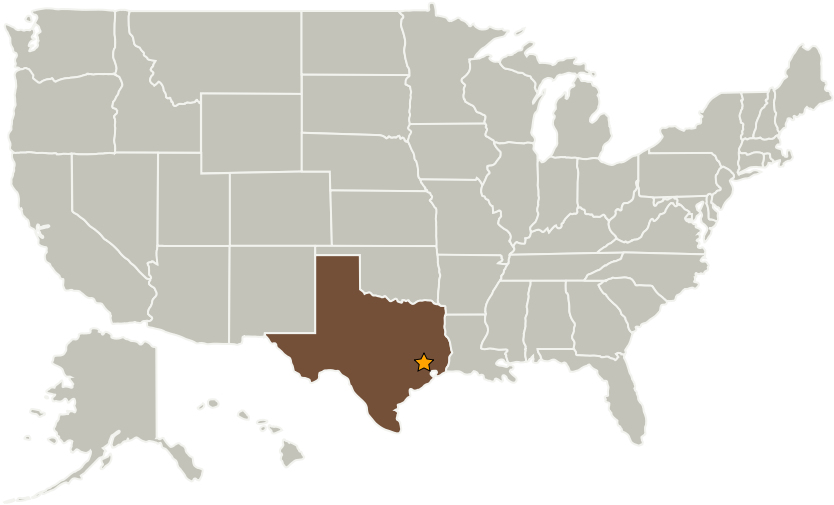
A Software Framework for Coordinating Human-Robot Teams, Phase II

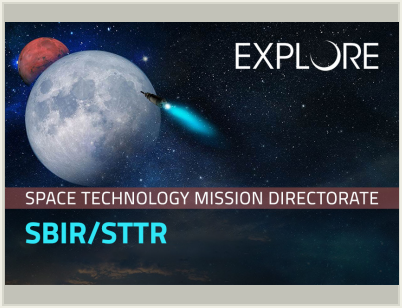
Completed Technology Project (2007 - 2009)

Project Introduction

Robots are expected to fulfill an important role in manned exploration operations. They will perform precursor missions to pre-position resources for manned missions. They will assist astronauts in site preparation, buildup, and maintenance of a lunar outpost. To support these roles, new forms of human-robot interaction are needed. Task-level commanding and predictive interaction are promising for tasks where time delay and limited bandwidth make tele-operations difficult. Supervised autonomy has potential to make better use of human resources by reducing the mission preparation time for routine tasks. But these new types of operations require human operators to support new types of tasks. TRACLabs proposes to develop a software framework that facilitates human-robot teaming. This software framework will provide tools for human supervisors to use when monitoring the performance and health of robots. The framework also will assist task coordination by applying operational protocols for information communication and allocation of control during remote distributed operations. This work is an innovative combination of technologies to support the new human tasks that arise when operating robots at different levels of autonomy. For performance monitoring, we propose to develop tools for users to define and adjust monitoring conditions, computations, and summaries in response to changing situations and missions. Additionally we will provide software to aid understanding of operational events and their relationship to underlying data. To support coordinating tasks, we propose to integrate our existing agent technology for role-based notification using communication protocols with new technology for authorizing the handover of robotic control. Phase II will produce a software framework for human-robot teaming.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
TRACLabs, Inc.	Supporting Organization	Industry	Webster, Texas

Primary U.S. Work Locations
Texas

Project Transitions

December 2007: Project Start

December 2009: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX10 Autonomous Systems
  └ TX10.2 Reasoning and Acting
    └ TX10.2.2 Activity and Resource Planning and Scheduling