High School Payload Challenge: Inspiring High School Students to Experience the Professional Design Process

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Agenda

- Introduction
- Competition Overview
- Competition Structure
  - Initial Stages
  - Design Reviews
  - Manufacturing and Launch
- Outcomes and Expansion Opportunities
- Conclusions

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Introduction

- STEM engagement is critical to the future of industry
- STEM education commonly relies on a classroom environment to teach the design process
- A target for research is non-classroom STEM design education for high school students

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Competition Overview

- Launch Initiative at Tech competes in NASA's USLI
  - USLI allows for an extra payload to be incorporated in the rocket
- A competition was designed for high school teams in the area
  - Focusing on the design process, and resulting in a functioning payload containing an experiment

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Competition Structure

- Interested teams submit a payload concept proposal
- All teams undergo a Preliminary Design Review
- Critical Design Reviews are then used to select experiments for flight
- Selected teams proceed to the construction phase
- Teams' payloads are launched

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Initial Stages

- The competition was outlined for prospective teams in a single document
- A webinar was held to advertise the content of the competition
- Advertisement and proposal collection was handled by Georgia Space Grant Consortium

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Preliminary Design Review

- Virtual presentation held over Microsoft Teams
  - 20 minutes to present
  - 10 minutes for questions
- Teams are expected to discuss a mature design concept for their experiment proposal
- Teams with a high score continue with the competition

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Table 1 Blank PDR Scoring Rubric

Category	Score	Comments
Deliverables Received by Deadline	_/10	
Technical Presentation Capabilities	_/30	
Presentation Design	_/10	
Experiment Originality and Quality	_/20	
Presentation Skills	_/10	
Professionalism	_/5	
Safety Information	_/15	
Total Score:	_/100	

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Critical Design Review

- Virtual presentation held over Microsoft Teams
  - 30 minutes to present
  - 15 minutes for questions
- Teams are expected to discuss a complete and functional design for their experiment
- The best teams are selected for launch

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Table 2 Blank CDR Scoring Rubric

Category	Score	Comments
BOM Requirement	_/50	
Launch Procedure Requirement	_/20	
Safety Information	_/25	
Design Completeness	_/35	
Presentation Skills	_/15	
Experiment Quality	_/35	
Other Requirements	_/20	
Penalties	- _%	
General Commentary		
Total Score:	_/200	

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Manufacturing and Launch

- Teams receive funding and can begin building their payloads
- LIT serves a mentorship role to each team
- A dry integration is scheduled before launch
- Launch can occur on the competition rocket or an alternative vehicle, depending on team selection

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Outcomes

- Any information related to identity and performance of the teams is omitted due to privacy regulations
- Teams are evaluated only on their performances, with no considerations such as age or school
- Logistical difficulties occurred due to coordination problems with the LIT engineering team

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Competition Expansion

- Collaborating with the High Altitude Balloons and High Power Rocketry teams has allowed for additional payload launches
- Future versions of the competition could include expansions in collaboration with local rocketry clubs

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Future Opportunities

- The competition can be expanded to reach schools with fewer STEM opportunities or younger students
- Other organizations developing similar projects to LIT can utilize the competition model to expand their outreach efforts

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Conclusions

- The competition is a natural evolution of current STEM opportunities in high school education
- The approach is innovative, focusing on the design review process
- It serves as a high-quality replicable model for prospective outreach activities

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