



T0125-P Human Exploration Telerobotics (HET) Smartphone

Problem Statement

- HET demonstrates & assesses remote operations of a robotic free-flyer to increase productivity, reduce cost, and mitigate risk for future human exploration missions
- Current ISS free-flyer uses rigged environment with time-of-flight sensors to estimate robot position, and is limited to a small environment
- ISS and future crew vehicles require a free-flyer that can navigate throughout the entire vehicle to perform IVA tasks
- ISS astronauts, Mission Control Center, ISS Program Office, and future exploration missions

Technology Development Team

PI: Terry Fong, NASA, Ames Research Center, terry.fong@nasa.gov

Team: NASA Ames Research Center, Intelligent Robotics Group

NASA Space Technology Mission Directorate

Technology Demonstration Missions Program

Proposed Flight Experiment

Experiment Readiness:

- System is complete and undergoing ground test.
- Ready in December 2013

Test Vehicles:

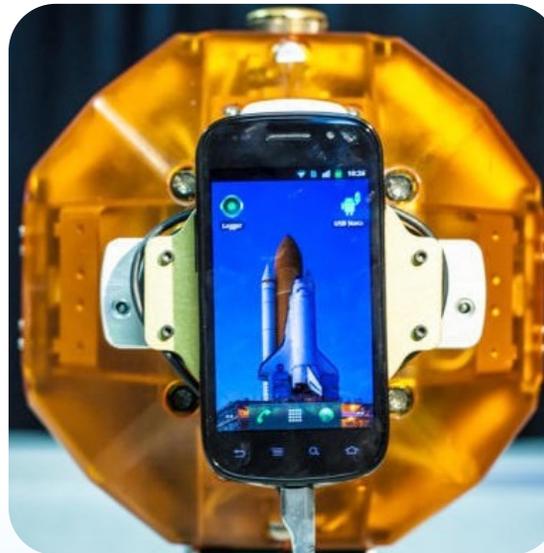
- Parabolic Aircraft

Test Environment:

- Test in micro-gravity to reduce risk for further testing and operations on ISS

Test Apparatus Description:

- Modified Smartphone attached to SPHERES free-flyer



Technology Maturation

- Smartphone vision-based localization currently TRL 3
- TRL 5 – Parabolic Flight
 - February 2014
 - Verify smartphone sensor performance in 0g
- TRL 6 – ISS operations
 - Launch on SpX-4
 - Smart SPHERES localization & navigation demonstration
- TRL 6 by September 2013

Objective of Proposed Experiment

- Verify Smartphone 3-D mapping of the environment in 0g
- Verify Smartphone sensor performance in 0g with SPHERES thrusters
- Verify recall position using a known map
- Verify SPHERES localization using Smartphone position estimate.
- Verify Smartphone SPHERES operations without beacons.