

HABET

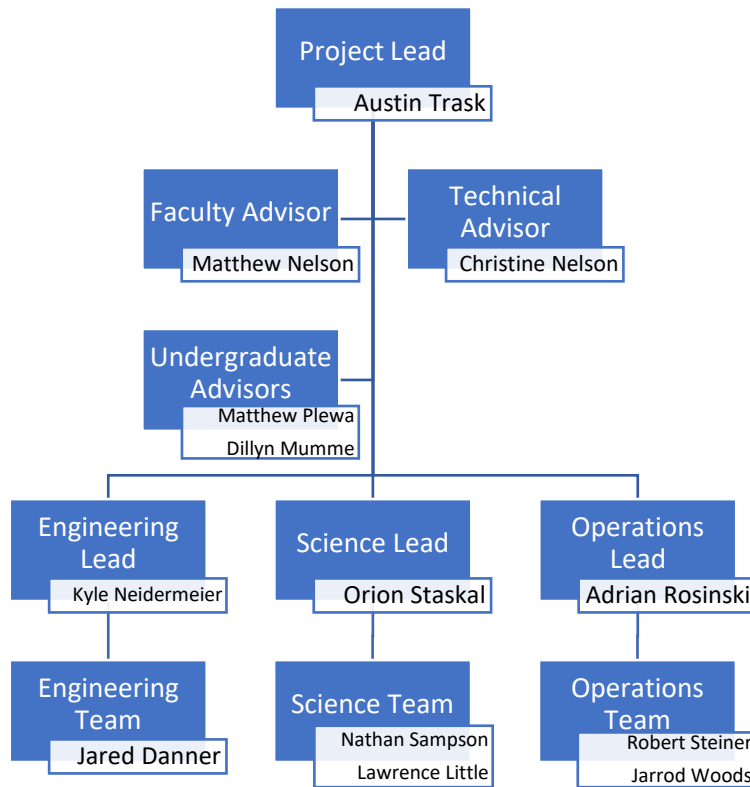
Project Lead- Austin Trask

Project Information

Project Name	HABET	# semesters in service	48
Project Classification	Service	Budget Requested	\$7,860.00
Project Student Leader	Austin Trask	Budget Approved	\$6,600.00
Project Member Size	9	Budget Spent	\$1412.96

The project has 3 teams: Engineering, Science, and Operations. The team leads are: Kyle Neidermeier, Orion Staskal, and Adrian Rosinski, respectively. The stakeholders are: Make to Innovate, Iowa Space Grant Consortium, and the University of Iowa.

Organization Chart



Project Mission Statement

HABET's mission is to provide a platform for students, professors, and other interested third parties to perform experimentation and design work that would require a high-altitude balloon system.

Project Goals

HABET's overarching, major goal this semester is to return to full flight capabilities in order to operate by our mission statement. Specific goals are set for each team. Engineering team's goal is to fully test and implement the LoRa system for transmitting payload location data and implement our own tracking and prediction software. Science team's goal is to work alongside engineering team and learn about the hardware systems we use in order to begin work on a science mission by next semester. Operation team's goal is to update our documentation processes in order to support flight operations, as these are largely outdated, yet important to the longevity of HABET.

Project Deliverables

- Successful flight of a LoRa
- Implementation of prediction and tracking website
- New fill nozzle
- Proposal for a research mission
- Updated documentation
- Implementation of checklists into the website

Project Summary

High Altitude Balloon Experiments in Technology, or HABET, is a project in Make to Innovate dedicated to providing a high-altitude balloon launch service to perform experiments and doing research in such high-altitude environments. Our services are open to other Make to Innovate projects, Iowa State University professors, and parties outside the university itself. HABET was founded in 1993 and became an Iowa State University program in 1995.

HABET's project lead is Austin Trask. HABET is divided into three teams. Engineering team, led by Kyle Neidermeier, is responsible for the development of payloads and the upkeep of our systems by which we communicate with payloads in flight. Science team, lead by Orion Staskal, works with those requesting our launch service to integrate their experiment or payload in a way that best suits their needs and is within our capabilities. Operations team, led by Adrian Rosinski, manages launch procedures and leads launch day operations to ensure safe, successful flights. Matthew Nelson and Christine Nelson are our faculty and technical advisors, respectively, and their experience with HABET is a tremendous asset.

A standard HABET launch is prefaced by three readiness reviews that take place leading up to a launch. Should all these readiness reviews be passed without meeting any scrub criteria, the launch will take place. The launch is handled by three launch-day teams: Launch, Recovery, and Mission Control. Launch team prepares the payload, fills the balloon, and performs the launch. Recovery team drives to the predicted landing spot and follows the updated prediction until the payload is back on the ground. They are responsible for delivering the payload back to

Howe Hall. Mission Control oversees the tracking and prediction of the payload, as well as coordinating the other two teams and facilitating communication throughout the flight.

HABET suffered a few rocky semesters recently, leaving the project without flight capability and filling the team with inexperienced members. Nevertheless, our members are dedicated, and we have the support of our undergraduate advisors Matthew Plewa and Dillyn Mumme. This semester, HABET has been focused on learning how to run the project, gaining experience for its members, and returning to normal launch capabilities. Reaching fully operational status would include taking steps to prevent the issues that plagued HABET, such as re-implementing training for inexperienced members and educating members who seek a leadership position when a team or project lead leaves the project.

We have successfully launched and recovered a payload with flight LX-150-A. This is the first real flight HABET has performed in a long time. The 150 Mission will continue with LX-150-B currently scheduled for Sunday, March 10th. This will once again test the LoRa boards and bring HABET closer to normal flight capabilities.

Beyond restoring flight capabilities, HABET is also looking into its next mission to fly hardware on behalf of a third party. A group from the University of Iowa is interested in our launch services, and this semester's successes should act as demonstration of our capabilities as a launch service provider.

Presentation Summary

The objective of HABET is to provide effective and reliable launch services to those who wish to perform experiments, tests, or research and extremely high altitudes. Having previously lost flight capabilities, this semester has been focused heavily on restoring those capabilities for long-term success. The goals, as listed above in this report, will move HABET in the right direction for future success,

Each team has milestones to reach this semester. Engineering team's milestones are to build a new fill nozzle jointly with Science team, successfully implement the LoRa system for payload tracking, and to learn to use the website being developed by Matthew Plewa. Science team's milestones are to create that new fill nozzle with Engineering team and to become

familiarized with the payload hardware and LoRa system to understand how to approach a future scientific mission. Operations team's milestones are to earn FCC amateur radio licenses in order to operate radios on launch day, and to improve documentation for both efficiency and simplicity.

HABET members' tasks have been focused on the goals at hand in order to restore HABET to operational status.

HABET is currently on track to meet most of our goals. Our successful implementation of the LoRa was pushed back when it failed before the launch of LX-150-A. We have addressed possible issues, and LX-150-B should be a proper test of its capabilities, but that flight may be impacted by weather and move to after spring break.

A high-altitude balloon mission can have a few constraints. Our payloads are limited in weight to 6 lb. per package or 12 lb. total weight of multiple packages, or else they become subject to federal regulation, and the process of flying the balloon would require much coordination with the FAA. These regulations exist for the safety of aircraft that may accidentally strike our payload.

Our current design for a payload contains primary and secondary tracking methods that broadcast GPS data via APRS radio packets. This is in addition to the LoRa board we are still testing.

Design changes of the payload to be made in this semester may include better insulation and a way of heating the LoRa, if that is a significant issue. In terms of procedures, we are overhauling and updating checklists and other documentation.

Design risks may include continued failure of the LoRa, or unknown issues with the new software we are implementing. Should we encounter these, we will do everything we can to troubleshoot the issues and get everything working.

