Small Business Innovation Research/Small Business Tech Transfer

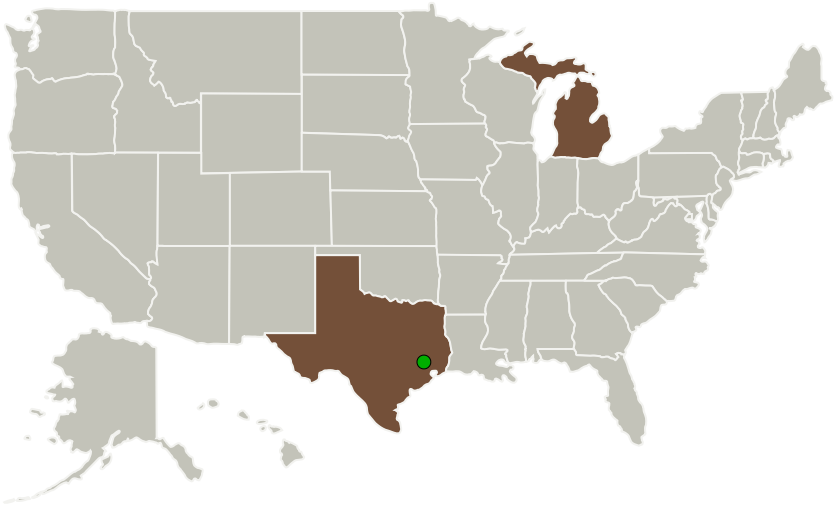
Grasp Algorithms For Optotactile Robotic Sample Acquisition, Phase II

Completed Technology Project (2010 - 2013)

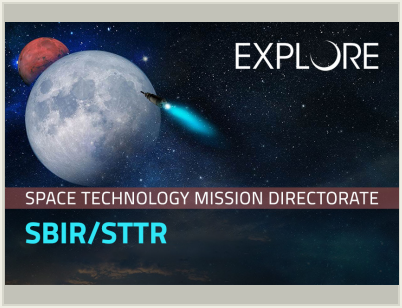
Project Introduction

Robotic sample acquisition is essentially grasping. Multi-finger robot sample grasping devices are controlled to securely pick up samples. Equations have been developed to provide optimal grasps for perfectly modeled objects, but grasping unmodeled objects like a random sample on planetary surfaces is an open research problem. Approaches to grasping unmodeled objects use various sensors, such as cameras, distributed pressure sensors, and strain gages, to characterize the object and the quality of a grasp. That information is then used to initiate or improve the grasp. A major source of difficulty in robotic grasping, therefore, is the sensing of object parameters and grasp quality. Humans combine the high information content of vision, several types of haptic/tactile sensors in the fingers (300 sensors per square centimeter), and a sophisticated learning process to grasp unknown objects. In comparison, current robotic graspers rely on a much more limited set of sensors, particularly for measuring tactile properties. This proposal focuses on an algorithm for improving grasp quality using several types of tactile information as well as the robotic grasper that can provide such information so that remote sample acquisition devices can perform as well as human sample gatherers

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Completed Technology Project (2010 - 2013)

Primary U.S. Work Locations	
Michigan	Texas

Project Transitions

July 2010: Project Start

April 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139027)*

Project Management

Program Director:

Jason L Kessler

Program Manager:

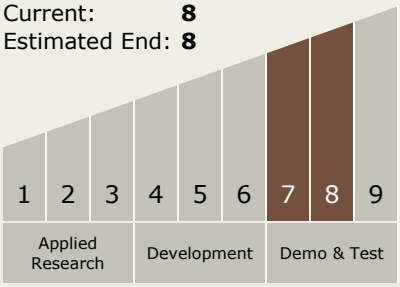
Carlos Torrez

Principal Investigator:

Katherine Jordan

Technology Maturity (TRL)

Start: **7**
Current: **8**
Estimated End: **8**



Technology Areas

Primary:

- TX04 Robotic Systems
  └ TX04.3 Manipulation
    └ TX04.3.4 Sample Acquisition and Handling

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System