

45th STUDENT CONFERENCE (E2)
Student Team Competition (3-GTS.4)

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PALLAS: A PORTABLE ASTEROID LIFT AND LOCK AGGREGATE SYSTEM

Abstract

The National Aeronautics and Space Administration (NASA) is currently developing a robotic mission to visit a near-Earth asteroid (NEA) and redirect it into lunar orbit. Once this mission is complete, NASA plans to send a manned mission to the same NEA so that astronauts can explore it and return to Earth with samples from the NEA's surface. Doing so will require a new set of extravehicular activity (EVA) tools, as existing surface sampling tools were designed during the Apollo program for use in a lunar gravity environment, in contrast to the microgravity environment presented by a NEA. Among the tools required for NEA exploration is a float sample grabber, which will allow astronauts to capture and store loose samples from a NEA's surface without cross-contamination between collection sites. This paper describes the design, prototyping, fabrication, and testing processes for a human-operated tool for NEA float sample grabbing. Details are also given on the team's efforts to use the tool development process to inspire the next generation of engineers and scientists through a comprehensive outreach plan. Finally, qualitative and quantitative data obtained from human trials on the ground and at NASA's Neutral Buoyancy Laboratory (NBL) will be presented and discussed to evaluate the device's viability as an EVA tool.