Experimental Sounding Rocket

Industrial Sponsor: White Sands Research and Developers LLC (WSRDs)

Background and Objective

The Fall 2020 team developed an interchangeable payload bay and a launch rail control system for the Mustang 6C rocket under the direction of White Sands Research and Developers (WSRDs).
The Mustang 6C will fly higher and faster than previous designs and will carry an experimental payload designed to deploy instrumentation for aerial experiments to characterize parachute performance.

Fall 2020 Objectives:

- Design and build functioning payload ejection system.
- Test door system for the payload on a large scale.
- Complete interface between launch rail and mission control for safe remote launches.
- Develop an instrumentation package capable of capturing pressure data, acceleration, and live GPS position.

Fall 2020 Team

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Electrical Task Group

The Electrical task group has assembled the payload sphere and instrumentation. The payload sphere will contain:

- tungsten pellets for weight
- shock cords for parachute attachment
- a circuit board to communicate with the ground station.

The team will communicate to the rocket using Arduino-based coding and components, pitcured on the right.

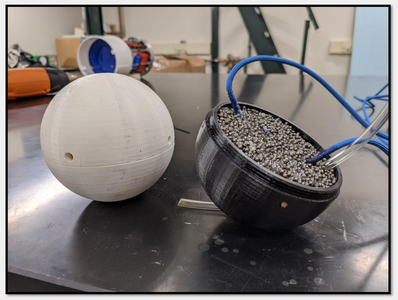

Figure 1: *Closed & Open payload*

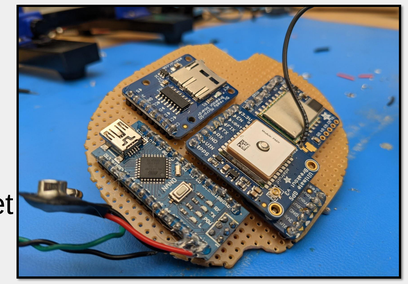

Figure 2: *Payload circuit board*

Rail Task Group

WSRDS constructed the rail and later shipped it to Las Cruces, N.M.

- The launch rail will adjust the rocket's azimuth and elevation in the beginning phase of the launch.
- The code for the azimuth and elevation motors is being written in C++.
- The team chose an inclinometer and compass that satisfied the necessary specifications. A custom mount was printed to attach the sensors to the rail.

Figure 3: *Rail design using a 24" stroke actuator*

Mechanical Task Group

Figure 4: *Payload ejection system uses a spring and cage system to guide the payload out of the rocket.*

- Ejection Ramp
- Cage holds payload and parachute.
- Linear Ejection Spring
- Bay Door
- Ring gear rotates which opens door and releases spring in a single motion
- Door motor and AIMS System

Future Work

- Perform a successful launch and recover the entire launch system and payload. (April)
- Test integrated mechanical deployment system with on-board avionics instrumentation. (March)
- Re-design layout of circuit board components. (February)
- Thoroughly test each circuit board component. (February)
- Receive new specifications for April launch. (January)