

Development and Testing of Robotically Assisted Extravehicular Activity Gloves

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Over the past two years, the High Performance EVA Glove (HPEG) project under NASA's Space Technology Mission Directorate (STMD) funded an effort to develop an electromechanically-assisted space suit glove. The project was a collaboration between the Johnson Space Center's Software, Robotics, and Simulation Division and the Crew and Thermal Systems division. The project sought to combine finger actuator technology developed for Robonaut 2 with the softgoods from the ILC Phase VI EVA glove. The Space Suit RoboGlove (SSRG) uses a system of three linear actuators to pull synthetic tendons attached to the glove's fingers to augment flexion of the user's fingers. To detect the user's inputs, the system utilizes a combination of string potentiometers along the back of the fingers and force sensitive resistors integrated into the fingertips of the glove cover layer. This paper discusses the development process from initial concepts through two major phases of prototypes, and the results of initial human testing. Initial work on the project focused on creating a functioning proof of concept, designing the softgoods integration, and demonstrating augmented grip strength with the actuators. The second year of the project focused on upgrading the actuators, sensors, and software with the overall goal of creating a system that moves with the user's fingers in order to reduce fatigue associated with the operation of a pressurized glove system. This paper also discusses considerations for a flight system based on this prototype development and address where further work is required to mature the technology.

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