

# High Altitude Balloon Control System

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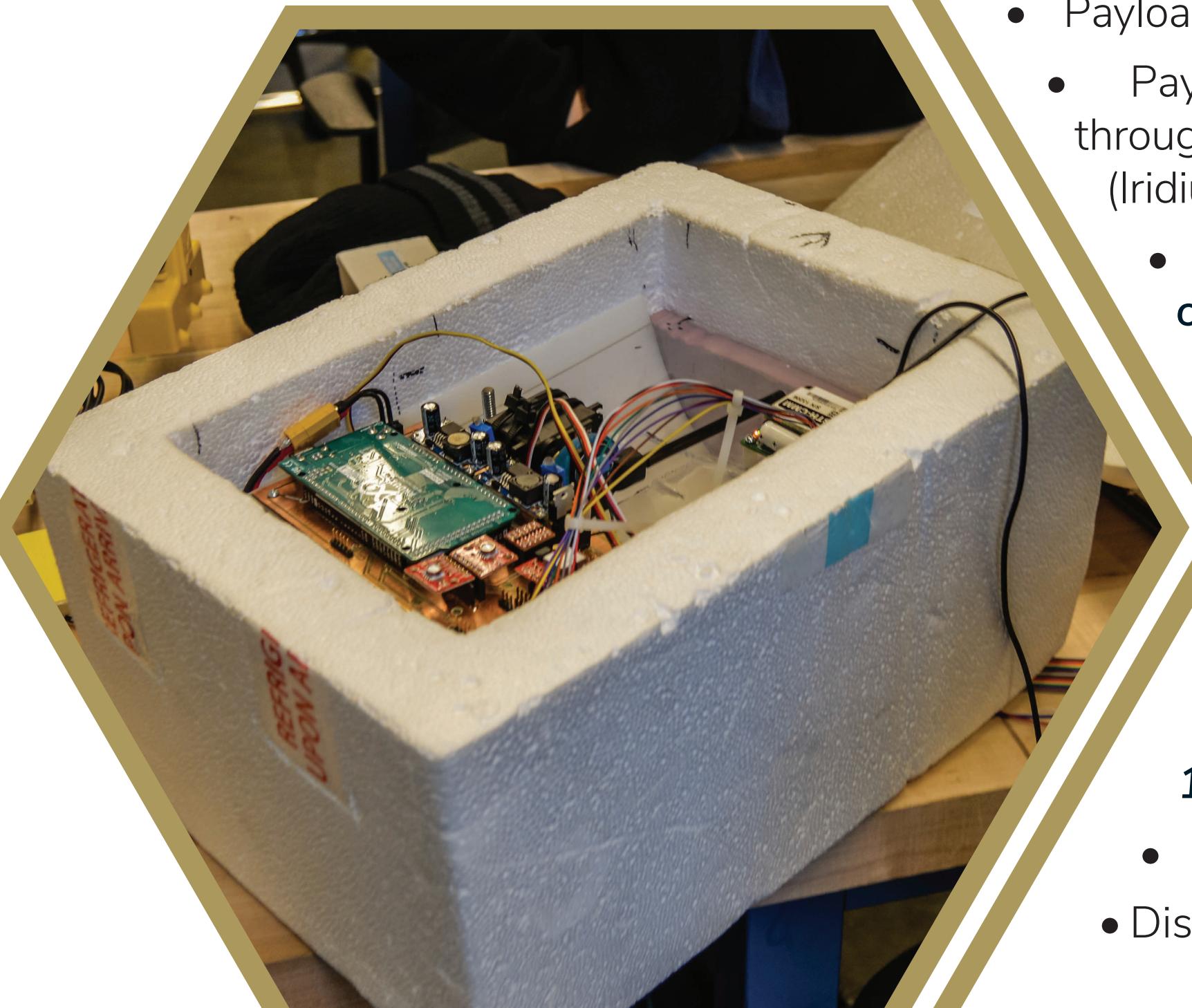
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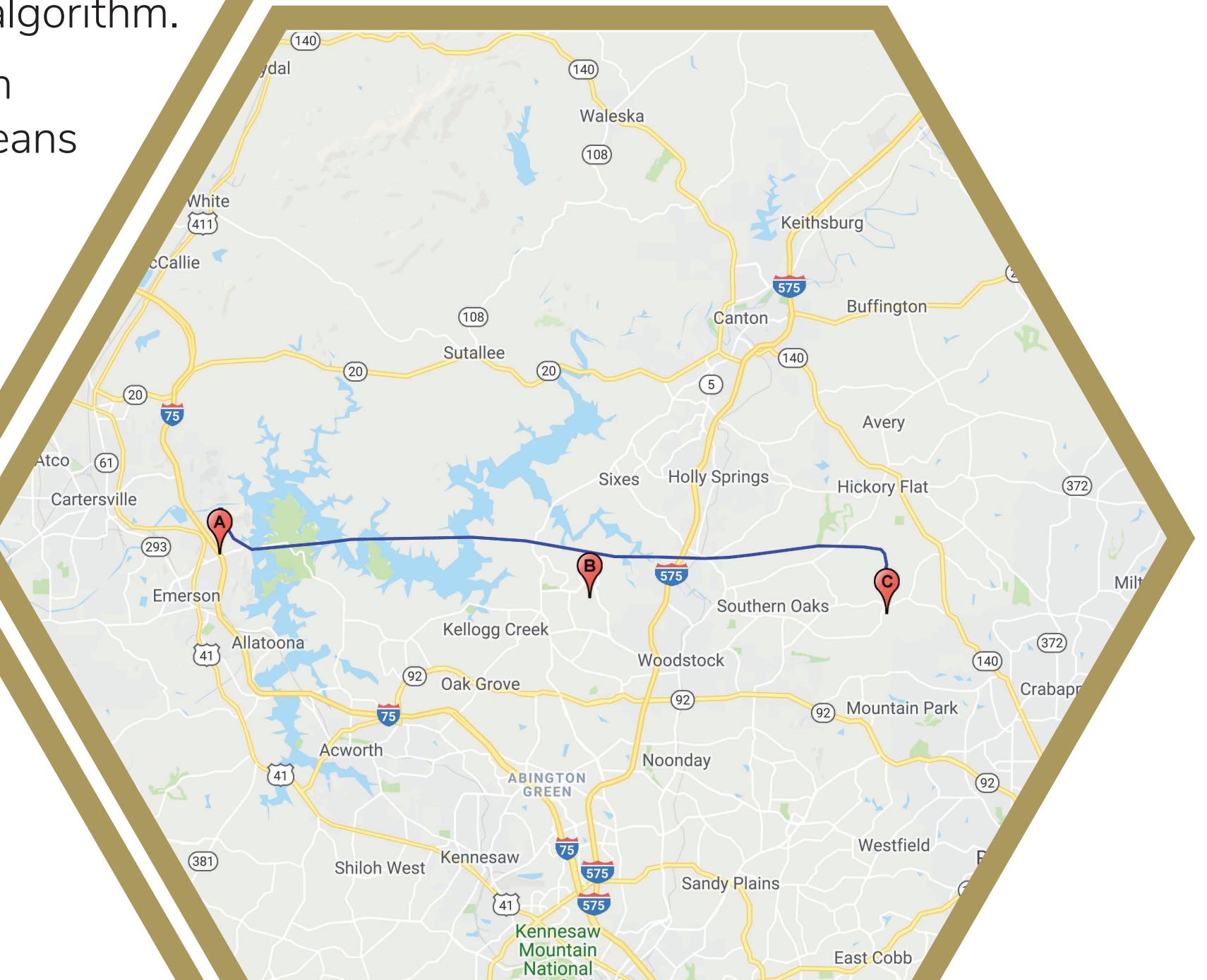
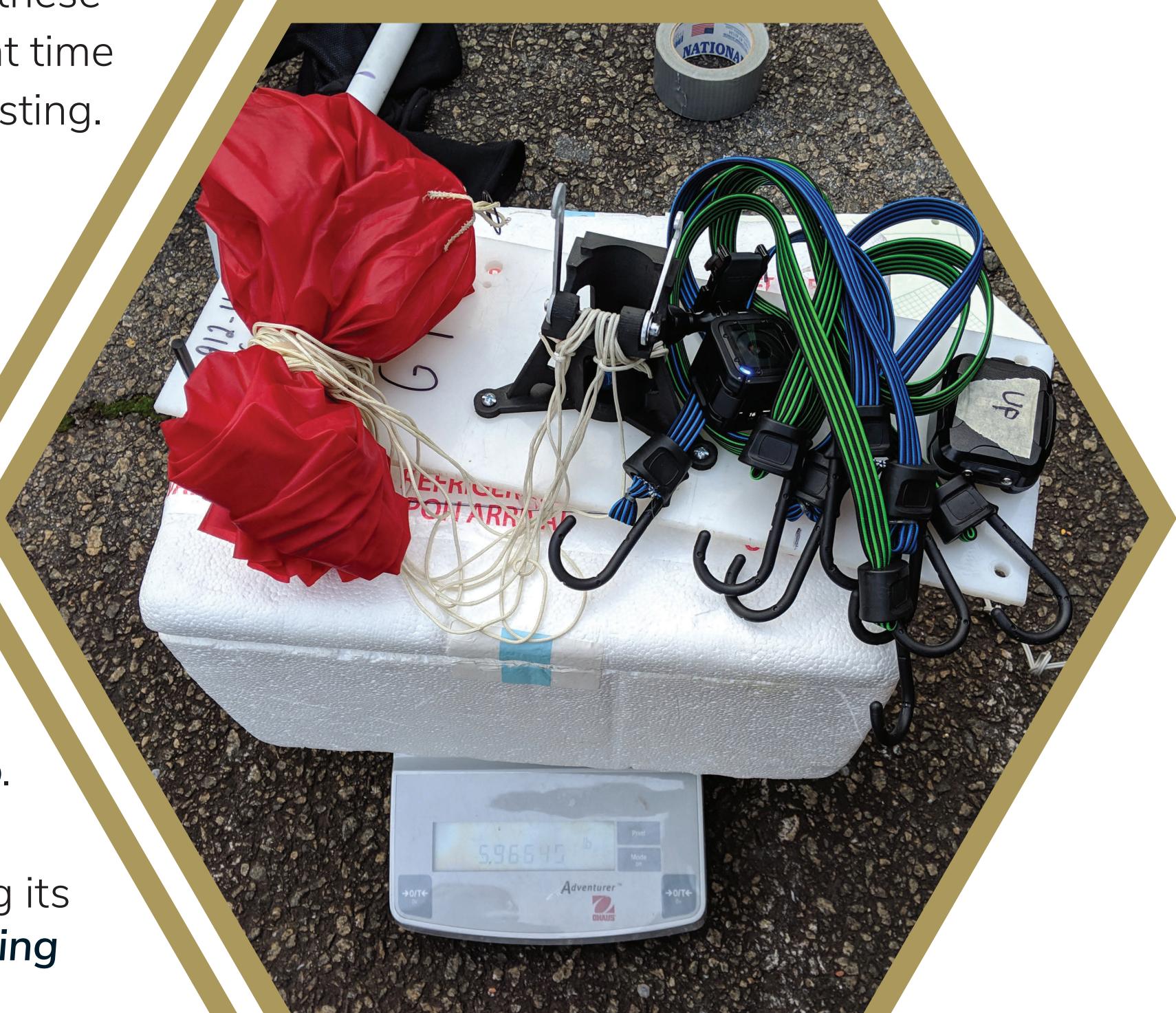


## Motivation

- Traditional methods of aerial sensor deployment cannot only remain above an area of interest for a limited time due to **fuel and time constraints**.
- High altitude balloons could mitigate these constraints, though traditionally, the flight time of an HAB is limited by the balloon bursting.
- An altitude control system will drastically improve the flight duration resulting in a larger variety of applications.

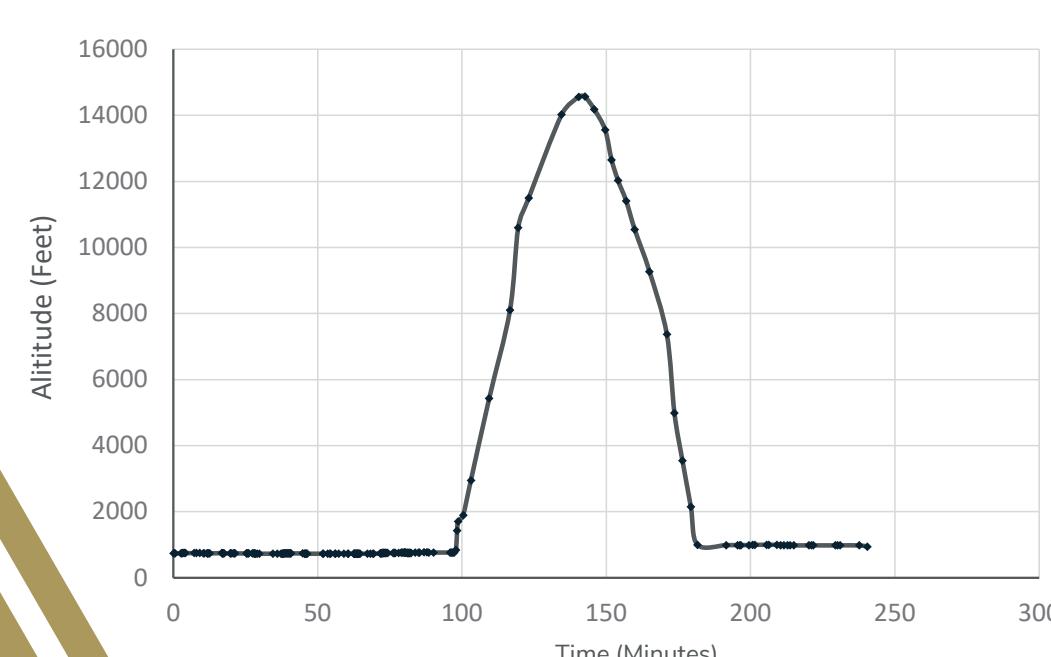
## Design Requirements

- Overall payload must **weigh  $\leq 6$  lb**. to comply with FAA regulations.
- Payload must be capable of controlling its buoyancy by **venting helium** and **dispensing ballast**.
- Payload must have an automatic control algorithm.
- Payload must maintain communication throughout the flight with commercial means (Iridium satellite communications).
- Payload must allow for **manual override** via the satellite communications.



## Test Flight Stats

- Maximum Altitude of **14,562 feet (MSL)**.
- Flight time of **84 minutes**.
- Distance traveled was **18.3 miles**.



## Objective

The goal of this project was to develop an altitude and location control system for a latex HAB to allow long duration flights over a general location. Algorithms take into account current pressure and temperature conditions when venting helium or dropping ballast to estimate altitude changes. Weather forecasts from the National Oceanic and Atmospheric Administration provide wind speeds at distinct pressure levels allowing for prediction of horizontal movement over time. Using this prediction along with altitude control, the balloon's position can be controlled.