

Purdue Hybrid Rocket Biweekly Update

March 16th, 2020

Overall

Welcome to the Purdue Hybrid Rocket Biweekly Update! This Newsletter is a biweekly update of what has been accomplished over the past two weeks and what the plan is for the upcoming two weeks for each sub team. Alongside that, news regarding the team as a whole will be included.

RECENT UPDATE: due to the recent outbreak of Covid-19 and the suspension of face-face classes, the team will undergo some changes to how work and meetings will be accomplished. First, subteam meetings will have an online conference option that members can use. Each subteam lead will be active in their respective slack channel with further details. Second, manufacturing will be suspended until further notice due to the BIDC and other labs being shut down. With manufacturing being suspended, all workflow will be transitioned towards refining the design and putting together extensive test procedures. Unfortunately, the October 2020 launch will have to be postponed due to the manufacturing suspension. A new development schedule will be formulated once more details come out. Finally, it is crucial that everyone stays safe during these challenging times. Health comes first and it is important that everyone practices the proper precautions set out by the [CDC](https://www.cdc.gov) and other government agencies!

As always, if anyone has any questions or concerns feel free to contact Elvin Garayev (egarayev@purdue.edu) or Austin Keck (keck2@purdue.edu) through slack or email.

Thank you all for the hard work and enjoy the biweekly update!

Sincerely,

Purdue Hybrid Rocket Team

Avionics

The Avionics team practiced manufacturing the bulk plate, researched material types for components boards in the avionics bay, researched material to be used in manufacturing of the slot switch holders, purchased the drogue parachute, completed more work on the electrical user manual, and did more research on the GPS tracking system.

From there, the Avionics team will complete the research for the GPS tracking system, finish the testing write ups, and continue to work on the electrical user manual. Manufacturing of the components has been suspended due to the Covid-19 outbreak.

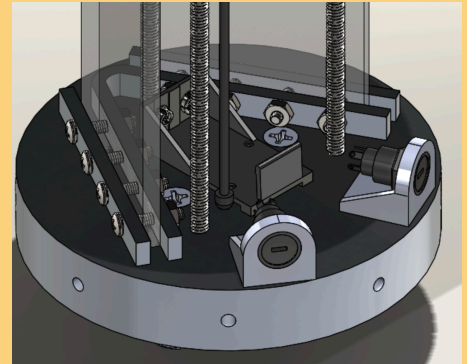


Figure 1: Slot Switch Holder

Payload

The Payload team began prototyping the camera arm for the rover and rewrote the schedule for the semester in light of the recent Covid-19 outbreak.

The rest of the semester is focused on creating the CAD model of the rover as it would not require much one on one interaction or manufacturing. This plan will go into effect once spring break is over.

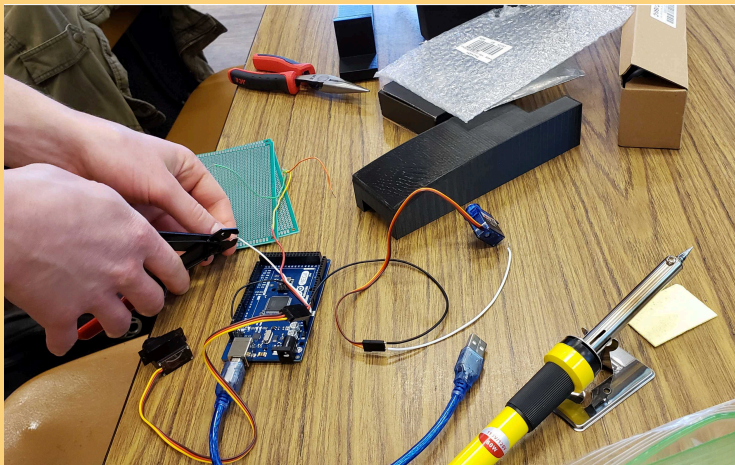


Figure 2: Payload Team Working with the Microcontroller for the Rover

Aerodynamics

The Aerodynamics got two extra Simscale licenses to help with the CFD analysis, designed bulk plates for the parachute, and manufactured fin can subscale parts.

From there, the Aerodynamics team plans to further refine the design of parachute components, continue with CFD analysis, and further improve the trajectory of the rocket due to the manufacturing suspension.

Structures

The Structures team has had a mini FEA session to work out stuff with the deployment mechanism. One major issue in CAD that was resolved was that 6"ID is standard for all fiberglass body tubing whereas our CAD was designed to 6"OD however this has been resolved with just a coupler which isn't uncommon among rockets.

Due to the Covid-19 outbreak, we will have a meeting to discuss future plans since we won't be able to manufacture for the rest of the semester. As of now it is looking like we will be documenting all FEA in the meantime alongside CAD and analysis of mounting of the rocket on the launch rail.

Propulsion

The Propulsion team has had ongoing discussion with Heister. There are some concerns with the L/D of the fuel grain port.

From there, the Propulsion team is looking into a multi-port fuel grain design due to the concerns brought up by Heister. GD&T drawings are being put off until Heister can confirm that the design is sufficient.

Ground Systems

The Ground Systems took its first steps toward the manufacturing of the data acquisition computer (DAQ). We met with Scott Meyer, Director of Zucrow Labs, who gave us advice about the best way to design and build the DAQ, and also supplied us with some surplus electronics parts that we will use in our DAQ. We were then able to refine our existing design and discuss ways to move forward with building the DAQ and the fluid systems plumbing.

From there, the Ground Systems team will work on finalizing design paperwork and writing up operating procedures for the entire ground systems due to the suspension of manufacturing.



Figure 3: Learning How to Build Up a DAQ at Zucrow

Manufacturing

Due to the BIDC being shut down for Covid-19 outbreak manufacturing will be suspended.