



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.



Orion Artemis I

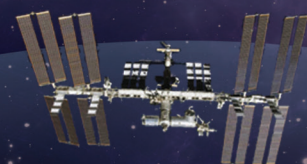
MMS



Classified Missions



GPS Constellation



International Space Station



Comm/ISR/GPS Coverage

Libration Point
Deep Space Missions
Interplanetary Transfers

BEO

Communications
Space Situational Awareness

GEO

GPS Orbit Determination
Highly Elliptical Orbits

MEO

Earth Observation
Earth Science Missions
Commercial Constellations

LEO



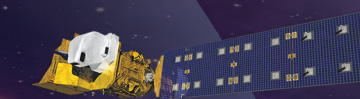
NASA Earth Observing System



Sierra Space Dream Chaser

Warfighter Support
Terrain Analysis

GND



Landsat 7, 8, 9



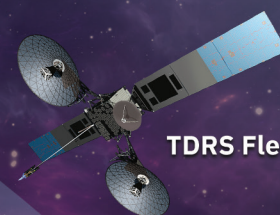
Lunar Gateway



James Webb Space Telescope



NOAA GOES Fleet



TDRS Fleet



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

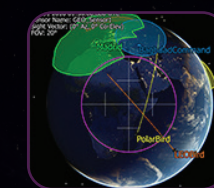
© 2025 a.i. solutions, Inc. All Rights Reserved.

4500 Forbes Boulevard, Suite 300, Lanham, MD 20706 (301) 306-1756



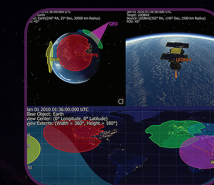
Flight dynamics software for spacecraft mission design, analysis and operations.

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.



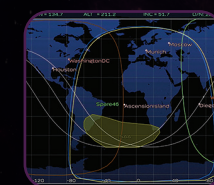
DESIGN

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

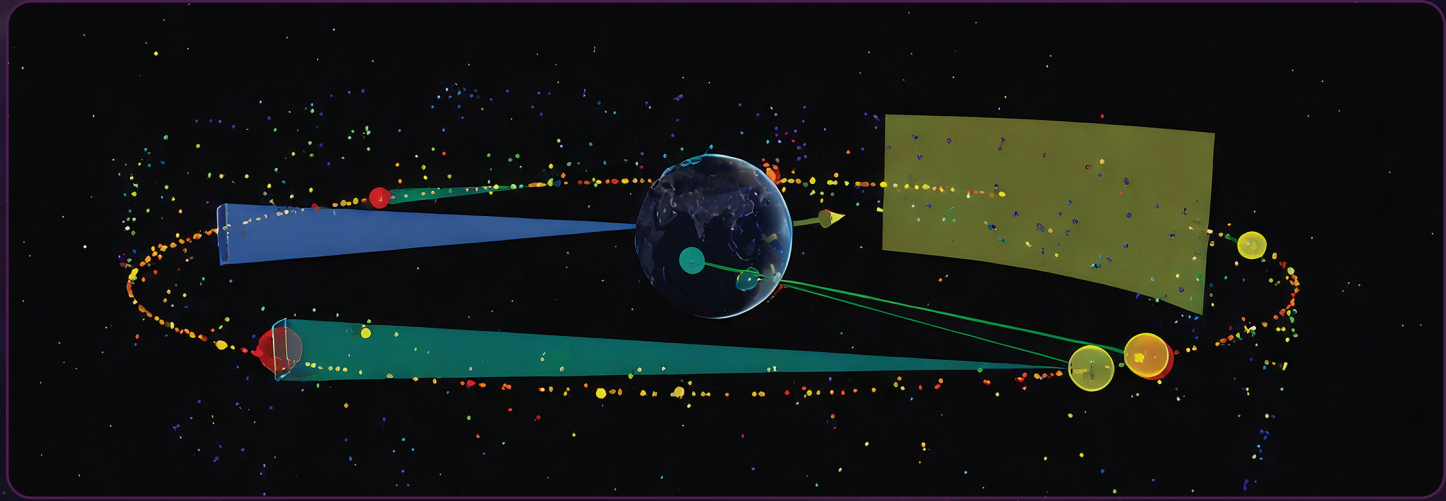
- Lanham, MD - Headquarters
- Cape Canaveral, FL
- Huntsville, AL
- Colorado Springs, CO

CUSTOMER FACILITIES

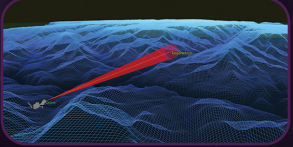
- NASA GSFC
- NASA KSC
- NASA JSC
- Kirtland AFB
- Peterson SFB
- Vandenberg SFB
- MDA

REGISTER FOR A
FREEFLYER DEMO

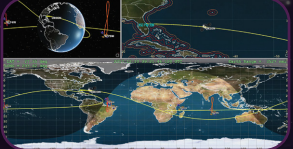




FreeFlyer® is a commercial off-the-shelf (COTS) software application for space mission design, analysis, and operations. FreeFlyer stands out as the most powerful tool of its kind by providing users with a robust scripting language for solving all types of astrodynamics problems. FreeFlyer has been validated, 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

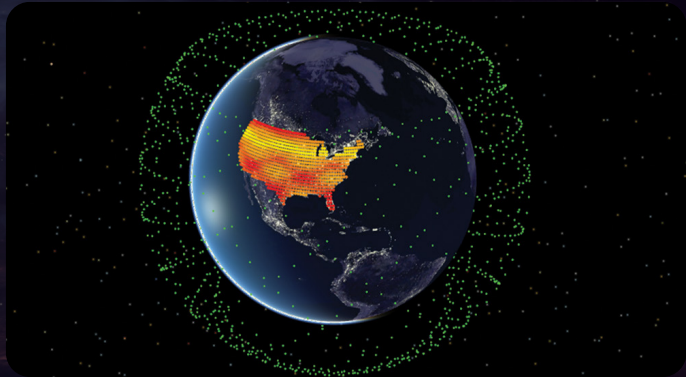
OVER 250 SAMPLE MISSION PLANS PROVIDE A JUMPING

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
- Constellation Management
- Cislunar Exploration Systems
- Space Ground Systems
- Launch & Range Systems
- Mission & Quality Assurance