2018 Payload Design Contest

Every year, OSU’s Buckeye Space Launch Initiative produces two sounding rockets for the annual Intercollegiate Rocketry Engineering Competition held in Spaceport America, New Mexico. Each of those two rockets carries an 8.8lb 3U payload. BSLI is giving the opportunity to high school students across Ohio to design a 1U cubesat payload to be flown in one of these competition rockets.

Ohio high school students will be challenged with designing a scientific experiment that will be flown in a supersonic rocket as a payload. Contestants will submit experiment proposals and be judged on a variety of categories. Finalists will be granted funding and access to state-of-the-art fabrication labs at OSU to have their experimental payloads constructed.

This is an excellent experience for students interested in rocketry, science, and many other fields; it opens many career possibilities. If you have any questions, please email Eisen.27@osu.edu, Dungan.23@osu.edu, or Kanapskyte.1@osu.edu.

Timeline:
- Oct 6: Basic proposals due (simple description of payload idea, 500 words or less)
- Oct 8: Winners announced
- Nov 10: Formal written proposal due (including materials list)
- January 13: All materials must be obtained by this point
- March 16: Payload completion date
- Mid-March: Test launch
- Late June: Students are given back their payload and data post-competition

Grading rubric:
- Scientific value: 45 points
- Feasibility: 25 points
- Design: 15 points
- Uniqueness: 15 points

TOTAL: 100 points
Payload must satisfy the following basic rules to be judged:

1. Satisfies CubeSat dimensions
2. Maximum 3.0lb (±0.1lb) in mass (Weight can be added to satisfy requirement)
3. Payload shall not contain *significant* quantities of lead or any other hazardous materials (Non-RoHS PCB's are OK, other quantities and materials can be handled case by case. Please contact us with questions).
4. Payload shall not contain any live, vertebrate animals

Payloads must be designed to meet or exceed the following performance parameters:

- **Power:** 8 hours of standby
- **Temperature:** Sustained 95°F, peak: 115°F for maximum 4 hours
- **Launch Acceleration:**
  - ±Z: Sustained +25G, peak vibrational +30G (0.25s)
  - ±X, ±Y: Peak vibrational: ±10G
- **Landing Acceleration:** ±Z: Expected +35G (0.10s) impact
- **Pressure:** 0.8-1atm launch site, 0.2-0.4atm apogee
- **Particulate:** 10-100micron sand (Full seal of electronics recommended)
- **Optical:** <30lux (Fully enclosed within rocket, no windows)

**Note:** Carbon fiber body prevents radio frequency transmission

**Flight parameters (approximate):**

<table>
<thead>
<tr>
<th>Apogee (AGL)</th>
<th>10,000ft Rocket</th>
<th>30,000ft Rocket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor burn time</td>
<td>3.3 seconds</td>
<td>3.5 seconds</td>
</tr>
<tr>
<td>Coast to apogee time</td>
<td>23 seconds</td>
<td>35 seconds</td>
</tr>
<tr>
<td>Descent to ground time</td>
<td>~190 seconds</td>
<td>~200 seconds</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>Mach 1.1/850mph</td>
<td>Mach 2.3/1600mph</td>
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</tbody>
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**Recovery Parameters:**

While payloads are generally collected within 3 hours of launch, payloads may take over 24 hours to collect. Any experiments that collect data must be able to save data before power units fail.

**Integration Parameters:**

Assembly and integration of payload must be completable by one BSLI member in under one hour.

**Facility Specifications:**

Miscellaneous tools and hardware are available for servicing. 120V AC power is available via generator, however in limited amount. Variable voltage LiPo battery charging equipment is available.