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## November at-a-Glance

During the month of November, our rocket division finalized the CAD model and our payload division reevaluated its previous fixed wing design choice and is currently transitioning towards a quadcopter design.

Before Thanksgiving, our team hosted a meet-and-greet with the Olin College rocketry team, a neighboring team also competing in IREC! It was a great chance for our members to socialize and connect with another team as we both continue our design and building processes.

Our team is currently on track to conduct ejection testing for our last year's rocket and payload in the second week of December at the facility of our sponsor Test Devices. Currently, all the sub-teams on both the rocket and payload divisions are preparing for a team-wide Internal Preliminary Design Review, which is a great chance for our younger members to share their designs and practice their presentation skills.

Finally, we want to say thank you to our sponsor enDAQ for providing a generous contribution to the team through their sensor donation program.

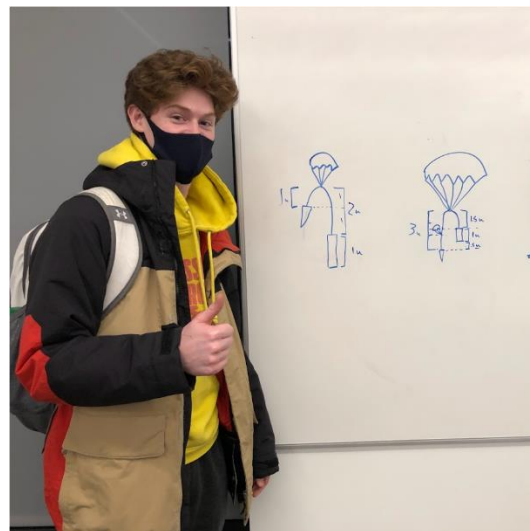
Happy Holidays!



Members of the aerostructures team practice composite layups for the fin can.



Members of Couplings sub-team utilizing the WPI Washburn Labs to begin machining for the coupling prototype.

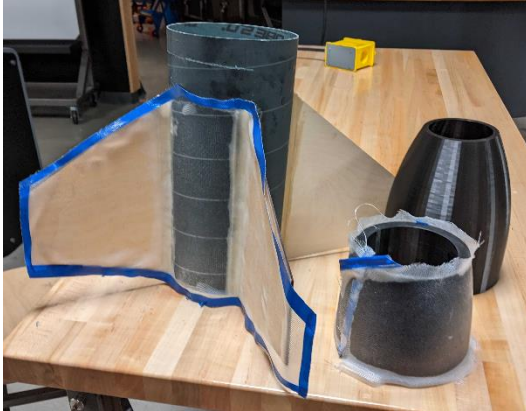


Member of Recovery sub-team contributing to the calculation process for recovering our rocket after launch.

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## Rocket Division

Altair

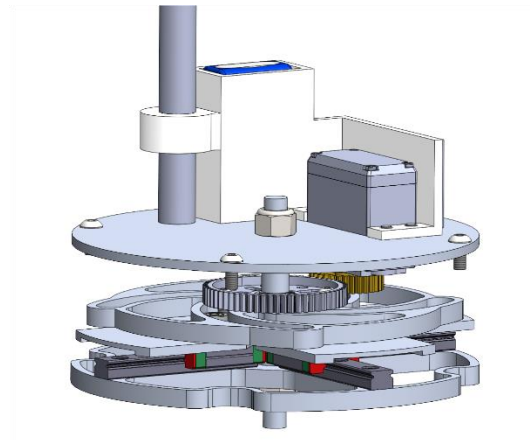


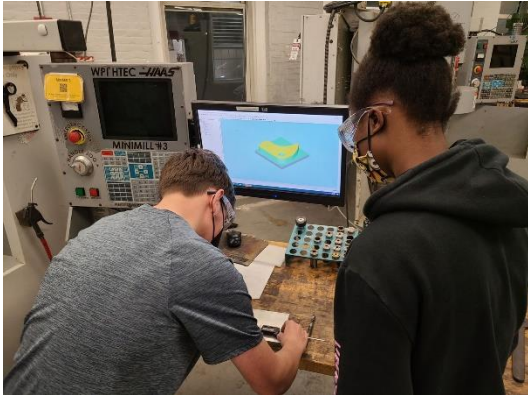
### Aerostructures

The aerostructures team has been working on the design of the fin alignment jig in order to ensure that our fins are perfectly spaced and vertical. We're also finishing up with learning ANSYS, and are currently focusing on modeling and analyzing composite layups. For our components, we've completed all our designs and are practicing fiberglass layups for both the fin can and tailcone.

### Airbrakes

Over the course of November, the airbrakes sub-team finalized the CAD design for the subsystem. In addition, we set up our flight profile in preparation for conducting CFD on the rocket with the airbrakes extended.





## Couplings

The couplings team has been making preparations for machining a prototype of the couplings. We plan to perform a 3-point bending test to verify the coupling's joint rigidity.

Simulations on the coupling joint and motor retention system will also be a priority in the coming weeks.

## Recovery

Over the past month, the recovery team has conducted a full re-design of the E-bay and selected the drogue parachute. The team has designed a custom vacuum chamber test for testing the electronics. In addition, we are building a test stand and refurbishing last year's rocket for the Ejection Test hosted at our sponsor Test Devices. We are currently investigating additional testing plans for the future and evaluating our mass budget.



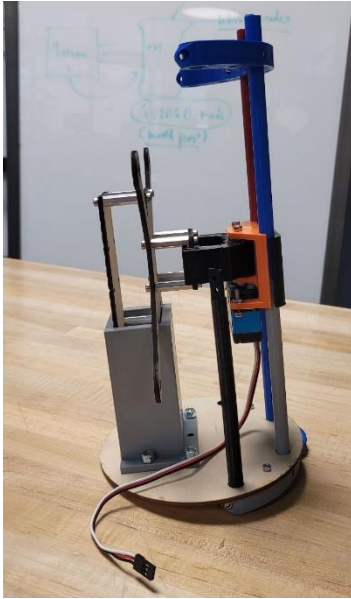
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## Payload Division

Tarazed

The payload team has begun initial design and is currently making preparations for the all-team internal initial design review. Furthermore, following the team's decision to transition from a fixed-wing aircraft to a folding quadcopter design,

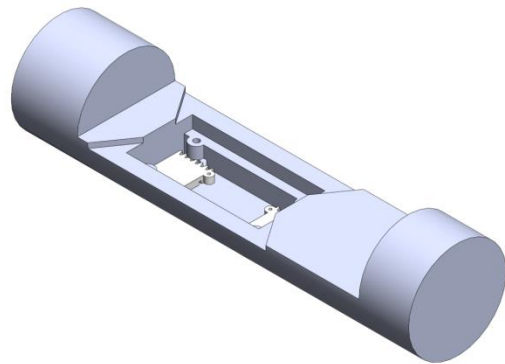
the mechanical team is pivoting and now focusing on developing a design for this alternative concept.



## Mechanical

Over the last few days, the mechanical payload subteam has been working on a payload stabilization system to ensure the quadcopter is close to level to the ground before take-off. We are also working on a system to deploy the arms of the quadcopter which will use a similar system to the fixed-wing design we chose. For the design of the quadcopter, we are planning on having a body that is 6 inches long and 6 inch propellers. To lock the wings, we are iterating on the locking mechanism design from our 2019 payload.

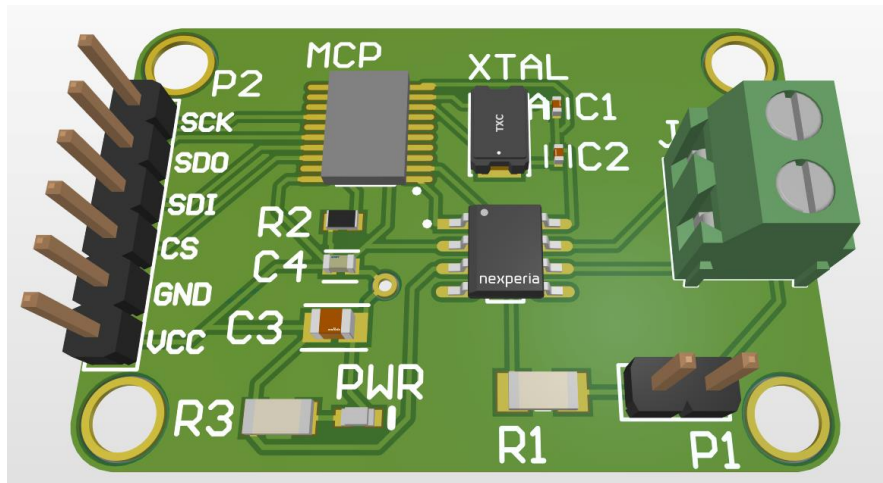
The decision to switch from a fixed-wing to a quadcopter design resulted from concerns about the ability to legally fly the vehicle in the launch airspace. The quadcopter can be easily launched from the ground once the approval to fly is given. A winged aircraft would require numerous safety exceptions from the Range Safety Officer which presents a mission liability.



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## Electronics and Programming Team





## Avionics

The electronics team is currently finishing up and reviewing the schematics design for the four custom printed circuit boards. The team also created a power budget and a mass budget for the avionics system. Members designed a custom breakout board for the CAN circuitry, which will be ordered soon to test functionality which will be implemented on the other final boards.

## Software

The ground station team is almost done with their initial prototype. The team is currently finishing up work on the LoRa telemetry and frontend. The avionics software team is able to pull data from all sensors being used and needs to add all those parts to the code base. The payload EnP team has been researching flight computers based on I2C connections, cost, size, and a few other factors. The two options we're considering right now are the Holybro Pix32 v5 and the Pixhawk 4. In the last few weeks of the term, the team will begin researching a method of rocket location and determine whether it's feasible to use live waypoints during the mission.