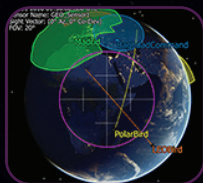




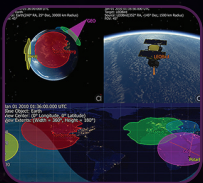
Flight dynamics software for spacecraft mission design, analysis and operations.

Leverage the power and flexibility of FreeFlyer® Astrodynamics Software in your next mission. FreeFlyer provides complete astrodynamics functionality for missions of any size, any scale, any orbit regime, ITAR-free. With heritage on over 250 missions, customizable interfaces, and easy integration into modern ground systems architectures, FreeFlyer supports the full lifecycle of your mission. Your guide to the best, most reliable flight dynamics software begins here.



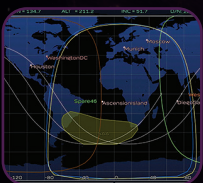
#### DESIGN

Design satellite orbits in any regime, define constellation parameters, target maneuvers, and simulate the full mission life cycle from launch to nominal operations to disposal.



#### ANALYSIS

Analyze any mission requirements, including spacecraft and ground sensor coverages. Generate fuel consumption reports and perform parametric trade studies. Augment FreeFlyer's internal algorithms with user-defined math functions and custom computations, or use the native MATLAB API.



#### OPERATIONS

Automate satellite operations for both routine and complex flight dynamics tasks. Integrate with ground system databases, 3rd-party TT&C software, and legacy code via the FreeFlyer Runtime API on both Windows and Linux with interfaces for C/C++, C#, Java, & Python.

#### COMPANY LOCATIONS

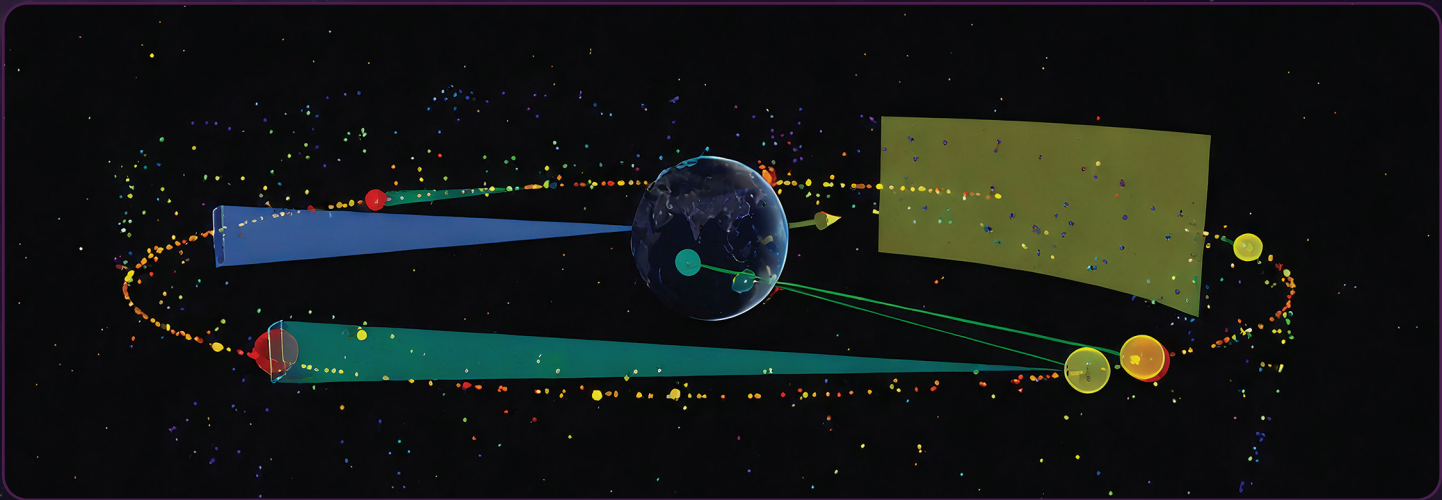
- Cape Canaveral, FL - HQ
- Lanham, MD
- Huntsville, AL
- Colorado Springs, CO

#### CUSTOMER FACILITIES

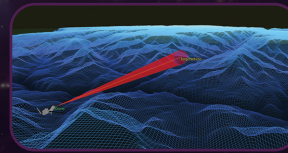
- NASA GSFC
- NASA KSC
- NASA JSC
- Kirtland AFB
- Peterson SFB
- Vandenberg SFB
- MDA

REGISTER FOR A  
FREEFLYER DEMO





**FreeFlyer®** is a commercial off-the-shelf (COTS) software application for space mission design, analysis, and operations. FreeFlyer stands out as the most powerful tool of its kind by providing users with a robust scripting language for solving all types of astrodynamics problems. FreeFlyer has been validated, flight-tested, and proven accurate. It is used for spacecraft analysis and operations by NASA, NOAA, USAF, USSF, IC, commercial, and international satellite providers.



Our multi-domain operations capabilities for space and missile defense.



Custom visualizations bring situational awareness to your mission controllers.

## FREEFLYER FEATURES

### GENERATING OUTPUT

- Customizable 2D and 3D visualizations of your mission
- Fully tailorable cartesian and polar plots of any mission parameters
- Data can be reported to consoles, tables, or exported via custom reports

### FREEFLYER SCRIPTING

- Scripting gives you full control over the inputs, outputs, and logical flow of an astrodynamical simulation
- Development and execution environment includes auto-complete, syntax highlighting, and smart indentation
- Native interfaces with MATLAB® and TCP/IP sockets

### FLEXIBLE INTEGRATION

- Custom force modeling and custom object definitions via FreeFlyer Extensions\*
- Runtime API for use with C/C++, C#, Java, MATLAB®, and Python applications\*
- Interfaces with ODBC databases created in MySQL®, Microsoft Access®, Oracle®, and more\*

### SUPPORT

- Free upgrades to newer versions of FreeFlyer
- New user training session included for free
- No-cost license transfers to new machines
- FreeFlyer Technical Support team via email or phone

### ARCHITECTURE

- Node-Locked, Dongle, and Network licensing options
- Multiple instances with each license for parallel processing
- Deployable to cloud, VMs, and containers
- Available in two tiers of functionality

\*Orbit Determination, Terrain Analysis, Trajectory Optimization, and certain Integration capabilities are only available with FreeFlyer Mission tier.

# FREEFLYER CAPABILITIES

## SPACECRAFT PROPAGATION

- Propagate using 12 integrators RK8(9), Cowell, SGP4-XP, etc for single spacecraft, clusters, and constellations
- Full force modeling capability includes multi-body gravitational acceleration, atmospheric drag and lift, and solar radiation pressure with flat plate modeling
- Relative motion (HCW) propagation for rendezvous and proximity analyses

## COVERAGE AND CONTACT

- Hundreds of pre-defined ground stations with accurate masking profiles, or customize your own
- Easily gather visibility, az/el, range/range rate, in/cross/along track, and coverage/revisit statistics system bodies

## CA/SSA APPLICATIONS

- Built-in methods for Time of Closest Approach (TCA), Probability of Collision (Pc), and Miss Distance
- Collision avoidance maneuver planning
- Model rendezvous and proximity operations, including BMC2 scenarios

## ORBIT DETERMINATION FEATURES

- Batch Least Squares, Extended Kalman Filter, Unscented Kalman Filter, and Square Root Information Filter
- Spacecraft state estimation with receiver and transponder modeling and covariance propagation
- Ground-based, GPS/Galileo point solution, space-based, TDRS, and BRTS tracking data options supported

## OPTIMIZATION FEATURES

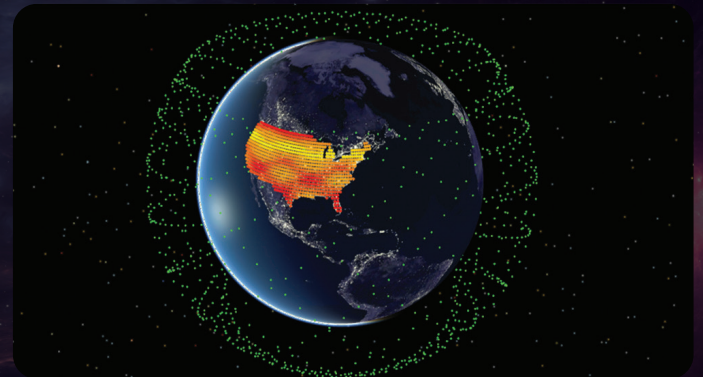
- Complete control over objective functions, state variables, and constraints
- Generic optimization plus optimal control
- SNOPT, Ipopt, and NLOpt integration
- Support for generic optimal control using segmented trajectory arcs and specific control models: ballistic, simple thruster, and ideal solar sail
- Multi-Objective Optimization with integer programming and Pareto front dominance, giving you the ability to optimize scenarios involving discrete choices

# FREEFLYER'S DIFFERENTIATORS

- TWO COMPREHENSIVE SOFTWARE TIERS
- INTUITIVE SCRIPTING FOR COMPLETE SIMULATION CUSTOMIZATION
- API ACCESS FOR AUTOMATED WORKFLOWS
- COMPUTATIONALLY EFFICIENT ASTRODYNAMICS ENGINE
- OVER 250 SAMPLE MISSION PLANS PROVIDE A JUMPING OFF POINT FOR MISSION DESIGN, ANALYSIS, AND OPERATIONS
- WORLD CLASS SUPPORT AND TRAINING



FreeFlyer used in the ISS NASA Mission Control Center (Houston, TX).



FreeFlyer easily scales to analyze constellations of any size.



## ENGINEERING SUPPORT SERVICES

a.i. solutions provides mission services solutions to government, civil, and commercial space agencies.

- Space Domain Awareness Systems
- Constellation Management
- Cislunar Exploration
- Space Ground Systems
- Launch & Range Systems

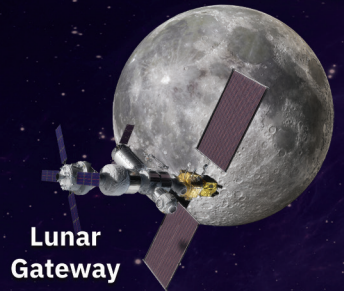
## NOTABLE SUPPORTED MISSIONS

FreeFlyer has been instrumental in supporting critical space missions, delivering advanced modeling, trajectory optimization, and mission planning solutions for groundbreaking exploration and operational excellence.



Libration Point  
Deep Space Missions  
Interplanetary Transfers

**BEO**



Communications  
Space Situational Awareness

**GEO**



GPS Orbit Determination  
Highly Elliptical Orbits

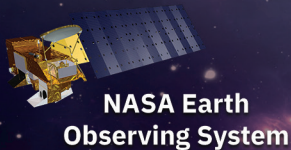
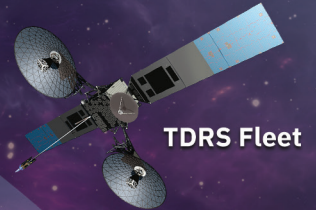
**MEO**

**NOAA GOES Fleet**



Earth Observation  
Earth Science Missions  
Commercial Constellations

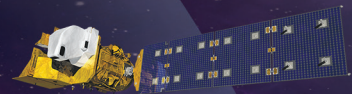
**LEO**



**Comm/ISR/GPS Coverage**

Warfighter Support  
Terrain Analysis

**GND**



**Landsat 7, 8, 9**

Contact us at [sales@ai-solutions.com](mailto:sales@ai-solutions.com) for a free evaluation and a customized demonstration to see what **FreeFlyer** can do for your mission.