



Secure-X

Software Modules for Intelligent Sensing



Secure-X

Secure-X is a family of field-proven software components for building sensor-based surveillance solutions. At its core, Secure-X provides modules for radar and camera interfacing, processing and display, which can be built into a security application. Additionally, Secure-X can be provided as a ready-to-run surveillance application, optionally with source code for extension, localisation and long-term support.

Secure-X

Secure-X is a library of software modules that cover a wide range of security-related radar and camera acquisition, processing and display functions, offering sensor and hardware-independent modules of expertise. This is aimed at system developers who require core software modules for radar and camera interfacing, processing and control.

If required, Cambridge Pixel can develop a customised security application based on the Secure-X libraries and incorporating Cambridge Pixels experience in the development of user interfaces. This software can then be delivered with source code for optional extension and maintenance by a customer.



The Secure-X software interfaces to many industry-standard radar, video and related sensors and provides a comprehensive range of processing and display capabilities. Starting with acquisition of data as signals or network streams, Secure-X proceeds to processing, classification and fusion and concludes with the option of display widgets or fully ready-to-use applications.

Custom Application

Secure-X Customer Application

Custom-built or modified security application available in executable or source code forms

Secure-X Library

Radar (input, tracking, display)
Video (input, tracking, display)
Recording (Input data or screen)
Processing (Enhancement, tracking)
Display (maps, symbols, targets)



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01 The Blighter series of electronically scanned FMCW radars are supported in Secure-X

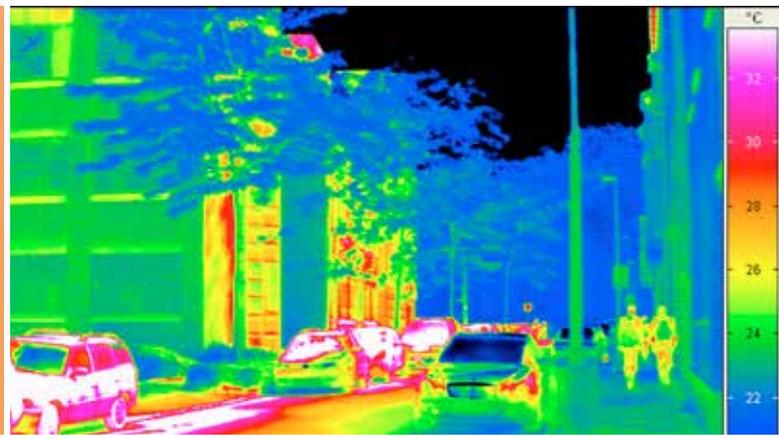
02 Terma's 4000 and 5000 series radars provide network video which can be input to Cambridge Pixel's tracking and display software

Secure-X for Software Developers

Secure-X is designed around Cambridge Pixel's field-proven SPx and SPx-AV software modules for sensor interfacing, processing and display functions. These modules are provided as C++ classes that can be built into a Windows or Linux application. A custom application can combine functions from across radar, video, processing and display options.

Radar Modules

Network or signal interface	<i>Many standard radars (Kelvin Hughes, Furuno, Terma, Blighter, Navtech, JRC, Simrad, Raytheon) can be used, either using a network interface (eg ASTERIX CAT-240) or radar signals that can be received by a HPx series radar input card</i>
Radar control	<i>Selected radars can be controlled using modules in the library</i>
Processing	<i>Radar video may be enhanced for display or to aid automatic track extraction. Processing includes correlation, filtering, LUT, blanking, thresholding, interference suppression, and scan integration. Custom processing elements can be incorporated into the processing chain.</i>
Clutter removal	<i>Automatic clutter processing can improve display presentation and aid detection of small targets</i>
Radar display	<i>High performance radar scan conversion with multiple radars in the same window and multiple windows. Radar may be displayed with map data, overlays and with history trails. PPI, B-Scan and A-Scan displays supported.</i>
AIS	<i>AIS decoding, display and recording</i>
Record and replay	<i>Incoming radar video can be recorded to local or network storage for later analysis or training</i>
Network streaming	<i>Radar video can be streamed from a network server to client displays in remote locations. Compression and processing can be used to make optimum use of available network bandwidth</i>
Plot Extraction and target tracking	<i>Fully automatic target tracking is available with programmable acquire and no-acquire zones over the radar coverage. Highly configurable track extractor for different radar types. Track reports can be provided onto a network, used to control a camera (slew-to-cue) or converted into symbols for overlay display</i>
Simulation	<i>Radar video, along with AIS, GPS and track data, can be simulated and used to provide representative data into a server or client</i>

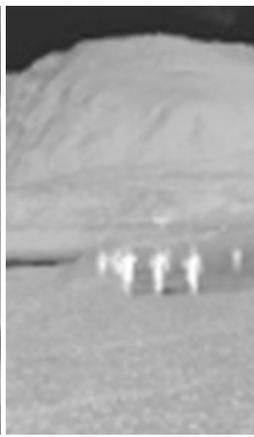
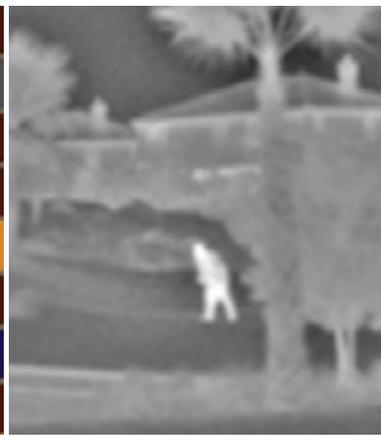
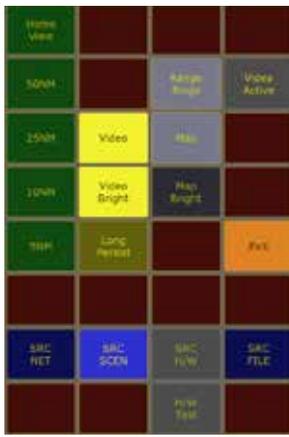
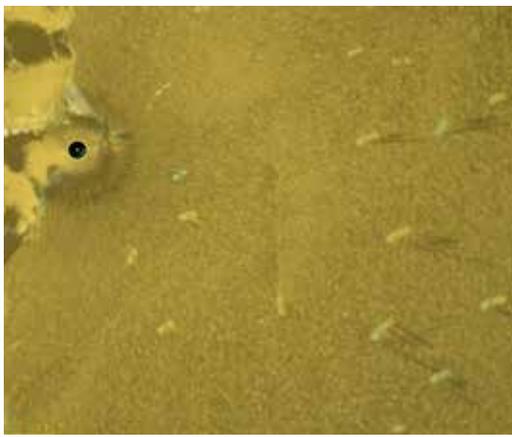


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Video Modules

Network or signal interface	<i>Cameras providing network data or standard analogue or digital signals are supported</i>
Camera control	<i>Control of Chess and Pelco-D based cameras are supported as standard. The camera control supports manual adjustment of camera position (eg from a user interface) or automatic adjustment from a processor or video tracker</i>
Video display	<i>Video data may be displayed in a window with optional overlays</i>
Record and replay	<i>Video data may be recorded to local or network storage for later incident review</i>
Processing	<i>Video data can be enhanced for improved display quality</i>
Compression and streaming	<i>Video can be compressed (GPU-based) to standard H.264 and distributed over a network with control over bandwidth and quality of service</i>
Slew-to-cue	<i>Camera may be steered based on track positions reported by radar tracker</i>
Motion stabilisation	<i>Software modules analyse video from frame to frame and automatically stabilise the image with respect to vibrations or motions of the camera platform</i>
Video tracking	<i>Video tracking permits one or more objects to be tracked in real-time, with the results being used to report a target's position and/or move a camera to keep the target in the field of view</i>





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Display Modules

Map Display	High-resolution geo-referenced maps such as world vector shoreline, tiled map (internet sources) or NASA terrain
Track Display	Target derived from a tracker or other external source (including AIS) may be displayed with built-in symbology
Screen Recording	The screen display may be captured and recorded to file to preserve the operator display for incident analysis or training. Screen recordings may then be replayed on the same or other system
Radar Video Display	Multiple radar videos can be displayed in the same window, along with maps and overlays. Radar video is transparently mixed with underlays. Up to six radar videos in one window.
Video Display	Camera video may be displayed with real-time overlays
View Control	Software modules support intuitive view control adjustment using a mouse or touch screen, including pinch-to-zoom and drag to pan.
Button Box	User interface control for buttons
Display markers	Range rings, electronic bearing line (EBL), variable range marker (VRM), parallel index lines
Alarms	Alarms may be configured to detect targets moving in user-defined polygon areas

01 Thermal and optical imagery is handled with video processing in the GPU

02 High-quality radar scan conversion with overlays and underlays

03 User-interface widgets include the Button-Box library

04 Targets can be acquired and tracked with radar, which can then update the camera (slew-to-cue)



Custom Application Development



The Secure-X software libraries provide software developers with a toolkit of radar and video-related modules that simplify the development of complex security solutions. For situations where customers require a fully developed application, Cambridge Pixel's engineers can develop a complete custom solution. This can combine the radar and video processing modules with a user-interface and interfaces to other sub-systems.

As an interim option between the toolkit and the full application development, Cambridge Pixel can offer a Framework Application. The Framework Application provides a partial solution that integrates all major components of the desired solution and substantially de-risks the complex radar and camera interfacing, display, tracking and fusion components. The Framework is delivered to the customer in source code format, permitting the customer to complete the development by focussing on the user-interface and other system interfaces, where localisation or special operational requirements may be implemented in-country.

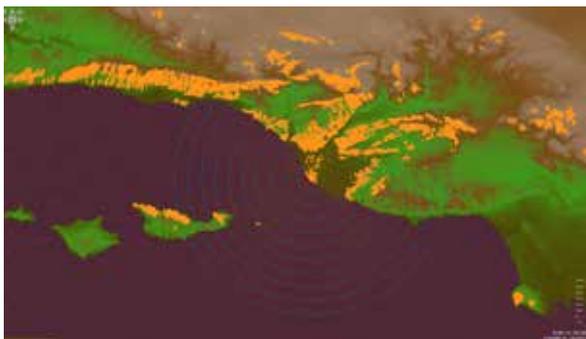


The CxEye application was developed for Kelvin Hughes to provide a visual display of multiple surveillance radars, cameras and target tracks. The software is built using the Secure-X software modules.



Simulation

Radar video and tracks can be simulated using Cambridge Pixel's SPx Simulator software. The simulation can be programmed with motion profiles for multiple air and surface targets, which can then be output as network data streams or representative radar signals (using the HPx-300 radar output card). The simulation includes a consideration of terrain local to the radar, which permits terrain to be visible in the radar video as well as ensuring that the visibility, or otherwise, of targets is correctly represented. Related data from secondary radar (IFF, AIS, ADSB) and navigation sources can be simulated and output in synchronism with the primary radar.

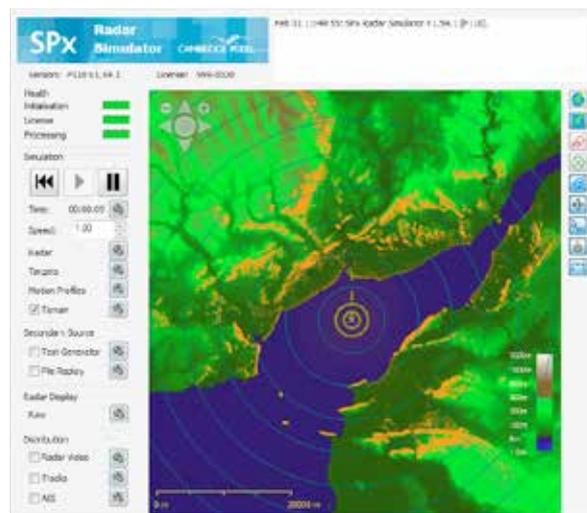


In most cases the simulation's scenario is configured within the application, where a graphical editor permits the motions of targets and radar characteristics to be defined. Alternatively, the scenario can be managed by an existing simulator, with SPx Simulator taking the role of converting target positions into video.

Multi-Radar Simulation

Multiple overlapping radars can be simulated to represent a security scenario with targets of interest moving from one radar coverage to another. Each radar can have different characteristics, for example to simulate short, medium and long range radars. The characteristics of the radars can be changed at runtime over a network interface.

For more information on SPx Radar Simulator, see Cambridge Pixel's web site.





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Secure-X Software Summary

Component	Description	Part Number	Windows	Linux
SPx Server	Primary radar tracking with radar distribution	110-701 (Windows) 110-700 (Linux)	✓	✓
SPx Fusion Server	Primary + secondary + AIS fusion	110-780	✓	✓
SPx Development Software	SPx Development software for Radar development	110-050 (Windows) 110-052 (Linux)	✓	✓
SPx AV Development Software	SPx Development software for Video development	173-100	✓	✓
SPx Simulator	Real-time simulation of radar video from multiple radars showing terrain and multiple targets.	110-590	✓	

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