**The Silly Goose Rocket Project**

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# Goals

* Designing and building:
  + a rocket with attitude control
  + an automated launch platform
  + wireless data transmission
  + a rocket motor at a later stage

# General Plan

##### Phase 1 (in work)

* A flyable rocket
* Data collection
  + Attitude data (translation + rotation)
  + Barometric data
  + Flight video
* Attitude stabilization
  + Static fins
* Launch platform
  + Auto ignition
  + Launch tower with retractable clamps

##### Phase 2

* Attitude control
  + TVC motor mount
  + Control surfaces
  + Reaction wheels
* Launch platform

# Components

##### Hardware

* Rocket body
  + 1 piece body tube
  + Multi-section body tube
  + Non/load bearing body tube
* Internal structure
  + Motor mount
  + Avionics mount
  + Stringers (depends on design)
* Motor
  + Off the shelf model rocket motor
  + Long burn time (>2s)
* Avionics
  + Arduino/Raspberry zero
  + Barometric sensor
  + Gyro module
  + GPS sensor\*
  + Power source
    - Lipo
  + SD card & reader
  + Servo/motor for ejection
  + Camera
* Aerodynamics
  + Nose cone
  + Fins
* Recovery system
  + Parachute
  + Spring ejection
  + Charge ejection
* Launch platform
  + Electronics
  + Structure

##### Software

* Altitude/acceleration triggered parachute ejection
* Data collection
  + Overwrite prevention
* Automatic ignition
* FEA + CFD
* Flight simulation
* Data analysis and visualization

# Workflow

* Block 1 Mechanical
  + Determine ranges for mass and dimensions (length, diameter) and choose appropriate motors
  + Design body tube and support structure for engine in CAD
  + Research into designs nose cone and fins; simulation may be needed
  + Manufacture the rocket body
  + Design and build ejection system; in the meantime develop launch platform
  + Integrate electronics components
* Block 1 Electrical
  + Make an Arduino circuit with 3 axis gyro and write data into SD card
  + Determine battery specs
  + Determine whether the ignition charge can be ignited using the current from 5V pin on Arduino
  + Create an algorithm for ejection system
* Block 3 Simulation and Software
  + CFD to determine drag and stability
  + ARD to log attitude and baro data

# 

# Required Skills

* Control theory
* FEA + CFD
* Arduino/python programming
* Fusion 360/CATIA CAD
* Simscale
* Mathematica/python data analysis
* Openrocket/RARS flight simulation

|  |  |
| --- | --- |
| Task | Status |
| Learn Fusion 360 |  |
| Research on nose cone & fin design + motor spec | Done |
| Learn Arduino |  |

# Random Ideas

* Quaternion, Euler angle, Tait-Bryan rotations
* Rocket fins use either glass fiber textile or internal carbon tubes to reinforce
* Use simscale for center of pressure calculation