6Sprint 7 Conclusion Meeting

Long Flight Time Buoyant Drone 5/15/2021 7:00 - 8:10 TIME(PST)

horizontal lineATTENDEES

* Excused absences: v
* Unexcused absences:

## AGENDA

**Sprint progress: 7:00**

* Leon/Jeremy: Able to verify voltage alarm working with the battery
  + Did a thrust test, 16% of the total thrust is the max estimated value needed for drone operation
    - Also burnt out one arm of the ESC, new one was ordered but the old one can still be used for testing
  + Power test will be done tomorrow for the thrust

7:05

* Dylan:
  + Did work on Chapter 2 outline
    - Worked on general design overview outline

7:06

* Isaac:
  + Spent the day traveling

7:07

* George:
  + Started work on redoing introduction of paper
  + Researching ways to give commands to autonomous

7:09

* Ryan:
  + Ordered pressure sensor for helium balloon
  + Worked on Chapter 5 outline
* **Review of Progress**: 7:10
  + Leon (**130 hours**) - 7:11
    - Assemble first PCB board with all components and test for bugs (**15 hours**)
      * Solder PCB board (5 hours)
        + Incomplete
        + Some parts didn’t have the right footprint, or were too small to solder by hand, and there were too many mistakes with the first PCB version so we decided to scrap it
        + Spent 2 hours on it
      * Test for bugs (10 hours)
        + Incomplete
        + First PCB was scrapped
    - Get total system power draw (**2 hours)**
      * Incomplete
      * Drone wasn’t constructed in time
    - Finish remote control implementation (**15 hours**)
      * Finish connecting RC receiver to Raspberry Pi (5 hours)
        + Complete
        + Spent 5 hours on it
      * Implement servos and motors to move in four basic directions (10 hours)
        + Complete
        + Not tested with all servos and motors yet
        + Spent 15 hours on it
      * Implement servos and motors to move in any direction (10 hours)
        + Incomplete
        + Not sure whether this will still have time to be implemented with the time left
    - Implement system state machine with remote control functionality (**20 hours**)
      * Implement state machine for PIC32 (10 hours)
        + Incomplete
        + Fixed theoretical state machine, but not implemented in code yet
        + Spent 3 hours on it
      * Implement state machine for Raspberry Pi (10 hours)
        + Incomplete
        + Fixed theoretical state machine, but not implemented in code yet
        + Spent 3 hours on it
    - Implement autonomous control (**20 hours**)
      * Implement Raspberry Pi data processing (20 hours)
        + Incomplete
        + Autonomous control in real time may be scrapped since not enough time left
    - Add autonomous control functionality to system state machine (**20 hours**)
      * Add autonomous control to PIC32 state machine (10 hours)
        + Incomplete
        + Autonomous control in real time may be scrapped since not enough time left
      * Add autonomous control to Raspberry Pi state machine (10 hours)
        + Incomplete
        + Autonomous control in real time may be scrapped since not enough time left
    - Write sections for report (**20 hours**)
      * Sensors programming (5 hours)
        + Incomplete
        + Didn’t get around to it
      * Remote control implementation (5 hours)
        + Incomplete
        + Didn’t get around to it
      * Autonomous control implementation (5 hours)
        + Incomplete
        + Didn’t get around to it
      * System state machine (5 hours)
        + Incomplete
        + Didn’t get around to it
    - Group meetings (**8 hours**)
      * Complete
      * Spent 8 hours on it
    - Sub-team meetings (**10 hours**)
      * Complete
      * Spent 12 hours on it
  + Jeremy (63 hours) - 7:18 (28/63 hrs Complete)
    - Test Motor Power at different throttles and compare it to estimates(5 hours)
      * Incomplete, only need to compare it to estimates
    - Test Servo Power and compare it to estimates(3 hours)
      * Incomplete, will be done with power test tomorrow
    - Adjust Power budget with tested power values(2 hours)
      * Incomplete, tests not done
    - Group meetings (8 hours)
      * Complete
    - Sub-team meetings (10 hours)
      * Complete
    - Writing Final Report Chapter 7, (10 hours)
      * Complete, first draft completed, needs revision
    - Write Final Report Chapter 11, legal and safety concerns(10 hours)
      * Incomplete, only outline done since no legal/safety tasks have been done
    - Help Leon with state machine coding(15 hours)
      * Incomplete, delayed state machine work, should be more specific with tasks like this in the future
  + Isaac (94 hours) - 7:21
    - Finish adding noise to sensors in sim (7 hours)
      * Complete: normal distribution added to GPS, IMU, barometer, ultrasonic
    - Implement closed loop RC in V-rep (30 hours)
      * Find a way to interface V-rep simulation with remote API that takes in C code (10 hours)
        + Complete: Legacy based API found to be able to support C code implementation
      * Write remote control code into client program to run server commands to V-rep (10 hours)
        + Incomplete: starting to import code into client side of sim (VS Code)
      * Debug and Test (10 hours)
        + Incomplete
    - Finish other 3D printing parts (10 hours)
      * Complete. 3d parts fits mounts and electronic components
    - Attach 3D printed parts to envelope (10 hours)
      * Incomplete
    - Inflation test of lift bag inside envelope with air (5 hours)
      * Complete: inflation test with adjusted envelope conducted
    - Attach servo and motor shafts to brackets (4 hours)
      * Incomplete: but it was tested and servos fit.
    - Writing simulation section (10 hours)
      * Incomplete: Outline and Abstract first draft written
    - Group meetings (8 hours)
    - Sub-team meetings (10 hours)
  + Dylan (100 hours) - 7:27
    - Finish other 3D printing parts (10 hours)
      * Complete: some parts may be reprinted for higher quality
    - Attach 3D printed parts to envelope (10 hours)
      * Incomplete
    - Inflation test of lift bag inside envelope with air (5 hours)
      * Complete: inflation test with adjusted envelope conducted
    - Attach servo and motor shafts to brackets (4 hours)
      * Incomplete: but it was tested and servos fit brackets
    - Add ultrasonics to bracket (1 hour)
      * Incomplete: only one attached for testing, waiting for electronics to be ready to implement
    - Add electronics to gondola (5 hours)
      * incomplete : electronics still in testing phase
    - Wire prototype (10 hours)
      * incomplete : electronics still in testing phase
    - Second Inflation test of lift bag inside envelope with air (5 hours)
      * Incomplete 3D parts not attached
    - Order helium and pick up helium (3 hours)
      * Incomplete: not ready for helium testing
    - Do initial RC test at Delaware (10 hours)
      * Incomplete: not ready for testing
    - Start Helium loss test (3 hours)
      * Incomplete: not ready for testing
    - Writing Considerations of a buoyant drone draft **(16 hours)**
      * Intro (4) Complete
      * General goals (4) Complete
      * Implications of a buoyant drone (4) Complete
      * General design overview (4) Incomplete: needs for filling out to be finished draft
    - Group meetings (8 hours)
    - Sub-team meetings (10 hours)
  + George (105 hours) - 7:31
    - Implement and test closed loop RC (15 hours).
      * Complete. Tests in Matlab show responses within design requirements, and was converted To C for vrep sim and for the onboard system
    - Design autonomous controls (25 hours)
      * Incomplete. Should have been broken Down into Subtasks. Plant definition Complete and will use similar state feedback loop with an integral path as the closed loop RC, but method of planning the drone path has not been implemented
    - Implement and test autonomous (15 hours)
      * Incomplete, retired autonomous controls design to complete
    - Test auxiliary functions (15 hours)
      * Test for large angle error and autonomous take and landing. Results tested in Matlab and remain in design requirements. Converted to C for vrep simulation.
    - Design filters (15 hours)
      * Incomplete, need to determine an autonomous method to determine which filters are needed and how to implement them.
    - Design estimators (20 hours)
      * Incomplete. Currently only using pitch and roll estimators, but has not been tested in conjunction with controls response. Shod have broken down into subtasks
  + Ryan (72 hours) - 7:35
    - Fix V1.9 PCB bugs in V2.0 (20 hours)
      * Incomplete: V1.9 scrapped due to footprint of electronics being too small and inexperience in hand soldering to test out V1.9 board. V2.0 will continue to be designed.
    - Order V2.0 PCB (1 hour)
      * Incomplete: V1.9 bugs not fixed as stated above. V2.0 PCB will not be ordered due to time constraints
    - Order new parts for V2.0 (1 hour)
      * Incomplete: V2.0 parts will not be ordered as V2.0 PCB will only be designed but not implemented
    - Implement Inductor Capacitor circuit for 1.8V, 3.3V, and 5V (10 hour)
      * Complete: Implemented in V2.0 PCB, inductors and capacitors are not needed as all sensors can tolerate the noise generated by the switching regulators.
    - Help coding with George and Leonid (20 hours)
      * Incomplete: Task was too vague and no task was asked from Ryan to help with George or Leonid.
    - Sub-team meeting(10 hours)
    - Final Report (10 hours)
* **Team Improvements**: 7:45
  + Too many hours for two week sprint
    - Over assigned in order to try and meet ending timeline
    - Not enough time was spent in the earlier sprints of the project
  + Need to be more critical of slides and Tasks completion
  + Need to delegate tasks more especially to people with less hours
  + Tasks need to be defined better in sprint setup
* **Individual Improvements: 7:48**
  + Dylan- 7:49
    - Needs to improve on working on multiple classes worth of work in one day
      * Usually just spends all effort in a day for one class
      * I think it would be more efficient to work on a little bit of each class everyday
  + George- 7:50
    - Need to improve slides and presentation
    - Break down tasks into smaller components
  + Isaac- 7:51
    - Ask more questions and take more notes
    - Start early in case errors arise
  + Jeremy - 7:52
    - Define task completion better during first sprint meeting
    - Justify work more completely when writing the final report
  + Ryan- 7:53
    - Check footprint sizes of ordered surface mount devices
    - Design own footprint in Eagle CAD to ensure sizes are the same as data sheet footprint
  + Leon- 7:54
    - Get more work done during the day
    - Watch more tutorial videos before attempting to do hands on work like soldering and putting together electronics
* **Next Goals**: 7:55
  + Dylan- 7:55
    - Finalize Envelope shape
    - Finish attaching parts too envelope
    - Add electronics and wire prototype
    - Full system RC test
    - Create slides for design defense
    - First Draft Chapter 3
  + George- 7:56
    - Retune closed loop controls response for actual drone dimensions
    - Design autonomous commands method
    - design and test autonomous controls response
    - Prepare autonomous controls response to be tested in Vrep
    - Have outlines of Chapter 1 and chapter 7 chapters
  + Isaac- 7:57
    - Finish implementing closed loop remote control
      * Import code to client program
      * Test and debug
    - Finish implementing autonomous control
      * Import code to client program
      * Test and debug
    - Help with fabrication testing
    - First draft of simulation chapter
  + Jeremy- 7:58
    - Finish Power Tests with motors and servos
    - Get new power estimates with new modifications to drone and with motors/servo test
    - Help with fabrication and wiring of drone
    - Write more chapters of the final report and revise those i’ve already done
  + Ryan- 7:59
    - Complete wiring design for V2.0 PCB
    - Prepare slides on PCB failure in final design defense meeting and show how surface mount parts should be ordered in larger footprint for hand soldering
    - Order 1.8V, 3.3V, and 5V switching regulator for servo, sensors array, microcontroller, and microprocessor
    - Finish Section 1 Sensor array chapter
      * All sensors that require I2C protocol with microcontroller
      * GPS sensor requiring UART protocol with microcontroller
      * Microcontroller SPI communication with microprocessor
      * Data telemetry GPIO pin to microprocessor
      * RC receiver GPIO pin to microprocessor
    - Finish Section 2 State Machine Intro
      * Explain how sensor array data determines state machine
    - Finish Section 3 PCB Interface
      * Explain V1.9 design features and failures
      * Explain V2.0 design improvements on V1.9 with switching regulators, trace width improvements
      * Trace width calculation guideline explanation
  + Leon- 8:00
    - Finish power tests with motors and servos with Jeremy
    - Finish any remaining code that requires the parts to be with me in person
      * State machine for PIC32 and Raspberry Pi
      * System start up procedure with device/sensor checks
    - Connect/solder electronics onto breadboard to be put into gondola
  + Team Goals 8:06
    - COMPLETE TEST FLIGHT OF PROTOTYPE WITH RC CONTROL
    - Implement closed loop RC and autonomous in simulation
    - Finish outline for all final report chapters
* **Other Business** - 8:07
  + Contact Mircea again
  + Keep using trello

Meeting End: 8:10