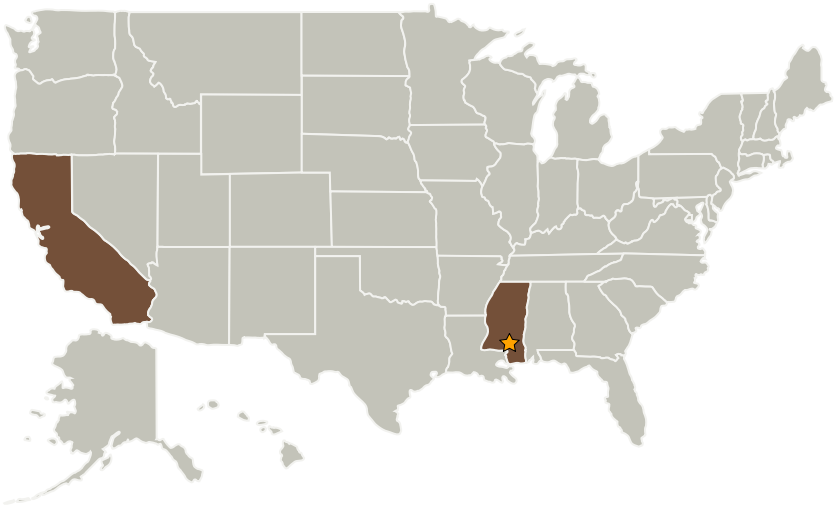
Health and Maintenance Status Determination and Predictive Fault Diagnosis System, Phase I

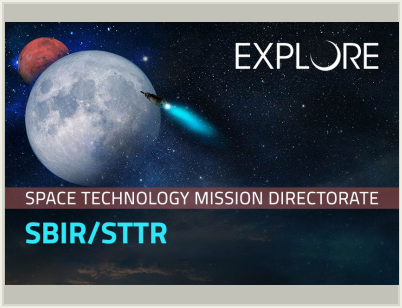
Completed Technology Project (2009 - 2010)

Project Introduction

The objective of this project is to demonstrate intelligent health and maintenance status determination and predictive fault diagnosis techniques for NASA rocket engines under online and offline conditions from either on-board or maintenance, test and analytic data. AGNC proposes a Health and Maintenance Status Determination and Predictive Fault Diagnosis System (HMSD/PFDS). The fuzzy qualitative model for model-based residual generation and the rule-based evaluation of residuals using neural-fuzzy combination are defined. Intelligent data fusion strategies for health and maintenance determination and predictive fault diagnosis are developed for rocket engine systems/subsystems. The goal is to ensure safety, cost reduction, graceful degradation and re-optimization in the case of failures, malfunctions and damages. Kalman filter based and rule based evaluation of residuals using neural-fuzzy combination are developed. The use of fuzzy qualitative models takes into account the uncertainties associated with behavior descriptions and incorporates available expert failure symptom knowledge to recognize the particular failure features. Actual or simulated rocket engine sensed or derived data are utilized to evaluate the effectiveness of the health and maintenance determination and fault prognosis approaches for NASA platforms. Phase I is devoted to the HMSD/PFDS design and simulation. Phase II will result in development of a functional prototype.

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:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
American GNC Corporation	Supporting Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Simi Valley, California

Primary U.S. Work Locations	
California	Mississippi

Project Transitions

January 2009: Project Start

January 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX10 Autonomous Systems
  └ TX10.2 Reasoning and Acting
    └ TX10.2.5 Fault Diagnosis and Prognosis