1. Mathematical Modeling (first 3 weeks)
   1. Read the related works:
      1. rocket control
      2. Drone control
   2. Derive the required equations to describe the dynamics of the drone’s flight with our conditions and constraints (only changing thrust equally for all the )
2. Simulation (2 week for simulation)
3. Motor control (2 weeks)
   1. material used for the spinning mass (test it on the drone)
   2. Prototyping the off center mass motor
   3. build the module and test it on rigid (not moving) body
   4. Be able to change the center position of spinning mass while spinning
4. Drone control (2 weeks)
   1. Identify the drone specifications
   2. hack the Drone controller (use ps4 controller for driving the drone)
   3. implement the sensor fusion
      1. adding our required sensors or using the sensors on the drone
5. Mechanical Design and build (module holding the motor on top of the drone) (2 week)
   1. PCB
6. Controller Design (maybe not PID) (3 weeks)
7. Stability flight testing of the drone with motor on board (End to End testing )
8. Documentation

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by motor = off center spinning mass motor as controller for the drone

Mathematical modeling:

Week 1 —> understanding the fundamental of drone flight and off center spinning mass

Week 2 —> deriving required equations to describe our flight system and create the simulation model

Week 3 —> calibrate and correct the model based on the data got from running simulation

Simulation:

Week 1 —> Code the system using mathematical model and update the model based on the data collected

Motor Control:

Week1: FInd the proper material to be used for the OCSM motor and start building the prototype

Week2: Have the OCSM prototype ready and testing it (change the center position of spinning mass while spinning)

Drone Control:

Week1: Identify the drone specifications

hack the Drone controller (use ps4 controller for driving the drone)

Week2: implement the sensor fusion

adding our required sensors or using the sensors on the drone

Mechanical Design and build

Week1 : PCB

Week2: Complete module by the end 2nd week

Controller Design:

Week1: derive the right controller model to implement

Week2: testing the model with drone+OCSM module attached

Week3: Improve the model based on data collected and simulation data

Testing :

Week1: end to end testing and final corrections

Week2: capture a video demo

Tasks:

* Theory
  + Mathematical correlation between drone and rocket. (fundamentally, does our work on the drone translate to the rocket?)
  + Research component: Spinning Actuator
    - Does the component exist?
    - Do we have to fabricate one ourselves
    - How do we control the center of mass
    - What are the dimensions necessary given the size of our drone. Is it even feasible?
  + Mathematical Model of drone + spinning COM
    - Controller
    - Simulate
* Mechanics
  + Obtain drain
  + Design modular piece to hold actuator