

SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)

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TALARIS PROJECT UPDATE: OVERVIEW OF FLIGHT TESTING AND DEVELOPMENT OF A
PROTOTYPE PLANETARY SURFACE EXPLORATION HOPPER**Abstract**

The TALARIS (Terrestrial Artificial Lunar And Reduced Gravity Simulator) project is intended to test GNC (Guidance, Navigation, and Control) algorithms on a prototype planetary surface exploration hopper in a simulated reduced gravity environment. The vehicle is under development by the Draper Laboratory and MIT in support of developments for the Google Lunar X-Prize. This paper presents progress achieved since September 2010 in flight testing and vehicle development.

Results are reported for restricted degree of freedom (DOF) tests used to tune GNC algorithms on the path to a full 6-DOF hover-hop flight profile. These tests include 3-DOF tests on flat surfaces restricted to horizontal motion, and 2-DOF vertical tests restricted to vertical motion and 1-DOF attitude control. The results of tests leading up to full flight operations are described, as are lessons learned.

Upgrades to the vehicle are described, including a redesign of the power train for the gravity-offset propulsion system and a redesign of key elements of the spacecraft emulator propulsion system. The integration of flight algorithms into modular flight software is also discussed. Future test and development plans are outlined, including the planned addition of navigation sensors to improve performance.