48th STUDENT CONFERENCE (E2)
Student Team Competition (3-GTS.4)

Author: Mr. Nicholas Lopac
Embry-Riddle Aeronautical University, United States, lopacn@my.erau.edu

Dr. Ryan Kobrick
Paragon Space Development Corporation, United States, ryanxpc@gmail.com
Mr. Cody Rivas
Embry-Riddle Aeronautical University, United States, rivasc@my.erau.edu
Mr. Chase Covello
Embry-Riddle Aeronautical University, United States, covelloc@my.erau.edu
Ms. Angelica Radulovic
Embry-Riddle Aeronautical University, United States, RADULOVA@my.erau.edu
Mr. Benjamin Banner
Embry-Riddle Aeronautical University, United States, bannerb1@my.erau.edu
Mr. Isaac Mendieta
Embry-Riddle Aeronautical University, United States, mendieti@my.erau.edu

THE SPECIALIZED TOOL FOR ASTRONAUT RECORDING (STAR)

Abstract

The student team from the Spacesuit Utilization of Innovative Technology Laboratory (S.U.I.T. Lab) at Embry-Riddle Aeronautical University (ERAU) designed, tested, and analyzed the Specialized Tool for Astronaut Recording (STAR) as part of the NASA Micro-g NExT 2019 Challenge. The STAR was designed to be a simple, safe, and an effective small tool for attaching a modified-GoPro camera to various handhold and equipment rails outside of the International Space Station (ISS) by NASA astronauts during Extravehicular Activity (EVA). Currently astronauts and mission controllers are limited to the footage recorded from close up cameras mounted on the spacesuit helmet and distant cameras mounted on the ISS. These angles are often not enough to capture all elements of an EVA task or anomaly. Having recordings from the additional camera angles provided by the STAR at the disposal of the astronaut or mission controller at the end of an EVA can contribute to astronaut training, EVA documentation, and future EVA operations. The interdisciplinary student team from the S.U.I.T. Lab worked together over two semesters to integrate the best practices from spaceflight operations, human factors, and aerospace engineering into one simple, safe, and compact tool for an astronaut to carry with them on EVA. The STAR utilizes a double-sided clamping interface that allows the single unit to mount to three types of unique interfaces: the ISS handrails, the square attachment grid of the Crew and Equipment Translation Aid (CETA) Cart, and the truss of the ISS. The device locks with two-fault tolerance, as influenced by other small EVA tools. A successful series of STAR testing in the Neutral Buoyancy Laboratory (NBL) at the NASA Johnson Space Center (JSC) has yielded critical design feedback from NASA EVA small tool engineers, professional divers, and astronauts. Using this feedback, the ERAU S.U.I.T. Lab has compiled a list of suggested design revisions which can improve the STAR's ergonomics, one-handed operation, and functionality. With these design improvements and flight-ready materials, the STAR can quickly be adopted for use outside the ISS by NASA astronauts to capture never before seen perspectives while on EVA. This report was created to summarize the design and performance of the STAR for NASA so they will be able to take some or all elements of the tool's design and develop flight hardware that can

achieve their human spaceflight exploration goals with the ISS and onward to Gateway with the Artemis Program.