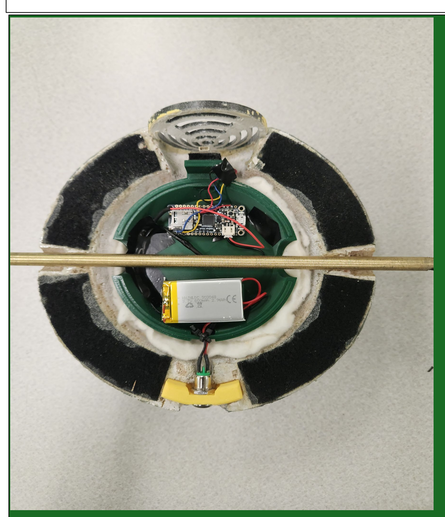
CAC Airheads

Students: Emmanuel Canales, Phoenix Coca, Javier Contreras, Edgar Ellis, Fernando Herrera Ortiz, Dillon Perez, Kacy Vick, Ryan Williams
Mentors: Dr. Kimberly Baldwin, Dr. Wayne Pryor, (TA) Michael Plummer
Central Arizona College ASCEND Team

Overview: Central Arizona College created two high-altitude balloon payloads in Spring 2026 that aims to continue a 5-year long data collection process. The first payload is the main payload that will be collecting temperature, humidity, and altitude. This payload is an improved mechanical design that will protect all electrical components from external harm. The second payload aims to collect acceleration through 3 different axes to test the capabilities of its respective mechanical design. The mechanical design has been improved to give a more solid structure while still having flexibility in the critical joints that hold together the payload by use of TPU 95A HF filament. A Long-Range radio has also been included in the second payload to receive data from the payload as it collects data so long as the payload is within range of our base location.

Control Payload

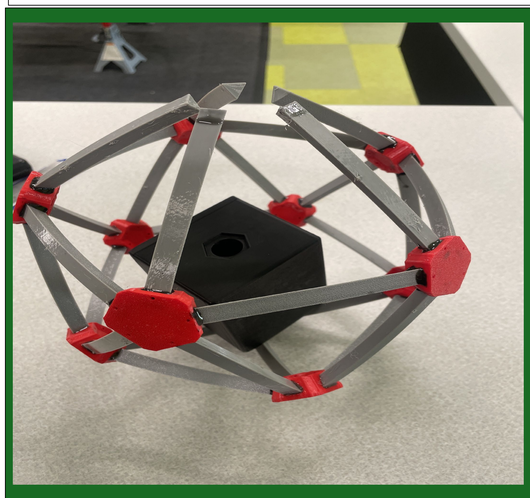
This is the main payload that records the temperature, humidity, and altitude. It acts as a control variable, or a "normal" payload to compare the experimental payload to. This payload is based off an earlier design from a different semester.



(Fig. 1: The inside of our control payload design. It has a spherical shape made with expanding foam molded with a 3D printed shell.

Experimental Payload

The experimental payload has a few changes compared to the control. It collects acceleration data through 3 different axes, has a solid yet flexible structure in the shape of an icosahedron, and uses a radio signal to send the data it collects to us.



(Fig. 2: The experimental payload. The icosahedron structure is made with TPU 95A HF filament.)

Results

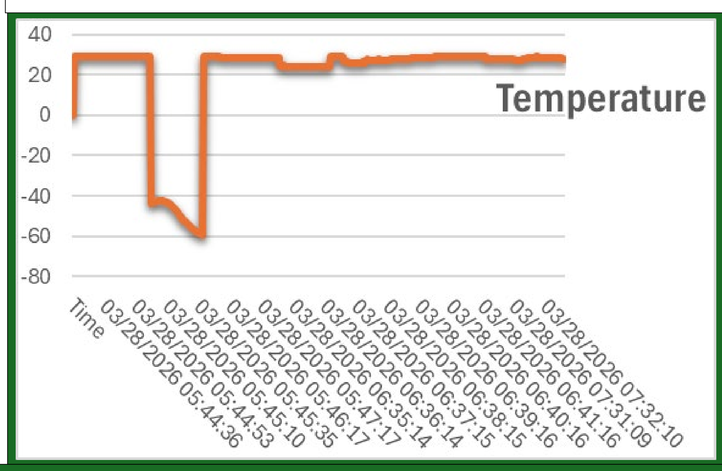
Unfortunately, our control payload at a certain point stopped recording data due to freezing temperatures of -55° Fahrenheit and lower. However, our experimental payload was able to receive and store the data it collected via the board from our payload.

Photo Credit: Desiree Crawl

(Fig. 3: The design of the Control Payload on the day of launch.)

Conclusion

TPU 95A HF filament can withstand intense temperatures, and our LoRa radio was able to stream data for the duration our payload was in the air. We will go in next semester keeping in mind to brace for the harsh, cold temperatures of the stratosphere.



(Fig. 4: The temperature of the experimental payload over the course of 2 hours.)

Future Projects: We hope to continue to improve upon the designs created at Central Arizona College to reach the best design imaginable. We also would like to go beyond these past iterations to create something new and inspiring for future CAC students to improve upon.

2026 Arizona Space Grant Consortium
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