Sprint 8 Conclusion Meeting

Long Flight Time Buoyant Drone 5/29/2021 7:00 - TIME(PST)

horizontal lineATTENDEES

* Excused absences:
* Unexcused absences:

## AGENDA

* **Review of Progress**: 7:00
  + Leon (49/85 hours completed, spent 53 hours) - 7:10
    - Finish servo testing with motor load with Jeremy **(4 hours)**
      * Complete
      * Spent 8 hours on it
    - Finish procedure to control servos/motors directly with remote controller **(15 hours)**
      * Code procedure (10 hours)
        + Complete
      * Test procedure (5 hours)
        + Complete
    - Wire up minimum electronics to get drone flying (uC32, Raspberry Pi, ESC, servos, motors, wire terminals, remote controller receiver) **(10 hours)**
      * Wire electronics (5 hours)
        + Complete
        + Wiring took longer than actually testing, also didn’t need uC32 and Raspberry Pi
      * Test drone with electronics (5 hours)
        + Complete
    - Implement system state machine for remote control functionality **(15 hours)**
      * Code state machine (5 hours)
        + Incomplete
        + Didn’t get around to it because wiring drone took longer than expected
      * Test state machine (10 hours)
        + Incomplete
        + Didn’t get around to it because wiring drone took longer than expected
    - Add sensor checking and sampling to system state machine **(15 hours)**
      * Code state machine (5 hours)
        + Incomplete
        + Didn’t get around to it because wiring drone took longer than expected
      * Test state machine (10 hours)
        + Incomplete
        + Didn’t get around to it because wiring drone took longer than expected
    - Wire up sensors to drone (IMU, ultrasonic, altimeter, GPS, and barometric) **(6 hours)**
      * Wire electronics (3 hours)
        + Incomplete
        + Didn’t get around to it because wiring drone took longer than expected
      * Test drone with electronics (3 hours)
        + Incomplete
        + Didn’t get around to it because wiring drone took longer than expected
    - Group meetings **(15 hours)**
      * Complete
    - Sub-team meetings **(5 hours)**
      * Complete
  + Jeremy (75 hours), (48/75 done + 10) - 7:12
    - Finish Testing Servos with motor load(4 hours)
      * Complete
    - Buy Wire terminal for battery distribution(2 hours)
      * Complete
    - Order helium and pick up helium (3 hours)
      * Complete
    - Revise Power Management chapter(10 hours)
      * Incomplete
    - Research legal/safety requirements(6 hours)
      * Incomplete
    - Finish draft of ch11 legal/safety(10 hours)
      * Incomplete
    - Wire prototype(10 hours)
      * Complete
    - Add electronics to gondola (5 hours)
      * Complete
    - Power test with all parts(5 hours)
      * Incomplete, 4 hours done although not all parts tested
    - Group Meetings(15 hours)
      * Complete
    - Subteam Meetings(5 hours)
      * Complete
    - Spent 10 hours at Delaware testing prototype
  + Isaac, 82 hours - 7:14
    - Finish implementing closed loop remote control (25 hours)
      * Import code to client program (10 hours)
      * Test and debug (15 hours)
      * **Incomplete** spent 50+ hours
    - Finish implementing autonomous control (20 hours)
      * Import code to client program (5 hours)
      * Test and debug (15 hours)
      * **Incomplete**
    - Help with fabrication testing(7 hours) **Complete** 10 hours spent
    - First draft of simulation chapter(10 hours) **Incomplete**
    - Group meetings (15 hours) **Complete**
    - Sub-team meetings (5 hours) **Complete**
  + Dylan, 63/81 hours - 7:16
    - Attach 3D printed parts to envelope (6 hours)
      * Gondola (1)
      * Servo brackets(4)
      * Ultrasonic(1)
      * **All Completed**
    - Inflation test with 3D parts (2 hours)
      * **completed**
    - Attach servo and motor shafts to brackets (4 hours)
      * **Completed**
    - Add ultrasonics to bracket (1 hour)
      * **Incomplete ultrasonics not ready**
    - Add electronics to gondola (10 hours)
      * **Completed**
    - Inflation test with all electronics (2 hours)
      * **Completed**
    - Order helium and pick up helium (3 hours)
      * **Completed**
    - Do initial RC test at Delaware (10 hours)
      * **Completed**
    - Start Helium loss test (3 hours)
      * **Completed**
    - Writing Considerations of a buoyant drone draft(10 hours)
      * General design overview outline (2)
        + Completed
      * Upgrading outline to draft (4)
      * Revisioning (4)
      * **Draft was not taken beyond the outline Pase**
    - Writing Lift Bag and Drone Frame Design outline (10 hours)
      * Lift Bag Design (3)
      * Gondola Design (3)
      * Ultrasonic Mounting (1)
      * Servo Mounting (3)
      * **Incomplete not worked on**
    - Group meetings (15 hours)
      * **Completed**
    - Sub-team meetings (5 hours)
      * **Completed**
  + George, (111 hours), 57/111 completed (Can contribute additional time since capstone is his only course) - 7:16
    - Update Closed Loop Control System with actual measurements (4 hours)
      * Complete
    - Design feedback loop and with integral for autonomous controls (4 hours)
      * Not Complete
    - Tune Closed Loop Control System to meet design requirements (4 hours)
      * Complete
    - Simulate State Response in Matlab for the Closed Loop system to confirm system response (3 hours)
      * Complete
    - Tune autonomous system to meet design requirements (7 hours)
      * Incomplete
    - Design control method for feeding control system next positional values (6 hours)
      * Incomplete
    - Simulate State Response in Matlab for the Closed Loop system to confirm system response (5 hours)
      * Complete
    - Design estimator to determine drone position using accelerometer and GPS data (5 hours)
      * Incomplete
    - Integrate estimators with the control system for RC (1 hour)
      * Complete
    - Test state response for closed loop RC with estimators integrated (2 hours)
      * Incomplete
    - Test state response for Autonomous with estimators integrated (2 hours)
      * Incomplete
    - Export Closed Loop RC to Vrep (3 hours)
      * Incomplete
    - Adjust Closed Loop RC gains according to Vrep Response (3 hours)
      * Incomplete
    - Export Autonomous to Vrep (3 hours)
      * Incomplete
    - Adjust Autonomous Gains according to Vrep Response (3 hours)
      * Incomplete
    - Complete Chapter 7 Outline (5 hours)
      * Incomplete
    - Complete Introduction Outline (4 hours)
      * Incomplete
    - Group Meetings (15 hours)
      * Complete
    - Subteam meetings (15 hours)
      * Complete
    - IdeaHub Pitch (10 hours)
      * Complete
  + Ryan, (90 Hours) - 7:19
    - Complete wiring diagram for dev boards to sensors, servos, and voltage regulator (5 hours)
      * Complete
    - Complete wiring design for V2.0 PCB (10 hours)
      * Incomplete, V2.0PCB will not be finished
    - 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 (10 hours)
      * Complete
    - Order 3.3V, and 5V switching regulator for servo, sensors array, microcontroller, and microprocessor (2 hours)
      * Complete
    - Finish Section 1 Sensor array chapter
      * All sensors that require I2C protocol with microcontroller (5 hours)
      * GPS sensor requiring UART protocol with microcontroller (5 hours)
      * Microcontroller SPI communication with microprocessor (5 hours)
      * Data telemetry GPIO pin to microprocessor (5 hours)
      * RC receiver GPIO pin to microprocessor (5 hours)
      * Incomplete, in progress, outline complete
    - Finish Section 2 State Machine Intro
      * Explain how sensor array data determines state machine (5 hours)
      * Incomplete, George will complete Section 2 of Chapter 5
    - Finish Section 3 PCB Interface
      * Explain V1.9 design features and failures (5 hours)
      * Explain V2.0 design improvements on V1.9 with switching regulators, trace width improvements (6 hours)
      * Trace width calculation guideline explanation for V1.9 and V2.0 PCB (2 hour)
      * Incomplete, in progress, outline complete
    - Group Meeting (15 hours)
    - Sub-team meetings (5 hours)
* **Team Improvements**: 7:20
  + Ensuring validation is properly presented. For Leon, he had shown the data that the sensors met or did not meet requirements, however, we failed to present it properly in the design review. For Ryan, after the PCB failed, he completed Dev Board design and verification so we could perform the power draw and flight tests, but we failed to show validation of his work as well. At this point these would mostly be solved in outline and design report review. We can hold a mini design defense for the last areas of validation as a team with Tanner present.
  + Assign work more evenly between members, and have members ask during sprints for more work if they have less work than others
* **Individual Improvements: 7:28**
  + Dylan - 7:33
    - Be more proactive about planning to use facilities like WRP so that there isn't confusion at the last minute.
    - Be more proactive about verifying others work, ask for more demonstrations
  + George - 7:34
    - Take more short breaks from project work. Set an alarm to take a short break every couple of hours
  + Isaac - 7:35
    - Learn more about coding in C++
    - Ask for more help
  + Jeremy - 7:36
    - Be more thorough when explaining tests and their system block diagrams
  + Ryan - 7:37
    - Help out anyway possible with system verification method and writing.
  + Leon - 7:38
    - When presenting work from a task, explicitly show requirement and data taken and show whether it was met or not
* **Next Goals**: 7:39
  + Dylan- 7:39
    - Finish writing drafts for chapters 2&3
    - Revise until finalized for all chapters
    - Help with closed loop RC V-Rep sim
    - Final Flight test.
  + George- 7:40
    - Get RC simulated
    - Physically test Auto takeoff and landing functions
    - Write Chapter 7 and relevant portion of chapter 6
    - Review and give feedback on all chapters
  + Isaac- 7:41
    - Finish closed loop RC
    - Write up simulation chapter
  + Jeremy- 7:42
    - Focus on writing final report chapters since power tests are complete
    - Assist with any other team members’ work as necessary
  + Ryan- 7:43
    - Need to verify dev boards system requirement with Leon by printing sensor data via uC32’s USB port.
    - Verify SPI output from Raspberry Pi 3 B+ State Machine Estimation if possible
    - Verify power input over one flight time to Raspberry Pi 3 B+ and uC32.
  + Leon- 7:44
    - Verify all four servos and motors work off PIC32 from same signals
    - Have individual servos and motors move independently of each other from PIC32
    - Implement balloon pressure sensor and data telemetry transmitter into system
    - Implement state machine into system and add remote control functionality to state machine
* Team Goals - 7:45
  + - Complete Final Report
    - Ideahub Pitch
    - Sponsor Day Presentation
    - Poster
    - Final Flight Test
* **Other Business** -
  + Porter funding

Meeting End: 7:51