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# MODULAR RADAR SOLUTIONS

## For developers, integrators and manufacturers


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# The SPx Software Range

Cambridge Pixel's SPx software is a collection of applications and development libraries for radar capture, processing, simulation and display for every task.

The SPx software range covers the following applications:

- Naval Defence
- Air Defence & ATC
- Security
- Maritime Surveillance
- Uncrewed Surface Vessels
- Other applications

**Find out more:**

Use this URL to find out more about the software used for these applications:

**cambridgepixel.com/applications/**

The following list shows the various types of software available:

- Tracking, track fusion and distribution
- Display applications
- Simulation and recording
- Tools
- Development toolkits

**Find out more:**

Use this URL to find out more about the software in these categories:

**cambridgepixel.com/products/**

See the next page for an index of Cambridge Pixel products discussed in this brochure.

## Target Tracking and Distribution

**SPx Server** is an application for Windows and Linux that provides the functions of radar acquisition and processing, network distribution of radar video, plot extraction and target tracking. **Page 4.**

## 3D Tracking

**SPx Tracker-3D** is a software-based radar tracker supporting tracking from 3D and electronically scanned (non rotating) radars. It is available for Windows and Linux. **Page 6.**

## Data Fusion

**SPx Fusion Server** is an application for the fusion of primary and/or secondary (AIS, IFF, ADS-B) sources. It is available for Linux or Windows. **Page 7.**

## Track Management

**SPx Track Manager** is a multi-function track processing module that provides a number of essential track-related services such as format conversion and filtering. It is available for Windows and Linux. **Page 8.**

## Radar Visualisation

**SPx RadarView** is a Windows application for the visualisation of primary radar video, along with graphics and secondary data. **Page 9.**

## Air Situation Display

**ASD-100** is an integrated Windows display application for the acquisition, display and tracking of primary and IFF targets. **Page 10.**

## Security Display Monitoring

**VSD** is a Windows-based application for the processing and display of radar and camera video, including camera control, slew-to-cue and integrated radar and video tracking. **Page 11.**

## 3D Viewer

**SPx Viewer-3D** is a software application that provides a 3D visualisation of radar track reports arriving in SPx or ASTERIX format, as well as AIS and ADS-B messages. **Page 12.**

## Browser-Based Display

**SPx Radar Web Server** supports the display of radar video in standard Internet browser web-based client applications. **Page 13.**

## Maritime Situational Awareness

**RadarWatch** is a flexible situational awareness Windows-based display for maritime applications, including port and harbour control, coastal surveillance and simple vessel traffic monitoring. **Page 14.**

## Maritime Display Framework

**Maritime Display Framework** is a Windows software development package that can be used to create customised user interfaces for the display of primary radar data and secondary transponder information, aimed at the maritime market. **Page 15.**

## USV Management

**USVx** is a Windows application that provides radar visualisation from a remote uncrewed surface vessel (USV). **Page 16.**

## Data Recording

**RDR** is a multi-channel, multi-format Windows record and replay application for primary radar video, tracks, AIS, ADS-B, video, navigation data, screen capture and other network data formats. **Page 17.**

## Radar Simulation

**SPx Radar Simulator** is a Windows application for the simulation of primary radar video, along with secondary sources and navigation data. Simulated data can be output via the network or as analogue signals using the HPx-310 card. **Page 18.**

## Video Simulation

**SPx Video Simulator** is a Windows software product that simulates multi-channel camera video and a PTZ (pan tilt zoom) controller. It is available for Windows and Linux. **Page 19.**

## Developer Toolkit

The toolkit is a package that supports the development of custom server and client radar applications. Radar processing capabilities can be added into existing software and build servers and clients. It is available for Windows and Linux. **Page 20.**

## Ancillary Applications

These are applications that perform various specialist tasks not covered in the other applications. **Page 22.**

## Hardware

We have a range of hardware products for radar interfacing and radar output **Page 23.**

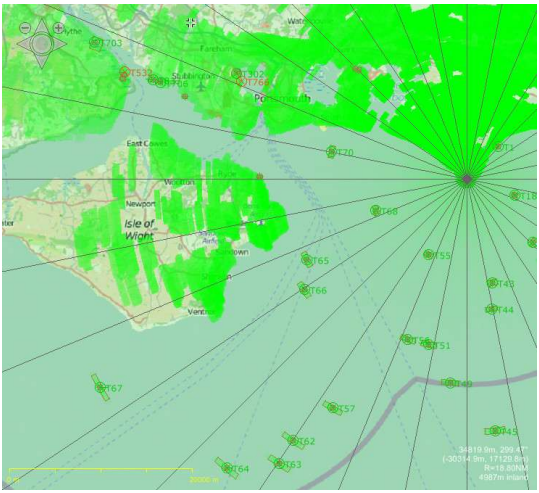
**More at: cambridgepixel.com/products/**

# SPx Server (Tracking & Distribution)

SPx Server interfaces to a wide range of radars to provide radar processing, plot extraction and target tracking. Widely deployed in command and control, navigation, security and maritime applications, SPx Server provides a full set of advanced capabilities, for primary and secondary radar processing.

## Capabilities

- Radar processing
- Plot Extraction
- Target Tracking
- Distribution Server
- Primary and IFF radar
- Recording



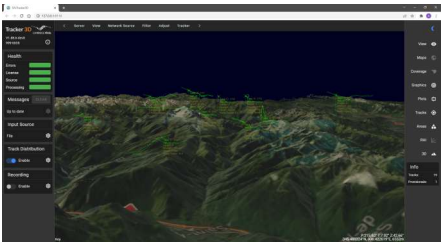

**Find out more:**

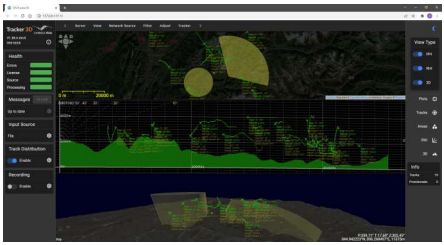
## Features and Benefits

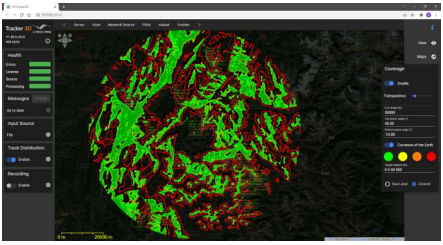
- Receipt of radar video from network (ASTERIX or proprietary interfaces) or radar signals (HPx series hardware)
- Processing (filtering, masking, clutter processing, interference suppression, thresholding)
- Plot extraction with plot merging
- IFF decoding and plot extraction
- Multi-hypothesis, multi-model target tracking
- Highly configurable tracking engine
- Area-dependent tracking parameters
- NMEA-0183 input for moving platforms
- ASTERIX CAT-240 radar video distribution
- ASTERIX CAT-48 or CAT-10 track distribution
- Record and replay
- Local display for set-up and maintenance
- Windows or Linux versions
- Remote control from host
- Supports redundant radar input with auto selection (with HPx-410 card)
- Widely deployed and field-tested

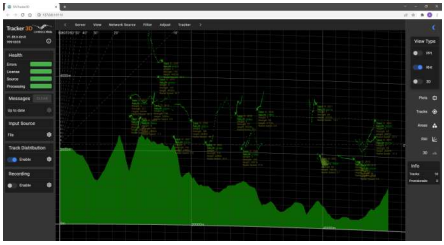
# SPx Tracker-3D

SPx Tracker-3D is a software application supporting tracking from 3D and electronically scanned (non rotating) radars. The software receives plot detections from the radar sensor to create and maintain target tracks, which can then be output in ASTERIX format for external display or fusion processing. SPx Tracker-3D complements Cambridge Pixel's SPx Server, which is focused on target tracking for conventional rotating radars.





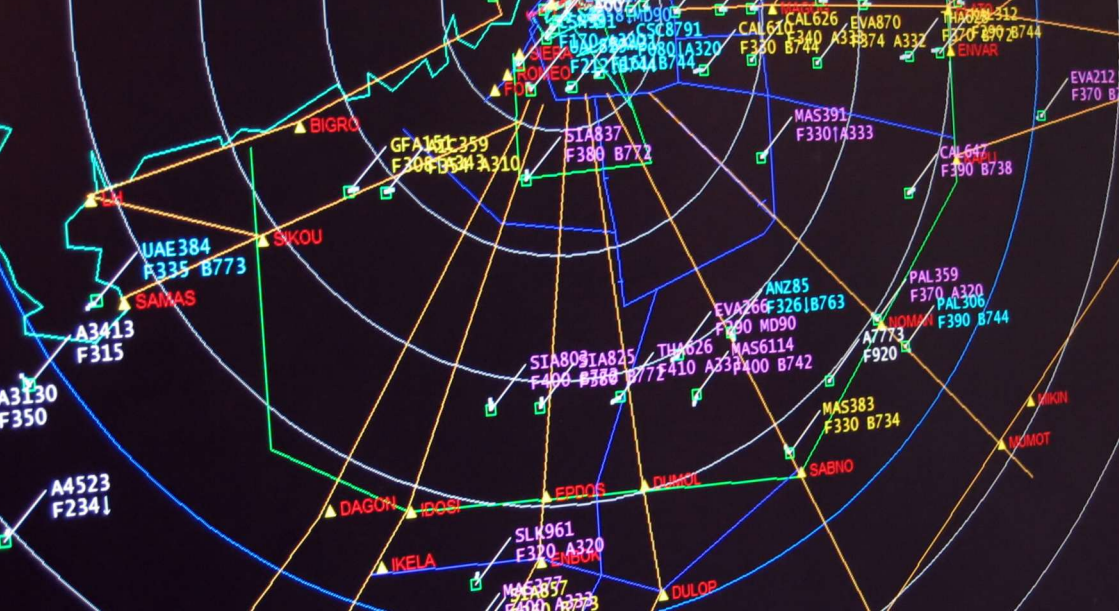




## Features and Benefits

- Primary/IFF Radar Tracker
- 3D radars and E-scan radars
- Automatic track initiation
- Fully configurable through parameters
- Area-dependent parameter values
- Kalman filter-based tracking
- Terrain visibility processing
- Plot input in ASTERIX, SPx or proprietary radar formats
- Plot input recording
- Track output in ASTERIX CAT-48
- Web-based configuration GUI
- Remote API for control, configuration and reports
- Optional external fusion (with SPx Fusion Server)
- Optional external plot extractor (with SPx Server)
- Up to 4000 targets
- Linux and Windows support

**Find out more:**

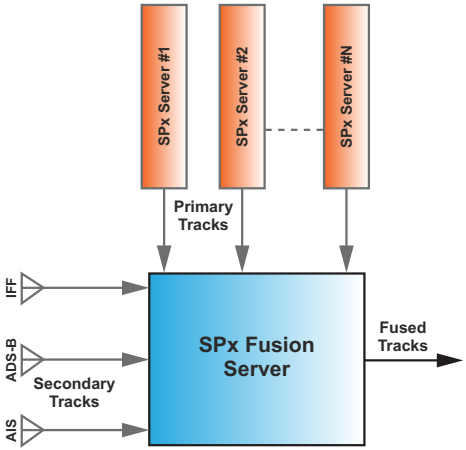



# SPx Fusion Server

This is a ready-to-run Windows or Linux application, used to combine primary tracks (e.g. from SPx Server) and secondary tracks in any combination.

## Features and Benefits

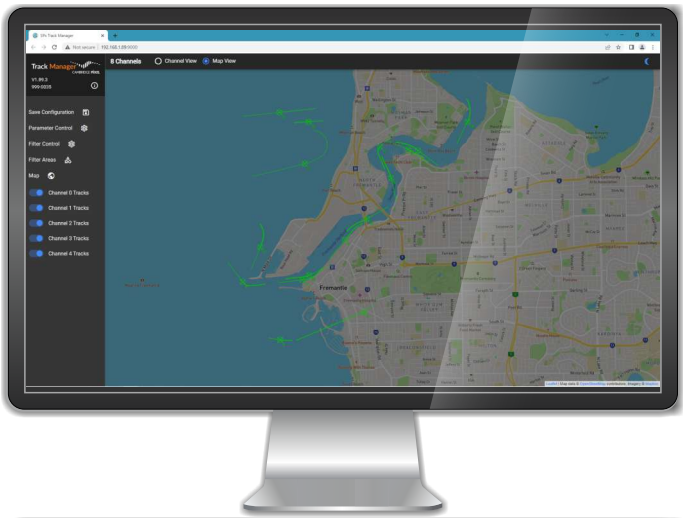
- Receives ASTERIX (CAT-1, 10 or 48) tracks
- Support for AIS (NMEA-0183)
- Support for ADS-B (ASTERIX CAT-21)
- Combines tracks from overlapping radars
- Hands over tracks from adjacent radars
- Consistent track labelling
- Options for 2, 4, 8 or more sensor inputs
- Configurable weighting and priority
- Moving platform support
- Remote control over network interface
- Primary and IFF radars
- Windows and Linux versions
- Web control and monitoring interface
- Windows System Tray option for running in the background
- Complements SPx Server and SPx Tracker-3D




Find out more:

# SPx Track Manager

Cambridge Pixel's SPx Track Manager is a multi-function track processing module that provides a number of essential track-related services including: format conversion, network switching, dual-redundant control, annotation and filtering.




## Features and Benefits

- Ready-made application for Windows or Linux
- Supports ASTERIX, SPx, NMEA, REL-4, SEIWG, GeoJSON, other proprietary formats
- Conversion between formats
- Filtering on position, speed, threat level
- Track annotation and correction
- Web-based control interface
- Supports dual-redundant switching of track streams
- Remote API for system integrators
- NMEA nav data input for track adjustment
- Compatible with SPx Server, SPx Fusion Server, SPx System Monitor
- Licensing options on number of output channels (1,2,4,8,16)

**Find out more:**

# RadarView for Radar Visualisation

RadarView is a ready-to-run Windows-based primary and secondary radar visualisation client, which supports the display of multiple radar videos in multiple windows with maps, overlays, targets and camera video.


## Features and Benefits

- Two channels of radar video (network or HPx input)
- Up to 5 radar windows, each with up to two radar videos
- Radar processing
- Record and replay
- Underlay maps
- Radar analysis tools
- Track display including ASTERIX CAT-10, CAT-48 and CAT-62
- Radar input as ASTERIX CAT-240
- User-definable maps
- Overlay graphics (range rings, compass, targets)
- AIS and ADS-B display
- PPI, RHI, B-Scan and A-Scan displays
- Radar control
- True/relative motion support
- NMEA-0183 navigation input
- Heading-up and north-up options for moving platforms
- Camera video display and control
- MSSR data monitoring and display
- Runs on Windows

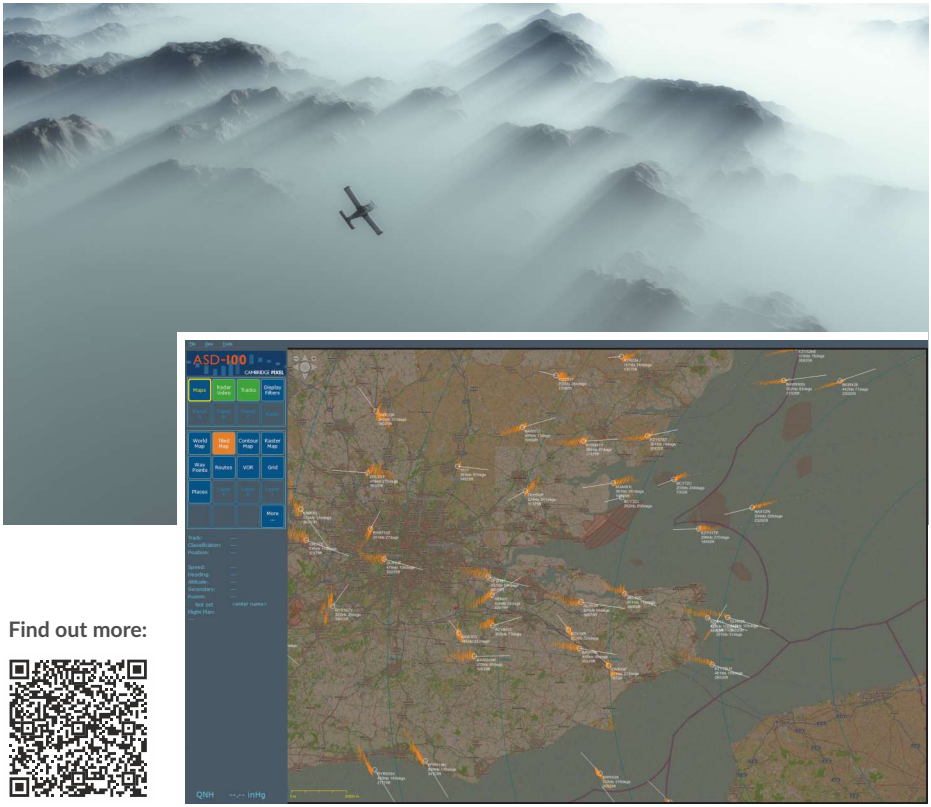
**Find out more:**

# ASD-100 for Air Situation Display

ASD-100 is a Windows software application that supports the receipt and display of primary and IFF radars for air situation awareness.

## Features and Benefits

- Primary and secondary (IFF) radar input
- Primary and IFF radar video display
- ASTERIX CAT-48 and CAT-240 support
- ASTERIX CAT-8 weather display
- ASTERIX CAT-21 ADS-B input
- Map display options
- Aeronautical chart support
- Target label display (configurable)
- Rulers and intercept calculations
- Flight plan handling
- Track filtering by altitude/speed/area
- Status display
- Automatic range rings
- Software Defined Radio support
- Safety alerts (ASTERIX CAT-4)
- Multiple radar support
- Configurable button panels
- Selectable units and coordinate formats




**Find out more:**

# VSD

VSD is a Windows application that provides an integrated display of radar and camera video for broad security applications, from threat analysis to small target tracking. VSD can be used as the base for a CUAS or Counter-UAS (Uncrewed Aircraft System).

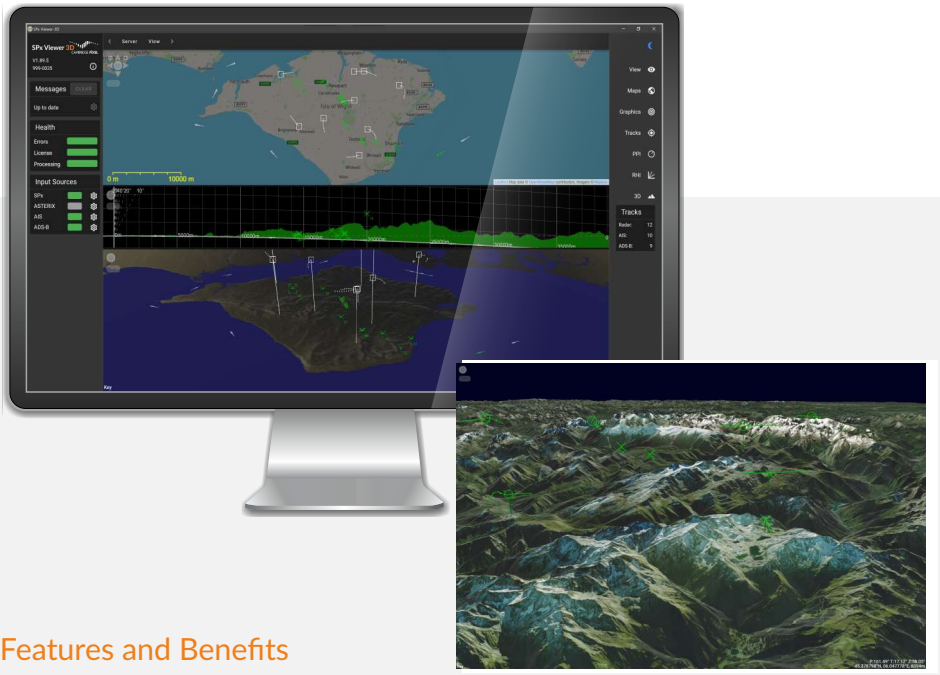

## Features and Benefits

- Primary radar input from network or signals
- Multiple radar support
- Radar display
- Map underlay
- AIS or ADS-B input to screen friendly targets
- Automatic target tracking
- Receipt and display of multiple camera videos
- Logging of tracks, alarms and operator notes
- Comprehensive camera control (Pelco-D, Onvif, FLIR Nexus, Hensoldt ZEOSys) from on-screen or physical joystick
- Slew-to-cue of camera from radar tracks
- Video tracking (from thermal or daylight camera)
- Alarm generation on targets in areas, crossing gate or coastline approach

**Find out more:**

# SPx Viewer-3D

SPx Viewer-3D is a software application for Windows or Linux that provides a 3D visualisation of radar track reports arriving in SPx or ASTERIX format, as well as AIS and ADS-B messages. The software provides 2D PPI and RHI views and also a 3D view of track reports. The user may manipulate the viewpoint to observe the tracks and history trails from any angle.



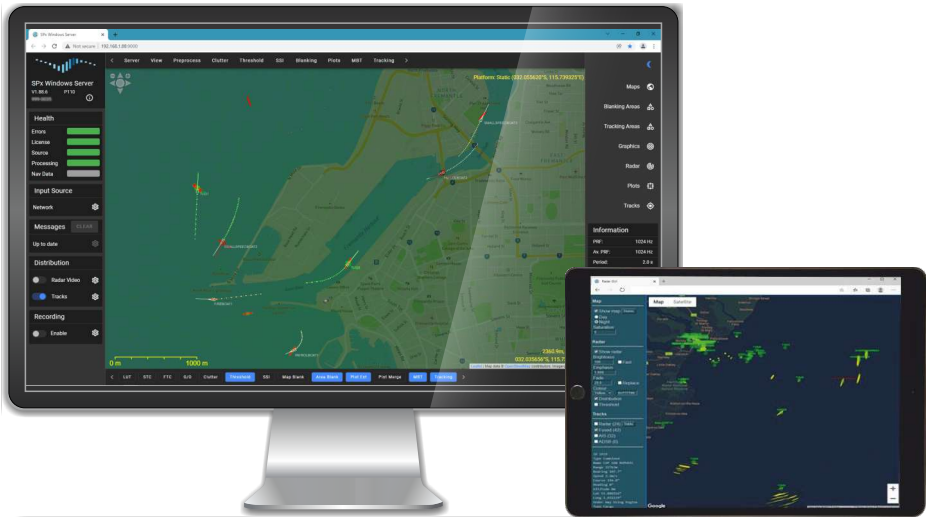
## Features and Benefits

- Windows or Linux support
- Underlay map display
- Terrain display
- SPx, ASTERIX, AIS and ADS-B input
- Tracks symbology for primary, secondary and fused tracks, AIS and ADS-B tracks
- Plan-Position Indicator (PPI) view
- Range-Height Indicator (RHI) view
- 3D view
- Track table
- Track monitor with history graph display
- RHI and 3D position information shown on PPI view
- Programmable track source colours
- Follow or view from selected track in 3D view
- Simple-to-use, multi-view track display
- Works with a wide range of track formats
- Intuitive user interface

**Find out more:**

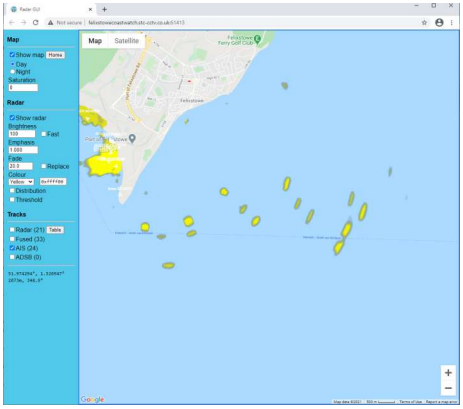
# SPx Radar Web Server

Cambridge Pixel's SPx radar display technology is available for browser-based client displays to support the display of radar video in standard Internet browsers. This permits a wide range of device types from desktop computers, tablets and smart phones to all have access to radar imagery, with the radar processing handled by a remote server or cloud-based architecture.



## Features and Benefits

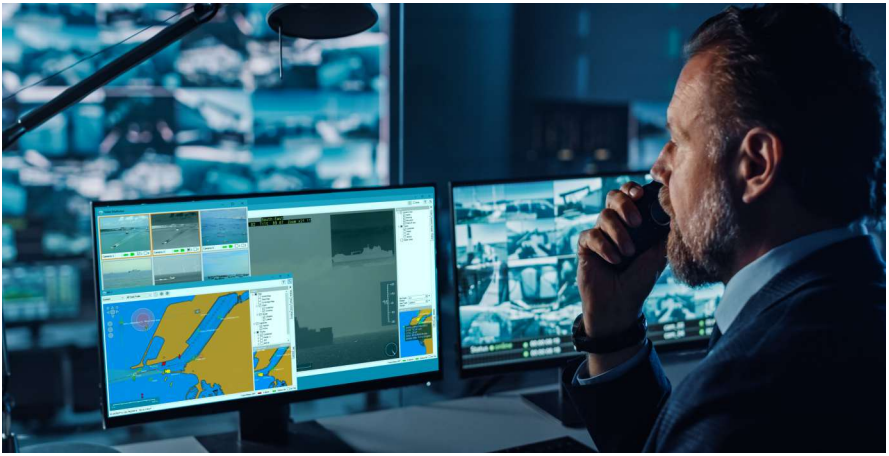
- Radar display in a standard web browser
- Per-client radar presentation
- GeoJSON Track/AIS/ADS-B data
- High quality radar scan conversion
- Radar overlay on ENC charts and maps
- Target overlays
- Secure protocols
- Scan conversion on remote server or in cloud
- Moving platforms supported using NMEA navigation data
- Sample client display provided
- Full API support for custom development



**Find out more:**

# RadarWatch for Maritime Situational Awareness

RadarWatch is a flexible situational awareness application for maritime applications, including port security, harbour control, coastal surveillance and simple vessel traffic monitoring.



RadarWatch provides an integrated presentation of radar video, tracks, camera data, AIS, mapping and alarm processing, offering a powerful, flexible and cost-effective maritime information system. RadarWatch works with a wide range of radar sensors and cameras, allowing system integrators to specify the right sensor for each application.

## Flexible Alarms

RadarWatch includes a comprehensive capability for defining alarms that occur on configurable events.

## Video Management

Multiple daylight and thermal cameras can be incorporated into RadarWatch.

## Multi-screen, Multi-window

RadarWatch supports multiple display screens.

## Augmented Vision

Supports overlay of target information onto camera video.

## System Configuration

RadarWatch works with other software from Cambridge Pixel, including the following:

- SPx Server
- SPx Fusion Server
- RDR
- SPx Camera Manager

**Find out more:**

# Maritime Display Framework (MDF)

MDF is a C# .NET software source code package for developing customised ARPA, ECDIS and Integrated Bridge displays. In its default configuration, it is supplied as a ready-to-run software application that can be used without development.

## Features and Benefits

- Supports resolutions from HDTV (1920x1080) up to 8K UHD (7680x4320)
- Multiple map support (On/Off-line):
  - S-57 / S-63 electronic charts
  - World vector shoreline map
- Track input from SPx Server
- Auto Track Initiation (ATI)
- Manual track creation
- AIS display filters, including: range, ahead only, moving only, large ships
- Multiple Regions Of Interest (ROI) for selected tracks and following cursor
- Multiple CCTV feeds
- Electronic Bearing Lines/Variable Range Markers/Parallel Index Lines
- Radar control and status
- Heading Up, North Up, Course Up modes
- True Trails and Relative Trails options
- NMEA-0183 navigation data receipt
- User-defined ahead-only Field Of View
- Programmable CPA and TCPA
- Acquired target data including lat/long, course, speed, range, heading, CPA, TCPA

**Find out more:**

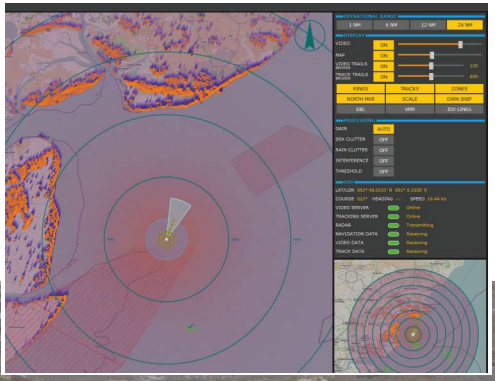
# USVx - Radar Display for Uncrewed Surface Vessels

USVx is a configurable software application to support the visualisation of radar data from a remote uncrewed surface vessel (USV). Radar and track data may be sent from the vessel to the USVx software, which shows an integrated picture comprising radar video, tracks, maps and overlays.

## Features and Benefits

- Receives and displays radar video
- Receives track reports from tracker on USV
- Displays tracks and AIS targets
- Shows USV and own-ship positions
- Remote control of radar (selected radars)
- Proximity alert generation
- Tiled map data
- Works with SPx Fusion Server

**Find out more:**



# RDR Data Recorder

RDR provides a multi-channel, multi-format record and replay application to support a wide range of recording requirements. Supported inputs include radar video, tracks, AIS, ADS-B, camera video, network packets, audio and computer screen recording.

## Features and Benefits

- Record and replay of radar and related data
- Radar recording from signals (with HPx card) or ASTERIX CAT-240
- Track input (ASTERIX CAT-48 or CAT-10)
- Camera video (H.264)
- AIS input (serial or network)
- ADS-B input
- Recording of remote computer screens
- Navigation messages (NMEA-0183)
- General network packets (TCP or UDP)
- Audio recording
- On-request or scheduled recordings
- Timeline display supports quick-look of recording and replay
- Event recording (user-generated, network messages, automatic events including radar failure, mode changes etc.)
- Control via web interface, local GUI or remote API
- Database storage with SQL Search
- Runs on Windows

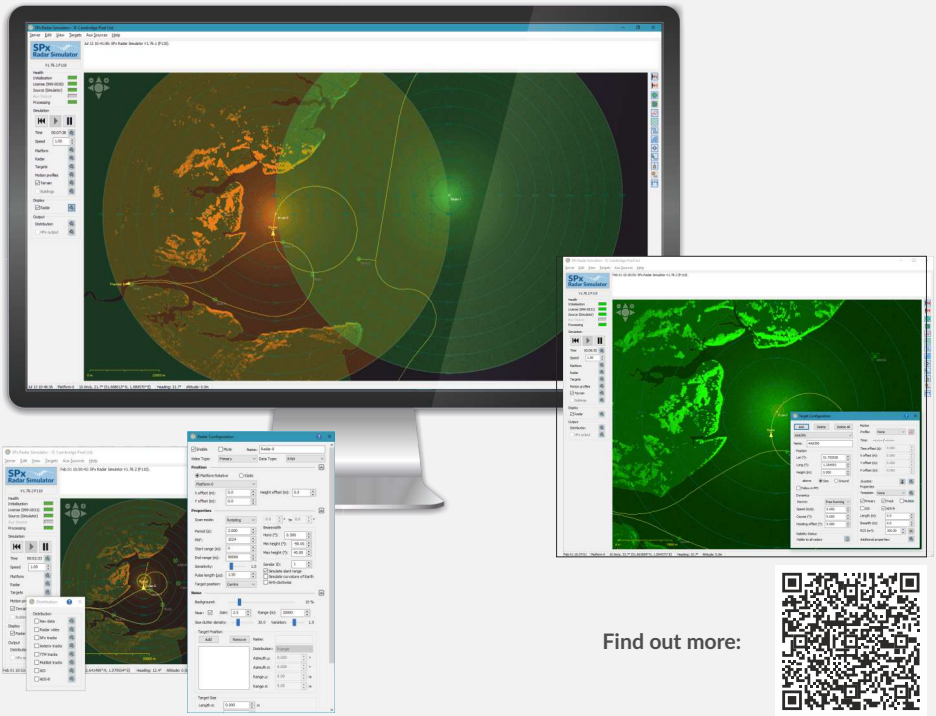
**Find out more:**

# SPx Radar Simulator

Use SPx Radar Simulator to generate synthetic real-time radar video, along with tracks, secondary data and navigation data.

## Features and Benefits

- Radar output in ASTERIX CAT-240 or signals with HPx-310 card
- Define complex scenarios with moving targets and moving radars
- Multiple radar support
- Terrain modelling and line-of-sight considerations
- Configurable radar characteristics
- Overlay synthetic targets on real radar
- AIS and ADS-B targets
- Racon and SART support
- Track simulation (ASTERIX CAT-10, CAT-48, CAT-62, TTM and multilateration)
- Generate primary, IFF, MTI and doppler video
- NMEA-0183 navigation data in and out
- Synchronise to external simulation generator if desired
- Generate video from external track inputs
- Full graphical editing of scenarios
- Runs on Windows



**Find out more:**

# SPx Video Simulator

Use SPx Video Simulator to simulate camera video and Pan-Tilt-Zoom (PTZ) controllers in a 3D-modelled scene to generate video streams.

## Features and Benefits

### Simulation
- Real-time updates
- Loadable 3D target models
- Configurable target motion profiles
- Terrain database for target visibility and display

### Video Output
- Configurable video frame size from SD to HD
- RTSP or ONVIF output
- H264 or MJPEG encoding
- Configurable frame rate

### Software
- Uses SPx Radar Simulator (supplied) for scenario generator
- GUI control for configuration and monitoring
- Remote API (C++ library) for configuration and control

### Camera Positioning
- Static camera or moving platform
- Configurable camera position on moving platform
- Dynamically adjustable PTZ
- ONVIF and PELCO-D interfaces

### Camera Types
- PELCO-D
- Nexus CGI
- ONVIF
- Network camera control
- Multiple cameras and PTZ platforms
- Configurable field of view

**Find out more:**

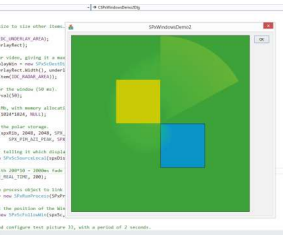
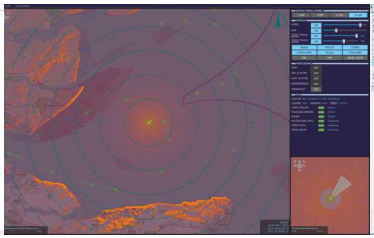
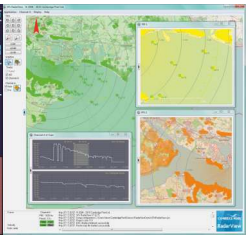
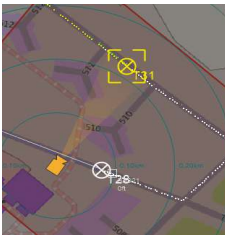
# Developer Toolkit

The SPx Development package is a toolbox of libraries, utilities, sample applications and comprehensive documentation that supports the development of server or client applications using our radar processing software.


**Find out more:**


## What's included?

- Files and libraries for Windows or Linux
- Collection of examples and sample applications with source code
- Comprehensive documentation
- Technical support from radar and software experts
- Radar acquisition (signals, ASTERIX)
- Test patterns and scenarios
- PPI scan conversion (multi radars)
- B-Scan display
- A-Scan display
- Overlay/underlay display mixing
- Record/replay
- Compression/decompression
- Network streaming
- Clutter processing and clutter mapping
- Filtering, gain control, thresholding, scan integration
- Area-based processing
- Plot extraction
- Target display rendering (AIS, primary, secondary)
- Graphical widgets
- Range rings, EBL, VRM, parallel index lines
- Map display
- AIS receipt and decode
- NMEA-0183 receipt and decode
- Camera interfacing and control
- C++ software interface
- .Net and Java interface (restricted functionality)
- Visual Studio 2015, 2017, 2019 or 2022

# Ancillary Applications

Cambridge Pixel provides a variety of specialised tools for performing tasks that are not covered in the stand-alone tracking, display, simulation and recording applications. A few are listed here:

## SPx Camera Manager

SPx Camera Manager is a self-contained, multi-function application that serves as a bridge between video cameras and applications. It allows shared, priority-based access to control the cameras, and supports automatic camera control to follow tracks.

**Find out more:** enquiries@cambridgepixel.com

## AVx VideoLink

AVx VideoLink is a client-server software application that manages the distribution of network camera video across unreliable, or variable bandwidth, data links. In such situations, occasional loss of data packets from the video stream can have an exaggerated effect on the continuity of a video stream, with loss of picture quality within a frame and over time.

**Find out more:** enquiries@cambridgepixel.com

## SPx RadarLink

SPx RadarLink provides a pair of applications that form a bridge to link two subnets together across a connection that might have limited bandwidth or is potentially unreliable or congested. It helps to get radar video from one network to the other more reliably than a standard network distribution (possibly automatically limiting the data rate according to real-time statistics for the link).

**Find out more:** enquiries@cambridgepixel.com

## GPS Assist

GPS Assist is a radar-based method of detecting and compensating for loss, spoofing or jamming of GPS information. It compares simulated target returns from coastal terrain with live radar returns to calculate accurate vessel position.

**Find out more:** enquiries@cambridgepixel.com

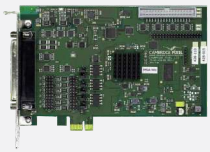
# HPx Hardware

## HPx-346 – Analogue Radar to Network Converter

- Self-contained radar in, network out
- 1 x analogue video in
- Trigger (RS422 or single ended)
- ACP/ARP (RS422 or single ended)
- ASTERIX CAT-240 output
- Compact, low power (DC input)
- Supplied as card or small enclosure


## HPx-410 – PCIe Radar Input Card

- PCIe (x1 or x4 bus options)
- Single and dual channel options
- 2 x analogue, 8 bits digital video in
- Trigger (RS422 or single ended)
- ACP/ARP (RS422 or single ended)
- Parallel azimuth input for synchro
- 125 MHz sampling
- Supports dual-redundant radar configurations



## HPx-450 – XMC Radar Input Card

- XMC bus
- 2 x analogue video in, 8 bits digital video in
- Trigger (RS422 or single ended)
- ACP/ARP (RS422 or single ended)
- Parallel azimuth input for synchro
- 125 MHz sampling

## HPx-310 – PCIe Radar Signal Output Card

- PCIe (x1) bus
- 2 x analogue video out, 8 bits digital video out
- Trigger (RS422 or single ended)
- ACP/ARP (RS422 or single ended)
- Parallel azimuth

## HPx-180 – PCI/PCIe Synchro/Resolver Card

- PCI/PCIe bus
- 12-bit parallel azimuth + strobe
- Synchro: 3 wire + reference
- Resolver: 4 wire + reference
- Use with HPx-410

**Have a question? Get in touch: enquiries@cambridgepixel.com**

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