Senior Project Proposal
Fall 2017
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Objective:

      To create a quadcopter capable of flying without aid of a human operator. The machine will operate primarily through an ardiuno microcontroller, using a breakout board to gather information about the quadcopter's orientation and movement via an accelerometer, gyroscope, and magnetometer. Which will be processed by the ardiuno in order to send pulse width modulation (PWM) signals to the electronic speed controllers (ESC) controlling the motors. Additionally, a raspberry pi + camera may be added if there is time to incorporate object avoidance using computer vision.

      A UI showing telemetry will be displayable, first using a usb cable connected to the craft and a laptop. If there is time, Wi-Fi will be used instead, though power consumption issues may prevent this from occurring.

Languages used: C++ (ardiuno), Python (raspberry pi)
Technologies used: Proportional-integral-derivative(PID) controllers, microcontrollers, computer vision

      Through this project I hope to learn how to apply software development techniques to design software that is capable of interfacing with hardware that has realtime requirements. This will also be an exercise in keeping computation, power, and memory costs down as the arduino in particular is notably limited in these areas.

Goals:

Craft can land in a controlled manner:-- 15 points
Craft can use onboard sensors to maintain a particular altitude:-------------------- 15 points
Craft properly makes use of PID controllers to allow for stable flight:-------------- 15 points
Craft can react to outside influences(wind, physically disturbed, etc):------------- 15 points
Craft can move around freely: -- 20 points
Unit tests for applicable portions of software: -- 15 points
Clean, understandable UI showing telemetry. Provided by raspberry pi,either tethered or via Wi-Fi:-- 10 points
Arduino can interface with raspberry pi: --- 10 points
Raspberry pi can use camera to detect objects: -- 5 points

Total Possible: 120 points

Grading Scale:

      A   95+   points
      A-   90-94 points
      B+   87-89 points
      B   84-87 points
      B-   80-83 points
      C+   77-79 points

C 73-76 points
C- 70-72 points
F 0-69 points