

MIDNIGHT

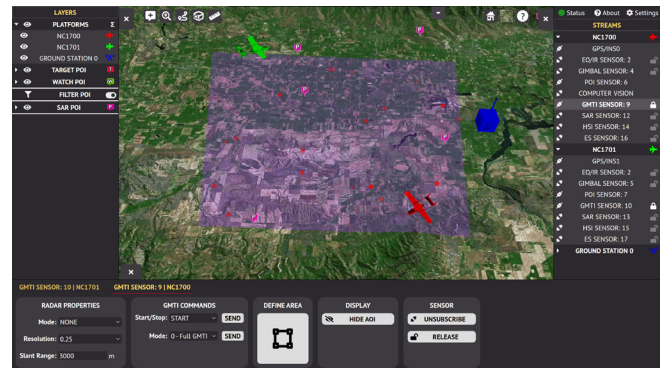
Sensor Command & Control Ground Station User Interface

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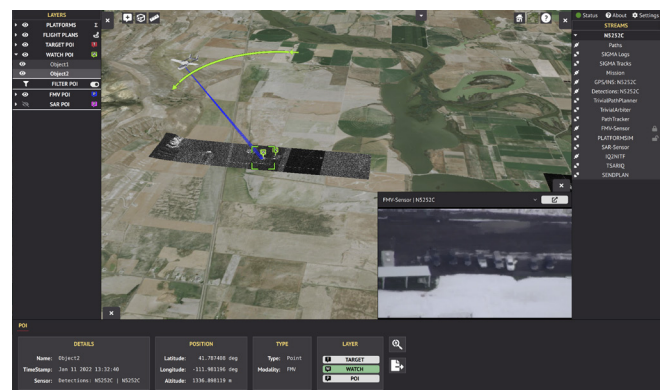
The Space Dynamics Laboratory (SDL) and Naval Research Laboratory (NRL) designed the Midnight software system to aid in sensor command and control (C2) for manned or unmanned platforms, primarily aerial reconnaissance vehicles. During pre-flight mission planning or in live flight, operators may define mission areas, restricted areas, platform configuration, sensor configuration, data collection areas and their priorities, and collection flight behaviors. Midnight will also display, through incoming feeds from an external processing and messaging system, the platform locations with their flight paths, sensor feeds and status, points of interest (POI), and overlaid data acquired from sensor interrogation. The system allows multiple simultaneous operators to provide commands during mission operation. Midnight aggregates the collected sensor information on a tactical map, enabling mission operators and analysts to make informed, real-time decisions.

CAPABILITIES

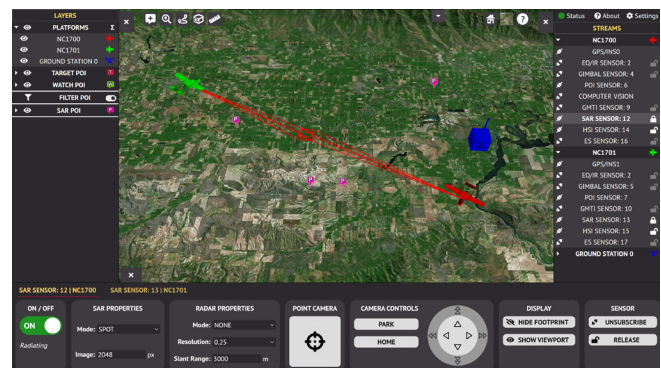
- C2 for multiple UAS & manned platforms
- 2D/3D visualization web user interface
- Sensor C2 capabilities
 - SAR/GMTI
 - ES Spectrum
 - FMV
 - EO/IR - Gimbal
 - Computer Vision
- Viewing & filtering for multiple POI modalities
- Sensor auto-cueing
- Pre-flight & in-flight sensor collection planning
- Aircraft telemetry
- Target promotion
- Ability to interface with SDL's Systems Intelligence Manager (SIGMA) network
- Multi-screen capability
- Offline map server integration with high-resolution imagery & terrain
- POI error ellipses
- Map distance measurement tool
- Modular design for easy development & use with other messaging systems
- Sensor image labeling for on-the-fly AI detection model retraining
- Event-based platform & sensor automation
- Sensor custody for moving targets
- Overlay lines, points, polygons & images using Keyhole Markup Language (KML)
- Sensor footprint display
- Manual camera gimbal controls



GMTI collection.



SAR collection with EO/IR FMV.



Two platforms performing a SAR collection.

Developed in
collaboration with

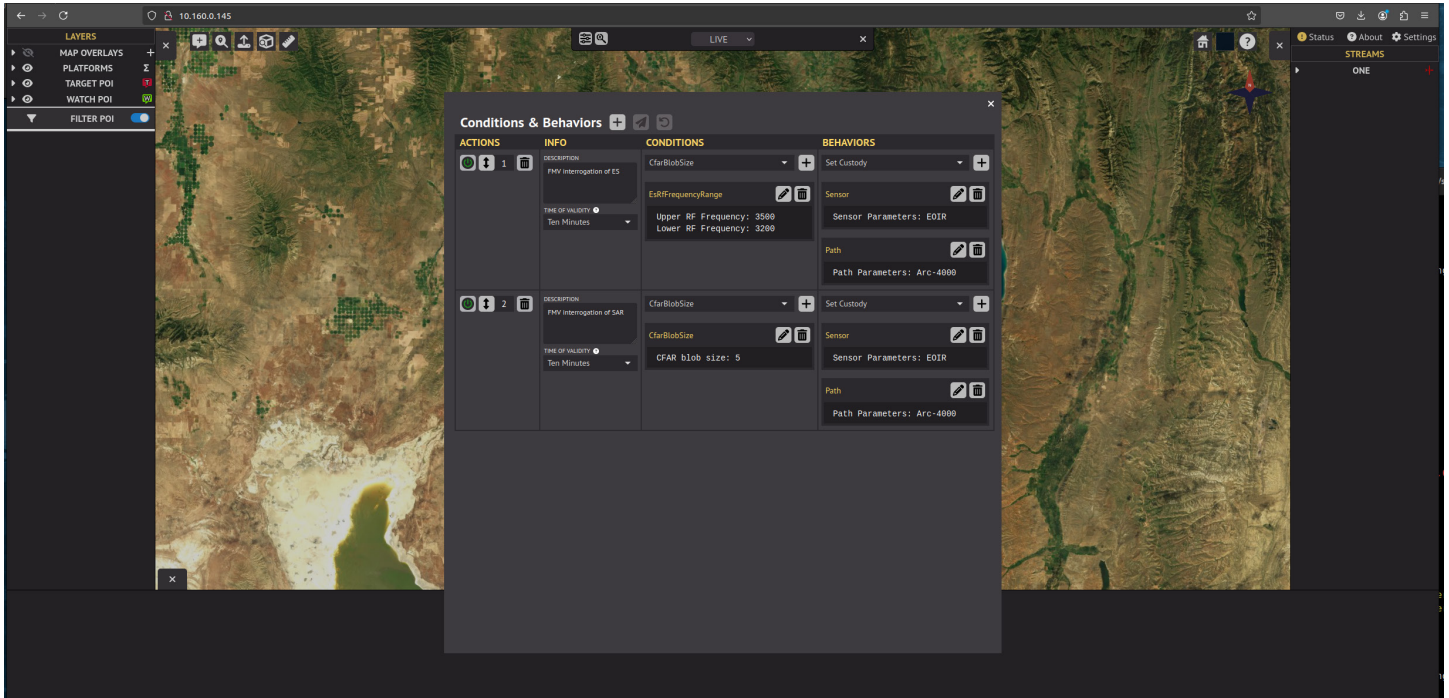


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MIDNIGHT Sensor Command & Control Ground Station User Interface

EVENT-BASED PLATFORM & SENSOR AUTOMATION

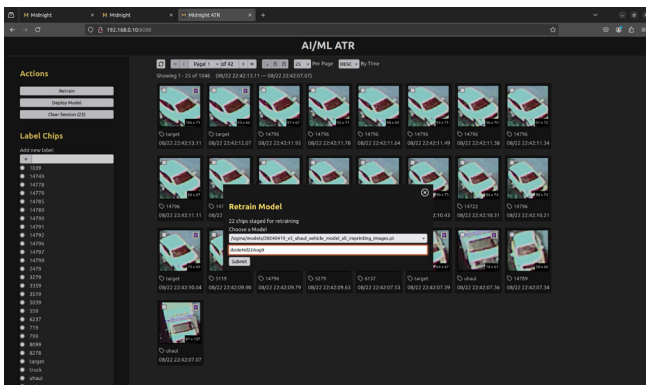
Operators can create platform/sensor automation using event-based conditions and behaviors that can be set up before or during a mission. Once all conditions are satisfied, platforms and sensors will automatically perform designated behaviors without operator intervention.



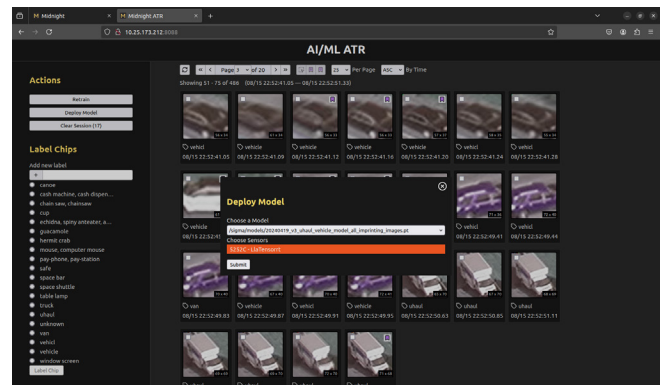
Conditions & Behaviors menu demonstrating an autonomy chain where full motion video FMV interrogation is used on ES and EO/IR POI.

ON-THE-FLY DETECTOR MODEL RETRAINING

SIGMA detector models can be retrained on the fly using Midnight's automatic target recognition (ATR) interface. Operators can see labels for image chips generated by SIGMA detector models. They can also add and apply new labels, retrain a detector model using the updated image chips, and deploy the model. This state-of-the-art imprinting accelerates training, improves performance, and reduces the amount of required training data.



The ATR interface demonstrating how new detector models can be created by updating image labels.



The ATR interface demonstrating how models can be deployed to sensors on the fly.

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