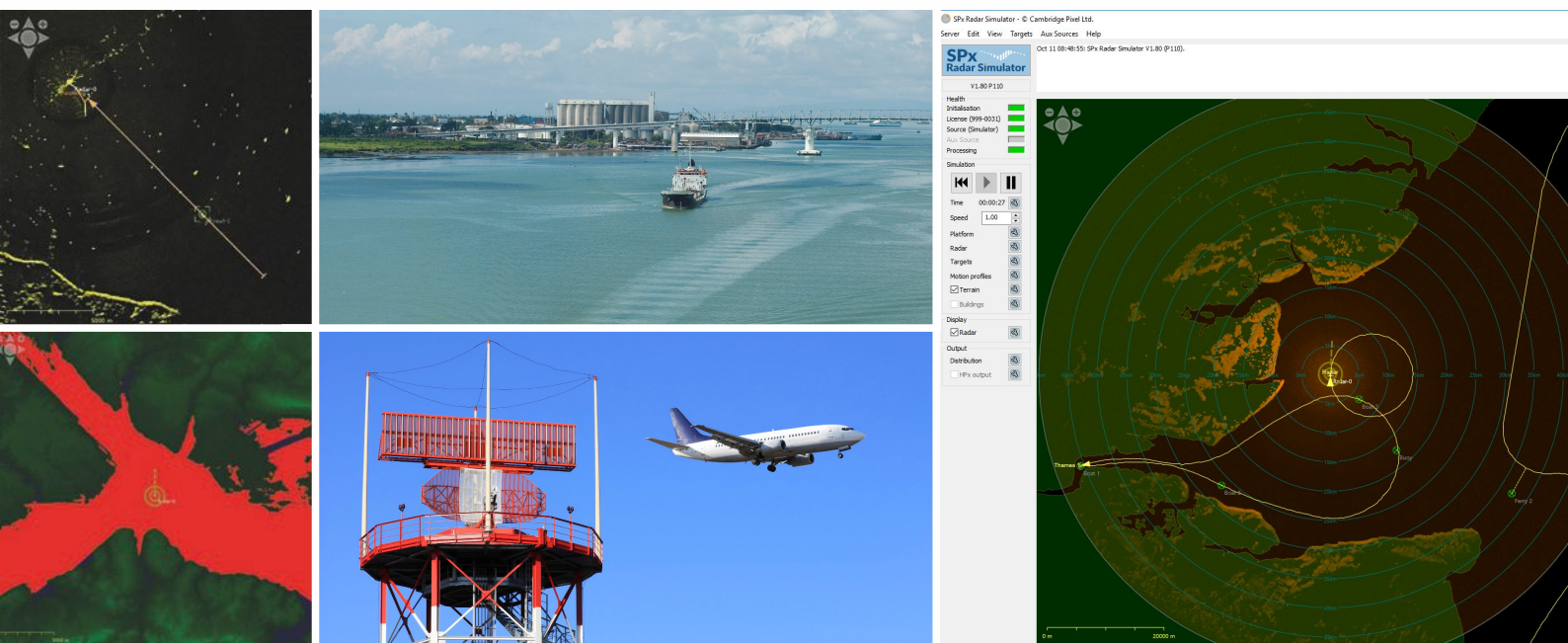


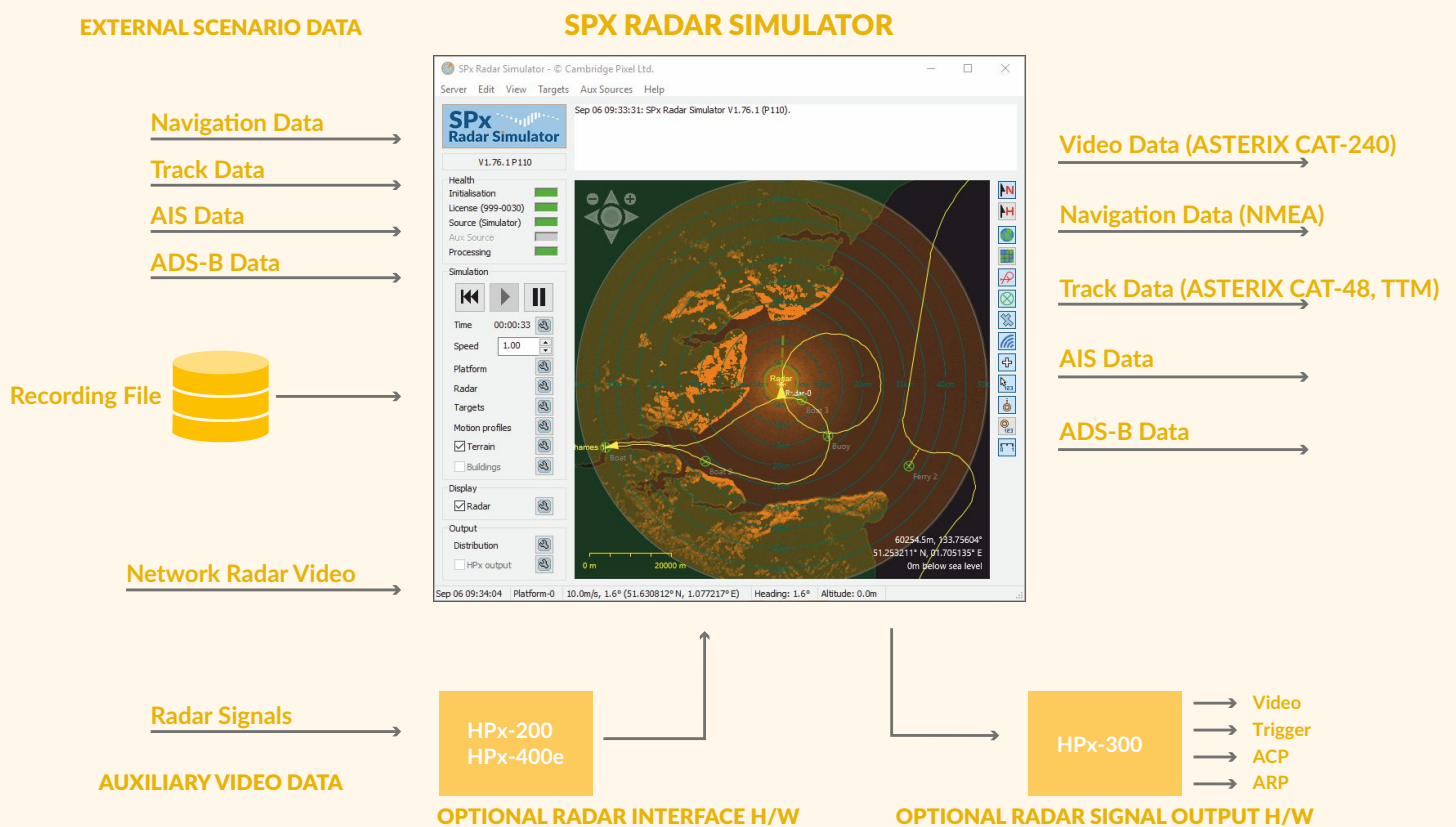
SPx Radar Simulator

Radar Video and Data Generator
Software for Windows



SPx Radar Simulator

SPx Radar Simulator is Cambridge Pixel's Windows-based software application for the generation of realistic radar video and associated data. SPx Radar Simulator provides a low-cost, convenient and reproducible source of synthetic data for a multitude of uses, including: client console development, system testing and operator training.



SPx Radar Simulator allows complex multi-radar, multi-target simulations to be defined, quickly and easily. Scenarios may be defined with moving or stationary radars and targets. The user has full control over the location of the radar platform and the movement of that platform and targets, in real time. The graphical interface provides easy control for creating and editing scenarios.

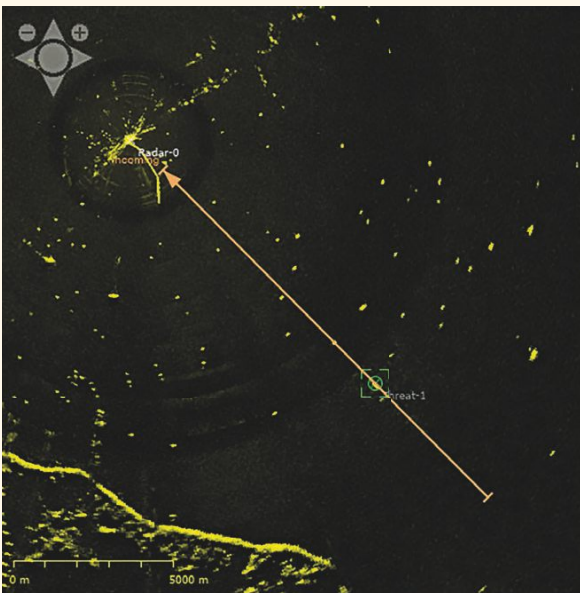
Alternatively, SPx Radar Simulator can be driven by external sources of navigation and target data.

The application is capable of outputting radar video data, target track data, navigation data, AIS data and ADS-B data. All of these data streams are available as independent UDP network outputs.

If analogue radar signals (video, trigger, ACP and ARP) are required as an output then one or more of Cambridge Pixel's HPx-300 cards may simply be installed into the host system and are fully controlled by the Simulator application.

Flexibility

The Simulator is extremely flexible, both in terms of how it may be configured and controlled, and in the variety of inputs and outputs that it supports. For example, the Simulator can accept tracks, AIS and ADS-B messages as inputs and generate corresponding radar video returns. Conversely, it can take in radar video as an auxiliary input and augment this with artificial target radar video data.



Auxiliary Input

A powerful feature of the Simulator is its ability to accept external data as an input.

Not only may the Simulator be driven by an existing system that provides target and positional information, it can also take in real radar video and supplement this with artificial data.

This auxiliary radar video data may come from a live network source, HPx radar input card or recording file, instantly providing a controllable, highly realistic source of test/training data.

The Simulator is configured at start-up by reading from configuration files. These are plain text files, which may be edited or even created outside of the application. Runtime control is then possible through the graphical user interface and remotely, via a network interface.

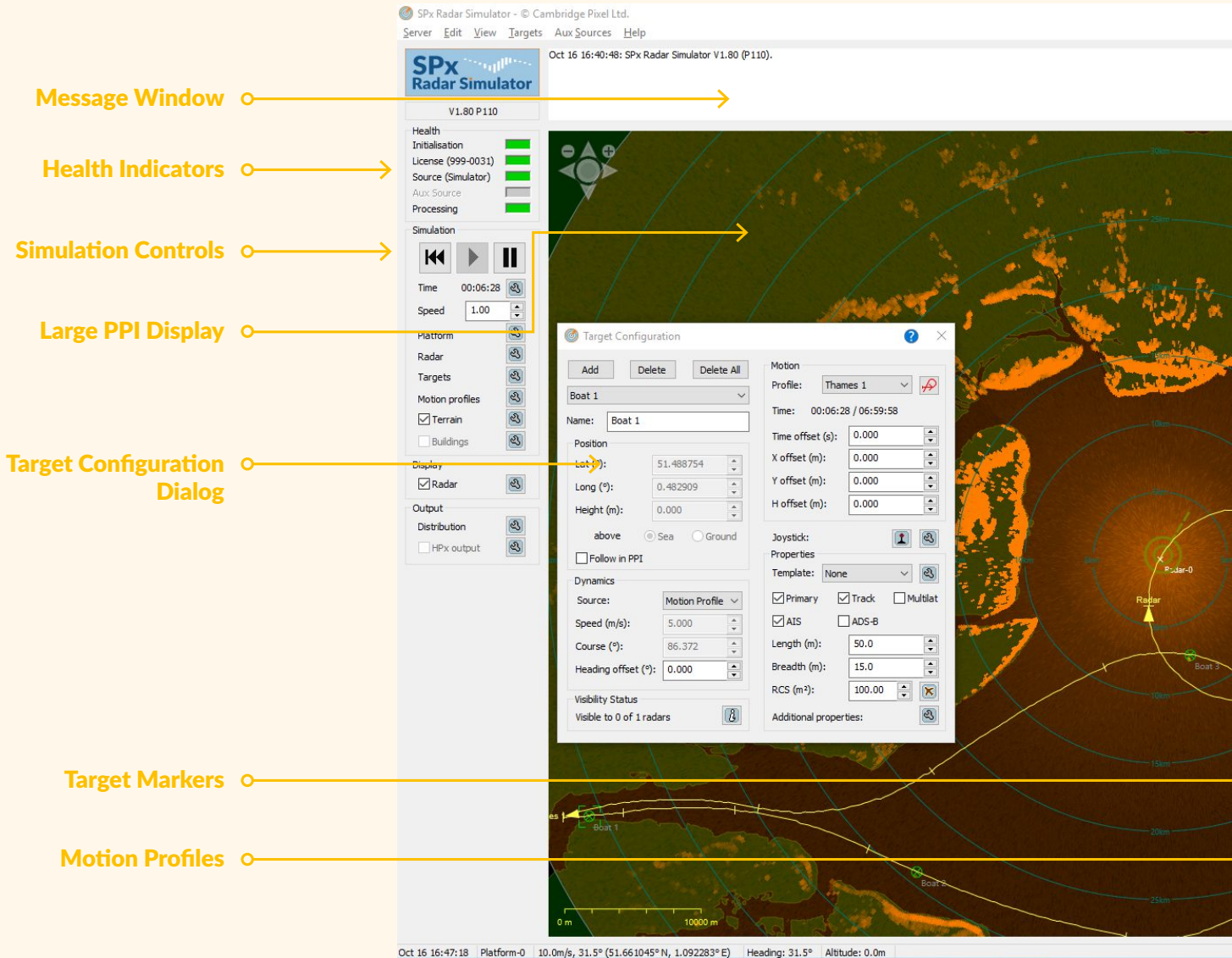
An external source of navigation data (for example, a live GPS feed) may be used to control the platform position within the Simulator. Similarly, external sources of tracks (for example from an existing simulator, AIS feed or ADS-B feed) may be used to position the targets within the simulation.

The Simulator is able to generate videos for multiple radars, all observing the same scenario. The radars may be at fixed geographic locations or mounted on the moving platform.

The terrain and targets that fall within range of each radar are considered independently within the radar video output for that radar, so that a single instance of the application can accurately represent the views of multiple radars.

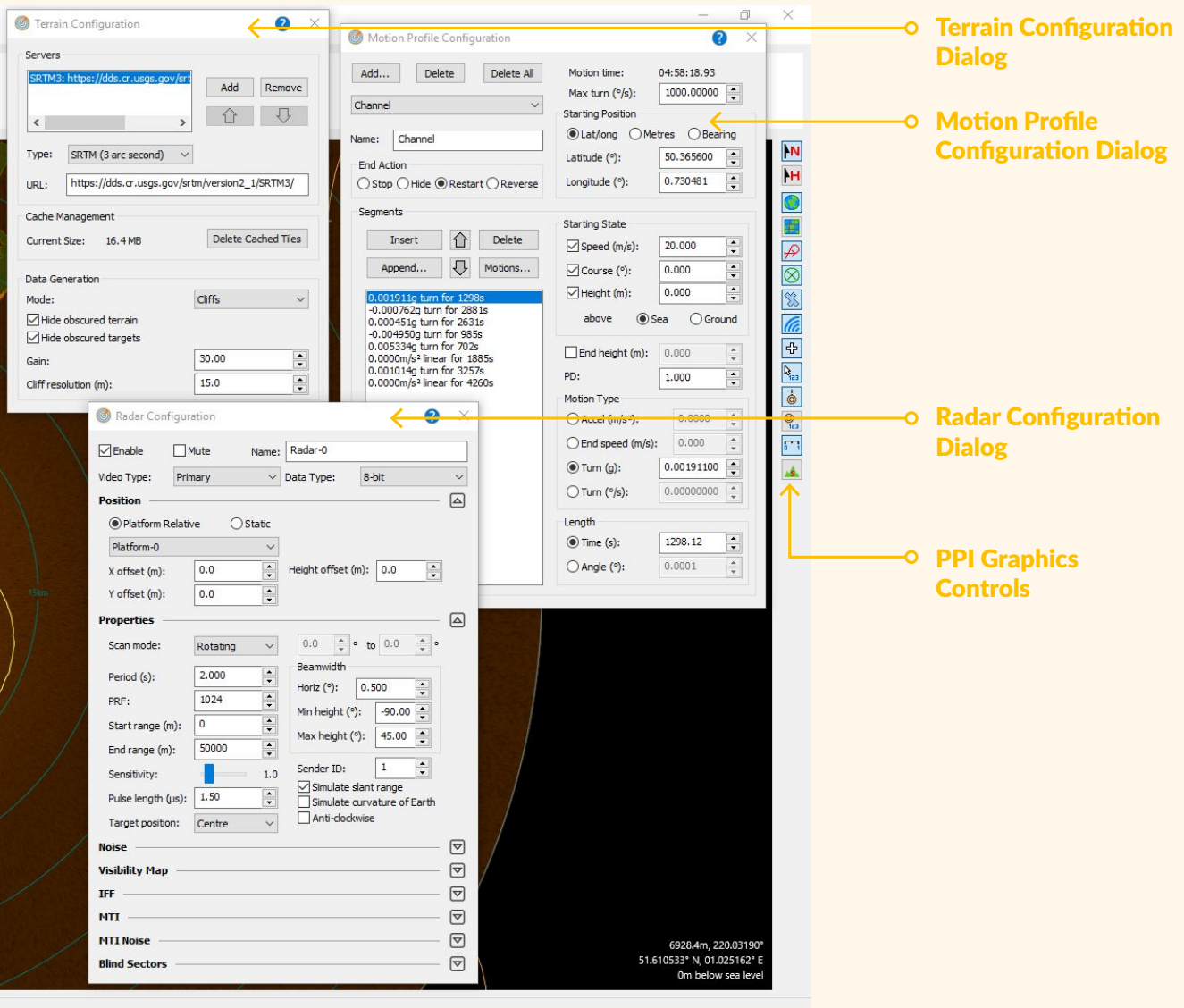
Graphical Controls

Key features of the SPx Radar Simulator GUI:



Feature Summary

- Realistic radar returns generated from:
 - Terrain elevation data
 - User-defined targets
 - Buildings
 - External target input
- Programmable radar characteristics, including:
 - PRF
 - Rotation rate
 - Beamwidth
 - Operating range
 - Pulse length
- Multiple radar support
- Programmable target size, shape and RCS
- Motion definitions for platform and targets
- Terrain from SRTM or DTED data sources
- Graphical motion profile editor
- Configuration file support
- Remote network control
- Built-in display featuring:
 - Tiled map underlay
 - World vector shoreline underlay
- Line-of-sight calculations
- Altitude considerations
- Curvature-of-earth consideration
- External track and navigation data inputs

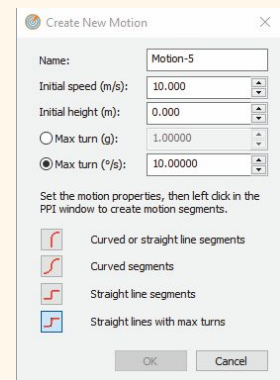
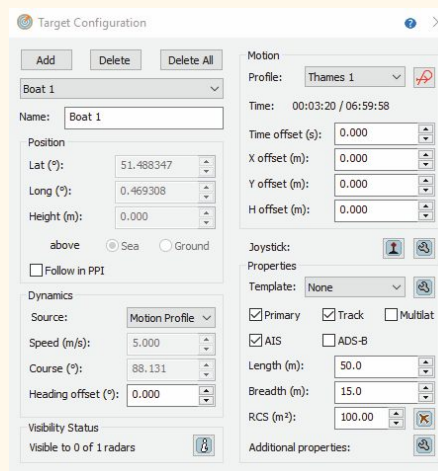
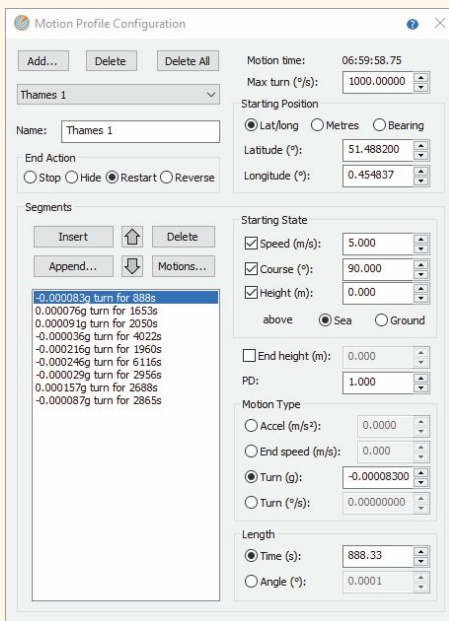


- Buildings defined by:
 - User input
 - ESRI Shapefile
- Auxiliary video source inputs:
 - Network radar video
 - HPx radar interface card
 - Recording file
- Random target generation
- Primary radar video output
 - SPx format
 - ASTERIX CAT-240
- Platform navigation data output
 - NMEA-0183 sentences

- Primary target track output
 - SPx format
 - ASTERIX CAT-48 (+ CAT-34 status)
 - ASTERIX CAT-10
 - ASTERIX CAT-62
- AIS target output
 - NMEA-0183 format
- ADS-B target output
 - ASTERIX CAT-21
- Multilateration report output:
 - ASTERIX CAT-20 (+ CAT-19 status)
- Radar emulation
- Joystick control of target and/or platforms

Control

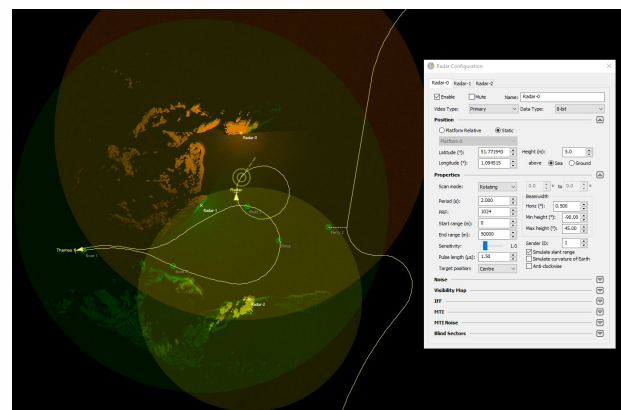
All aspects of SPx Radar Simulator's operation may be adjusted, from the location of the radar(s) to the outputs generated by individual targets. The user is provided with full control over the appearance of the radar video, the target scenario, the platform motion, auxiliary sources and the data outputs. The built-in scenario creation and editing facility is both powerful and simple to use, making it possible to define complex scenarios quickly and easily. Alternatively, an existing scenario generator may be used, with SPx Radar Simulator responsible only for the video generation.



Returns from terrain, targets and buildings are all independently controllable. Each target's size, shape and nominal radar cross section is configurable. Furthermore, the outputs generated for each target are independently selectable.

For a given target, you can select whether it outputs any or all of: radar video return, primary track messages, AIS messages, ADS-B data and multilateration reports. This makes it possible to simulate real threat scenarios where hostile targets may be visible to the radar but do not provide a transponder reply.

Multiple radars may be simulated, including primary and IFF sensors, which could be coincident or overlapping.



Realistic Radar Video

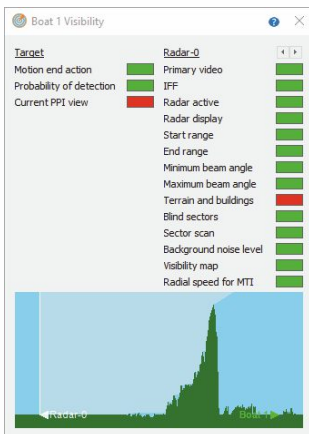
By adjusting the high-level properties of the radar object within the Simulator, it is possible to control the appearance of the simulated video, making it similar to that of real radar systems. The Simulator provides control over the range, rotation period, PRF, beamwidth, pulse-length and sensitivity of each radar it is simulating. Together, these parameters provide the capability to replicate the appearance of almost any real-world radar video.



Real Radar Video



Simulated Radar Video



SPx Radar Simulator uses a worldwide terrain database or standard DTED data files to estimate the typical returns that may be expected from land, given the radar's location and height.

Line-of-sight calculations take into account the view from the perspective of the radar, such that terrain and buildings at shorter ranges may obscure targets, terrain and buildings at longer ranges.

On moving platforms, the view of the land is constantly changing and this is reflected in the radar video that SPx Radar Simulator generates.

Simulation of high fidelity radars require the physical shape of targets to be considered. SPx Radar Simulator allows each target to have a user-defined shape. Target shapes may be stored as templates and used by a number of targets. Shape consideration can add an extra layer of realism to the target returns generated by the Simulator.





Typical Applications

Accessing real radar video data can be difficult and time consuming. Having a controlled real-world target scenario is even more challenging. SPx Radar Simulator provides a convenient, controllable and repeatable source of radar video data. Its uses range from simply providing an arbitrary source of input data for display application development, to testing the performance of a tracking system, to providing an input for operator training.

The SPx Radar Simulator application can also be supplied with a built-in emulation capability, allowing it to mimic the status and response of a real radar system, in addition to generating a representative radar video output.

Ordering Information

The standard SPx Radar Simulator licence allows up to two radars to be simulated by the application. Enhanced licences are available to support greater numbers of radars and to provide radar emulation capability.

To interface with radar signals, for live analogue radar video input, an HPx-200 radar interface card (part number 161-100) (or HPX-400e, part number 318-100 for PCIe) is required. Please see Cambridge Pixel's separate HPx data sheet for full details of the supported radar signals. Network radar video may be received directly into SPx Radar Simulator (subject to the data format being supported).

Output of analogue radar signals requires one or more HPx-300 PCIe radar output cards to be installed within the host system.



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