

# Thinking Systems, Inc.

Software Solutions for Spacecraft Missions

# **Capabilities Statement**

Thinking Systems is a small business operating in Tucson, Arizona. Since our founding in 2001, Thinking Systems' focus has been the development and support of tools used to design and fly spacecraft missions, from low Earth orbit to deep space.

Thinking Systems is the commercial domain expert for NASA's General Mission Analysis Tool, GMAT. We developed the architectural specification for the GMAT system based on extensive experience with the Swingby, Autocon, and FreeFlyer systems. From this specification, we designed and implemented large portions of GMAT. Working with a civil servant programming team, we continue to support and extend the system today. Our parallel processing tool, Paramat, leverages GMAT's proven capability to solve large scale analysis problems ranging from Monte-Carlo analyses to phase studies for mission trajectories.

Thinking Systems is the commercial vendor capable of assisting organizations looking to support and leverage GMAT for their space missions, and to develop tools that meet evolving mission needs.

## Core Competencies

#### **Software Development**

- Spacecraft Simulation and Modeling
- Physics based Mission Simulation
- Custom Component Design and Integration
- Parallel processing and HPC integration

#### **Mission Analysis**

- Trajectory Design
- Mission Analysis
- Large Scale Parameter Scans and Monte-Carlo Analyses

#### Training

- Seminars and Presentations
- Tutorials

## Past Performance

#### Government

#### NASA GSFC

- GMAT Architectural Design
- GMAT Component Design and Implementation
  - System Infrastructure
  - Propagation Subsystem
  - Navigation Subsystem
  - Target and Optimization Subsystems
  - Plugin Components
  - Python Interfaces
  - API Development
- Conjunction Analysis Study using Paramat
- Stand-alone Propagation Libraries
- Genetic Algorithm Orbital Use Case Exploration

#### NASA SBIR

- Phase 1 System: Parallel Processing with GMAT
- System Extended and Rewritten as the Parallel Mission Analysis Tool, Paramat

# Industry

- **Emergent Space Technologies** 
  - GMAT GUI Plugin Extensions
  - OpenFramesInterface Development Support

## Space Exploration Engineering

GMAT User Support

## Analytical Graphics

- Testing of STK API interfaces
- a. i. Solutions
  - Development of FreeFlyer Socket Interfaces
  - FreeFlyer Component Development and Support





# Company Snapshot

#### NAICS Codes

- 541511 Custom Computer Programming Services
- 541330 Engineering Services
- 541690 Other Scientific and Technical Consulting Services
- 541715 Research and Development in the Physical, Engineering, and Life Sciences

CAGE Code:	1X6D2
DUNS Number:	021791467

## **Contact Information**

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