SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Enabling the Future - Developing the Space Workforce (5)

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NASA'S EXPLORATION SYSTEMS AND HABITATION (X-HAB) ACADEMIC INNOVATION CHALLENGE

Abstract

Future exploration missions in the space between the Earth and the moon or beyond will require complex operational activities to ensure that crew, cargo, and exploration systems safely and successfully reach their destination. Through the eXploration Systems and Habitation (X-Hab) Academic Innovation Challenge, NASA develops strategic partnerships and collaborations with universities to increase knowledge in technologies, capabilities, and operational approaches related to future human spaceflight missions. X-Hab activities help NASA bridge strategic knowledge gaps, better understand technology risk reduction, and combine the innovative approaches and diverse insights of university teams with unique agency expertise.

The X-Hab Academic Innovation competition links with senior- and graduate-level design curricula that emphasize hands-on development of functional prototypes for deep space exploration missions. Research topics are identified and funded annually by NASA technology projects in collaboration with the National Space Grant Foundation. University teams submit proposals based on their interests and capabilities, and multiple small awards are made for the design and creation of studies or products that align with NASA strategic objectives. The selected project teams implement the design course during the fall and spring semesters using a systems engineering approach that requires formal reviews with NASA for requirements and system definition, preliminary design, and critical design. The challenges allow students to follow genuine hardware and systems engineering development processes and gain valuable experience that will extend to their professional careers.

Since 2009, NASA has selected 33 X-Hab student concepts to address advanced fabrication concepts, plant growth, atmosphere management, waste handling, and recycling. This paper provides a status and overview of submissions received, selected projects, success stories, and lessons learned. It also details methods employed by NASA to manage and promote the X-Hab competition, summative information on participating organizations, and next steps for the activity. The X-Hab project assists NASA in optimizing technology investments, fosters innovation and facilitates technology infusions that address specific, real-world challenges being faced by NASA as the agency works to send humans further into space than ever before.