Robust 3-D algorithm for Flare Planning and Guidance for Impaired Aircraft, Phase I

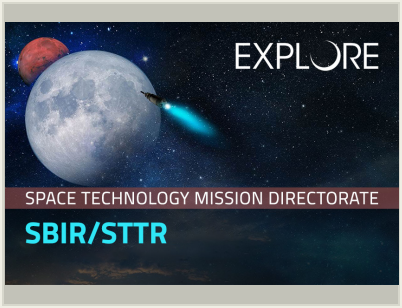
Completed Technology Project (2009 - 2009)

Project Introduction

Development of a robust nonlinear guidance law for planning and executing the flare-touchdown maneuver for impaired aircraft under adverse wind conditions is proposed. The approach employs estimated operational envelope of the damaged aircraft and ambient winds to plan flap deployment schedule and the flare-touchdown maneuver. The algorithm will also provide guidance for precise execution of the terminal de-crab maneuver in the presence of crosswinds. The guidance law will be formulated in terms of aircraft attitude components to enable direct coupling with the autopilot or for providing pilot guidance through the flight director. Phase I research will demonstrate the feasibility of the proposed guidance law in an aircraft simulation. Robustness to unmodeled dynamics and uncertainties will be demonstrated. Phase II research will develop standalone guidance law implementation in a real-time operating system for NASA-specified aircraft model. This implementation will then be coupled with a high-fidelity manned simulation to assess its performance under realistic operational scenarios. Algorithms and software developed under the proposed research will be provided to NASA at the end of Phase II research. Phase III work will focus on flight test evaluation of the robust flare guidance law.

Anticipated Benefits

Potential NASA Commercial Applications: The proposed research will develop a robust guidance law for impaired aircraft. This guidance law is also useful for use under normal operating conditions. Algorithms and software developed under the proposed SBIR work will contribute significantly towards improving the safety of military, commercial and general aviation aircraft operations.



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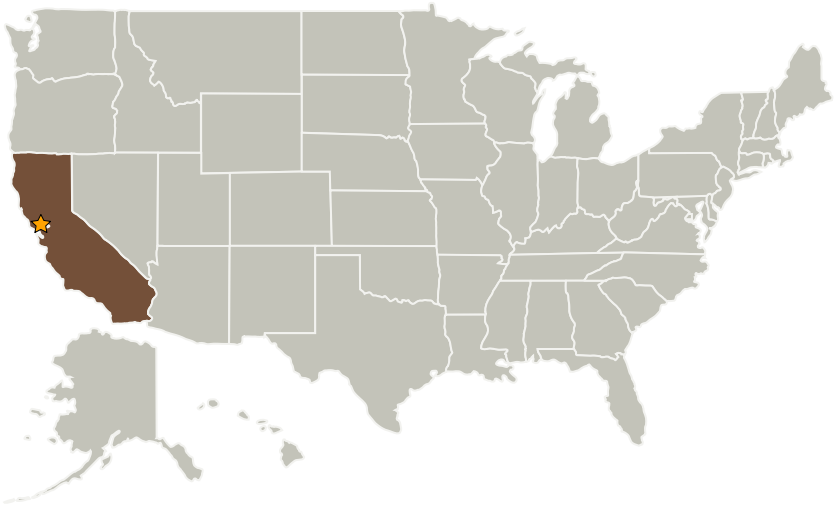
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Optimal Synthesis, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California

Primary U.S. Work Locations
California

Project Transitions

January 2009: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

John T Kaneshige

Principal Investigator:

P. K. Menon

Robust 3-D algorithm for Flare Planning and Guidance for Impaired Aircraft, Phase I

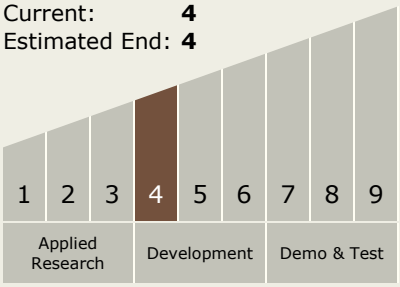
Completed Technology Project (2009 - 2009)

July 2009: Closed out

Closeout Summary: Robust 3-D algorithm for Flare Planning and Guidance for Impaired Aircraft, Phase I Project Image Robust 3-D algorithm for Flare Planning and Guidance for Impaired Aircraft, Phase I

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  └ TX17.1 Guidance and Targeting Algorithms
    └ TX17.1.1 Guidance Algorithms