CAPSTONE PROJECT: *CANSAT*

Project Purpose: To develop a sensor package and support infrastructure for a rocket payload that will utilize the *UpAerospace* vehicle. The canister is illustrated in Figure 1. It is capable of holding 10 lbs of payload and is approximately 12 inches in diameter. It is made of machined aluminum. It fits in a rocket that is approximately 20 feet long as illustrated in Figure 2.

Figure 1 -- UpAerospace canister for rocket payloads.

Figure 2 -- Rocket on launch rail.

The canister has a clear volume inside, removable top and bottom lids, and an access hatch that can be machined to allow and on/off switch or sensing of the outside environment.

Project Schedule:

- Begin fall 2008
- Expected launch date -- April 2009
- Project end date – May 2009

Funding Sources:

- Rocket – provided by the State of New Mexico
- Supplies – New Mexico Space Grant Consortium
- Payload carrier (payload canister) – provided by *UpAerospace*

Disciplines Needed:

- Power (batteries, power distribution, power control)
- Data acquisition (sensor data acquisition and component control)
- Structures (mounting for components and surviving launch loads)
- Electronics (sensors and support electronics)
- Systems Engineering (requirements, test, evaluation, verification, project control)

Project Constraints:

- Safety (electrical and structural) – must meet lunch specifications
- System Mass must meet launch specifications
- System form factor must meet system specifications

Number of students desired: 5 to 10; ECE students and either ME or ETM for the structures.

Faculty Sponsor: Stephen Horan

Methodology:

1. Student team will need to determine an appropriate "science mission" given the constraints of the flight profile and canister envelope and the methodology of conducting the mission (sensors, data acquisition, etc.)
2. Student team will need to develop detailed mission requirements and mission success criteria
3. Student team will need to develop subsystem concepts and associated subsystem requirements
4. Students will need to produce a design that addresses electrical and mechanical safety issues, collect mission science data, collects mission environmental support data (temperature, pressure, acceleration, location, etc.), and control

the operation of the payload in the pre-launch, flight, and recovery configurations
5. Student team will need to develop an engineering prototype (flatsat) to work out hardware and software, develop assembly and test procedures, and run simulated missions
6. Student team will need to assemble and validate a working flight payload.

Project deliverables:

1. Mission statement
2. Acceptance criteria
3. Requirements documents document and verification matrix
4. Software and hardware design details (analysis, schematics/drawings, parts list)
5. Working prototype by CDR
6. Assembly procedures
7. Test procedures
8. Working payload by launch integration date

Project Reviews:

1. System Concept Review
2. Preliminary Design Review
3. Critical Design Review
4. Launch Readiness Review
5. Final Review (post flight and/or end of spring semester)

Outreach Requirements:

1. Student team will be required to present the project to at least one precollege group/visit
2. Students will need to make a 5-minute (maximum) video describing the project and showing it working