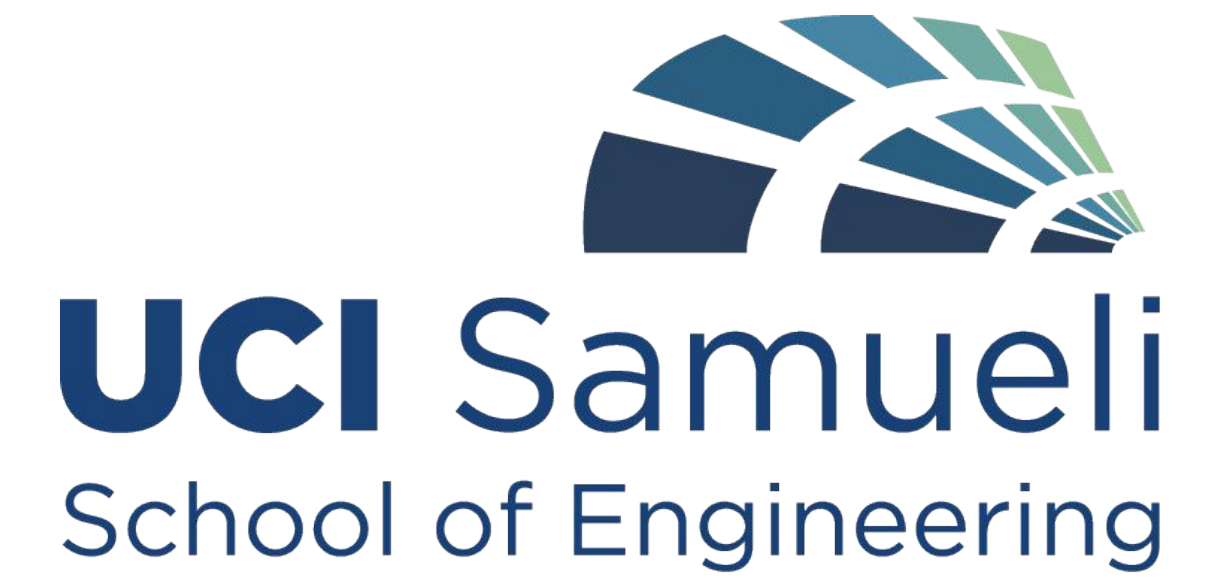




# Fuel Cell Drone

Innovative Drone Design Combined with Fuel Cell Energy



## Background

Hydrogen fuel cells are a form of renewable energy that is easily accessible since hydrogen is the most abundant element in the universe, and do not cause pollution or danger to our environment as they do not release greenhouse gases as opposed to fossil fuels. A fuel cell is similar to a battery in that it will function and provide power through electrochemical reaction as long as there is fuel available to it. In a fuel cell hydrogen and oxygen molecules are split up and combined throughout a process which produces pure water, heat, and electricity as by-products due to their high efficiency.

For this particular project, we will be researching the fuel cell efficiency in a drone that we will design and build ourselves. Groups will be building a structure for the drone and assembling electronic parts for use throughout the experiment, while keeping the fuel cell as the focal point of this project. Our drone will be capable of carrying loads as well as have a camera for filming. The advantages of the fuel cell lie in longer flight times, quick refuel, and function in low temperatures. Drones have many applications that are evolving as our technology advances. Drones can be used to survey and map land, reduce human liability exposure, aerial surveillance, disaster relief, and so on.

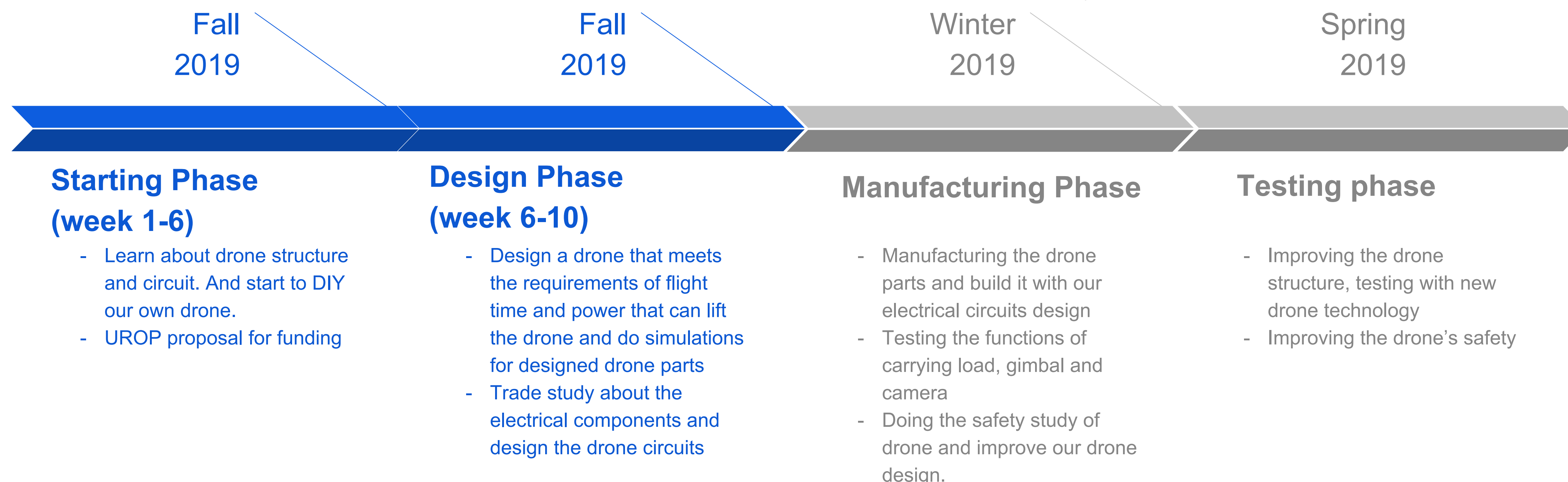
## Goal

Build a fuel cell battery powered drone. Furthermore, we also design our fuel cell drone with different function like carrying 5lbs loads with 30 mins flight time, carrying gimbal and camera for filming.

## Objectives

- Researching about fuel cell battery application in low power devices
- Learning about how to DIY a drone.
- Learning about the appropriate construction materials and electrical parts for the drone

## Timeline



## Requirements

Mechanical:

- Design a drone that will be powered by a fuel cell battery
- Carry a 5kg payload and record a video
- Fly for at least 30 minutes

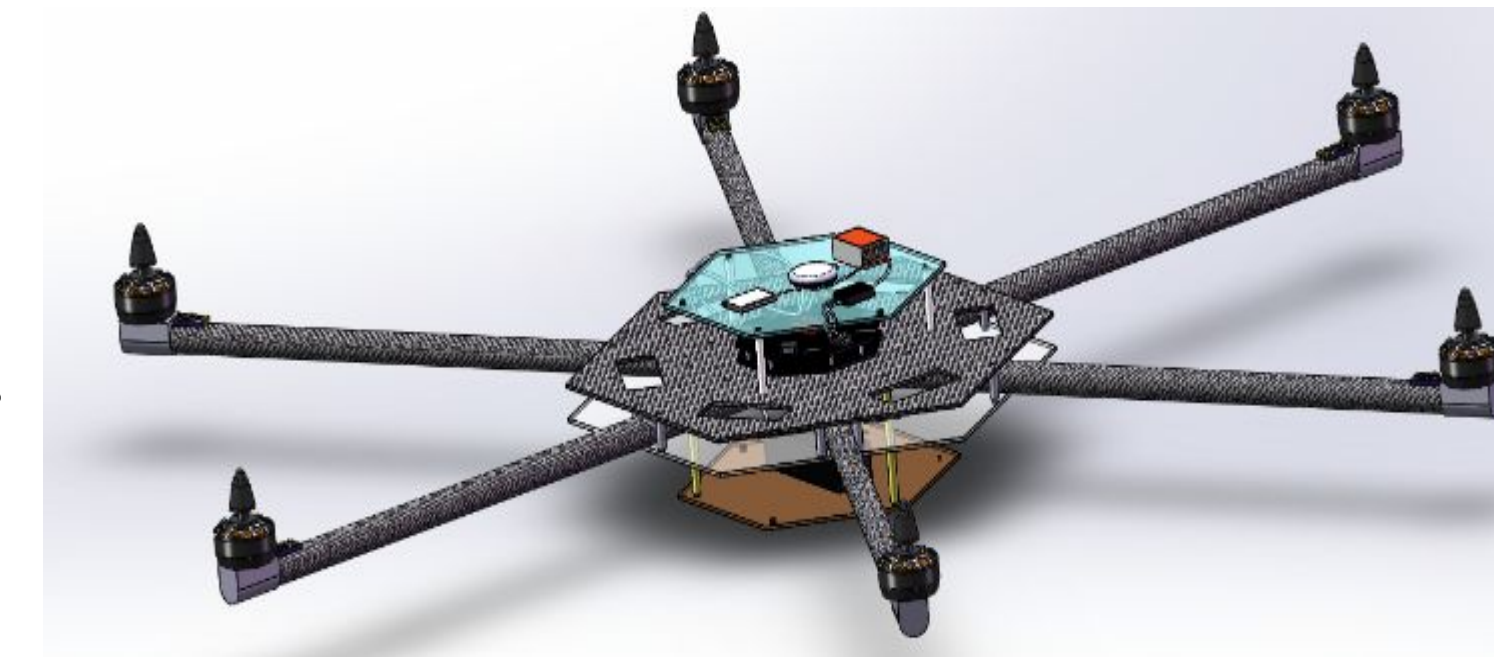
Electrical:

- Flight control require 6s Lipo battery input.
- Fuel cell battery operation temperature: 5 – 35 degree Celsius

## Current Status

Mechanical: The structure of the drone has been finalized, consisting of four different plates, with 6 arms between the two center plates, each with a motor. Electronic components will go on the top plate as well as on the plate below. The fuel cell module will fit on the bottom plate, and the hydrogen tank will hang below. The gimbal for the camera will go between two of the arms. A trade study on different motors, propellers, fuel cell modules from Intelligent Energy, and hydrogen tank sizes was completed to determine the appropriate types to power the drone and sustain a payload of roughly 4-5 kg as well as a flight time of 30 minutes.

Electrical: All electronic components are completed in the method of trade study, the circuit diagram design has also been consummated, all the voltage and current are in accordance with the component specifications. Components including: Flight Control; Electronic Speed Control; Lipo Battery; Transmitter; Power Distribution Board; Wires and Connectors; Camera Set (Camera; video transmitter; receiver)



## Budget

- Drone Structure - \$970.48
- Fuel Cell Module - ~\$ 2000
  - Fuel Cell
  - Hybrid Battery
  - Hydrogen Tank
  - Hydrogen Fuel
- Material Fee - \$630
  - Electronic Components

## Next Step

Mechanical : Purchasing all structural components and fuel cell module. Start manufacturing the drone parts according to our CAD design to ensure accurate size.

Electrical: Purchasing all components and connecting according to the circuit diagram to ensure that all components operate at safe voltage and current. Debugging our drone and complying with international drone safety regulations

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