Sprint 6 Start

Long Flight Time Buoyant Drone March 29, 2021 6:00 PM(PST)

horizontal lineATTENDEES

* Excused absences: N/A
* Unexcused absences: N/A
* Late: N/A

## AGENDA

* Administrative Stuff

6:01

* Updates
  + Leon: Looking at videos to power motors and servos
    - Also got servo shipping and motors should be coming soon

6:02

* + Jeremy: Updated motor power on the Power Budget, added camera
    - Flight time still is at least 30 minutes and can reach 1 hour

6:03

* + Isaac: Drag force implemented based on the velocity of the envelope
    - 30% complete to having drag fully implemented

6:05

* Dylan: Added RC transmitter to CAD, new voltage regulator as well
  + Helium vendor almost finalized, can either rent a large can or get a small can and refill it

6:11

* George: Mircea replied to funding email

6:15

* Ryan: Wiring Schematic finalized
  + Needs to work on BoM and PCB board before sending to Leon

6:17

* Gantt Chart Updates
  + CAD design still needs to add newest parts

6:22

* Add a presentation slide for all sensors working together
* Servos/Motors will need to be worked on, servos have arrived to test

6:25

* Path following should be done by 4/2, previously was 3/29

6:27

* Board Wiring and BoM should be finalized by tomorrow 3/30
* PCB design should be verified by power design on 3/31

6:40

* Leon is the SCRUM master for this sprint from 3/29/21 - 4/26/21
* Define Goals (General, see where we need dependencies etc)
  + Dylan - 6:46
    - Update CAD with newest parts (camera, receiver, voltage regulator) (4/2)
    - Fabricate Prototype (4/26)
  + Isaac - 6:50
    - Implement Drag Force (4/5)
    - Implement Sensors (4/13)
    - Implement Closed Loop Remote Control (4/19)
    - Implement Autonomous Design (4/26)
  + Leon - 6:52
    - Implement electronic actuators in software (ESC, motor, servos) (4/2)
    - Implement remote control in software (4/9)
    - Implement autonomous control in software (4/23)
  + George - 6:55
    - Closed Loop Remote Control designed and tested in Matlab (4/12)
    - Path following and terrain tracking ideal sensor model designed and tested in Matlab (LATE estimated completion on 4/3)
    - Path Following and Terrain Tracking-Noisy Sensor model designed and tested in Matlab (4/12)
    - Auxiliary Flight functions (4/26)
  + Ryan - 6:58
    - Finalize BOM PCB parts (3/30)
    - Wire up PCB (3/30)
    - Verify PCB with power management (3/31)
    - Send out PCB design to manufacturing (4/2)
  + Jeremy - 7:03
    - Finalize Power Budget when parts list is finalized (4/2)
    - Finalize/Optimize battery to fit within technical requirements of flight time (4/5)
* Define End Date 7:07
  + Sprint end: 4/26/21
* Tasks (Specific) List Requirement ID if available. Time estimate
  + Leon (140 hours) - 7:15
    - Implement servo control (10 hours)
    - Implement ESC/motor control (10 hours)
    - Implement remote control communication with Raspberry Pi (10 hours)
    - Implement servo control with remote controller (10 hours)
    - Implement ESC/motor control with remote controller (10 hours)
    - Implement autonomous control data processing between PIC32 and Raspberry Pi (30 hours)
    - Implement servo control with autonomous control (10 hours)
    - Implement ESC/motor control with autonomous control (10 hours)
    - Group meetings (25 hours)
    - Sub-team meetings (15 hours)
  + Jeremy (123 hours) - 7:22
    - Verify PCB Design (4 hours)
    - Finalize Power Budget by double checking all parts and heat efficiencies (10 hours)
    - Optimize Battery once power budget is finalized (4 hours)
    - Group meetings (25 hours)
    - Sub-team meetings (15 hours)
    - Push ECE121 code to Github(1 hour)
    - Program C libraries for Linear algebra, integration, and other functions needed for controls (16 hours)
    - Program C libraries RC response (16 hours)
    - Program C Libraries for autonomous (16 hours)
    - Program C libraries automated landing and takeoff (16 hours)
  + Isaac (152 hrs) - 7:31
    - Implement Drag Force **(30 hours)**
      * Calculate Balloon Speed (10 hours)
      * Create 3D Drag Force (10 hours)
      * Apply Logic to Drag Force Given Balloon Speed (10 hours)
    - Implement Sensors to Read Pseudo Data from Vrep **(22 hours)**
      * Research Sensors (6 hours)
      * Implement Ultrasonic Sensor (4 hours)
      * Implement IMU (4 hours)
      * Implement GPS (4 hours)
      * Implement Balloon Barometer (4 hours)
    - Implement Closed Loop Remote Control **(35 hours)**
      * Learn to Use Remote API to Apply C Code (15 hours)
      * Use Remote API or Rewrite C Code to Lua (10 hours)
      * Apply Outputs of Functions to Individual Parts (10 hours)
    - Implement Autonomous Design **(30 hours)**
      * Feed Sensor Input to Functions (10 hours)
      * Use Remote API or Rewrite C Code to Lua (10 hours)
      * Take Outputs and Apply Them to Individual Components   
        (10 hours)
    - Group meetings **(25 hours)**
    - Subteam meetings **(10 hours)**
  + Dylan (126 hours) - 7:39
    - Add updated parts to CAD (4/2) **(14 hours)**
      * Voltage Regulator (2 hours)
      * Camera and transmitter (4 hours)
      * Magaero housing (8 hours)
    - Fabricate Prototype (4/26) **(50 hours)**
      * Set up sewing machine and 3D printers (2 hours)
      * Sew envelope (10 hours)
      * 3D print parts **(8 hours)**
        + Servo brackets & plates (4 hours)
        + Ultrasonic mount & plate (1 hour)
        + Motor mounts (1 hour)
        + Gondola and plate (2 hours)
      * Attach 3D printed parts to envelope (5 hours)
      * Inflation test of lift bag inside envelope with air (5 hours)
      * Attach servo and motor shafts to brackets (4 hours)
      * Add ultrasonics to bracket (1 hour)
      * Add electronics to gondola (5 hours)
      * Wire prototype (10 hours)
      * Second Inflation test of lift bag inside envelope with air (5 hours)
    - Implement Sensors to Read Pseudo Data from Vrep **(22 hours)**
      * Research Sensors (6 hours)
      * Implement Ultrasonic Sensor (4 hours)
      * Implement IMU (4 hours)
      * Implement Gps (4 hours)
      * Implement Balloon Barometer (4 hours)
    - Group meetings (25 hours)
    - Subteam meetings (10 hours)
  + George (140 hours) - 7:48
    - Complete path following terrain tracking PID design (10 hours)
    - Simulate Path following terrain tracking in Matlab (10 hours)
    - Define plant for closed loop RC (5 hours)
    - Pole placement and integral control added to RC design (15 hours)
    - Simulate RC response in Matlab (5 hours)
    - Design filters to obtain accurate state data (25-30 hours) will be Broken down when filter design chosen after further research
    - Simulate and test noisy sensor model (10 hours)
    - Auto landing function (10 hours)
    - Auto take off function (10 hours)
    - Meetings (35 hours)
  + Ryan (122 hours) - 7:57
    - Finalize BOM PCB parts (2 hours)
    - Wiring data bus between sensors to microcontroller in board design (3 hours)
    - Wiring voltage rails to all components (4 hours)
    - Wiring microprocessor to microcontroller, receiver and pinouts for servos and ESC (3 hours)
    - Verify PCB with power management (4 hours)
    - Send out PCB design to manufacturing (1 hour)
    - Remove ECE 121 repo within Barone2 repo and re-upload ECE121 C programming code to Barone2 repo (1 hour)
    - Program C libraries for Linear algebra, integration, and other functions needed for controls (16 hours)
    - Program C libraries RC response (16 hours)
    - Program C Libraries for autonomous (16 hours)
    - Program C libraries automated landing and takeoff (16 hours)
    - Group meetings (25 hours)
    - Sub-team meetings (15 hours)
  + Members who finish their tasks early should help with sensors/controls/simulation coding depending on current progress in those areas.

Meeting End: 8:10

**3/30/21 7:30 - 7:44pm**

* Leon: working on slides and scratchwork for servos and motors
  + Github work should help figure it out

7:32

* Jeremy: Working on double checking the power budget
  + PCB will be done tomorrow for verification

7:34

* Isaac: Vrep got balloon speed working with drag

7:35

* Dylan: Found screws and standoffs for voltage regulator
  + Made an account to order helium, helium should be available same day

7:36

* George: Running hole placement program with large matrix

7:37

* Working on wiring, error causing rewiring is source of delay, should be done by tomorrow

7:38

* Other stuff:
  + Reminder to review sprint planning doc for better planning on month-long sprint
  + Sprint meetings will be done at 7:00 in the future

7:44 END

**3/31/21 6 - 7:05pm**

* Leon: Slides are still in the works, although all sensors work together with interrupts
  + Working on running the servo code to get it operable

6:03

* Jeremy: Helping Ryan verify PCB design
  + Also still needs transmitters, camera, and rail power reviewed

6:04

* Isaac: Drag force vectors work as intended, need more time to make it work with velocity

6:05

* Dylan: Finished making an account for helium
  + Added Camera to CAD design, still need exact dimensions of the camera
  + Transmitter will be double taped on
  + WIll work on the MagAero Mounting for the drone

6:07

* George: Determinant finished running, result was unsatisfactory, is redoing it by hand

6:08

* Ryan: Finished for PCB and will have it reviewed with power management
  + Next step is to finalize BoM

6:09

* ETC
* Design review 1 slides made, as tasks are done, move slides onto there
* Rest of the meeting was designated to individual work

6:10-7:05

* Confirming PCB design is correct with all parts in the power budget and BoM
  + Parts were confirmed based on their voltage from 11.1,5,3.3, and 1.8V
  + Issues with ground plane not being auto done with all ground requirements
  + Double Checking Bom on Eagle Cad with BoM sheets
* PCB Board would be needed by 4/23/21

7:05 END

**4/1/21 7:05 - 7:20pm**

* Leon: Added slides to design review to demonstrate sensors, formatting needs review by the team
  + Comments: slides do not need to show exact process, only solution of the final product
  + Working on operating the servos with draft code

7:11

* Jeremy: PCB and wiring diagrams confirmed with designer
  + Power budget finalized and double checked with all parts

7:12

* Isaac: Needs to implement logic to the equations for drag force

7:13

* Dylan: Helium tank rentals will be free due to UCSC affiliation, helium itself would be around 250$
  + Finished camera mount in CAD design

7:15

* George: Working with new toolbox in matlab to finish determinant work

7:16

* Ryan: Only one linear voltage regulators needed for each voltage, ground pin also added
  + Ready for ordering by OSHA park
  + Should run it by TA in meeting tomorrow

7:20 END

**4/2/21 5:05 - 5:15pm**

* Sprint Updates

5:05

* Leon: servos are running, found out continuous servo motion is not sufficient for our project
  + Will either need to get new servos or find a way to find the position of the servos
  + ESC and motor came in, soldering may be needed for the motor
    - WIll also need connection between ESC and motors fixed

5:09

* Jeremy: Power budget done, will shift to helping George with C coding
  + Basic linear algebra functions will be sent later by controls
  + Power will also need to be changed if servos are replaced

5:10

* Isaac: All forces pumping out numbers, need to confirm with group before implementing

5:11

* Dylan: Helium needed is confirmed, 248$ total
  + CAD done for MagAero Holder, camera may need to be moved to make room

5:12

* George: Wrote hole placement methods

5:13

* Ryan: Needs to confirm SPI and other issues before ordering PCB board

5:14

* Milestone checking for each group member
  + About 1 day behind total on average
  + Keep checking due dates and try to hit them on track
* Split between personal work with servo discussion and PCB final checking
  + Also looking at simulation code

5:15 END

**4/3/21 7:00 - 7:10pm**

* Sprint Updates

7:00

* Leon: Motors cannot be connected without external bullet connectors to ESC
  + Scratch code written in the meantime to input numbers
  + Connecters ordered from amazon

7:02

* Jeremy: Servos added to Bom
  + Will help george with C coding

7:03

* Isaac: Direction and velocity affect magnitude of drag in simulation

7:04

* Dylan: Ordered New servos and screws for standoffs
  + RC controller and camera still need to be ordered
  + Nylon came in today, sewing of envelope is ready to begin
  + Will go over CAD design a final time

7:06

* George: Working on turning poles, trial and error method will taking time

7:08

* Ryan: PCB finished and ordered
  + Digikey parts ordered as well
  + Only things left to buy are battery, charger, ultrasonics, RC transmitter and receiver, and camera/receiver, telemetry transceiver, and helium

7:10 END

**4/4/21 7:00 - 7:11pm**

* Leon: Bullet connectors will be here tomorrow for connecting ESC and motor
  + Motor code tested on servos, code does work with it

7:02

* Jeremy: Helping george code linear algebra in C
  + Stuck on matrix multiplication

7:03

* Isaac: Finished with drag force, but has to code how it adds to normal force

7:05

* Dylan: Start of fabrication will start tomorrow, will email Mircea for assistance
  + Rachel Carson said it is not funding senior capstone projects

7:07

* Ryan: Had to backorder crystal oscillator, USB to UART
  + Is looking for other sellers to order them quickly
  + Battery should be ordered sometime this week
  + Wrong screws ordered, but they should still work with the standoffs for the voltage regulator
  + Weight allocation with new servos will have to be done

7:11 END

**4/5/21 6:00 - 6:35pm**

* Sprint Updates:
* Leon: WIll solder the bullet connecters after this meeting to the ESCs
  + Will test out motor code that was also used with servos

6:02

* Jeremy: Coding matrix functions in C
  + Matrix multiply, scalar multiply, add are complete
  + Next is determinant and inverse

6:03

* Isaac: Debugging Drag forces, some logic may be missing

6:04

* Dylan: Done with CADing

6:05

* George: Laptop broken, unable to continue work for the time being

6:06

* Ryan: Ordered remaining parts: transceivers and sensors
  + Found alternate oscillator that might not work with PCB already ordered
  + Also found USB to UART chip, will take longer to ship

6:07

* Need to keep emailing Mircea until he responds to get lab access
* Capstone Pitch Competition 10-11am this Sunday
  + Should participate to get funding for project
  + 200$ 1st place, 100$ 2nd place, 50$ 3rd place

6:12

* Software architecture workshop tomorrow
  + Leon should definitely go
  + Also Ryan and Jeremy should go as well

6:14

* Gantt Chart Updates
  + George: Path following should be done by tomorrow when he gets a new laptop
  + Dylan: CAD design completed
  + Leon: Actuators should be done by tomorrow since all parts have come in
  + Ryan: Board wiring and PCB are both complete
  + Jeremy: Power Source and Power budget are complete
  + Etc: All vendors have been finalized

6:22

* Need to order spools of wire to connect ESCs and motors together
* Longer and thicker wires may cause noise to interfere with electrical signals

6:26

* Presenters for Sunday’s pitch competition: Dylan, George, Jeremy, Leon

6:30

* Everyone needs to update trello because it is very out of date

6:35 END

**4/6/21 7:00 - 7:20pm**

* Sprint Updates:
* Leon: Soldered motors and ESCs with connectors
  + Issue because the current rating for the motors is too high for an adapter
  + Needs to get the battery to test the motors
  + After this, will work on the remote controller
  + Workshop today was not very helpful
    - Only going through an example project code and PCB

7:06

* Jeremy: Struggling with determinant code of a matrix, looking for examples online

7:09

* Isaac: finalizing drone design, choosing from 2 different designs within the simulation to see which performs better

7:10

* Dylan: Looking into the dimensioning of the ellipse to see how much fabric is needed for the drone’s envelope

7:13

* George: Got a new laptop, lost some data so will need to catch up
  + Porter college responded and sent the grant application

7:15

* Ryan: Ordered battery and charger
  + Everything on the BoM is now ordered
  + Just installed matlab, so can help out with matrix math for George

7:16

* Cannot fabricate in Mircea’s lab, will look into a separate source to fabricate
* Flowchart for microcontroller due next week
* Everyone needs to make slides for the tasks they have completed by friday’s meeting with the TA

End 7:20

**4/7/21 6:00 - 7:20pm**

* Sprint Updates:
* Leon: Remote controller being studied with manual and searching for other resources online

6:02

* Jeremy: Finished matrix math C code and pushed through GIT

6:03

* Isaac: finalized drag force in simulation
  + Starting on sensor research

6:04

* Dylan: Looking into the envelope sewing process and gores that will be needed
  + 6 gores per hemisphere, 12 total
  + Mircea said it may be possible to fabricate in the delaware lab

6:05

* George: Laptop fixed, finalizing grant application
  + Should go over it as a team before submission by tomorrow

6:06

* Ryan: Pressure sensor tubing needs another distributor because the other one will not ship little amount so far

6:07

* Work Meeting:
* Going over grant proposal: Overview of responses to the following prompts to get funding:
  + How does project facilitate porter students creative/innovative work
  + How do porter students contribute as innovators
  + How many students/how many porter students
  + How will this project benefit porter as whole

6:34

* Starting on work for the state machine with half on grant proposal and half on state machine due tomorrow

7:14

* Reconvening to finalize prompts for grant proposal
  + Making sure the prompts are not too technical for porter council and attention grabbing with regards to porter theme of art
  + Avoid using buzzwords in 1 paragraph
    - Spread them all around to envision passion with the project

7:50

* Grant Proposal Ready to submit
* Flowchart is also complete and ready to submit

**4/8/21 7:00 - 7:20pm**

* New servos had to be ordered because the wait time would be too long
* Sprint Updates:
  + Leon: Has a step-by-step diagram for the microcontroller flowchart, will get to finishing the final diagram
    - Implementing remote control with motors and servos being changed with inputs
    - Hardest part is figuring out how to interface with the remote controller

7:04

* + Jeremy: Working on slides to present for tomorrow
    - Will continue to assist george with C code

7:05

* Isaac: GPS and IMU are displaying in the simulation, ultrasonic would be next
  + Transferred into new model in code
  + Moment is off with new model due to larger speed, causing greater wobbling

7:06

* Dylan: Found new servo and ordered new servo couples
  + Will need to fix the dimensions of the servo in CAD
  + Also working on redimensioning the gores of the envelope
    - Concluded we have enough fabric and sewing/fabrication of the envelope will begin this weekend

7:09

* George: Working on turning controller and staying within the max of the motors
  + Will have Jeremy assist with coding more C libraries
  + Request max amount of funding possible, so we can get as much money as they can give us

7:11

* Ryan: Trying to find tubing to work with the system PCB

7:13

* Have slides ready for tomorrow to present to the TA for improvement for the next design review

7:15 END

**4/9/21 4:00 - 5:45pm**

* Meeting with TA Tanner
* Going over design review slides

4:10

* Jeremy: Be more specific with goals with flight time
  + Title should show goal oriented
  + Show how stretch goals is being attained
  + Specify power needed for throttle levels
  + Matrix slide is not needed, have that in the responsibilities
  + Include motor power redo

4:25

* Dylan: Have a refresher for the teaching team
  + Not every slide needs to be goal oriented
    - Each task must have a reason
  + MagAero needs to stand out more in the dimensions of the CAD
  + Good Slides overall

4:41

* Isaac: Needs to input what requirements are being met by the simulation
  + Input numbers on what is being tested, point out the changing variables in videos
  + Use videos showing wind and propeller separately
  + Specify what exactly is being proven by each video
  + Unrealistic to show wind up & down 20mph

4:53

* Ryan: Layouts may not be required for the design review, petersen may be able to read it however
  + Add goals/tasks to slides to be more goal oriented
  + Professors might not care where the parts were ordered from
  + Make some slides on some PCB board design considerations

5:04

* Leon: Flowchart showed to TA
  + Two state machine will be needed for the raspberry pi and microcontroller
  + State machine should describe low level processes such as interrupt priorities
  + Start with PIC state machine, use the flowchart made from last quarter to give an overview
  + Needs to specify how each state moves to another
  + Specify decisions vs readings in the flowchart to get a measure of the state machine

5:30

* Final words: STAY GOAL ORIENTED

5:35

* Sprint Meeting
* Leon: Working on state machine, TA helped understand how to separate it from a flowchart

5:37

* Jeremy: Working on C coding matrix functions for Controls

5:38

* Isaac: Putting in proximity sensor into simulation

5:39

* Dylan: Did a bunch of small changes in CAD
  + Moved ultrasonics, edited MagAero being fitted onto the bottom

5:40

* George: Tuning closed loop autonomous control

5:41

* Ryan: Had to clarify to some websites that he was not a chinese spy

5:42

* Pitch presentation is not specified if we are accepted, need to email back if we will be allowed
* Finish slides to submit either Monday or Tuesday
* Update and add new Trello Cards

5:45 END

**4/10/21 7:00 - 8:30pm**

* Sprint Updates

7:01

* Leon: Worked on state machine and trying to finish connecting the remote controller

7:02

* Jeremy: Finished coding matrix math for George

7:03

* Isaac: Looking at properties for proximity sensors for use in simulation

7:04

* Dylan: Will start cutting gores for envelope tomorrow and learn how to use the sewing machine

7:05

* Ryan: Adding slides for trace widths in PCB

7:06

* ETC: Slides can be reviewed one at a time by posting them on new channel on discord

7:10

* Working on Pitch day presentation slides and practicing for tomorrow

8:30 END

**4/11/21 7:00 - 7:20pm**

* Sprint Updates
* Won 1st place in pitch competition, 200$ for project funding

7:03

* Leon: Will have state machine done by tomorrow

7:04

* Jeremy: Will assist Leon since power management is out of work for right now
* Isaac: All the other sensors can work for functions, ultrasonic sensors are placed correctly in the simulation

7:05

* Dylan: Sewing machine used for getting width of the stitches

7:06

* George: Porter college grant wants to know more specifically how it will improve porter college specifically

7:12

* Ryan: Emailed OSH park about current specifications on the traces

7:15

* Crown Application for funding is also available, due in 2 days
  + Will submit tomorrow
* Tanner’s Office hours T-TH 12-1, we will be going to discuss design review on Friday
* Everyone also should update notebooks for submission before design review

7:20 END

**4/12/21 6:00 - 8:02pm**

* Archisha said faculty advisor must approve the money, then we will get a VISA gift card with the 200$ we won
* We need to wait for Mircea to approve before we can fabricate at Delaware, even though we have permission
* Sprint Updates:

6:03

* Leon: Drafted both state machine and flow chart for submission
  + Also wrote pseudocode for motors and servos with the remote control

6:04

* Jeremy: Crown grant request is done, needs review before submission

6:05

* Isaac: Added proximity sensors, still looking at how to code them

6:06

* Dylan: Cut the sheets of the gores into the sizes we needed, shapes themselves need to be cut after

6:07

* George: Working on matlab code with the aerospace toolbox
  + RC controls should come a lot faster

6:08

* Ryan: Tubing for pressure sensor is shipped

6:12

* Going over both crown and porter project funding applications before submitting them

6:21

* Gantt Chart Updates;
  + Simulation: 80% done with implementing proximity sensors, will be done tomorrow or the day after

6:23

* + Hardware Implementation: Implement controls in software should be done by April 14th
    - Autonomous control hasn’t been started yet

6:25

* + Controls: Path following is still in the works
    - Closed loop RC control needs ideal sensor model from simulation
    - May skip ideal sensor and move to noisy sensor model

6:27

* + PCB: Done and ordered
  + Fabrication: 15% done, moved to 4/26
    - Envelope started

6:29

* ETC: Ryan, Leon, and Jeremy will go to PCB workshop tomorrow
* Have slide done by tomorrow, milestones are the biggest part to focus on
* Isaac will be helping Dylan Fabricate

6:30

* State Machine Review
  + Needs an off button, else the drone will not know when not to turn the motors
  + Interrupt priorities are also specified
    - Needs to have sub priorities for sensors with the same priority

6:58

* Group split up so others can work on the diagram while Leon can work on the servos and motors with Ryan and Jeremy

7:07

* Leon will be working to coordinate the RC controller commands to be processed by the raspberry pi and have the Pic adjust the PWM of the servos and motors
  + Advanced controls, such as turning and moving at the same time, will be focused on later, due to complex moment mechanics needed

7:27

* Working on State machine

7:58

* Both diagrams finished
* Office hours tomorrow, Leon and George will go

8:02 END

**4/13/21 7:00 - 7:26pm**

* Sprint Updates:
* Went over final iteration of state machine and flow chart

7:11

* Sprint Report
* Leon: Finished working on state machine and flow chart
  + Also went to workshop and office hours today
  + Used an oscilloscope to translate controller outputs, should be able to connect them to any input

7:14

* Jeremy: Also went to workshop and worked on slides
  + Leon, George, and Isaac, can reach out if anyone needs help
  + Also received 300$ from crown for funding

7:18

* Isaac: Testing ultrasonic code, will be done by today

7:19

* Dylan: Has the 24 sheets, will start sketching the cuts of them by tomorrow

7:20

* George: Will try meeting with controls professor to help with tuning controls
  + Also will keep track of Porter’s funding application
  + Can also email to get funding from pitch competition

7:21

* Ryan: Added slides and went to workshop, showed Petersen PCB schematic

7:25

* Add milestones to first slides, will submit by 9pm today

7:26 END

**4/14/21 6:00 - 6:26pm**

* Meeting with TA Tanner:
* Traces are smaller than most manufacturers allow
  + Trace calculations may be wrong

6:07

* Actual Traces are much thicker than shown
  + However, still small compared to Amperage needed
  + Might fry the board since the copper width is too small

6:17

* Motor trace will probably be too big for the board
  + Will probably have to wire the motors outside the PCB

6:26 END

**4/14/21 6:00 - 6:47pm**

* Jeremy and Ryan are in a meeting with Tanner at the beginning of the meeting at Tanner’s request. George Dylan Issaac and Leon are in attendance. Will request an update message in discord for update and add to minutes when complete.

Sprint Report

* Leon 6:01 -
  + tested servos and ran with previously used code and servos were controllable. Takes position data and able to make multiple revolutions as need
  + Can only use one servo at a time for testing due to current draw
    - Needs update from Ryan on battery
* Dylan/Issaac 6:03
  + cut out the first half of the first gore, took a few hours but progress is being made. Might need to dedicate a few extra hours. Isaac and Dylan have been working together.
  + Need to follow up with Mircea again
* George 6:07
  + Am stopping by office hours for pointers on the control design
  + Generating matrices for the closed loop RC control to do work in the meantime
  + Could use noisy sensor model in Vrep
    - Isaac will check it out
    - Use data sheet for numbers
* Motor updates 6:15
  + Current draw is limiting testing but appears to be working so far
  + May try testing with no load to limit current on brushless motors
* Meeting schedules for 7pm 4/15 to have practice run of presentation. Expect Long meeting
* Meeting End at 6:28PM, hopped back on for Jeremy and Ryan

6:34

* Ryan and Jeremy finished with Tanner so we hopped back on
* Ryan Update
  + Need to adjust voltage at board due to lack of enough width for copper
  + Can do the 12V off the board
  + Will not reorder yet, gonna test the board to see if there are any other problems
  + Need to remove a couple pin outs in the next design of the board

6:35

* Jeremy
  + Worked on coding the height tracker for use in the controls
  + Needs to push but ready to be checked
* Battery Update given for Leon
  + Shipped on April 12th
  + Battery order got “cancelled by sender”, but we didn’t cancel. Not sure what happened, so we need to contact the seller immediately
  + Need to get a barrel Plug for testing due to the delay while we figure this out

6:47 Meeting End

**4/15/21 7:00 - 8:47pm**

* Sprint Updates:
* Leon:

7:03

* Jeremy: Went over slides a final time

7:04

* Isaac: Not sure where to find datasheets for sensors
  + Should find them on the BoM

7:05

* Dylan: Tela has given feedback for slides, will work on that today

7:06

* George: Working on slides
  + Also been working on remote control and Complementary filter

7:07

* Ryan: Updated current for each rail and rearranging PCB designs

7:10

* Need to put all milestones in the first 2 slides

7:15

* Fixing Slides based on TA notes

8:02

* Practice Design review and fixing slides
* Common Issues:
  + Change wording of milestone slides and titles

10:30 END

**4/17/21 7:00 - 7:10pm**

* Sprint Reports
* Tanner was invited to the discord
* Leon: Working with the remote controller

7:01

* Jeremy: Sent in power budget for review, also sent receipts for crown funding

7:02

* Isaac/Dylan: Cutting out gores for the envelope, will be halfway done by the end of the day
* Isaac also has the equation for the standard deviations for the noisy sensors

7:05

* George: Building the pitch/roll system should be done quicker than the closed loop remote control

7:06

* Ryan: Contacted Digikey for reviewing second order, delivery for rest of electronics will be delayed until the end of next week

7:08

* Speaker notes will be on the design review slides for follow ups

7:10 END

**4/18/21 7:00 - 7:15pm**

* Sprint Reports
* Leon: Working on coding between the Raspberry pi and Pic32 from getting the RC controller inputs

7:03

* Jeremy: Getting sources for battery draining and fixing the voltage divider

7:05

* Isaac: Testing out code for standard Gaussian distribution of noise

7:06

* Dylan: Cut out the gores last night, will be finished by tomorrow

7:07

* George: 2 degree of freedom system will be done by tomorrow
  + Also working on how good the functionality of exporting the system to C works and how it works to test reliability

7:08

* Ryan: Added wires into PCB design for the 12V rail, which is an underneath wire

7:10

* Fill out peer eval forms for meeting on Monday

7:12

* George will be presenting slides to catch the team up in the controls part of the project
* We should start planning on how to start writing the report

7:15 END

Peer Review meeting

Long Flight Time Buoyant Drone 4/19/2021 6:00 PM -(PST)

horizontal lineATTENDEES

* Excused absences:
* Unexcused absences:
* Tardy:Ryan

## AGENDA

* **Check in:**
  + Leon 6:06
    - Got signal to propagate from RC controller to motors and servos
    - Ready to start working on the 4 basic turns, left, right, up/down,forward/backwards
    - Didn’t use the battery on the motors yet
  + Jeremy 6:10
    - Working with Ryan to fix voltage divider for PCB
    - Also seeing power losses from switching regulators compared to linear
  + Isaac 6:13
    - Been cutting out gores with Dylan
  + Dylan 6:14
    - Cutting out gores with Isaac, should be done today
  + George 6:15
    - Working on Error cases for large angle approximation
    - Added new folder to google drive for final report drafting by chapter
  + Ryan 6:16
    - Contacting Digikey to see status of shipments
    - Also rearranging power components, regulators in PCB
* **Gantt Chart 6:17**
  + Changes: 6:25
    - PCB milestone added to update PCB design
      * Also needs fabrication for the 2nd PCB delivery
    - Power management changed task to testing motor power
      * Also added milestone to finalize decision to use switching or linear regulators
* **Feedback:** Each person will receive feedback from each of the team members and themselves pros and cons, this should be the same feedback you gave on the evals. **BE HONEST**
  + Dylan 6:36
    - Has been noticing he has been feeling burnt out lately
    - Can still work on conflict resolution
    - Has been doing a good job keeping himself and others on track with the project
    - Has improved on holding people accountable for their work
    - Can still work on delegating tasks more evenly among the team
    - Pivotal member of the team, does well in discussing work during the design reviews
  + George 6:43
    - Has been behind in his work due to lack of experience with what he has been working with
    - Has been good recently at delegating and asking team members for help
    - Will be presenting to the team about controls stuff more often
    - Been putting in the most time of the team
    - Maybe is burnt out from the hard material he is dealing with
    - Can still work on communicating and delegating his work with the rest of the team
  + Isaac 6:54
    - Caught up with his work that was lagging behind, also asking more questions during meetings
    - Has also been putting in more time and quality of work
    - Can work on showing the team his finished tasks and what it means for the rest of the team
    - Work can be a fallback if the fabrication does not work
  + Jeremy 7:02
    - Always willing to help out and work with other people
    - Should reach out more to team members if they need help with anything
    - Struggles with presenting slides and showing them in slides
    - Also should work on providing better documentation, can work on the final report early if nothing else to do
    - Has been doing well in the tasks that other team members needed help with
  + Ryan 7:12
    - Has improved on slides and working on milestones
    - Has been struggling with the meeting times
    - Working more with Leon and Jeremy in sub-team meetings more
    - One of the last ones to work on slides
    - Has also been rushing some aspects of his work without team checking, reviewing with other people can help catch any mistakes
  + Leon 7:22
    - Has been focusing more on his work due to lack of other hard classes
    - Can work on slides more and practice presenting to get better at design reviews
    - Work on understanding and commenting on code
    - Ask for help more often since others have experience with coding he is working on
    - Work will decide how well the drone will perform and team’s final accomplishments
* **Group discussion:** How we can improve as a team, what changes should we make to the team, what should our workflow look like going forward. 7:32
  + Slides have gotten better
  + Peer reviews have been the biggest issue, sub-teams should work together more
  + Have been following Gantt Chart more and using it to hold us accountable
  + Documentation and Trello has been lagging behind
  + Prototyping needs to be done as soon as possible to fix bugs for the second design phase
* **Individual Improvement:** Everyone says one or two things that they are going to improve on before the next design review. 7:42
  + Dylan 7:43
    - Work on checking in with everyone to get a better understanding of their work
    - Delegate high level team tasks so that work flow become more efficient especially related to the final paper
  + George 7:44
    - Delegate tasks to other team members, particularly ones with coding or tuning, to free up time on the design side of controls.
    - Start generating lots of graphs and images to help the team follow my work better, as well as use in the final report.
  + Isaac 7:45
    - Review other people's work more in depth and be able to provide technical feedback
    - Work on tasks throughout the week instead of working near the end of a sprint week
  + Jeremy 7:46
    - Get better at showing documentation and reasoning behind design decisions
    - Take initiative and ask team members specifically if they need help with anything
  + Ryan 7:47
    - Work more with Leon and Jeremy in sub-team meetings
    - Prepare slides in days advance before design reviews
    - Ask team members to review PCB design before sending it to board house
    - Work more closely with TA whenever making critical changes to design
    - Whenever there are no tasks, work on the final design review presentation and paper
  + Leon 7:48
    - Have better documentation on any piece of code written
    - Understand every single line of code and be ready to explain what it does
    - Allocate more work to teammates

Meeting End: 7:50 PM

**4/20/21 7:00 - 7:10pm**

* Sprint Updates:
* Leon: Working on PIC32 code on 4 basic directions for RC controller
  + Charging the battery, will be used later tonight

7:01

* Jeremy: Worked on Voltage divider for receiver and coding height algorithm for George

7:02

* Dylan/Isaac: Finished cutting gores, sewing gores will come next but is harder

7:03

* George: Unable to work on project today due to other reasons

7:04

* Ryan: Talked with Tanner about soldering iron
  + Added Voltage divider to PCB
  + Digikey should be shipping everything by the end of the week

7:08

* Presentation tomorrow for controls

7:10 END

**4/21/21 6:00 - 8:10pm**

* Sprint Updates:
* Leon: Hooked up the battery to the ESC and got a single motor working
  + Next step is to write procedure for all controller inputs

6:07

* Jeremy: Power budget had been given feedback by instructors, will be looked at as soon as possible

6:08

* Isaac: Looking at datasheets for 4 sensors, all had noise components
  + Only sensor that noise can’t be found is the ultrasonic

6:09

* Dylan: Focusing on 3d parts the rest of the day while sewing the gores together

6:10

* George: worked on presentation for the team to review controls
  + Also working on simplifying some systems since they will not need to be perfect

6:11

* Ryan: Digikey says they will ship tonight or tomorrow
  + Also started to look into trapezoidal integral for controls programming

6:12

* Controls Presentation by George:
  + High level overview of use of controls
    - Moving from current state to desired state
* PID Controls and how they interact with a tunable system
* Different Matrices used as inputs to get outputs

7:10

* Get slides for the TA meeting if you have completed tasks
* Sprint end on Monday
* Working on the final paper will be planned and implemented as part of the hours of future sprints

7:15 END

**4/22/21 7:00 - 7:15pm**

* Sprint Report
* Leon: Worked on the PIC32 code, is finished
  + Now working on the raspberry pi code, had to install a bunch of libraries, looking at other code online to see how to read protocol

7:05

* Jeremy: Sent responding comments to Tela with the power budget
  + Worked on using switching regulators instead

7:07

* Dylan: Worked on more sewing last night, will work more with Isaac tonight
  + Might need to redo some of the sewing, also might run out of string so will order more just in case
  + Haven’t started 3d printing yet, focusing on sewing

7:08

* George: Controls need to be tuned since it gets steady within 6 seconds

7:09

* Ryan: Digikey cannot guarantee but they said they will ship tomorrow, 2-day shipping everything else is finalized

7:10

* Isaac: Looking at datasheets for noise specifications
  + Will be helping Dylan with sewing tonight

7:12

* Next sprint will be focused on testing and writing the final report
  + 80% testing 20% writing
* Next sprint will be 50% testing, 50% writing
* Last sprint will be 100% writing

7:15

* Follow up with Mircea for lab access

7:17

* Follow up with funding from crown, porter, and the pitch competition

**4/23/21 4:00 - 5:32pm**

* Meeting with TA Tanner

4:06

* Flowchart needed an interrupt service routine and interrupt vector table
  + Sub flow chart for those interrupts
  + Add specific reading number quantified to progress in the flow chart

4:12

* Get started as early as you can on writing the final report

4:14

* Making slides on fabrication can be shown with the verifications that it was fabricated correctly

4:20

* PCB and fabrication should be finished and tested by the next design review

4:22

* Mircea has been unresponsive to give an orientation to delaware labs even though we technically have access to the building already

4:26

* Our project has a complicated PCB board, it will most likely require much more fixing before it is complete and with minimal errors

4:30

* Gore design would have taken a lot longer if we didn’t have 2 people in-person working on it

4:36

* Overview of PCB:
  + Switching regulator breakout boards can be used instead of linear regulators in the PCB to save power efficiency
  + Keep the analog and digital signals separate from each other so they don’t interfere with each other

5:13

* Going over final report outline and folders in our google drive

5:19

* Questions about the appendix:
  + Github, CAD drawings will be put in the appendix
  + Don’t be rigid with the chapter breakdown because it can change

5:24

* Sprint Updates:
* Leon: Working on Raspberry Pi code, couldn’t do too much due to getting vaccine

5:28

* Jeremy: Working with reducing noise from the switching regulator

5:29

* Dylan/Isaac: Finished sewing the gores, had to redo some of them
  + Will do some 3d printing this weekend

5:30

* George: Simplified pitch-and-roll response even more
  + Figured out how to convert simulink into C Code, still needs verification
  + Working on implementing open-loop control RC in conjunction with closed loop of the height control and pitch & roll

5:31

* Ryan: Working on PCB 2nd design and integral function for controls

5:32 END

**4/24/21 7:00 - 7:15pm**

* Leon: Found example code interacting with special protocol on receiver

7:02

* Jeremy: Will need to ask Tanner about a circuit to average an AC voltage

7:03

* Isaac/Dylan: Doing more sewing last night and today
  + Dylan is also working on 3d printing, had some trouble getting it working initially
  + Will try to print all parts by Monday

7:05

* George: Making changes to A and B matrices, trying to simplify them as much as possible with different types of coordinates

7:09

* Ryan: Absent due to doctor’s appointment

7:10

* ETC: Sewing should be done this weekend as well

**4/25/21 7:00 - 7:15pm**

* Leon: Found example code interacting with special protocol on receiver
  + Trouble converting C++ code state machine

7:01

* Jeremy: Troubleshooting using a switching regulator with a low pass filter to reduce noise

7:05

* Isaac/Dylan: Still sewing the envelope gores, sewing needle broke but had a replacement
  + 3d printing was very wrong, created a clump, resulted in delay

7:08

* George: Layout of the response was redone, resulted in dampening much faster
  + Hovering capability being added now, closed loop RC should be done by the end of the sprint

7:09

* Ryan: Writing documentation for GPS module and antenna
  + Also correcting trace widths for PCB

7:12 END

Sprint 6 Conclusion Meeting

Long Flight Time Buoyant Drone 4/26/2021 6:00 - 7:35 (PST)

horizontal lineATTENDEES

* Excused absences:
* Unexcused absences:

## AGENDA

* **Sprint progress:** 6:00
  + Leon: Struggling with code and compiling issues
    - Might try to write code instead of using libraries

6:03

* Jeremy: Figured out low pass filter for switching regulators
  + Should some power compared to linear regulators

6:04

* Dylan/Isaac: Almost finished with envelope, more string coming tomorrow and will be finished the same day
  + Printed ultrasonic mount, caused a jam in the printer
  + Getting it unjammed right now
  + Updated servo mounts with new dimensions Leon sent

6:05

* George: Height control added to the system, adjusts properly
  + Added remote control system that works with the pitch/roll/height regulator by combining them with the RC inputs

6:06

* Ryan: Digikey realized something is not right with shipment, contacted warehouse
  + Also working with the switching regulators and filters onto the PCB

6:08

* **Gantt Chart Updates:**
* Isaac: Sensor Simulation due 29th

6:10

* Leon: Electronic actuators implemented, marked as done
  + RC control almost done, raspberry pi needed to interact with receiver, will be done by 4/30

6:12

* George: Closed loop RC in matlab requires saturation numbers from the motors, 99% done, code generated by 4/27
  + Auxiliary autopilots functions designed, needs to code it into simulation

6:15

* Ryan: Fixing V1.9 PCB pushed to 5/4 due to shipping parts
  + Implementing switching regulators due 4/28

6:18

* Jeremy: Regulator choice has been finalized
  + Test power draw of motors and servos is waiting for the motor propellers and first PCB design

6:22

* Dylan: 3d printing fabrication is pushed back a couple of days due to printer issues
  + Also envelope sewing will be done by tomorrow
* **Review of Progress**: 6:30
  + Leon (110/140 hours) - 6:31
    - Implement servo control (10 hours)
      * Complete
      * Spent 20 hours due to change in servos
    - Implement ESC/motor control (10 hours)
      * Complete
      * Spent 10 hours
    - Implement remote control communication with Raspberry Pi (10 hours)
      * Incomplete, in progress
      * Had issues connecting to the receiver using receiver’s protocol
      * Spent 30 hours
      * Expected 4/30
    - Implement servo control with remote controller (10 hours)
      * Incomplete, in progress
      * PIC32 control of servos and motors completed, and communication between PIC32 and Raspberry Pi completed, but remote controller controlling servos not completed yet due to remote control communication with Raspberry Pi not being done yet
      * Spent 10 hours
      * Expected 4/30
    - Implement ESC/motor control with remote controller (10 hours)
      * Incomplete, in progress
      * PIC32 control of servos and motors completed, and communication between PIC32 and Raspberry Pi completed, but remote controller controlling motors not completed yet due to remote control communication with Raspberry Pi not being done yet
      * Spent 10 hours
      * Expected 4/30
    - Implement autonomous control data processing between PIC32 and Raspberry Pi (30 hours)
      * Incomplete, haven’t started yet due to not being done with remote control implementation
    - Implement servo control with autonomous control (10 hours)
      * Incomplete, haven’t started yet due to not being done with remote control implementation
    - Implement ESC/motor control with autonomous control (10 hours)
      * Incomplete, haven’t started yet due to not being done with remote control implementation
    - Group meetings (25 hours)
      * Complete
    - Sub-team meetings (15 hours)
      * Incomplete
      * Only 5 hours of meeting
  + Jeremy (123 hours) - 6:43 **(77/123 hours worked) + 9 hours on other tasks**
    - Verify PCB Design (4 hours)
      * Complete
    - Finalize Power Budget by double checking all parts and heat efficiencies (10 hours)
      * Complete
    - Optimize Battery once power budget is finalized (4 hours)
      * Complete
    - Group meetings (25 hours)
      * Complete
    - Sub-team meetings (15 hours)
      * Incomplete
      * Only 5 hours of meetings
    - Push ECE121 code to Github(1 hour)
      * Complete
    - Program C libraries for Linear algebra, integration, and other functions needed for controls (16 hours)
      * Incomplete:
      * 12 hours done on linear algebra
    - Program C libraries RC response (16 hours)
      * Complete
    - Program C Libraries for autonomous (16 hours)
      * Incomplete, in progress by George
    - Program C libraries automated landing and takeoff (16 hours)
      * Incomplete, found an alternative way for landing and takeoff
    - Other Tasks:
      * Low-pass filter implementation(5 hours)
      * Finalized voltage divider for receiver(4 hours)
  + Isaac (est. 152 hrs /**act. 129 hrs**) - 6:55
    - Implement Drag Force **(30 hours) - Complete**
      * Calculate Balloon Speed (10 hours)
      * Create 3D Drag Force (10 hours)
      * Apply Logic to Drag Force Given Balloon Speed (10 hours)
    - Implement Sensors to Read Pseudo Data from Vrep **(22 hours) - Complete**
      * Research Sensors (6 hours)
      * Implement Ultrasonic Sensor (4 hours)
      * Implement IMU (4 hours)
      * Implement GPS (4 hours)
      * Implement Balloon Barometer (4 hours)
    - Help Fabricate Prototype with Dylan **(30 hours) - Complete**
      * Sewing Envelope (20 hours)
      * 3D printing parts (10 hours)
    - Adding Noise to Sensors **(12 hours) - Incomplete/ In Progress**
    - Group meetings **(25 hours)**
    - Subteam meetings **(10 hours)**

Delayed due to Remote Control Sub-team Delays

* + - Implement Closed Loop Remote Control **(35 hours) - Incomplete**
      * Learn to Use Remote API to Apply C Code (15 hours)
      * Use Remote API or Rewrite C Code to Lua (10 hours)
      * Apply Outputs of Functions to Individual Parts (10 hours)
    - Implement Autonomous Design **(30 hours) - Incomplete**
      * Feed Sensor Input to Functions (10 hours)
      * Use Remote API or Rewrite C Code to Lua (10 hours)
      * Take Outputs and Apply Them to Individual Components   
        (10 hours)
  + Dylan (126 hours) - 6:59
    - Add updated parts to CAD (4/2) **(14 hours)**
      * Voltage Regulator (2 hours)
      * Camera and transmitter (4 hours)
      * Magaero housing (8 hours)
      * **All completed**
    - Fabricate Prototype (4/26) **(50 hours)**
      * Set up sewing machine and 3D printers (2 hours)
        + It took far more than 2 hours to complete closer to 10 hours.
      * Sew envelope (10 hours)
        + 90% complete waiting on more string to arrive tomorrow
        + Almost 30 hours spent on sewing and cutting (far underestimated time) should have probably been split into 3 10 hours tasks 2 of which are complete.for cutting sheets, cutting gore shapes, and an incomplete for sewing.
      * 3D print parts **(8 hours)**
        + **Issues with 3d printers caused delays in starting the printing process**
        + Servo brackets & plates (4 hours)
        + Ultrasonic mount & plate (1 hour)

**complete**

* + - * + Motor mounts (1 hour)
        + Gondola and plate (2 hours)
      * **All other tasks blocked by 3d printing and PCB not being ready**
      * Attach 3D printed parts to envelope (5 hours)
      * Inflation test of lift bag inside envelope with air (5 hours)
      * Attach servo and motor shafts to brackets (4 hours)
      * Add ultrasonics to bracket (1 hour)
      * Add electronics to gondola (5 hours)
      * Wire prototype (10 hours)
      * Second Inflation test of lift bag inside envelope with air (5 hours)
    - Implement Sensors to Read Pseudo Data from Vrep **(22 hours)**
      * Research Sensors (6 hours)
      * Implement Ultrasonic Sensor (4 hours)
      * Implement IMU (4 hours)
      * Implement Gps (4 hours)
      * Implement Balloon Barometer (4 hours)
      * **All complete**
    - Group meetings (25 hours)
    - Subteam meetings (10 hours)
  + George (140 hours) - 7:02. Spent 164
    - Complete path following terrain tracking PID design (10 hours)
      * Incomplete. 50 hours spent. Current design approach is impractical to implement and needs a matrix and controls redefinition. This was a failure where I chose an abstraction approach when i shouldnt used abstraction to start and build up from auxiliary functions.
      * Also decided Closed Loop RC is more important for testing and should be completed first.
      * Currently scrapping the current design since the new approach, that has been used to define closed loop and auxiliary functions, is far faster and allows me more control in the design.
    - Simulate Path following terrain tracking in Matlab (10 hours)
      * Delayed since PID autonomous design not completed
    - Define plant for closed loop RC (5 hours)
      * Complete. Spent about 20 hours redefining matrices and analyzing approximations. Resulted in using a mix of polar and XYZ coordinates. Estimations are better defined and justified and much easier to work with.
      * Also new definitions assisted in applying pole placement with integral implementations that we will be using for the rest of controls.
    - Pole placement and integral control added to RC design (15 hours)
      * Complete. Far superior approach that was built off of auxiliary functions. Will use the same method for the rest of controls. Spent approximately 15 hours. (Current design also includes height control) Current design works by calculating motor forces after the pith/roll/height regulator has already issued commands, so that the RC response does not interfere with stability of the drone.
    - Simulate RC response in Matlab (5 hours)
      * Complete. Response has been tested by analyzing physical response and motor commands based on user input. Appears to be ready to export to VREP simulation. Approximately 5 hours spent.
    - Design filters to obtain accurate state data (25-30 hours) will be Broken down when filter design chosen after further research
      * Task 1: Complementary filter for calculating pitch roll angles designed. Spent approximately 7 hours.
      * Task 2: Estimation of height was not completed, only high level design. Spent approximately 10 hours.
      * Task 3: Filter for ultrasonics for object avoidance not yet developed.
      * Task 4: GPS filter not yet designed
    - Simulate and test noisy sensor model (10 hours)
      * Task 1: Filter for pitch and roll tested only, approximately 2 hours.
      * Task 2: Rest of noisy sensors and filters not tested since not yet developed.
    - Auto landing function (10 hours)
      * Complete: Design is complete and ready to be exported into Vrep.
      * Spent approximately 10 hours
    - Auto take off function (10 hours)
      * Complete: Design is complete and ready to be exported into Vrep.
      * Essentially the same function as auto landing. No time spent.
    - Meetings (35 hours)
      * Spent more than 35 hours with a few smaller meetings for other functions. Approximately 40 hours.
  + Ryan (122 hours) - 7:07
    - Finalize BOM PCB parts (2 hours)
      * Complete
    - Wiring data bus between sensors to microcontroller in board design (3 hours)
      * Complete
    - Wiring voltage rails to all components (4 hours)
      * Complete
    - Wiring microprocessor to microcontroller, receiver and pinouts for servos and ESC (3 hours)
      * Complete
    - Verify PCB with power management (4 hours)
      * Complete
    - Send out PCB design to manufacturing (1 hour)
      * Complete
    - Remove ECE 121 repo within Barone2 repo and re-upload ECE121 C programming code to Barone2 repo (1 hour)
      * Complete
    - Program C libraries for Linear algebra, integration, and other functions needed for controls (16 hours)
      * Incomplete, working on fixing voltage rails, rearranging sensors and microcontroller away from voltage rails.
    - Program C libraries RC response (16 hours)
      * Complete
    - Program C Libraries for autonomous (16 hours)
      * Incomplete, in progress by George
    - Program C libraries automated landing and takeoff (16 hours)
      * Incomplete, found an alternative way for landing and takeoff
    - Group meetings (25 hours)
    - Sub-team meetings (15 hours)
      * Incomplete
      * Only 5 hours of meetings
* **Team Improvements**: 7:12
  + Sprint should have been shorter so goals could have been adjusted
  + Got better at working together within sub-groups
  + Task time was estimated very incorrectly
* **Individual Improvements: 7:16**
  + Dylan- 7:16
    - Over confident (especially related to 3D printing
    - Need to stop assuming things will go as planned (leaving more room for error)
    - Will need more help going forward, much of fabrication is at least a 2 person job
  + George- 7:18
    - Should be less stubborn with trying to make tasks work. PID autonomous severely delayed controls progress, should have changed approach earlier.
  + Isaac- 7:19
    - Start work earlier in the day and manage my time more effectively
    - Ask for help outside of team meetings
    - Give more input during team meetings
  + Jeremy- 7:20
    - Needs to ask other team members if they need help more often when tasks are getting stuck behind others
    - Clearly define tasks better or what needs to be worked on that are not exactly tasks
  + Ryan- 7:21
    - Ask for help on C programming tasks when I don’t understand
    - Be proactive about asking other team members if they need help
  + Leon- 7:22
    - Spent too much time on beginning of tasks and didn’t get around to future tasks
    - Need more optimized daily routine
* **Next Goals**: 7:23
  + Dylan- 7:24
    - Finish 3D printing, related tasks
      * Print parts attach parts to envelope
    - Help out with other tasks for sensors coding and simulation while I wait for hardware to be ready to add to prototype
    - Test prototype once electronics and remote control are ready
    - Get helium
  + George- 7:25
    - Design autonomous Controls
    - Tuning for all systems
    - Design rest of sensor filters
    - Assist with manufacturing
  + Isaac- 7:26
    - Complete prototype fabrication
    - Add closed loop control to simulation
      * Find out how to convert C to Lua
      * Edit code to fit V-rep
  + Jeremy- 7:27
    - See how correct motor and servo estimations were with actual testing with Leon
    - Assist other team members with coding
  + Ryan- 7:28
    - Get started on V2.0 PCB and fix all issues with V1.9 board when its working
    - Ask to help other team members when I have time
  + Leon- 7:29
    - Finish up remote control implementation
    - Put together first PCB board with all parts and test hardware as fast as possible to find bugs
    - Start autonomous control implementation, at least create a structure to just plug in numbers for when autonomous control design is finished
  + Team Goals
    - Report writing-
    - Put together complete drone
    - Attempt first drone flight
* **Other Business**- 7:30
  + Final report should be started by each team member over the course of this week
  + Sprint report should be started by Wednesday, and submit it by Friday
  + Next sprint will be started sometime this week

Meeting End: 7:35

Sprint 7 Start

Long Flight Time Buoyant Drone April 30, 2021 6:00 PM(PST)

horizontal lineATTENDEES

* Excused absences: N/A
* Unexcused absences: N/A
* Late: N/A

## AGENDA

* Administrative Stuff
* Sprint Reports
* Leon: Still working with the receiver, using C++ experience in other class to switch over with the raspberry pi

6:05

* Jeremy: Will try to test motors next with Leon
  + Else was just working on writing the final report

6:07

* Isaac/Dylan: 3D printed ultrasonic mount
  + Finished envelope sewing, currently working on inflating balloon inside of envelope as a test

6:09

* George: Seeing if servo speed can be inputted into the controls system for better responses

6:10

* Ryan: Catching up with ordering sparkfun parts that were delayed. Digikey is also shipped, waiting for delivery

6:11

* Weight allocation columns have been added for actual weight of components
  + This is to make sure the weight budget is still within limitations
* Sprint report will be finished on friday
* Everyone should have slides to show by friday for TA meeting

6:14

* Planning for writing the final paper
  + Hours will be assigned in sprints to work on writing, should be specific in the section of writing that is assigned instead of hours worked
* Sprint 7 will be started on Friday
  + Goals should not be defined per person, but related to the areas that need work
  + SCRUM master will be Jeremy
* Define Goals (General, see where we need dependencies etc) 6:20
  + Hardware
    - Finish fabrication of PCB design and test bugs and power usage
    - Finish drone prototype
    - Test RC on drone prototype
  + Software
    - Autonomous and remote control implementation in sim
    - Finish remote control implementation in software
    - Implement autonomous control in software and test in simulation
    - Implement closed loop remote control in software and test in simulation
    - Design and program the state machine
    - Fix V1.9 PCB bugs in V2.0
    - Order V2.0 PCB
    - Implement inductor capacitor circuit design for 1.8V, 3.3V and 5V rails in V2.0 PCB
  + Miscellaneous
    - Work on design report
* Define End Date 6:32
  + Sprint end: talk to tanner about sprint goals before deciding on end date
* Tasks (Specific) List Requirement ID if available. Time estimate
  + Leon (**130 hours**) - 6:49
    - Assemble first PCB board with all components and test for bugs (**15 hours**)
      * Solder PCB board (5 hours)
      * Test for bugs (10 hours)
    - Get total system power draw (**2 hours)**
    - Finish remote control implementation (**15 hours**)
      * Finish connecting RC receiver to Raspberry Pi (5 hours)
      * Implement servos and motors to move in four basic directions (10 hours)
      * Implement servos and motors to move in any direction (10 hours)
    - Implement system state machine with remote control functionality (**20 hours**)
      * Implement state machine for PIC32 (10 hours)
      * Implement state machine for Raspberry Pi (10 hours)
    - Implement autonomous control (**20 hours**)
      * Implement Raspberry Pi data processing (20 hours)
    - Add autonomous control functionality to system state machine (**20 hours**)
      * Add autonomous control to PIC32 state machine (10 hours)
      * Add autonomous control to autonomous control state machine (10 hours)
    - Write sections for report (**20 hours**)
      * Sensors programming (5 hours)
      * Remote control implementation (5 hours)
      * Autonomous control implementation (5 hours)
      * System state machine (5 hours)
    - Group meetings (**8 hours**)
    - Sub-team meetings (**10 hours**)
  + Jeremy (63 hours) - 6:51
    - Test Motor Power at different throttles and compare it to estimates(5 hours)
    - Test Servo Power and compare it to estimates(3 hours)
    - Adjust Power budget with tested power values(2 hours)
    - Group meetings (8 hours)
    - Sub-team meetings (10 hours)
    - Writing Final Report Chapter 7, (10 hours)
    - Write Final Report Chapter 12, legal and safety concerns(10 hours)
    - Help Leon with state machine coding(15 hours)
  + Isaac (79 hours) - 6:53
    - Finish adding noise to sensors in sim (7 hours)
    - Implement closed loop Finishing V-rep (25 hours)
    - Finish other 3D printing parts (10 hours)
    - Attach 3D printed parts to envelope (10 hours)
    - Inflation test of lift bag inside envelope with air (5 hours)
    - Attach servo and motor shafts to brackets (4 hours)
    - Writing simulation section (21 hours)
    - Group meetings (8 hours)
    - Sub-team meetings (10 hours)
  + Dylan (100 hours) - 6:53
    - Finish other 3D printing parts (10 hours)
    - Attach 3D printed parts to envelope (10 hours)
    - Inflation test of lift bag inside envelope with air (5 hours)
    - Attach servo and motor shafts to brackets (4 hours)
    - Add ultrasonics to bracket (1 hour)
    - Add electronics to gondola (5 hours)
    - Wire prototype (10 hours)
    - Second Inflation test of lift bag inside envelope with air (5 hours)
    - Order helium and pick up helium (3 hours)
    - Do initial RC test at Delaware (10 hours)
    - Start Helium loss test (3 hours)
    - Writing Considerations of a buoyant drone(16 hours)
      * Intro
      * General goals
      * Implications of a buoyant drone
      * General design overview
    - Group meetings (8 hours)
    - Sub-team meetings (10 hours)
  + George () - 6:57
    - Implement and test closed loop RC 15
    - Design autonomous controls 25
    - Implement and test autonomous 15
    - Test auxiliary functions 15
    - Design filters 15
    - Design estimators 20
  + Ryan (72 hours) - 7:01
    - Fix V1.9 PCB bugs in V2.0 (20 hours)
    - Order V2.0 PCB (1 hour)
    - Order new parts for V2.0 (1 hour)
    - Implement Inductor Capacitor circuit for 1.8V, 3.3V, and 5V (10 hour)
    - Help coding with George and Leonid (20 hours)
    - Sub-team meeting(10 hours)
    - Final Report (10 hours)

Etc: 7:07

* Writing sprint 6 report

Meeting End: 7:40

**4/29/21 7:00 - 7:12pm**

* Leon: Sprint report will be done by tomorrow’s meeting

7:02

* Jeremy: Working on writing final report and slides
  + Also will be testing servo power with Leon

7:03

* Dylan: 2 Inflation tests were done
  + 2nd test was done to see circumference of balloon
    - Balloon itself is off a little bit to shorten top circumference
    - Lift bag has a small hole, another has been ordered
  + Need to try to get internal support out of the envelope

7:07

* George: Unable to work today due to other work

7:08

* Ryan: Solder has been delivered, allowing Leon to be able to Solder onto the PCB board

7:12 END

**4/30/21 4:00 - 7:12pm**

Meeting with TA Tanner

* Use ADS for trace width calculation to ensure maximum power transfer from trace in PCB
  + Parameter can also be found from boardhouse

4:05

* Switching regulator noise can be eliminated, but it is unknown as to if the noise would actually affect the components that it is powering

4:10

* Last design review will be a design “defense” where we have to defend our design choices

4:12

* Design considerations when sizing the envelope needs to be put on the slide

4:18

* Tela likes bullet points while petersen does not

4:24

* Specify noise is actually the voltage ripple
* Coulomb counting will be a better way to determine battery percentage
  + Depth of discharge can be used with this

4:40

* Debating on whether to introduce the slides of controls, because there are many parts in the greater result that is found

4:47

* Last sprint doesn’t have to be all writing, some groups may need extra time to work on project
* Paper is due on June 7th

4:52

* If tasks need to be split up, they can be assigned with their hours to other people

4:56

* Milestones that need to be done before the quarter are testing the 1st iteration and completing the 2nd iteration

5:01

* Soldering the board together should focus on making sure everything is powered
  + Then you can worry about everything else
  + Also take time soldering the board

5:10

Sprint Reports:

* Leon: Did some work coding and finished his part for the sprint report

5:13

* Jeremy: Finished up slides and will be writing more for the final report tonight

5:14

* Dylan/Isaac: Need to put work into other classes due to putting them off for fabrication
  + However, they did finish the inflation test

5:15

* George: Made slides
  + Now working on how to do autonomous controller, what to feed it for the autonomous functions

5:16

* Ryan: Sparkfun is on its way, needs to work on slides

5:17

* Need to rearrange first couple of slides to integrate the work shown more to not make it individualized

5:18

* Sprint starts today
* Previous sprint report will be done after the product owner feedback is done
* Gantt chart and slide reviews will be done on Monday

**5/1/21 7:00 - 7:09pm**

* Leon: Still writing code on Raspberry Pi, getting ready to solder at least power components onto PCB

7:02

* Isaac: Reviewed V-REP code for noise analysis

7:03

* Dylan: started another print, backplates for servo brackets came out well.
* Weather balloon should arrive on wednesday

7:05

* George: Found different way to calculate gains so he is exploring it to try to reduce overshoot on the height regulator

7:08

* Ryan: Checked shipment of Sparkfun, delivery May 4th

7:09 END

**5/2/21 7:00 - 7:09pm**

* Sprint Updates:
* Leon: Receiver output is able to be read with the protocol
  + Now needs to parse the data on the raspberry pi

7:02

* Jeremy: Working on more writing for final report

7:03

* Isaac: Working on adding torques one meter away from the center of the balloon

7:04

* Dylan: Stuck with other class work, Feedback on the sprint report should be done by the meeting tomorrow

7:05

* George: Working with augmenting the matrices in order to do integrals on them

7:06

* Ryan: Has been stuck with other class work

7:07

* ETC: Finish slides by Tuesday for submission for review
* Soldering tests should be done soon for testing of the PCB board

7:08 END

**5/3/21 6:00 - 7:03pm**

Sprint Updates:

* Leon: Finished with testing the RC receiver protocol, will be working on different directions next

6:01

* Isaac: Coding Vrep closed loop RC conversion

6:02

* Jeremy: Working on writing, also sticking with RC receiver method for measuring battery

6:03

* Dylan: New lift bag came in, propellers were lost in the delivery, new ones were ordered

6:04

* George: Baskin funding will be sent to Dylan
  + Overshoot for height control is fixed, will be reduced enough for controls

6:05

* Ryan: Will work on slides for Friday

6:06

* Feedback was delayed for the sprint report, will be done by tomorrow
* Slides should also be done tomorrow
* Another inflation test will be done tomorrow for the new balloon

6:07

Gantt Chart Updates

* RC closed loop control complete
* Testing motors and servos delayed to this friday due to delivery issues

6:14

* Updating design review intro slides to be less individualized and a general overview of the project

6:20

* Working on milestones to include on the first slides

6:35

* Everyone should work on notebooks
* George has another presentation for controls

7:02

* Tomorrow’s workshop is CIED workshop and modified office hours
* Jeremy and Isaac can attend

7:03 END

**5/4/21 7:00 - 7:57pm**

* Sprint Updates:
* Leon: Working on coding basic maneuvers, forward, turning, and backwards

7:02

* Jeremy/Isaac: Unable to write much today, went to workshop and identified two presentations we are supposed to do do

7:05

* Dylan: Will be going to campus to do 3d printing after the meeting

7:06

* George: Working on using augmented matrices to get new gains, error causing destabilization is being investigated

7:07

* Ryan: Working on finishing slides and trace widths

7:08

* Going over response to product owner feedback in final report

7:20

* Finalizing executive summary

7:28

* Team Goals
  + Report writing- First drafts of five chapters to be completed.
  + Put together complete drone
  + Attempt first drone flight

7:33

* Submitting slides and sprint report tonight

7:35

* Fixing slides to be integrated between certain team members
* Ryan/Jeremy: Power
* Dylan/Leon: Hardware & fabrication
* George/Isaac: Software and Controls

7:57 END

**5/5/21 6:00 - 7:03pm**

* Sprint Updates:
* Leon: Working on coding for direction procedure
  + Tomorrow will do motor/propeller and servo test

6:04

* Jeremy: Unable to work on writing, but did fix slides
  + Fixed voltage divider for RC receiver after miscalculation

6:05

* Isaac: Inflation test with balloon with sewing attached
  + Helped Dylan with 3d printing the gondola

6:06

* Dylan: Printing Gondola, ran out of filament at 98% complete
  + Should be fine, but will order more filament

6:11

* George/Ryan: Unable to do much work due to midterms

6:14

* Working on comments based on the slides by Tela
* Individual work on slides and other work

7:03 END

**5/6/21 7:00 - 8:45pm**

* Sprint Updates:
* Leon: Working on more coding, no slides made yet
  + Found missing propellers when organizing packages
  + Also was weighing materials for weight allocation

7:06

* Jeremy: Will be done with Ch7 draft in the next few days and will work on other chapter after

7:08

* Isaac: Starting on writing his chapter in the final report
  + Should make a slide for sim or inflation test

7:09

* Dylan: Got new filament for Printer, more parts will be printed over the weekend

7:10

* George: Having issues with the saturator, looking for errors
  + Got 500 dollars for funding from Porter

7:11

* Ryan: Also should start on writing his chapter in the final report

7:13

* Individual slide work before practice presentation

8:02

* Practice Run-through of design ⁹review

8:45 END

**5/9/21 7:00 - 7:14pm**

* Sprint Report
* Leon: Working on code for basic movements of servos

7:04

* Jeremy: Meeting with leon to test motors and other parts he has
  + Also responded to feedback from George on Chapter 7 outline
  + Lastly was looking at voltage alarms as a replacement

7:08

* Isaac: Started chapter outline

7:09

* Dylan: Read some chapter outlines and gave feedback
  + Need to make sure servo brackets are right size to fit servo

7:10

* George: doing the estimators, and making the matrices for autonomous control, but haven't figure out how to approach the controls response yet

7:11

* Ryan: Will get started on chapter outline

7:12

* This sprint will end on the 14th, this Friday

7:14 END

Peer Review meeting

Long Flight Time Buoyant Drone 5/10/2021 6:00 PM -(PST)

horizontal lineATTENDEES

* Excused absences:
* Unexcused absences:
* Tardy:Ryan

## AGENDA

* **Gantt Chart Updates:** 6:03
  + RC Control basic commands 85% done
  + Closed loop RC control in Matlab is complete
  + Testing motors and servos 10% done
* **Check in:** 6:11
  + Jeremy/Leon: Tried to test motor and servo power with Jeremy but didn’t have the necessary materials

6:14

* + Isaac: Working on his own chapter outline

6:15

* + Dylan: Tried to 3d print more parts but wasn’t able to get it working

6:16

* + George: Needs to give Isaac RC code to put in the sprint

6:17

* + Ryan: Started on Chapter 5 outline and posted for review by team
* **Feedback:** Each person will receive feedback from each of the team members and themselves pros and cons, this should be the same feedback you gave on the evals. **BE HONEST**

**6:19**

* + Dylan
    - Feels like he is doing well in the design reviews, staying consistent in the team meetings
    - More mistakes usually happen when things are rushed, has been needing more help with his work
    - Needs to be more proactive in scheduling
    - Putting in more time than most of the team, but needs to watch overconfidence in 3d printing especially
    - Has been working consistently in fabrication over the last sprint
    - Has been getting more proactive in encouraging peer-review

6:27

* + George
    - Doing better on the technical side, but more work needs to be done
    - Making effort to bring the rest of the team up to speed with controls
    - Giving more feedback but also trying to be careful not to be too aggressive
    - Did very well in the last design review, spending a ton of hours on work

6:35

* + Isaac
    - Feels like it is his slowest sprint, could have done more with simulations but it didn’t work out
    - Has been helping Dylan with fabrication, so could not work on other things
    - Got better at presenting his own work
    - Still quiet in the meetings
    - Overall improved since the last sprint with making sure work is reviewed

6:42

* + Jeremy
    - Didn’t have as much to do until now, until in person testing
    - Didn’t put enough thought into design considerations
    - Online environment has been hard, should ask for help more
    - Needs to work on writing and presentation skills
    - Offers help to other people, finishes work very quickly
    - Good at looking for tasks, and has done the most work for writing
    - Be more careful with calculations and design considerations
    - Take feedback better and incorporate it better into work

6:54

* + Ryan
    - Little work, so needs to ask for more work to do from other members since shipping delays have been occurring
    - Time delays due to time zones are still a trouble, since he is not awake at the same time as most of the team
    - Can focus more on writing as being proactive, can research or write the final report if more work needs to be done
    - Has been a little late to some meetings
    - Some oversights with shipping and PCB have been issues

7:02

* + Leon
    - Haven’t had much to show since he has been held back with the receiver work
    - Will be working more with Jeremy and he can help out with some work
    - Has been doing a lot of work and communicating trying to keep up with the work he is doing
    - Should present work to the team more for review
    - Has been helping other team members as well with his own work
    - Last design review was his best since he was able to describe his own work very well
    - Can ask the team more for help in a video call if some hardware issue comes up
    - State Machine/Flow chart also needs to be redone
* **Group discussion:** How we can improve as a team, what changes should we make to the team, what should our workflow look like going forward.

7:12

* + Was kinda burnt out when it comes to reviewing slides
  + Team is getting burnt out overall, need to finish strong
  + Discord has been being used more effectively with peer review and TA help
    - Peer review needs more improvements
  + Gantt Chart has been being used well
  + Trello is very far behind
  + Try to meet in person with whoever is available, since the team is divided by area
  + Report drafts need to be updated since they all need to be the same format
    - Outlines need to be done first and reviewed before actually writing
* **Individual Improvement:** Everyone says one or two things that they are going to improve on before the next design review.

7:21

* + Dylan
    - Ask for help earlier don't be overconfident in everything(expect mistakes)
    - Don't panic/rush when issues arise

7:24

* + George
    - Get better at math
    - Be more forward in pointing out errors/mistakes but make sure to be respectful

7:25

* + Isaac
    - Participate more on critiquing other people’s work
    - Spend more time in the beginning of the week

7:26

* + Jeremy
    - Work more in-person with Leon, making effective power tests for the components available
    - When writing, plan ahead and do a good outline before trying to write

7:27

* + Ryan
    - Ask for help when no tasks are at hand, be proactive about getting tasks from others
    - Show up on time to team meetings

7:28

* + Leon
    - Need to update team with the work I’m doing, especially this week with so much to do
    - Ask for more help, especially with any hardware connections

Meeting End: 7:30 PM

**5/11/21 7:00 - 7:10pm**

* Jeremy: Working on power switch implementation
  + Also working on Ch11 outline

7:01

* Isaac: Updating Outline and code for closed loop RC

7:03

* Dylan: Mechanical part is having issues
  + Trying to fix the 3d printer, thermistor is broken
  + Other parts will need to be printed without Nylon

7:05

* Leon: Had midterm today, couldn’t work

7:06

* George: Made starting slides for presentation slides
  + Also gave feedback on some chapters from other members
  + Also changing control components back into commands for simulation

7:07

* Ryan: Worked on outline for Chapter 5, abstract is done

7:08

* Work on outlines and chapters when there is nothing to do, however other tasks relating to the project takes priority
* Tomorrow, we can go through slides for the presentation and also peer review outlines that have been drafted
* Jeremy, Leon, and Dylan will be meeting tomorrow in person to do hardware work

7:10 END

**5/12/21 6:00 - 7:32pm**

* Jeremy/Leon/Dylan: Got the motor with propellers working with the RC controller
  + Also tested servos with a load working
  + Next test will get thrust capabilities of motor and propeller depending on throttle and also testing the power requirements per throttle bracket
  + Servo brackets could not fit with the wire and the servo
    - Servo shaft does fit with the servo, but had the wrong size to screw the motor onto

6:10

* Isaac: Running RC code in simulation, also finished outline of chapter

6:11

* George: Added converter to turn forces from controller into servo angles and throttles
  + Gave feedback on some chapters of the writing, also made a list of common writing errors we were making

6:12

* Ryan: Working on slides
  + Also applied switching regulators to PCB

6:13

* Smaller nylon filament ordered for fabrication, should be all printed by the end of the sprint

6:15

* Looking at pitch presentation slides to turn in for the pitch event

6:50

* Review of 6 chapters that have been worked on by each of the 6 team members

7:30

* Soldering should be done as soon as solder is fixed, since oxidation causes issues with current solder.

7:32 END

**5/13/21 7:04 - 7:10pm**

Jeremy excused, internet issues and ROTC emergency

* Leon:
  + Bought new solder tip and flux, about to assemble PCB

7:04

* Isaac:
  + Looking for way to convert Lua to C
  + Looking for remote api for vrep

7:05

* Dylan:
  + Set up new printer with new head
  + Printed gondola feet
  + Working on servo brackets

7:06

* George:
  + Trying to figure out best way to implement autonomous control for drone

7:07

* Ryan:
  + Implemented pinout for switching regulators on PCB
  + Rearranged surface mount for coaxial cable for GPS on PCB

7:08

* Other:
  + Got approval from Jonathan to use picture
  + Try to finalize slides with Tanner tomorrow

7:10 END

**5/14/21 5:50 - 7:49pm**

Sprint Reports

* Leon: PCB soldering had issues, breakout boards will have to be used or 1-2 layer PCBs instead of current PCB and use jumper wires

5:54

* Jeremy: Will be doing a power test with Leon tomorrow in the late afternoon

5:55

* Isaac: Looking at remote control into simulation code, Matlab installed for better transitions
  + Closed loop RC in simulation is one week out

5:57

* Dylan: Every 3d part is now printed, some may need to be reprinted if dimensions do not match up

6:00

* George: Working on idea hub application

6:01

* Ryan: PCB soldering isn’t available anymore, due to issues, will have to decide fixes with breakout boards, including if any need to be printed.

Application:

* Worked on Idea-hub application and slides

7:49 END

Sprint 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 autonomous control 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 (84 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 (21 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
    - dimenions
    - 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

**5/16/21 7:00 - 7:17pm**

* Leon/Jeremy: Did servo and motor power tests
  + Servo and motor power are both a lot less than expected

7:09

* Isaac: Imported Vs code into V-rep

7:12

* Dylan: Was busy with other lab work

7:13

* George: Working on revising writing and giving comments

7:14

* Ryan: Will be helping with figuring out how to wire

7:17 END

Sprint 8 Start

Long Flight Time Buoyant Drone May 17th, 2021 6:00 PM(PST)

horizontal lineATTENDEES

* Excused absences: N/A
* Unexcused absences: N/A
* Late: N/A

## AGENDA

* Administrative Stuff
* Sprint Reports

6:01

* + Leon
    - Working on startup procedures for drone flight
    - Wire terminal will also be needed to solder onto

6:05

* + Jeremy
    - Inputting values from servo and motor test
    - Will be doing a final servo test with a motor attached

6:08

* + Isaac
    - Helping Dylan with inflation test and working on final report

6:09

* + Dylan
    - Needs a pickup truck to carry the helium, will also need to buy a gauge
    - Pockets of the envelope cause more drag than expected

6:12

* + George
    - Using control points to optimize the correction

6:15

* + Ryan
    - Worked on chapter 5 of the final report

6:18

Etc:

* Got accepted for the first round of the pitch competition, need to follow up with them for practice pitch

6:23

* 8:30 thursday will be the pitch practice
* Define Goals (General, see where we need dependencies etc)

6:29

* + Hardware
    - Hook up minimum hardware to get drone to fly
      * 3D parts held taught by balloon
      * uC32, Raspberry Pi, ESC, servos, motors, wire terminals, remote controller receiver
    - TEST FLIGHT W/ Helium
    - Sensor array working with uC32
    - uC32 sensor data sending to Raspberry 3 B+
    - uC32 output 4x PWM signals to ESC (via OC pins)
    - uC32 output 4x PWM signals to servos (via digital I/O
    - Finish Servo Power test
  + Software
    - Finish procedure to control servos/motors directly with remote controller
    - Implement remote and autonomous control in VREP

6:41

* Define End Date
  + May 28th

6:42

* Tasks (Specific) List Requirement ID if available. Time estimate
  + Leon - (**85 hours**)
    - Finish servo testing with motor load with Jeremy **(4 hours)**
    - Finish procedure to control servos/motors directly with remote controller **(15 hours)**
      * Code procedure (10 hours)
      * Test procedure (5 hours)
    - 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)
      * Test drone with electronics (5 hours)
    - Implement system state machine for remote control functionality **(15 hours)**
      * Code state machine (5 hours)
      * Test state machine (10 hours)
    - Add sensor checking and sampling to system state machine **(15 hours)**
      * Code state machine (5 hours)
      * Test state machine (10 hours)
    - Wire up sensors to drone (IMU, ultrasonic, altimeter, GPS, and barometric) **(6 hours)**
      * Wire electronics (3 hours)
      * Test drone with electronics (3 hours)
    - Group meetings **(15 hours)**
    - Sub-team meetings **(5 hours)**
  + Jeremy (75 hours) -
    - Finish Testing Servos with motor load(4 hours)
    - Buy Wire terminal for battery distribution(2 hours)
    - Order helium and pick up helium (3 hours)
    - Revise Power Management chapter(10 hours)
    - Research legal/safety requirements(6 hours)
    - Finish draft of ch11 legal/safety(10 hours)
    - Wire prototype(10 hours)
    - Add electronics to gondola (5 hours)
    - Power test with all parts(5 hours)
    - Group Meetings(15 hours)
    - Subteam Meetings(5 hours)
  + Isaac - 82 hours
    - Finish implementing closed loop remote control (25 hours)
      * Import code to client program (10 hours)
      * Test and debug (15 hours)
    - Finish implementing autonomous control (20 hours)
      * Import code to client program (5 hours)
      * Test and debug (15 hours)
    - Help with fabrication testing(7 hours)
    - First draft of simulation chapter(10 hours)
    - Group meetings (15 hours)
    - Sub-team meetings (5 hours)
  + Dylan - **81 hours**
    - Attach 3D printed parts to envelope (6 hours)
      * Gondola (1)
      * Servo brackets(4)
      * Ultrasonic(1)
    - Inflation test with 3D parts (2 hours)
    - Attach servo and motor shafts to brackets (4 hours)
    - Add ultrasonics to bracket (1 hour)
    - Add electronics to gondola (10 hours)
    - Inflation test with all electronics (2 hours)
    - Order helium and pick up helium (3 hours)
    - Do initial RC test at Delaware (10 hours)
    - Start Helium loss test (3 hours)
    - Writing Considerations of a buoyant drone draft(10 hours)
      * General design overview outline (2)
      * Upgrading outline to draft (4)
      * Revisioning (4)
    - Writing Lift Bag and Drone Frame Design outline (10 hours)
      * Lift Bag Design (3)
      * Gondola Design (3)
      * Ultrasonic Mounting (1)
      * Servo Mounting (3)
    - Group meetings (15 hours)
    - Sub-team meetings (5 hours)
  + George (111 hours) - (Can contribute additional time since capstone is his only course)
    - Update Closed Loop Control System with actual measurements (4 hours)
    - Design feedback loop and with integral for autonomous controls (4 hours)
    - Tune Closed Loop Control System to meet design requirements (4 hours)
    - Simulate State Response in Matlab for the Closed Loop system to confirm system response (3 hours)
    - Tune autonomous system to meet design requirements (7 hours)
    - Design control method for feeding control system next positional values (6 hours)
    - Simulate State Response in Matlab for the Closed Loop system to confirm system response (5 hours)
    - Design estimator to determine drone position using accelerometer and GPS data (5 hours)
    - Integrate estimators with the control system (1 hour)
    - Test state response for closed loop RC with estimators integrated (2 hours)
    - Test state response for Autonomous with estimators integrated (2 hours)
    - Export Closed Loop RC to Vrep (3 hours)
    - Adjust Closed Loop RC gains according to Vrep Response (3 hours)
    - Export Autonomous to Vrep (3 hours)
    - Adjust Autonomous Gains according to Vrep Response (3 hours)
    - Complete Chapter 7 Outline (5 hours)
    - Complete Introduction Outline (4 hours)
    - Group Meetings (15 hours)
    - Subteam meetings (15 hours)
    - IdeaHub Pitch (10 hours)
  + Ryan (90 Hours) -
    - Complete wiring diagram for dev boards to sensors, servos, and voltage regulator (5 hours)
    - Complete wiring design for V2.0 PCB (10 hours)
    - 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)
    - Order 3.3V, and 5V switching regulator for servo, sensors array, microcontroller, and microprocessor (2 hours)
    - 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)
    - Finish Section 2 State Machine Intro
      * Explain how sensor array data determines state machine (5 hours)
    - 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)
    - Group Meeting (15 hours)
    - Sub-team meetings (5 hours)

7:07

* Gantt Chart Updates

Meeting End: 7:19

**5/18/21 7:00 - 7:07pm**

* Leon: Unable to do much due to other class assignments
  + Will be ready to test motor and servo code when fabricating tomorrow
  + WIll keep the drone to put in wire terminal and new ESC

7:01

* Jeremy: Will be doing final tests for motor and servo power tonight

7:02

* Isaac/Dylan: Inflation test, all parts were screwed onto the gondola
  + Both balloons popped, ordered 2 more

7:03

* George: Sick, could not work

7:04

* Ryan: Did wiring diagram to fabricate drone tomorrow

7:07 END

**5/19/21 6:00 - 7:40pm**

* Sprint Reports:
* Leon/Jeremy/Dylan: Planning to wire, but issues with motor and ESC delayed it
  + New ESC already arrived, 6 new motors were ordered just in case
  + Old motor data is useless because new motors had to be gotten due to very long wait times on new motors

6:05

* Isaac: Working on Vs code and having trouble with including C code

6:06

* Dylan: Put hot glue on the envelope parts to soften sharp ends to prevent more popping
  + Gondola left at Leon’s house after most parts were tested to fit together

6:08

* George: Working on autonomous, also got an email confirming zoom for pitch meeting

6:09

* Ryan: Working on final report chapter

6:11

* 2 things today: Practice pitch and start design defense slides

6:15

* New info: Only one person can present the pitch for practice
* Dylan and George will be presenting the pitch

6:17

* Working on pitch slides

6:36

* Practice pitch run

6:43

* Adjusting pitch slides based on pitch run

6:54

* Working on Design defense slide outline
  + Slides based on system technical requirements
  + Use one slide for each subsystem requirement

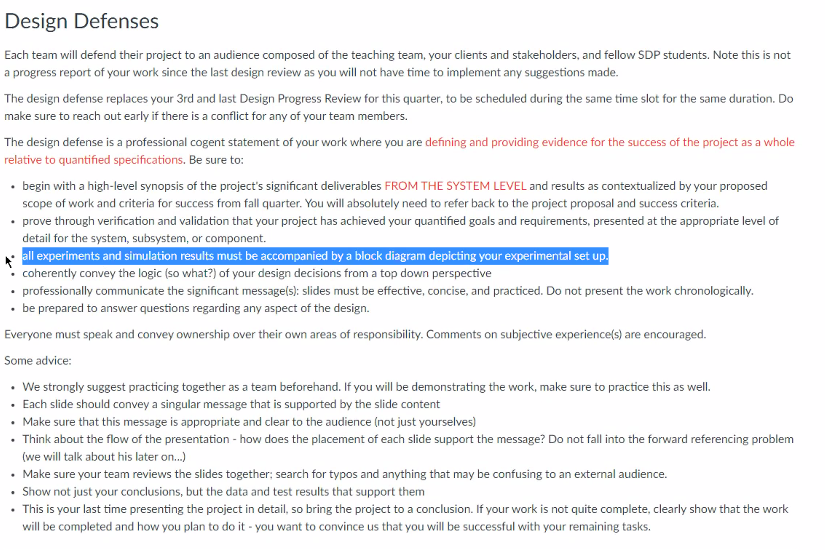
7:20

* Dylan and George practicing pitch run more while others work on design defense slides

7:40 END

**5/21/21 4:00 - 5:34pm**

* Meeting with TA Tanner
  + Slides:
    - Should be system level overview
    - For each system requirement, say if it will be done/successful by the end of the quarter
      * Focus on client-set deliverables
    - For each Requirement, sub slides would be good to show how it was
    - For goals not met, explain why
    - Introduce autonomous and remote control requirements first, then talk about sensors and microcontroller, servos and motors
    - Move cost slide to the end
    - Drone Safety slide: switching regulators for heat doesn’t belong there?
    - Helium Leakage slide: can do one day test of helium loss and estimate for a week
    - FAA Compliance slide before cost slide
    - Make sure to add verification to prove specs



* Slides are good, mostly need results due to delayed testing
* Sensors need to be specified whether or not they work and meet the requirements

5:02

* Burnt out motor required replacing all the motors
  + Be honest about why, also say if requirements were not met due to this but would have been met otherwise
* Everyone must talk about their own area of responsibility
* Work that was not correct should not be talked about, focus on the completed work

5:25 end of TA meeting

* Sprint Reports:
* Leon: Getting ready to test the motors tomorrow, soldering and fixed the servo/motor code

5:27

* Jeremy: Working on slides, will be testing new motors tomorrow with Leon

5:28

* Isaac: Keeps getting include errors in C code to Vrep/Vs

5:30

* Dylan: Finished the pitch presentation, new schedule for next week will come out soon

5:31

* George: Needs to figure out how to avoid overshoot with waypoint

5:32

* Ryan: Trying to write section 2, state machine and the PCB

5:33

* ETC: Everyone work on slides over the weekend
* Sprint report will also be done over the weekend

5:34 END

**5/23/21 7:00 - 7:14pm**

* Sprint Reports
* Leon/Jeremy: Got better thrust and power values while testing both motos

7:03

* Isaac: Having trouble compiling, working on C++ with new code trying to compile

7:04

* Dylan: Ordered new ESCs to be delivered to Leon
  + Will be going tomorrow to pick up helium with Jeremy and to meet with Gordon

7:07

* George: Helping Isaac figure out how to fix compiling error

7:08

* Ryan: Fixing traces for V2.0 PCB

7:10

* Keep working on design defense slides

7:13 END

**5/24/21 6:00 - 8:00pm**

* Sprint Reports
* Leon: Waiting for ESCs, will be testing with Jeremy after the meetings
  + Also working on design defense slides

6:02

* Dylan/Jeremy: Got helium and nozzle, also chain and lock to keep the tank at 2300 Delaware
  + New issue with not being able to fill drone with helium without proper procedures, sent an email to see

6:06

* Isaac/George; Testing more compiler issues, stuck with C++ code not compiling in Vrep

6:07

* Ryan: Met with power budget to redo the voltages required for sensor boards
  + Another Switching regulator ordered for other 5V parts other than servos

6:08

* Everyone needs to fill descriptions for sprint report

6:10

* Dylan and George will email to get form to sign up for next pitch slides

6:12

* Working on sprint report feedback and tasks

6:22

* Working on design defense slides

8:00 END

**5/25/21 2:00 - 4:00pm**

* Meeting with TA Tanner
  + Focus slides on if goals/requirements/deliverables were met and how they were verified
  + Really looking for verification on how engineering specifications were met
  + Power draw test
  + Semi-verified can be used with block diagram of power tests
  + If something was not met, explain if it could have been met or could be met in the future
  + If we have not tested it, say how we will test it

4:00 END

**5/25/21 7:00 - 7:15pm**

* Leon/Jeremy: Tested motor power and servo power
  + Servos will not stall with max thrust on motors, verified power
  + Motor power is verified as it was before
  + 4 in 1 esc is more efficient than the single ESCs
  + Verified that kill-switch work

7:10

* Isaac: Met with Alexey today to help fix Vrep simulation work

7:12

* Dylan: Did some work on chapter 2 outline
  + Redid inflation test and balloon didn’t pop after smoothening edges

7:13

* George: Made changes to pitch slides that will be presented on Thursday
  + Also still helping Leon on closed loop control in Vrep

7:15

* Ryan: Working on slides and chapter 5 outline for PCB
  + Finishing Eagle CAD for V2.0 PCB

7:16

* Design defense should focus on meeting requirements and how it was verified

7:20 END

**5/26/21 6:00 - 8:00pm**

* Leon/Jeremy/Dylan: Were able to get motors working on the drone, servos too but the servos had some glitches
  + Dylan will be meeting with Gordon tomorrow to fly with helium

6:03

* Isaac/George: Trying to integrate simulation code together, got stuck on a bug and couldn’t move on

6:04

* Ryan: Working on block diagrams and PCB verification slide

6:05

* Finishing spring sprint 3 report

6:30

* Dylan is back, going over feedback from slides and working individually

8:00 END

**5/27/21 7:00 - 7:20pm**

* Sprint Stand up
* Leon: Doing concrete results with sensors and video of servos and motors
  + Power tests were not done yet, will be done later today

7:02

* Dylan/Jeremy
  + Inflation test, 4.44kg uninflated, after adding air and helium it was 1.2kg
  + After it popped before flight testing, another inflation test happened but we didn’t have enough helium, final weighing 750g
  + Flight test was not done since balloon could not be fully inflated with helium because the motors were hitting the envelope
    - Balloon popped while trying to fill it up with more air
  + Helium test: after half an hour, got 100g heavier

7:08

* Isaac: Making progress with simulation with George and Leon’s help
  + Position, linear and angular velocity, and orientation is integrated
  + Still need remote control functions into the simulations
  + Goal is to finish by tonight

7:11

* George: Added synopsis slide at beginning saying if project was successful or not
  + Other feedback gotten from Tanner’s TA meeting
  + Also helping Isaac getting the sim working

7:13

* Ryan: Added diagram and slides for design defense
  + Verification for power supply to each sensor within the PCB and power tests needed

7:20 END

Sprint 8 Conclusion Meeting

Long Flight Time Buoyant Drone 5/29/2021 7:00-7:51 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), (43/75 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)
      * Incomplete
    - 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

**5/31/21 7:00 - 9:00pm**

* **Sprint Reports:**
  + Leon: Busy with programming assignment
  + Jeremy: Finish redoing ch7 power management
  + Isaac/Dylan/George: Working on pitch presentation and group poster.
  + Ryan: Worked on outline for ch5 for the PCB

7:02

* Tonight, need to work on poster for submission

8:55

* Posted submitted

9:00 END