Ultra-Fast Proximity Charging (UFPC) – TP

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Project Overview

In partnership with NASA, Wibotic, Bosch, and the University of Washington, this program will provide wireless charging systems for power transfer on the lunar surface enabling small systems to operate and survive the harsh lunar night without needing their own source of power generation. Unlike physical cable connections, WiBotic systems are also fully sealed and impervious to the effects of harsh lunar dust and regolith. The system will be designed to optimize charging position through autonomous positioning of assets.

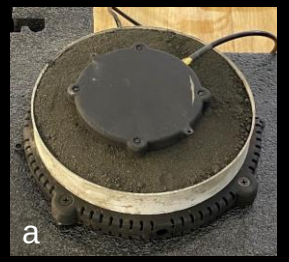
Within this scope of work the system TRL will be increased from level 4 to level 6 allowing transition of the technology into future flight missions.

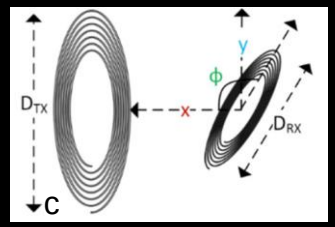
Technical Approach

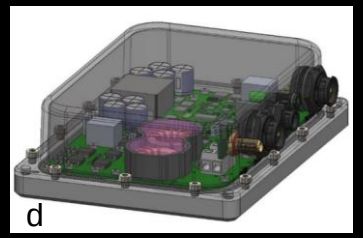
This program will mature the UFPC system by developing both a base station and rover with integrated power receiver capable of operating in a lunar environment. The charging system will be demonstrated as a feasible means of enabling small rovers and critical equipment to survive the lunar night through testing and simulation within a Dirty TVAC chamber. The system will be space qualified through shock & vibe, radiation, and EMI testing.

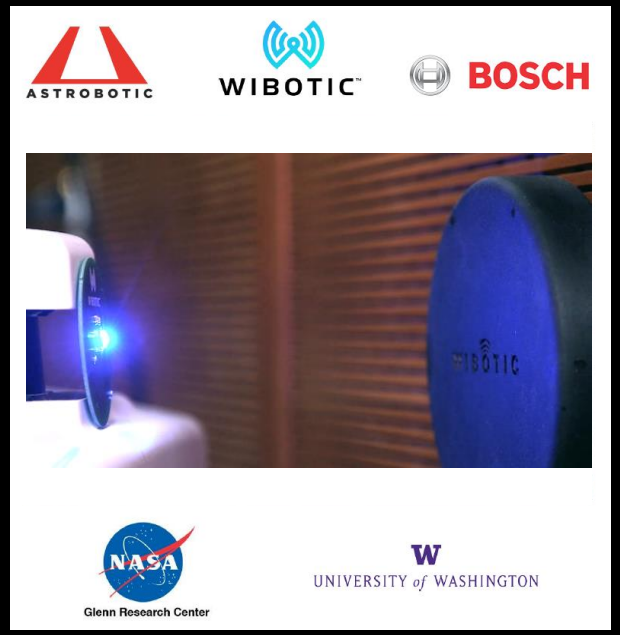
Results/Summary

To date, the system has been subjected to 8 different lunar regolith simulants with little to no adverse effect on performance.









a. Testing impacts of regolith accumulation in the charging field

b. Developing thermal management solutions for customer-specific applications

c. Autonomous docking demonstration with CubeRover to optimize orientation of charging system antennas.

d. Light-weight, durable system

Contributing Partners

WiBotic

Development and manufacture of wireless charging systems

NASA Glenn Research Center

Lunar night survival study, regolith properties and thermal modeling consulting. Facilitation of Dirty TVAC testing equipment VF13

University of Washington

Wireless charging subject matter expertise, regolith impacts study

Bosch

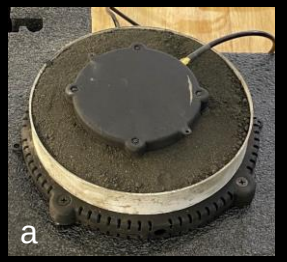
Development of CubeRover autonomous docking suite for charging position optimization

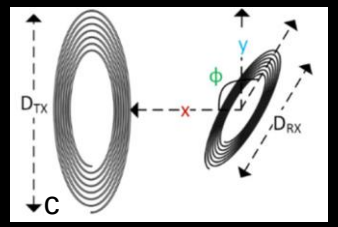
Infusion and Transition Plan

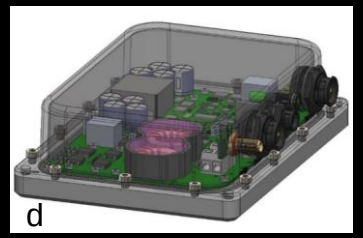
There are several applications that necessitate proximity chargers in space. In relation to the Moon, these activities include supporting marsupial roving missions, enabling robotic systems that do not contain onboard nuclear or solar power generators, charging toolkits on crewed lunar terrain vehicles, and powering the heaters of critical devices to survive the lunar night. Near-field wireless power transmitters are important tools to reduce regolith incursion in mechanically mated systems and static joints.

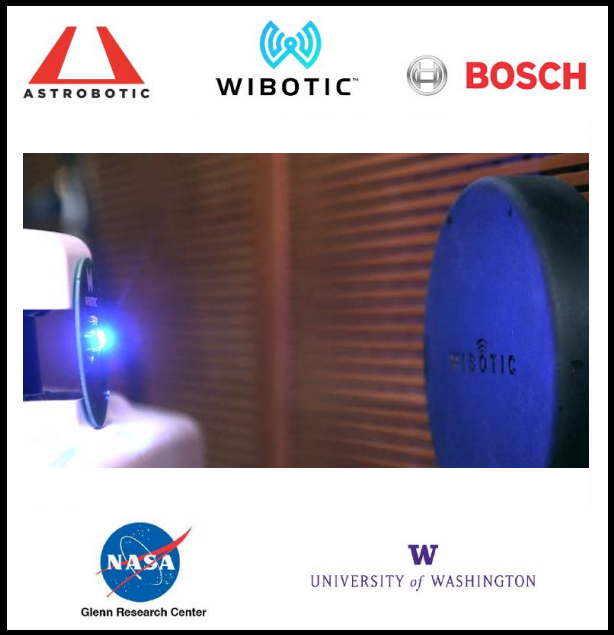
Astrobotic is maturing a product line of wireless charging systems. 125W and 400W systems are available capable of up to 85% efficiency. This project will focus on the 125W system.

Astrobotic is currently working with NASA KSC to integrate the UFPC system in upcoming lunar excavation missions.









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