Revolutionizing Aerospace Simulations, Modeling & Digital Twins

Sim Dot Space is a next generation Simulation framework that allows rapid creation of scalable high-fidelity system of systems simulations, Hardware in the Loop (HIL) hybrid labs and Digital Twins. Sim Dot Space's technology has been trusted and utilized by leading aerospace companies for UAVs, satellites and other spacecraft.

Rapid high-fidelity simulation development

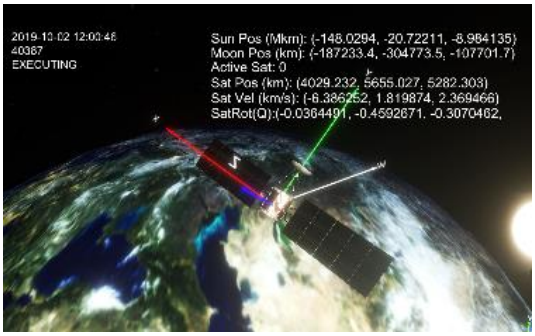
Our **simulator generator tool** and field-proven generic high-fidelity aerospace related **algorithmic models library** (off the shelf models marketplace) will reduce your simulation & modeling development efforts, increase your productivity, simulation reliability, maintainability and code consistency.

Supporting large swarms of drones and satellites

(Picture: Alarmy)

Harnessing the power of parallel processing and cloud computing

As one of the pioneers in this field, Sim Dot Space harnesses the power of parallel processing, distributed simulation technology and (private) cloud computing. This allows users to efficiently handle large-scale simulations of **thousands of satellites or UAVs**, and/or complex Monte-Carlo analyses. Our technology is platform agnostic (both Windows and Linux) and can run on any topology, such as Laptops/Workstations, Virtual Machines, Dockers, Kubernetes and HPC (High Performance Computing).



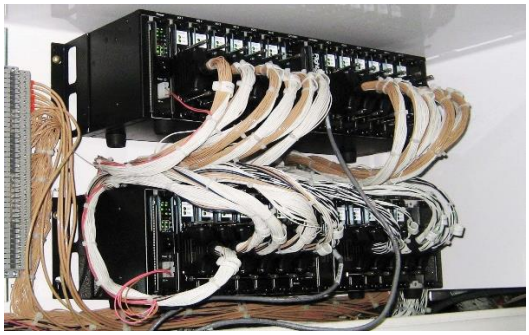
Built-in interface for visualization software

Leveraging existing models, algorithms and simulation assets

Sim Dot Space facilitates integration and orchestration of our customers' existing legacy assets. This means that valuable investments made by the customer in simulation software, models, algorithms and data can be easily integrated and utilized within Sim Dot Space's framework while benefiting from advanced features and scalability.

Unified Software SIL / HIL / Digital Twins

Sim Dot Space brings together Software (or Model) In the Loop (SIL/MIL), Hardware In the Loop (HIL) testing and Digital Twins within a unified dynamic simulation environment. This provides a holistic approach to system testing and validation. With Sim Dot Space, the same scenarios and training methodologies are leveraged in both SIL and HIL, ensuring consistency, reliability and reducing the learning curve for simulation users and operators of the spacecraft or aircraft.



Unified SIL / HIL / Digital Twins simulation

Sim Dot Space framework main features

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Simulation Execution features

- Platform agnostic (both Windows and Linux)
- Simulation control via web user interface
- Command line simulation execution
- Batch simulation execution
- Open simulation architecture via REST API
- Step by step simulation execution
- Continuous execution until end conditions
- Fast forward or slow-motion execution
- Real-time simulation execution
- Execution of multiple concurrent instances
- Ability to reproduce any specific run
- Monte-Carlo execution and analysis
- Save “Snapshot” of simulation
- Restore simulation from saved “Snapshot”
- Scenario scripting and automation

Integration of customer existing assets

- Subsystems models (e.g. propulsion), spacecraft and UAV element models (e.g. IMU) or algorithms as source code in various programming languages
- Models / algorithms as libraries
- Models exported from MATLAB/Simulink
- Models integrated as DLLs, or executables
- Models integrated as Dockers
- Flexible IDE (Visual Studio, Eclipse, etc.)
- Models running on a separate computer
- Models running on hardware emulators
- Models running within software emulations
- Integration of entire 3rd party simulations
- Flexible flight software integration methods

Cloud computing & parallel processing

- Scalable from a simulation of a single satellite or UAV, to a constellation of thousands of satellites or UAVs
- Parallel processing via container orchestration platforms, such as Kubernetes
- Parallel processing via HPC
- Distributed parallel processing on server cluster
- Distributed processing via Dockers
- Distribution down to the single model level

Flexible models fidelity and execution

- Configurable model fidelity levels
- Configurable model debug level
- Configurable model execution frequencies
- Configurable model Enabled / Disabled

Rapid Simulation Development

- Simulation code generator tool
- Extensive field-proven high-fidelity generic aerospace-related algorithmic models’ library (e.g. GNSS), fully extendable by customer
- Extensive mathematical & physics library (such as 6DOF motion due to forces and moments acting on the craft)
- Comprehensive training material and samples

Debugging logging and recordings

- Visual debug, data inspection and breakpoints
- Pause the entire simulation upon break-point
- Execution time, CPU load and memory analysis
- Log collection (across distributed architecture)
- Global and per model log level configuration
- Configurable model(s) recorded data
- Configurable model(s) recording frequency
- Event based and/or conditional recordings
- Multiple concurrent recordings
- Recording to files or published via Kafka
- Data recording and (open loop) playback

Hardware In the Loop & Digital twins

- Extensive set of ready-to-use hardware interfaces (serial, analog, digital I/O, etc.)
- Software controlled switching of HIL hardware configurations and power
- Hard real-time using external clock / counter
- Configurable per-model testing mode: Digital model, Real Hardware or Augmented
- Model configuration without recompilation
- Combined hardware and software models
- Unified digital simulation and HIL environment
- Ability to update digital twin with data from the “real” system based on telemetry data

Miscellaneous

- Built in Unit-Testing framework
- Freedom from end-use limitations
- Bidirectional interface to 3D visualization
- Multi-project development and run-time simulator environment
- Integration to configuration control tools
- Flexible licensing (Perpetual, Leased, Node locked, Network, License borrowing)

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