**BARONE2 MEETING MINUTES W21**

**1/4/21**  **5:20 - 5:30pm**

* 3 things to do this week:

1. Complete the gantt chart(Due Wednesday 1/6/21)
   1. Priority, use last fall lecture as benchmark
2. Schedule a meeting with the instructors(Due Friday 1/8/21)
   1. Use whentomeet to find times where everyone is available
3. Complete updated materials request(Due Friday 1/8/21)

**5:30 - 6:30pm**

* Everyone downloaded microsoft office
* Figuring out how to get microsoft office to work
* Only one person can edit the microsoft office project app at once

**6 - 7pm**

* Working on Gantt Chart
* We will all create our own Gantt Charts and merge them together tomorrow
* Sent an email to USGS contact Jonathan Glen to set up a meeting to be a possible client

**1/5/21 3 - 4pm**

Meeting with Jonathan Glen, potential client at US Geological Survey

* Keep magnetometer as far away from vehicle as possible to reduce magnetic field interference
  + Any interference would need to be corrected for
  + Acceleration also has to be corrected for using drones to survey
* Gordon is involved in developing a drone mounted magnetometer system
  + Magnetometer is suspended from the drone platform by carbon fiber tubes and 3d printed parts
  + Magnetic field of drone is corrected for in the range of a few nanoteslas
* Current system is expected to be 1 meter long, around 1-1.5kg
* Shut off propellor engines when approaching survey site to avoid magnetic interference
  + There will still be remnant magnetic fields
  + Propellers higher on the drone with device suspended below drone
* Surveys would involve driving the drone in alternating lines, allowing to map a magnetic field
* We need to do more research to demonstrate the specific improvements on our design
  + Will be done through simulation and small-scale model testing
  + A full-scale model would be a good goal to finish by the end of the year, even if low quality
* Issues with merging magnetometer data with drone gps data to get good precision
  + Other things to focus are on propulsion, magnetic field interference, and sensor mounting/connecting
* Manual control of the drone is preferred, but gps positioning can work as well
  + Issues with wind control and flying as close to the ground as possible
* Naima Jackson - Sales Representative for Magnetometer

**1/5/21 7 - 9pm**

* Worked on Gantt Chart the whole time

**1/6/21 9:15 - 10:15pm**

* Finished Gantt Chart
* Decided on first-week meeting time w/ Tela on Friday, 1/8/21 at 12:45pm

**1/7/21 7 - 8pm**

* Updated bill of materials, materials request from BELS

**1/8/21 12:45 - 1:30pm**

* Meeting with Professor Tela Favaloro
* Gantt Chart
  + Pretty good overall, ready for day-to-day tasking
  + Put names/team members in resources column
  + Specify milestones, important tasks to complete
    - Include different phases and subphases of tasks
  + Be more specific what the goals are for each task within the time it takes
  + Highlight critical tasks in red
* Block Diagram, we made it worse somehow and we need to fix it again
* Make a google calendar with all of the classes and times anyone is unavailable
* Set a time for meetings twice a week
  + Plan a 2hr work session, everyone is working together on the project
  + Plan meetings between some team members to work on a specific part of the project at once
* For Discord, make different channels for different topics
* Prioritize tasks for team members to work on
  + Make sure everyone knows what tasks are available and what to work on next
  + SCRUM Software will help organize this

**1/8/21 7 - 8pm**

* Completed Google Calendar Assignment
* Completed BELS Materials Request

**1/11/21 9 - 10:00pm**

* Fixed Gantt Chart
  + Added names, milestones, critical path
* Finalized drone weight
  + 1kg weight total, 2.2lbs
* Decided two weekly meeting times
  + Discussion Tuesday 7:30-9pm
  + Work Thursday 7:30-9pm

**1/12/21 7:30 - 9pm**

* Worked on System Concept of Operational Flow Chart

**1/13/21 6 - 7:30pm**

* Updated success criteria matrix
  + Based on instructor comments
* Worked on System Technical Requirements

**1/14/21 7:30 - 9:30pm**

* Worked on System Technical Requirements
  + Some questions to ask tomorrow in TA meeting

**1/15/21 4:30 - 6:30pm**

* Meeting with TA Alexey
* Questions about Technical Requirements
  + Separate hardware and software requirements
  + Put sensor requirements as components
* Flowchart
  + Consider cases that cannot be detected by the system
  + Add AND or OR gates to simplify chart
* Completed System Technical Requirements

**1/17/21 5 - 6:30pm**

* Organized Trello App Scrumboard
  + Ryan is Scrummaster for sprint1
  + Turned in to Sprint0 assignment
* Completed System Concept Flow chart

**1/19/21 7:30 - 8:00pm**

* Spring Planning Meeting
* Short Meeting
* Stay on top of Trello assignments
* Vrep vs Gazebo
  + Gazebo is better for beginners
* Thursday meeting:
  + Update system block diagram

**1/21/21 7:30 - 9:30pm**

* Sprint Meeting
* Updated System block diagram
  + Arduino microprocessor added with microcontroller in drone
    - Arduino is better at sampling and controlling input/output
    - Raspberry Pi has own operating system
  + Added ultrasonic sensor for detecting nearby objects and ground
  + Servos for motor positioning
  + Added Camera for video streaming
  + Sensor: Sparkfun IMU MPU-9250
* Sprint Review/Planning Meeting
  + Merge Jeremy’s and Ryan’s Roles to get them more work in the beginning of the project as most of their work is later, what else can they work on?
  + What do we turn in for the sprint?

**1/22/21 4:30 - 5:15pm**

* Sprint review meeting with TA
  + Slides for tasks that are completed for design reviews
    - Design review in 2 weeks
    - Presentation on progress of project
  + Sprint report
    - Fill out template, include meeting minutes
  + If some members have less work early on, have them assist other team members, and they will have more hours to report on.
  + Put each of the microcontrollers on excel, add features and weighting factors for each
    - Future assignment to compare microcontrollers
  + Jan 25th
    - Intro to Pspice
    - Review of team scrum processes
    - (Possibly) Microcontroller workshop
  + CSE13E microcontroller is similar to the arduino

**5:15 - 6:00pm**

* Sprint debrief meeting
  + PCB schematics
    - Gotta download more libraries to connect modules
  + Force analysis is almost complete
  + For batteries, need higher voltage, lower current to minimize magnetic interference

**1/23/21 7:30 - 8:30pm**

* Worked on Sprint 1 Report
  + Inputted the tasks and hours divided by gantt chart categories

**1/24/21 7:30 - 9:30pm**

* Finished sprint 1 report

**1/26/21 7:30 - 8:30pm**

* Sprint 2 Scrummaster: Jeremy
  + Sprint will be from beginning meeting of Thursday 1/28/21
  + Goes until Tuesday 2/2/21
* CAD model in a working simulation with controls: Milestone
  + Simulation working - Isaac (est 6 hrs)
  + CAD model works in it - Dylan (est 15)
  + Controls working from simulation - George (est 10 hrs)
  + Leon Ordering Sensors/ Microcontroller(est 3 hrs)
  + Jeremy/Ryan working on PCB (est 8 hrs)
* Added descriptions for some Trello cards, resubmitted sprint 0

**1/26/21 7:30 - 9:00pm**

* Re-worked system technical requirements
  + Will ask TA tomorrow how to re-do it
* Updated bill of materials with CAD files and CAD library checkboxes for each part
* Ready to order parts

**1/26/21 4:30 - 5:30pm**

* Meeting with TA Alexey
  + System technical requirements
    - Need to organize into systems and grouping of subsystems
  + Next week design review
    - Make slide for each task/deliverable

**1/27/21 7:30 - 7:40pm**

* Start Slides for Friday Meeting

**2/2/21 7:30 - 8:00p**

* Update Gantt Chart by Friday
* Everyone get their notebooks in shape
* Sprint Goals not met yet, sprint continues

**2/3/21 7:30 - 8:00p**

* Leon: Working on design review slides, waiting for parts ordered to arrive
* Jeremy: Working on slides, notebook, power sim complete as much as parts ordered
* Isaac: Got model working in Vrep, not able to apply forces yet -> focus for next week
  + Focus on making model spin
* Dylan: worked on CAD model
  + Side pieces cut down to 3d printable size, redid gondola to fit onto balloon
  + Did not know where to start with adding the microcontroller to CAD
  + Big question: How to fit in an envelope to the balloon
    - Possibly make our own envelope
* George
* Ryan: Busy with ECE121, unable to PCB in eagleCAD, will start tonight
* Bad estimate on simulator hours
* Worried about progress of the project, haven’t made much progress this sprint due to everyone’s workload
  + Much of the work has been based on Leon ordering parts and Isaac using Vrep
* Team works to work more overall
* Plan for Friday, modify 163 code to simulate our drone in RC control

**2/4/21 7:30 - 10:30p**

* Dylan: working on CAD, added holes and replaced the drone shaft
* Jeremy: slides finished
* George: updated system technical requirements, finished slides, created weight allocation sheet
* Isaac: working on finishing simulation
* Ryan: working on PCB, will include raspberry pi and camera modules later
  + Sensors and Arduino working in PCB
* Leon: Waiting for rest of the parts to be delivered
* System requirements: review block diagram
  + Went through each system and sub-system
* Practice slides
  + Went over a practice run
* Update gantt chart
  + Marked completed tasks, made notes on what tasks were pushed back

**2/5/21 4:30 - 6:30p**

* Follow up with Mircea with lab space
  + Other space may be given if we cannot get lab space on Delaware
* Get paperwork done to fly drone from BELS
* Submit proper block diagram by the end of next week

**2/6/21 7:30 - 8:30p**

* Sprint Report due tomorrow
* New Trello Board assignments
  + If task is done, make a slide for it
  + Do not split slides per person
* Practice design review slides with Alexei during Friday meetings
  + Make equations neater on slides
  + Turn in slides early to get them reviewed
* Peer reviews done by Tuesday
* Dylan & George: Working on force analysis
* Ryan: Working on PCB
* Jeremy & Leon: Working on power budget
* Isaac: Working on simulation

**2/7/21 7:30 - 9:00p**

* Completed the sprint 2 report
* Next SCRUM master: George

**2/8/21 7:30 - 9:30p**

* Updated system technical requirements
* Sent template slides to Alexey to make sure all the points are checked for design review
* Russel Evans asked why we need lab space on campus
  + Respond to him
* If Mircea doesn't respond by tomorrow, send another email

**2/9/21 7:30 - 9:00p**

* Peer review meeting
* Sprint planning meeting on thursday
* Update system block diagram

Sprint 3 Start

Long Flight Time Buoyant Drone February 11, 2021 7:30(PST)

horizontal lineATTENDEES

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

## AGENDA

* Administrative Stuff 7:30
  + New discord channels
    - Reorganized Discord into channels for each position
  + Changes to Trello cards
    - Added Help column
  + Slides
    - Only Ryan has new slide on PCB Design
  + Team Submissions
    - Microcontroller workshop turned in
* Define Goals (General, see where we need dependencies etc) 8:10
  + Dylan:
    - Optimize lift bag & envelope
    - Add detailed electronics to CAD
    - Force Diagram
    - Finalize motors and servos
  + Isaac:
    - Add physics to simulation environment(Need force diagram)
    - Fix CAD file exporting to simulation
  + Leon:
    - Get sensors and other parts working with microcontroller
    - Be able to read data from the sensors
  + George:
    - Complete root locus(control software) C library
    - Add throttle control for RC
  + Ryan:
    - Work on second PCB design with surface mounting
    - Implement raspberry pi into PCB
    - Help Leon with cameras
  + Jeremy:
    - Complete full power budget
    - Simulate power drain with first PCB design
* Define End Date 8:30
  + Sprint end: 2/20/21
* Tasks (Specific) List Requirement ID if available. Time estimate. 8:32
  + Leon (15 hours)
    - Program sensors with microcontroller and read data (15 hours)
      * IMU
      * Ultrasonic
      * Barometric
      * GPS
  + Jeremy: (12 hours)
    - Complete full power budget with Leon (6 hours)
    - Simulate power drain with first PCB design (6 hours)
  + Isaac (18 hours)
    - Implement buoyancy to balloon (6 hours)
    - Implement propeller forces (NEED FORCE DIAGRAMS) (6 Hours)
    - Implement servo movement (6 hours)
  + Dylan (18 hours)
    - Simulation for finding envelope design (8 hours)
      * Find and download drag simulator toolbox for matlab
      * Use matlab box
    - CAD Draft 2
      * Envelope/Balloon update (3 hours)
      * Update other parts to fit new envelope (2 hours)
      * Add in some electronics to gondola (2 hours)
    - Force Diagram (3 hours)
  + George (36 hours)
    - RC throttle control (2 hours)
    - Define characteristic differential force equations (7 hours)
    - Find transfer functions (5 hours)
    - Design overall controls (10 hours)
    - Use simulation to define gains (2 hours)
    - Implement in C libraries (10 hours)
  + Ryan (15 hours)
    - Work on second PCB design with SMD(4 hours)
      * Capacitors
      * Resistors
      * Diodes
    - Implement raspberry pi into PCB (8 hours)
      * Connect Arduino and Raspberry Pi compute module data bus
    - Help Leon with cameras, update block diagram with cameras (3 hours)
      * Decide on camera, transmitter and receiver components

Meeting End: 9:00

**2/12/21 7:30 - 8:00p**

* Dylan: Finalizing force analysis with drag force
  + Ellipsoid drag equation for envelope
* Leon: working on getting the sensors working together with the microcontroller
* Jeremy: Working on the power budget
* Isaac: Getting physics into simulation
* Ryan: 2nd PCB Design in progress
* George: Working on controls configuration for drone

**2/13/21 7:30 - 8:00p**

* Leon: Studying Sensors
* Jeremy: Power budget completed
* Isaac: Fixing servo motors to turn a certain direction
* Dylan: Working with matlab, ratio and weight of lift bag including drag
* George: Differential force equations and reviewing digital control
* Ryan: Replaced passive components to surface mounts in PCB, added 5V-1.8V and 2V regulator, fixed raspberry pi mount

**2/14/21 7:30 - 8:00p**

* Leon: Working with I2C with microcontroller
* Jeremy: Fixing Power budget with alternate voltage inputs
* Isaac: Adding forces to propellor and balloon in simulation
* Dylan: Will present slide tomorrow on ratio of balloon
* George: Started on differential equations, will reach out to Alexei if help needed
* Ryan: Connected raspberry pi compute module to arduino with SPI
  + Added 7.4V to 5V regulator

**2/15/21 7:30 - 8:00p**

* Isaac: Added motors to propellers, research on adding a GUI to control forces with propellers
* Leon: Will get more work done after tomorrow 171
* Jeremy: Done with V2 of power budget, working on CAD simulation of power
* George: Worked on setting up the differential equations, can implement buoyant force into equations
  + Need to linearize power
* Dylan: Completed slides for the best ratio for the size of the envelope
* Ryan: Been keeping up with documentation with schematics
  + May switch over to Allegroinstead of Eagle CAD
* Keep emailing Mircea for info about lab access

**2/16/21 7:30 - 8:30p**

* Leon: Working on speaking between arduino and the raspberry pi
* Isaac: Looking at tutorials for force simulation
* Dylan: Updated slides, did volume analysis of unused helium capacity
* Jeremy: Worked on getting force equation for thrust
* George: Finished re-deriving all force equations
  + Will set up control system based on force analysis
* Ryan: Helped Leon with software schematics
* Have slides ready for meeting on thursday

**2/17/21 7:30 - 8:30p**

* Zoom Meeting with Gordon tomorrow 6pm

**2/18/21 7:30 - 8:30p**

* Leon: Hooking up sensors at the same time to work together
* Jeremy: Working slides and updating power budget
* Isaac: Working on slides for simulator
* Dylan: Worked on CAD model and working on getting material for envelope
* Ryan: working on slides for each sensor
* Went over slides to show Alexei tomorrow

**2/19/21 4:30 - 6:30p**

* Meeting with Alexei
  + Specify conclusions for each slides
  + Formulate slides into a single task
    - Multiple slides can be for one task, but specify
* Updates
* Leon: Looking at IMU measurements
* Jeremy: Power budget due next Thursday
* Isaac: Working on getting servos to move
* Dylan: Working on new CAD design, need to add micros to finish
  + Start on force diagram tomorrow
* George: Finished RC throttle adjustments
* Ryan: Separate trigger pins used for ultrasonic sensors, fixed IMU I2C communication
* Need to schedule meeting with Mircea to discuss lab access and equipment use

Sprint 3 Conclusion Meeting

Long Flight Time Buoyant Drone 2/20/2021 7:30 - TIME(PST)

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* Excused absences:
* Unexcused absences:

## AGENDA

* **Review of progress:**
  + Dylan-7:34
    - Finding Envelope Design
      * Do a force analysis of drag in order to find optimal design
      * Complete and accepted by time
    - CAD Draft 2
      * Updating the CAD file with the new envelope and changing component sizes to fit the new design. FInally, include electronics
      * Incomplete. CAD file updated for envelope, but electronics not added in
    - Force Diagram
      * 3D force diagram based on new CAD model
      * Incomplete due to problems with solidworks. May change to 2D diagrams
    - Decided on Motors and Servos
      * Dependent of force diagram so incomplete
  + George-7:40
    - RC throttle control
      * Throttle adjustment to eliminate unintended yaw moment
      * Complete
    - Define characteristic differential force equations
      * Find differential equations of movement for the drone
      * Complete
    - Find transfer functions
      * Incomplete. Started change into state space design instead after seeing it is the best option and we have time constraints. Did not make significant progress due to struggle in generating differential equations and the learning curve needed for discrete time MIMO state space systems
    - Design overall controls
      * Incomplete
    - Use simulation to define gains
      * Incomplete
    - Implement in C libraries
      * Incomplete
  + Isaac-7:50
    - Added forces into objects on V-rep
      * Force can be applied in all directions by GUI
      * Testbench shows that the functions work
      * Complete
    - Created a GUI to work with the forces in the simulation
      * Corresponded rotor speeds to forces
      * Implement servo rotations to change direction
      * Incomplete more work will be done the following week
    - Import new CAD design
      * Move parts
      * Simplify polygons
      * Incomplete relies on CAD design Draft 2
  + Jeremy-7:52
    - Complete Power Budget
      * Analyzing the power requirements of all parts in the bill of materials within one cycle of the drone’s use
      * Complete
    - Simulate components with Eagle CAD
      * Use Eagle CAD software with PCB schematic of drone’s confirmed components to simulate their power draw in one cycle of the drone’s use
      * Incomplete
  + Ryan-7:54
    - Work on second PCB design with surface mounting
      * Replace all through hole footprint devices with surface mount footprint devices
      * Complete
    - Implement Raspberry Pi into PCB
      * Implement hardware connection between Arduino (ATMega328P) and Raspberry Pi Compute Module CM3+
      * Complete
    - Help Leon with cameras
      * Find an acceptable live stream camera setup
      * Incomplete- All-in-one RX, TX and camera components selected but missing display output solution that accepts RX coax cable
  + Leon-7:55
    - Get sensors and other parts working with microcontroller
      * Wire up IMU, ultrasonic, barometric, and GPS with the proper connections, and verify that they are detected correctly in software
        + Complete
    - Be able to read data from the sensors
      * Read from the sensors with the right protocol and verify that their data makes sense
        + Incomplete: IMU, ultrasonic, barometric sensors read from but not GPS sensor yet
* **Team Improvements**-7:57
  + Improvement shown from last sprint
    - Better goals, allocated time more reasonably
  + A lot of incompletes, need more realistic sprint goals
* **Individual Improvement**-8:00:
  + Dylan
    - Improve sleep schedule to get more work done earlier
  + George
    - Set more realistic goals. Especially with how fast I can learn stuff
  + Isaac
    - Keep motivation up as the sprint goes on
  + Jeremy
    - Set more realistic goals for sprint tasks
  + Ryan
    - Make sure every task is well defined, keep momentum & consistency going
  + Leon
    - Better time management with other classes & sleep schedule
* **Next Goals**-8:03:
  + Finish all incomplete tasks (ALL)
  + Prep for design review, fix slides
  + Fix slides by Tuesday meeting to send to Alexey for feedback
  + Dylan - look more at UHMWPE, do analysis/pugh chart to decide on best material
  + Leon - demo for design review, like a video
  + George - rough simulation of RC control and Autonomous control
  + Ryan - verify Camera RX & TX works with display.
  + Isaac - have my GUI working to demo
  + Jeremy - use Eagle CAD simulations to get power draw of components
* **Other Business**-8:09:
  + Mircea will be able to meet next week after Gordon finishes his Thesis
    - Ask for paperwork of confirmation that we can use Delaware labs
  + Motor workshop is on Monday, most of us should go

Meeting End: 8:20

**2/25/21 7:30 - 8:00p**

* Finished sprint 3 report

team meeting

Long Flight Time Buoyant Drone 2/26/2021 7:30 - TIME(PST)

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* Excused absences:
* Unexcused absences:

## AGENDA

* **Go over new and updated slides and send to Alexey-7:30**
  + Make sure all slides have goals and conclusions labeled
  + Standardize requirement numbers
* **Decide on next scrum master and start date for next sprint-7:42**
  + Thursday-Planning meeting and sprint start date
    - Due next Sunday, March 7th
  + Isaac is Scrum master
* **Other Business**-7:50
  + Keep emailing Prof Evans
  + Wait for Mircea and Gordon to be available next week
  + Overleaf possible for final report format

Meeting End: 7:55

**2/27/21 7:30 - 11:00p**

* Sprint Start moved to Saturday
* Finalized Power Budget before submission
* Finalized Slides for Design Review

Long Flight Time Buoyant Drone February 27, 2021 TIME(PST)

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

## AGENDA

* Administrative Stuff 7:30pm
  + Define Milestones (General, see where we need dependencies etc)
  + Dylan:
    - Fabricatable CAD design
  + Isaac:
    - Working Simulation (thrust, drag, buoyancy, throttle)
  + Leon:
    - All sensors sending data to Arduino at the same time with interrupts implemented
  + George:
    - Remote Control Implemented in 163 Simulation
    - State-Space Math Fully Defined
  + Ryan:
    - Entire system wiring complete
  + Jeremy:
    - Cycle-Based Power Budget Completed with decided power source
* Define End Date: 8:12pm
  + Sprint end: 3/7/21
* Tasks (Specific) List Requirement ID if available. Time estimate.
  + Leon (22 hours)
    - Write own libraries for reading data from sensors with interrupts (15 hours)
    - Make one file for calling all sensors at same time using written libraries and verify that data is accurate (5 hours)
    - Decide on exact Raspberry Pi Compute Module model and find connections for Ryan (2 hours)
  + Jeremy: (19 hours)
    - Get motor/ESC power requirements once motors are decided(3 hours)
    - Re-work power rails according to regulated current(4 hours)
    - Reorganizing Power budget with 1 hr cycle power requirements(2 hours)
    - Find current estimated to be used in I/O pins(I2C, SPI)(5 hours)
    - Assist with interrupt driven Sensor Libraries(5 hours)
  + Isaac (23 hours)
    - Import new CAD design (3 hours)
    - Implement buoyancy control (3)
    - Implement drag (7)
    - Implement thrust (10)
  + Dylan (23 hours)
    - **Finalize Motor & Servos (2 hours)**
    - Updated Gondola to hold sensors in correct locations (3 hours)
    - Add sensors to CAD (3 hours)
    - Add new motors and servos to cad (2 hours)
    - Create 3D printing material pugh chart and decide on attachment methods for servo brackets and gondola (4)
    - Added screw holes and other fabrication related details to CAD(3)
    - Create envelope Material Pugh chart(4)
      * Call UHMWPE supplier for info
    - Contact Helium suppliers (2)
  + George (26 hours)
    - RC implementation (6 hours)
    - State Space math(20)
  + Ryan (19 hours)
    - Wire up the power bank to PCB, and find power bank port model (1 hour)
    - Assign ports for 4 servo PWM output capture ports from ATMega2560 (1 hour)
    - Assign ports for 4 ESC PWM output capture ports from ATMega2560 (1 hour)
    - Wire up SPI from ATMega2560 to Raspberry Pi Compute Module (1 hour)
    - Write up documentations for all sensors to ATMega2560 (3 hours)
    - Write up documentation for Raspberry Pi Compute Module and pin configuration to ATMega2560 (3 hours)
    - Finalize decision on all-in-one camera live stream solution with Leon (3 hours)
    - Setup Git Hub with Jeremy and Leon (1 hour)
    - Assist with interrupt driven Sensor Libraries (5 hours)

**2/28/21 7:30 - 8:00p**

* Progress
  + Jeremy: Working on Power rails and replacing parts for power budget
  + Dylan: Working on Motor selection, will use 163 equations for propeller analysis
  + George: Changing 163 code for RC control simulation, will be ready by tomorrow
  + Ryan: Replaced a couple of PCB components, working on Wiring schematic
  + Isaac: Working on buoyancy force and moments of inertia
* Finalized slides before submission
* Peer Evaluation meeting tomorrow, finish them by tomorrow
* May need to add an extra sonic sensor due to large lift bag
* CAD design for sonic sensor is new backlog item

**3/1/21 7:30 - 8:40p**

* Leon: Switching to MPLabx
  + Also created the project github
* Jeremy: Worked more on power budget with sensors and new microcontroller
* Isaac: Importing CAD model and fixing parts in simulation
  + Adding forces to the propellers
* Dylan: Trying to find coefficients for propeller equations, using 163 tables
  + Thrust equations found based on RPM
  + 7200 max RPM to attain required thrust
* George: Worked on remodifying old simulation
  + Forces are being interfered with by something else
* Ryan: Catching up with documentation for all sensors
* Peer Evaluation Meeting

Peer Review meeting

Long Flight Time Buoyant Drone 3/1/2021 7:30 -(PST)

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* Excused absences:
* Unexcused absences:

## AGENDA

* **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 7:39
    - Often underestimate time required to accomplish tasks, but once done is good quality
    - Keep better tabs on everyone as leader to know state of project better
    - Struggles with giving harsh criticism to team members, gotten a little better
    - Should delegate more people to tasks, for example CAD design requires more group work, work closer with George and Isaac
  + George 7:44
    - Lack of experience using software is causing some tasks to lag on
    - Can work on communicating suggestions to team members better
    - Heavy workload compared to other members, may not be able to do it by himself
    - Should work on asking for help if he needs it with large workload, cooperate with other team members more
  + Isaac 7:53
    - Might have to do more in later sprints to meet milestones, underestimated coding required, so is behind on simulation
    - Communication can be improved with goal setting and achieving goals
    - Simulation work can be helped by George and Dylan
    - Has gotten better at speaking up during meetings
    - Not pressured to complete simulation work, should spend more time on it
    - Could be more vocal about simulation requirements and what it means for the rest of the project
  + Jeremy 7:59
    - Work better independently in power management
    - Help out more in hardware design (with Ryan and Leon)
    - Communicate better on what was accomplished in power management, also show goals and conclusions from power
    - Underutilized in project work, try to help out with more areas
    - Sole meeting minutes taker, get better at meeting minutes goals/conclusions
    - Using arbitrary values with power budget can hurt in long term
    - Listen more to team member suggestions
    - Speak up more during meetings
  + Ryan 8:04
    - Vague milestones in Gantt Chart, will update tasks to be more detailed
    - Show more detail in wiring and PCB designs, team members might be struggling on keeping up with his work
    - Communicate more often to team members about what is required or needs to be changed
    - Smaller workload, should help other team members more
    - Show other members what others may need from own work on PCB and wiring
    - Work more with Jeremy and Leon on electrical connections
  + Leon 8:11
    - Put more time into work, 171 been taking a lot of time, work limited to week days
    - Make more concrete examples of programming hardware, create better tests for sensors
    - Use better time management between classes, work is good quality until rushed for time
    - Ask for help more from other team members, electrical group can assist Leon with Jeremy and Ryan
    - Ask for clarification on what is required for the sensors and hardware of the project
* **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. 8:19
  + Improve milestone definitions and measure progress based off of them more
    - Milestones should be more defined, specific, and concrete
  + Redoing Gantt chart is necessary
  + Use tuesdays for progress meetings, identify how to catch up
  + Work more on doing slides as tasks are done, slide format has improved but still needs a lot more improvements
  + Ask more specific questions from Alexey, but don’t rely on Alexey’s answers
  + Sub-team meetings
    - Jeremy, Leon, and Ryan(Hardware)
    - George, Isaac, and Dylan(Software)
  + Use Trello for low level tasks and Gantt Chart for high level
  + Don’t cut time from documentation aspects of the project
* **Individual Improvement:** Everyone say one or two things that they are going to improve on before the next design review. 8:33
  + Dylan 8:34
    - Keep track of the progress of both sub-teams, delegate more people if necessary
    - Prevent bottlenecks from forming when delegating work
    - Make sure documentation is top priority
  + George 8:36
    - Work more on communicating better with tasks required and help needed
  + Isaac 8:37
    - Put more time in simulation work
    - Use sub-team meetings for asking questions
  + Jeremy 8:38
    - Ask more questions to verify power budget progress
    - Help out more during meetings and especially sub-team meetings
    - Record progress and tasks relating to power budget better
  + Ryan 8:39
    - Set clear milestones for own work
    - Help Leon with software design when workload is small
  + Leon 8:40
    - Put in more time with project work compared to other classes
    - Ask for more help when working with sub-groups

Meeting End: 8:41

**3/2/21 7:30 - 8:30p**

* Leon: working with getting the arduino connected with MPlabX
* Jeremy: Working on getting the power required from motors
  + May need help from the force analysis of the motors
* Isaac: Buoyancy no longer instantaneous in simulation
  + Adding joints to attach propeller forces to
* Dylan: Decided on motors, replaced in BoM
  + Working on finding the correct ESC that can control the motors, new one added to the BoM
    - Make sure ESC is able to communicate with the Arduino
  + Moment of inertia of motor and shaft helped decide servo, not finalized yet
* George: Debugging simulation, fixed buoyant moments on drone
* Ryan: Working on wiring diagrams
* Sub-team meetings having good effect
* Edited Gantt Chart

**3/3/21 7:30 - 8:30p**

* Leon: Microcontroller switched to Uc32 from ECE121, should get it from school
  + Github created for the whole group
* Jeremy: Battery selection limited from 7.4V or 11.1V batteries
  + Will need to add more weight for batteries to power motors
* Isaac: Propeller force still being investigated in simulation
  + Milestone: remote control done before drag force is preferred
  + Applying all forces milestone will have to be pushed back
* Dylan: Added sensors and PCB to CAD Design
  + Updated motors and motor mount in the gondola
  + Weatherproofing measures added to CAD design
  + Issues with moment of inertia calculations in CAD for servo finalization
* Ryan: Added another ultrasonic sensor, 7.4V will be changed in the PCB
  + New ultrasonic sensor placement, 3 in the front, 1 below

**3/4/21 7:30 - 8:30p**

* Leon: Working with getting a new Pickit with Uc32 board
  + Receiver, Transmitter, and camera all in one decided
* Jeremy: 2 batteries instead of 1 has been decided
  + One 11.1V battery for motors
  + Another 5V battery for peripherals
* Dylan: Servos have been decided, will be run off of 5V battery
  + Also looking for new helium supply
* Isaac: Working with new CAD design bugs
* George: Linearizing equations from the force analysis for use in servo calculations
* Ryan: ESCs still unknown as to how to control them, PWM is most likely the solution

7:45

* PCB will need standoffs from aluminum sheet
  + Shouldn’t affect any heat issues with the battery
* Gondola will be expanded to account for the battery

7:51

* Started the final report outline

**3/5/21 4:30 - 7:00p**

* Alexey Meeting 4:30
  + Make sure milestones are shown what percentage each is on
  + Show updated Gantt Chart
  + Keep better meeting notes
    - Keep timestamps for each comment/argument made
  + Base the chapters of the final report on the system technical requirements

4:50

* ESCs controlled by microcontroller
  + ESC controls are unknown with what pins do what

5:10

* Gondola will probably not need standoffs
  + Although will improve safety in edge cases

5:27

* ECE121 code can help program microcontroller
  + Code tweaked to new motors/servos and other sensors

5:41

* We should message Mircea again to see if we can use Helium from Delaware labs
  + Helium would be very expensive to buy online

6:01

* Funding may be available from residential colleges for design expenses

6:10

* Alexey meeting over, now on sprint progress meeting

6:15

* + Leon: Code from ECE121 can help immensely

6:19

* + Jeremy: Will have to update power budget and weight allocation for new parts and batteries

6:22

* + Isaac: Working on applying all forces in the simulations

6:26

* + Dylan: Will have to estimate material strength because supplier doesn’t have specifications for them

6:29

* + George: Can now State space plan fully defined with Yaw measurements

6:34

* + Ryan: Ultrasonic input captures connected, GPS also connected through UART
    - Chose standoffs and screws in PCB

**3/6/21 7:30 - 7:45p**

* Sprint End meeting 7:30
  + Leon: Working with Ryan’s code into the Uc32 microcontroller

7:32

* + Jeremy: Decided provisional battery selection
    - Also looked at servo and motor power
      * Motor power decided, servo is unknown with no datasheet

7:35

* + Isaac: Worked on Sprint report format
    - Also got forces applied into simulation

7:37

* + Dylan: Added standoffs into gondola
    - Gondola size increased to 7x7 inches, small cost increase
    - In process of making servo connector

7:39

* George: Using Matlab to help with matrix equations for forces

7:41

* Ryan: GPS module, ultrasonics, I2C, SPI all connected
  + Still need interrupt pins for sensors and connecting the 5V battery

Sprint 4 Conclusion Meeting

Long Flight Time Buoyant Drone 3/7/2021 7:30 - TIME(PST)

horizontal lineATTENDEES

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

## AGENDA

* **Review of progress:** 7:30
  + Dylan - 7:36
    - Ultrasonics and camera implemented in CAD and in weight allocation
    - Screws, Nuts, and Washers picked for attachments
    - Pugh chart made for 3D printing
  + George - 7:40
    - Controls working in updated version of 163 simulation
  + Isaac - 7:35
    - Propeller forces complete in simulation
    - Buoyancy forces completed in simulation
    - Servo movement adjusted and fixed
  + Jeremy - 7:33
    - New Microcontroller added to power budget
    - Power rails updated with new voltage regulators
    - Only missing from budget is transmitter, servo, and ESCs
  + Ryan - 7:54
    - Finished wiring schematic 1.9
  + Leon - 7:30
    - Got output from UART on Uc32
    - Ultrasonic code gotten with help from Ryan
* **Team Improvements** - 8:01
  + Overall improved in general as a team
  + One improvement is estimating hours better
    - Another thing is pacing throughout the week so tasks get done consistently
  + Sub-team meetings work well with communication
* **Individual Improvement** - 8:04
  + Dylan
    - Envelope material put off, issues with getting material strength from suppliers
    - Look into process of each tasks to delegate time better during sprint
  + George 8:05
    - Start developing work to be more pleasing to the eye, make more graphs
  + Isaac 8:06
    - Have to start working on practical things instead of modeling the drone
  + Jeremy 8:07
    - Get a better understanding of how much time each task will take
      * Work more consistently to accomplish tasks with evenly spaced out time intervals
  + Ryan 8:08
    - Verify tasks better, such as making sure connections are correct
    - Versioning & documentation also needs improvement with his work
  + Leon 8:09
    - Make better use of time for tasks
      * Lots of time wasted on debugging without getting anywhere
* **Next Goals**- 8:10
  + Dylan 8:15
    - Finalize all parts and retailers. Includes deciding on materials based on pugh charts and other analysis. Ensuring weight requirements are met for system weight requirements. Finding suppliers, for all parts and ensuring feasible price and shipping times. 3/14/21
  + Leon 8:24
    - Implement event-driven programming with sensors using interrupts by 3/19/21
    - Have all sensors working at the same time and showcase trial run around the neighborhood by 3/19/21
  + George 8:30
    - Path Following and Terrain Tracking in Matlab Simulation. Include calculations for power usage to confirm power budget values. Use the linear MIMO state space discrete time-Zero Order Hold model for control, but use a nonlinear model for physical responses to commands to check for stability and controllability. Only the ideal sensor model is tested, but disk margin should be tested as well in preparation on stochastic sensor error testing over break. 3/19/21
  + Ryan 8:39
    - Make final changes to schematic by 3/12/21
    - Complete board design by 3/19/21 (verify with Professor Petersen)
    - Include all electronic parts lists into BOM by 3/15/21
  + Isaac 8:42
    - Finish remote control (joy-stick implementation) 3/12/21
    - Finish implementing drag forces 3/19/21
  + Jeremy 8:46
    - Finalize Power Budget by completing uncertainties, such as the transmitter power and the servos by 3/12/21
      * Start working on how to simulate wiring diagrams using a power source in Eagle CAD spice simulation by 3/19/21
* **Other Business**- 8:51
  + Completed sprint 4 report

Meeting End: 9:34

**3/8/21 7:30 - 8:00p**

* Sprint Planning Meeting will be tomorrow, Leon will be the SCRUM master
* Went over Final Paper Outline and Introduction

Sprint 5 Start

Long Flight Time Buoyant Drone March 9, 2021 7:30 PM(PST)

horizontal lineATTENDEES

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

## AGENDA

* Administrative Stuff 7:30
  + Reviewed Gantt Chart to insure that we are on track
  + Decide Scrum master, Dylan
* Define Goals (General, see where we need dependencies etc) 7:54
  + Dylan - 7:56
    - Finalize All Parts 3/14
  + Isaac - 7:56
    - Implement drag force and RC 3/19
  + Leon - 7:57
    - Be able to read from every sensor at once 3/19
  + George - 7:59
    - Write C libraries for use in simulation
    - Path Following and Terrain Tracking in Matlab Simulation.
      * Include calculations for power usage to confirm power budget values.
      * Use the linear MIMO state space discrete time-Zero Order Hold model for control, but use a nonlinear model for physical responses to commands to check for stability and controllability.
      * Only the ideal sensor model is tested, but disk margin should be tested as well in preparation on stochastic sensor error testing over break.
  + Ryan - 8:00
    - Finalize wiring schematic
    - Finalize PCB board
    - Finalize PCB electronics in BOM
    - Write sensor libraries
  + Jeremy - 8:01
    - Finalize Power Budget
* Define End Date 8:02
  + Sprint end: 3/19/21
* Tasks (Specific) List Requirement ID if available. Time estimate 8:03
  + Leon (30 hours) - 8:13
    - Write library for each sensor to read from them using interrupts (20 hours)
    - Write code to use every sensor at the same time (5 hours)
    - Perform test run around neighborhood showing sensors working over time logging data and make data presentable (5 hours)
  + Jeremy(23 hours) -
    - Finalize Power Budget(5 hours)
    - Write up C library to communicate between microcontroller and sensors (12 hours)
    - Get Wiring Diagram Simulation Spice Eagle CAD to work(6 hours)
  + Isaac (40 hrs) - 8:15
    - Decide on GUI variables for RC (4 hours)
    - Add in code to RC variables (20 hours)
    - Add in drag force depending on movement speed (6 hours)
    - Import better design (10 hours)
  + Dylan (30 hours) - 8:16
    - Finalize Envelope Material using Pugh chart (4 hours)
      * Email about how best to sew parts together (material/method)
    - Add extra support 3D printed parts to CAD (2 hours)
    - Find Heat sink and added to CAD (2 hours)
    - Double check/look for better parts that team is unsure of
      * ESC (3 hours)
      * Servos (3 hours)
    - Find Servo Connector piece (2 hours)
    - Find little screws for ultrasonic sensors and add to CAD (2 hours)
    - Make sure all parts are finalized with vendors by the 14th (8 hours)
    - Sensors Library coding (4 hours)
  + George (46 hours) - 8:19
    - Write alpha angle program in C (5 hours)
    - Write throttle factor program in C (2 hours)
    - Apply LQR to develop PD control (5 hours)
    - Add integral control to system (5 hours)
    - Discretize system with Zero Order Hold (5 hours)
    - Run simulation to test robustness (1 hour)
    - Develop Nonlinear system model to act as system response to control commands (6 hours)
    - Run simulation of nonlinear responses to linear control commands (7 hours)
    - Run simulation to test path following and terrain tracking (10 hours)
  + Ryan (29 hours) - 8:20
    - Update documentation with current version (3 hours)
    - Wire up balloon pressure sensor and add it to the BOM (1 hour)
    - Update all parts in BOM with weight allocation (based on breakout boards) (2 hours)
    - Hand wire the board with a 5V plane, GND plane and wire up all ICs solder points. Reduce signal noise by separating data lines from voltage rails as much as possible (10 hours)
    - Verify PIC32 microcontroller oscillator if it needs an external oscillator (1 hour)
    - Write up C library to communicate between microcontroller and sensors (12 hours)

Meeting End: 8:25PM

**3/10/21 7:30 - 8:30p**

* Leon: Working on initializing interrupts with Microcontroller

7:31

* Jeremy: Resubmitted power budget to get feedback from Tela

7:32

* Isaac: Working on importing new CAD model

7:33

* Dylan: Working with Isaac on the CAD model
  + Fixed weight allocation

7:34

* George: Wrote file for alpha angle and thrust factors for RC control
  + Working on script to update new matrices when numbers change

7:35

* Ryan: Helping Leon with code and updating documentation

7:40

* Gordon got back to us in an email, wants a doodle set up to organize a meeting
* Jonathan also responded, wants to meet next week

7:45

* Finished Final Report Outline and submitted for review

**3/11/21 7:30 - 8:30p**

* Leon: Got Ultrasonic Sensor working with Microcontroller
  + WIll use PIC32 library to get I2C to work

7:35

* Jeremy: Battery and Charger have been redone with 1 battery
  + Added new pressure sensor to power budget
  + Working on total flight time with all included parts

7:39

* Isaac: Rewrote C code in LUA for simulation
  + Working on getting remote API working

7:43

* Dylan: Working on envelope suppliers and getting tensile strength
  + Also added screws to ultrasonics in CAD

7:47

* George: Working on PD control

7:48

* Ryan: Added pins for connection to receiver from raspberry pi
  + Needs to decide on remote controller

7:50

* General:
  + Need to decide on all parts by the end of the sprint
  + Fill out doodle poll to set up a meeting with Gordon

8:00

* Everybody has been given parts of the introduction on the final report to finish

**3/12/21 6:30 - 7:30p**

* Meeting after Alexey meeting

6:39

* Leon: Debugging ultrasonic sensor code
  + Has several sources to help debug, as well as Jeremy and Ryan to help
  + Also looked at remote controllers

6:50

* Jeremy: Power Budget submitted again, will try to get more feedback
  + Will help leon and work on simulation over the weekend

6:53

* Isaac: Finding angle with max propeller forces and finding propeller force equation in simulation

6:55

* Dylan: Looking at heat sinks
  + Picked a new ESC that does not rely on flight controller and has a manual

6:56

* George: Worked on Matlab script, should be good to go after testing
  + Working on root locus and PD control
  + Did research on remote controllers as well, found a few decent options
    - Programmable and has telemetry

6:58

* Ryan: Changed PCB board layout size to 4x4’
  + Tomorrow we should meet to decide remote controller
    - Needs to receive camera, battery, and crash detection
  + Need a rough idea for the controller by Sunday

7:04

* Everyone needs to find sources to their respective parts of the Final report
* Submitting slides for feedback

**3/13/21 7:30 - 7:45p**

* Leon: Ultrasonic interrupts fixed, good to go
  + Working on I2C now

7:33

* Jeremy: Eagle CAD simulation might not work
  + May have to get hand calculations of circuit power

7:35

* Isaac: Propeller force needs to be scaled down to something Vrep can handle

7:36

* Dylan: Tensile strength of nylon figured out for supplier

7:38

* George: PD control still being worked on
  + DGI matrix analysis will have to be set up
  + Added suggestions to outline

7:40

* Ryan: Working on new RAM slot for raspberry pi
  + Schematic behind schedule due to fixes
  + WIll be working on board

**3/14/21 7:30 - 8:30p**

* Leon: Figured out I2C protocol and being able to connect the sensor
  + Needs to get data from sensors still

7:32

* Jeremy: Needs to update Gantt chart because power simulation is not realistic
  + Will have to do everything by hand

7:34

* Isaac: Translating equation into Simulation

7:35

* Dylan: Finalizing materials is due today
  + Lighter material for envelope will be used for 3d printing
  + Heat sink is the last thing to finalize

7:37

* George: Made some progress on the hole placement

7:38

* Ryan: Board wiring diagram had to be changed
  + More regulators added to reduce noise

ETC:

* Email Gordon to set up a meeting before the design review
* Submit slides after the meeting tomorrow, everyone finish their slides
* Final Paper is due Wednesday, everyone complete their assigned sections

**3/15/21 7:30 - 8:30p**

* Leon: Realized sensors had dedicated interrupt pin on them, change notify pins may be a possible alternative to read sensors

7:33

* Jeremy: Added more components to power budget, oscillators and ESC power fixed

7:34

* Isaac: Graphs matlab working with degrees per second of servos
  + Propeller forces scale correctly in Vrep

7:35

* Dylan: Ran solidworks heat simulation, steady state heat is within operating range of components, no heat sink would be required
  + Needs to run simulation again with envelope on top

7:36

* George: DJI Matrix and alternatives written in final report
  + Ready to implement PD control

7:37

* Ryan: Added new crystal oscillators and more voltage regulators
  + Added pins for servos to be powered
  + Board design still in progress

7:41

* Meeting with Jonathan on Wednesday
* Meeting with Gordon on Thursday

7:43

* Working on updating Gantt Chart
  + CAD Design 95% complete

7:49

* Get remote control working and implement drag is next goal for simulation grp

7:55

* Interrupt Driven Sensors 35% done

8:00

* Power of PCB passive components should be done by hand now

8:04

* Went over Slides before submission
  + Slide titles need to be more goal oriented

**3/16/21 7:30 - 8:30p**

* Dylan: Running new solidworks simulation with envelope on drone
* Everyone else is busy with finals

7:36

* Worked on revising the final report introduction

**3/18/21 7:30 - 12:00am**

* Leon: Got all sensors working individually, next needs to get all at same time working
  + Should be done next week

7:33

* Jeremy: Selected New battery, changed power budget to not be worst case for most parts
  + Needs to work on motor power and battery voltage differing over time

7:34

* Isaac: Importing the new model and adding RC to it
  + Debugging RC, trying to find any problems

7:35

* Dylan: Materials chosen for envelope is as light as it needs to be

7:36

* George: PID controller will be done tonight hopefully, will not be tuned until later

7:38

* Ryan: Some changes to the PCB needs to be made to fit power budget changes

7:45pm -12am

* Went over each others slides in a practice design review

Sprint 5 Conclusion Meeting

Long Flight Time Buoyant Drone 3/22/2021 7:30 - TIME(PST)

horizontal lineATTENDEES

* Excused absences:
* Unexcused absences:

## AGENDA

* **Review of progress:**
  + Dylan-7:30
    - Finalized Envelope Material, force analysis with Pugh Chart
    - Added Extra 3D printed parts to CAD for support
    - Didn’t need a heat sink added
    - Changed ESC and doubled check Servos
    - Found Screws for Ultrasonics
    - Finalized all vendors except Helium, 90% complete
    - Remote Controller not finalized
  + George-7:39
    - Wrote alpha angle programming in C
    - Throttle Factor programming is complete in C as well
    - PD control complete
    - integral control to system Not finished, 50% complete
    - Discrete system with zero order hold, 80% complete
    - Needs to run simulation to test robustness, path following/terrain tracking, and non-linear responses
    - Developed nonlinear system model to act as system response to control commands
  + Isaac 7:43
    - Gui variables for RC and code for it complete
    - Open loop RC implementation is complete
    - Drag force dependencies on speed is incomplete
    - Most updated CAD is imported
  + Jeremy 7:44
    - Finalize Power Budget incomplete, need to check motor and voltage regulators, 90% done
    - Helped Leon Write up C library to communicate between microcontroller and sensors
    - Did passive component power by hand instead of simulating
  + Ryan 7:48
    - Updated documentation with current version, 80% complete
    - Wired up balloon pressure sensor and add to BoM
    - Updated all parts in Bom in weight allocation, incomplete, 90% done
    - 0% complete, hand wire board with ground plane, wire all ICs
    - Verify Pic32 external oscillator complete
    - Helped Leon Wire up C library with microcontroller sensors
  + Leon 7:51
    - Write library for each sensor to read from them using interrupts complete
    - Write code to use every sensor at the same time, 25% done
    - Perform test run around neighborhood showing sensors working over time logging data and make data presentable complete
* **Team Improvements**- 7:52
  + Many incompletes due to final week and final presentation
    - Sprint was too short, sprints need to be longer
    - Sprints need to be based on milestones
      * Milestones that are farther off could be used to delegate other work
  + Need to implement a peer review system for checking each other’s work
    - Sub-team group meetings should be used to check each other’s work
      * These should also rotate once at a time
      * Possible to have a day of peer-evals
  + Slides need to be done earlier, not a day before presentation
  + Still underestimating time needed for research tasks
  + Overall, quality of work has been increasing
* **Individual Improvement**-: 8:07
  + Dylan- 8:07
    - Underestimates research tasks still
    - Needs to have an order to do tasks in instead of doing them at any time
  + George- 8:08
    - Needs to get better at estimating tasks time needed
  + Isaac- 8:09
    - Needs to talk more during group work and sharing his criticisms
    - Needs to have better time management with tasks
  + Jeremy- 8:10
    - Peer evaluation on power management
  + Ryan- 8:11
    - Do more research on tasks before doing them
    - Needs more peer checking on his work
    - Estimate task time with better time management
  + Leon- 8:12
    - Manage time better, allocate more time to tasks
    - Present more work to the team in understandable terms
* **Next Goals**-: 8:13(Goals over spring break)
  + Dylan- 8:14
    - Finalize helium vendor
    - Check in with Mircea about the lab space
    - Order all needed parts for fabrication on the BoM, envelope and lift bag already done
  + George- 8:15
    - Get the PID control working in simulation
  + Isaac- 8:16
    - Get drag force working in simulation
  + Jeremy- 8:17
    - Check motor power usage with dylan’s equation
    - Confirm switching voltage regulator with Ryan
    - Guide someone through everything on the power budget to check for mistakes
  + Ryan- 8:18
    - Add switching voltage regulator to schematic
    - Finish PCB wiring diagram
    - Send PCB design to OSH Park for fabrication
  + Leon- 8:19
    - Finish setting up all sensors working at the same time
    - Implement servo and motor control in software
* **Other Business**- 8:20
  + Will send most of the ordered parts to Leon for testing

Meeting End: 8:24

**3/23/21 7:30 - 8:00pm**

* Sprint Review 7:30
  + Leon: Researched how to write sensor code altogether

7:31

* Jeremy: Went over power budget and finalized voltage regulators
  + Regulator needs to be added to CAD for mounting

7:32

* Isaac: Added new variable for drag analysis and wind speed
  + Not sure how to convert it to 3D

7:33

* Dylan: McMasterCart has been ordered and will arrive tomorrow
  + Will email Mircea and other labs on campus for helium

7:34

* George: Can work on Porter college funding for project

7:36

* Ryan: Did research on wire thickness for PCB wiring, will stick with 4 layer PCB
  + Needs to add pin outs for voltage regulator

7:39

* Gantt Chart updates
  + Sub team group meeting tomorrow to finalize RC controller
  + Split open loop and closed loop RC control milestones for Isaac

7:54

* Magnetometer data needs to be offloaded from drone
* RC Controller also needs GPS coordinates and battery functions, also crash report

8:30 end

3Peer Review meeting

Long Flight Time Buoyant Drone 3/24/2021 7:30PM -(PST)

horizontal lineATTENDEES

* Excused absences:
* Unexcused absences:

## AGENDA

* Check in: 7:30
  + Leon/Jeremy/Ryan: Did research and found an RC controller, needs input from the rest of the team to see if it fits requirements
  + Isaac: Researched converting drag force and adding vector
  + Dylan: Ordered motors/servos/ESCs/propellers to ship to leon’s house
    - Emailed biochem department to see if we could get helium, referenced to Glen
    - Emailed Mircea about lab access
  + George: Looked more into getting Porter college funding with detailed bill of materials
    - Need a faculty sponsor
* **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 7:57
    - Started with struggling in leadership aspects, got a lot better throughout the quarter at being assertive as a leader and holding people accountable to their work
      * Can be better at conflict management between team members
    - Good at asking for help and knowing when to listen
    - Technical work has improved throughout the quarter
    - Struggles with work exhaustion with the project work and as a leader
  + George 8:05
    - Technical aspect has been struggling with the project work, but still has been learning how to do his work across the quarter
    - Put more hours than anyone else, reached most of his milestones
      * Knows the most out of the team and puts a lot of work on himself
    - Can talk more when disagreements occur or when work exhaustion occurs
    - Can explain his work better to the team, because most of it is complicated and advanced, which speaks to his technical background
      * Presentation skills can also use improvement
  + Isaac 8:12
    - Lacking in technical expertise, learning on the go, needs to ask questions to the rest of the team often
    - Can update his work more while showing it to the rest of the team
    - Has been communicating better and working better on the simulation
    - Most improved out of anyone on the team
    - Time management can improve a bit, work exhaustion is a problem for everyone, Start work on milestones earlier in sprints
    - Take notes during meetings so same questions aren’t asked again
  + Jeremy 8:20
    - Needs team members to review his work to help fix mistakes, be more proactive
      * Most criticism with justifying his numbers, sometimes numbers are arbitrarily defined when unknown, should specify when unknown
      * Explicitly show how numbers and decisions are made
    - Improved on helping group members with their tasks
    - Gets tasks done early when assigned
    - Struggles with communication in showing and presenting his work
    - Has to leave early sometime due to time conflict, possibly change meeting time
    - Hard to see how much work he is actually doing on spreadsheets
    - Can speak up more during meetings, veen when topic is inapplicable
  + Ryan 8:30
    - Some work is missing documentation, review technical documentation
    - More research is required to do PCB work correctly
    - He feels like he is doing the least amount of work
    - Good commitment when having to wake up early for the team
    - Presentation can use a work, go faster through presentation because professor gets bored listening to details
    - Procrastination is an issue when facing minor tasks, although he has been completing his assigned tasks
    - Improved with helping others in sub-group meetings
    - Needs to get his work checked by the rest of the group
  + Leon 8:41
    - Getting better at coding with the microcontroller since there was a late switch
    - Time management struggled with other difficult classes
      * Easier classes next quarter should allow more time devoted to capstone
    - Can be more proactive in asking for help
    - Drastic improvement since the last 2 design reviews
    - Can catch up next quarter while asking for help when needed
    - Everyone needs to improve when people are asking why, it doesn’t mean it is the wrong decision it just needs justification
* **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. 8:53
  + Not taking criticism as rejection
    - Everyone needs to improve when people are asking why, it doesn’t mean it is the wrong decision it just needs justification
    - Can be simulated in sub-team groups
  + Everyone can work on presentation, it is lethargic from many people
    - Makes it hard for audience to stay engaged
  + Get slides done earlier to practice before
  + Sprint goals should not be considered done unless there are slides to present on it
  + Help team members with non-technical tasks such as documentation
    - Divide up documentation such as sprint reports better
  + Group assignment work needs to be done before team meetings so the meetings can be used to just review
* **Individual Improvement:** Everyone say one or two things that they are going to improve on before the next design review.
  + Dylan 9:12
    - Step in more during Conflicts to help resolve issues and come to a common consensus.
    - Be more on top of scheduling so that I don't burn out and get exhausted during longer meetings.
  + George 9:13
    - Keep talking throughout the meetings even when tired or frustrated
    - Break down my updates better for the team to better understand my contributions
  + Isaac 9:14
    - Take more notes during meetings
    - Start early on work
    - Clearer communication
  + Jeremy 9:15
    - Get work checked much more often
    - Speak up and ask questions more during group meetings
  + Ryan 9:16
    - Start on tasks early
    - Finish a slide for each tasks
    - Get team members to verify my work
  + Leon 9:17
    - Make Capstone more of a priority and dedicate more time
    - Do more work and ask more questions outside of sub-team meetings
    - Show my work as I’m doing it rather than before Design Review

Meeting End: 9:20 PM

**3/25/21 7:30 - 7:45pm**

* Everyone should fill in their sprint 5 report tasks

7:35

* Sprint Updates
  + Jeremy: 3 commands for inputs, 1 state channel,
    - 1 channel for GPS, errors, and battery

7:41

* + Isaac: Looking at how to convert drag equation in 3 dimensions
    - Origin of drag force is on outer envelope

7:42

* + Dylan: Will order more parts tonight and working on the sprint report
    - Has also been looking at sewing machine to connect envelope pieces

7:43

* + Leon: Almost done with all sensors being done at the same time

7:44

* + Ryan: Working on how to send data back from the receiver to the RC controller

7:45 END

**3/26/21 7:30 - 8:20pm**

7:30 start

* Leon: All sensors are working together, will try to fix bugs with some of the sensor readings
  + Will have a demonstration for the group by tomorrow

7:31

* Jeremy: Working more with motor math
  + RC receiver research has concluded that the receiver cannot detect the battery voltage correctly

7:32

* Isaac: Looking up ways to get drag to work, will have to use matrix math properties
  + Also has been looking at a snake model for drag

7:33

* Dylan: Ordered servo connector pieces, still needs to order camera
  + Working on sprint 5 report
  + Also found sewing machine for envelope pieces

7:34

* George: Working on controls, has been struggling working due to injured finger
  + Porter funding application should be working by tomorrow

7:35

* Ryan: Remote controller has been chosen, however there is still issue with sending data back to the controller
  + Will choose a transmitter and receiver to go to a laptop for data logging

7:37

* Finishing the Sprint 5 report

8:20 END

**3/27/21 7:30 - 7:45pm**

* Jeremy/Ryan/Leon: Found a better camera with a lower resolution to add to the drone because high resolution is not needed
  + Also found radio transmitter/receiver to get GPS and error from the drone to a computer

7:36

* Dylan: Will try to fit voltage regulator into CAD, might need more standoffs
  + Try to find way to attach payload or magnetometer
  + McMasterCart shipping came in

7:39

* Isaac: Implemented velocity of the balloon into the drag function

7:40

* Leon: Also worked on debugging the sensors, still having issues with misreadings of the sensors

7:41

* George: Sent funding email
  + WIll be making a presentation to explain progress made to the rest of the group and so they can understand it

END 7:45