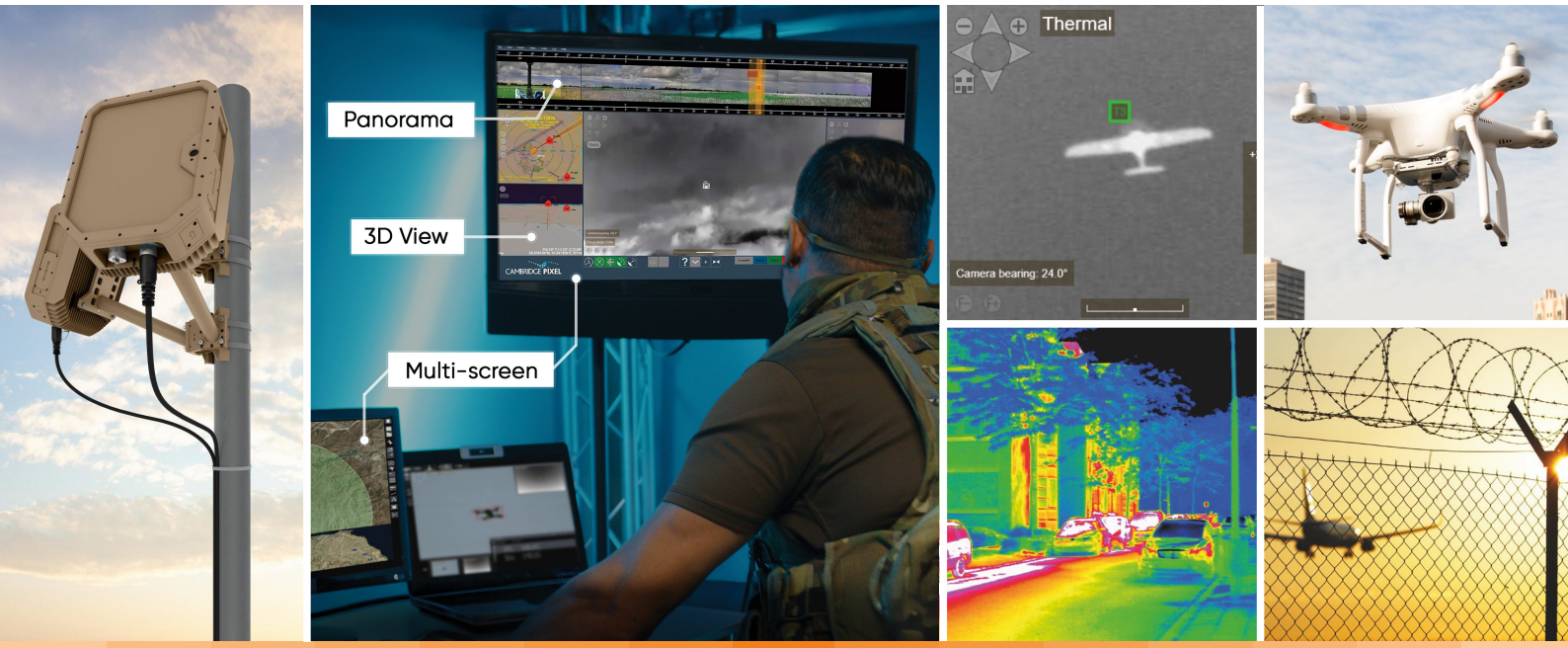
VSD

Customisable Operator Display Software for Security, C2 & C-UAS Applications



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VSD Customisable Operator Display Software for Security, C2 & C-UAS Applications

VSD is Cambridge Pixel's highly cost-effective, customisable operator display software package, which can be purposed for both military/defence command & control (C2) applications and security-based critical infrastructure protection applications. VSD interfaces to a wide range of supported cameras, video tracking systems, AI modules, ground-based radars and other C2 sensors and effectors.

VSD runs on standard Windows-based PC workstations, laptops or servers and can be deployed in both hierarchical C2 or edge network structures for both ground fixed and ground mobile applications. Deployed systems are easy-to-learn and have a low overall training burden. The inherent flexibility of VSD allows new capabilities to be quickly integrated into a new bespoke solution.

VSD-C2 Advanced with Video Panorama, 3D Window, Track Table, PPI, Thermal & Visible Videos

VSD can be tailored to visualise both 2D and 3D sensor feeds and supports live camera video windows, fused PPI radar windows and both panoramic and 3D display windows. The position and size of all controls and windows can be customised and support is included for real-time overlaid symbology and background maps or charts. Support for multi-screen operator displays is also included.

In addition to locally networked sensor/effector control stations, wide area C2 is supported through the concept of tiered regional and/or central command centres. When deployed at these higher-levels of hierarchy, VSD supports automatic discovery of subordinate control stations on the C2 network. Where required, VSD can also support both local and remote control of the sensors and effectors.

VSD Versions

As standard, the VSD application software is available in four off-the-shelf, ready-to-run versions, which are progressively more feature-rich:

- VSD-Camera Standard
- VSD-Camera Advanced
- VSD-C2 Standard
- VSD-C2 Advanced

For more specialised operator display requirements, Cambridge Pixel offers a customisation and rapid prototyping service for VSD, covering such activities as:

- Customisation of screen layout, controls and workflow
- Integration of new cameras, video tracking systems, AI-based classifier modules, C2 sensors and C2 effectors
- Rebranding of the user interface colours, icons and logos

Example of a Customised VSD-C2 Display

Why Choose Cambridge Pixel?

Cambridge Pixel is an employee-owned British company, based near Cambridge in the East of England. We are independent, stable and an expert supplier of sensor processing and display solutions for the air defence, ATC, C-UAS, critical infrastructure protection, maritime, naval and USV markets.

We are hardware-agnostic and can provide off-the-shelf software processing modules and hardware cards or devices to interface to a wide selection of third-party sensors and effectors. We are experts in user interface (UI) design for radar and camera display systems. Cambridge Pixel has an extensive library and existing codebase for efficient development of new systems.

Cambridge Pixel is trusted by many leading primes and system integrators, with a strong track record in the military/defence and security markets.

VSD-Camera Standard

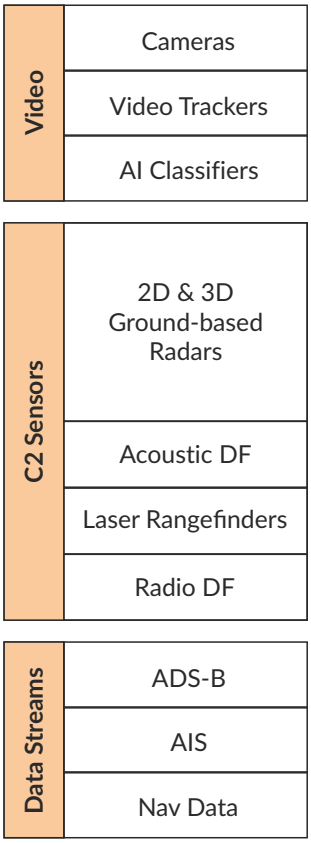
VSD-Camera Standard features multi-camera PTZ control, live camera video windows and a 2D tiled map window. The map window can be used to command slew-to-cue of the camera(s) and includes real-time overlay graphics for the current camera field-of-view (FOV) and azimuth orientation.

Additional features of VSD-Camera Standard include:

- Camera tour support
- Configuration setup wizard
- Customisable video preset buttons

All versions of VSD support multiple screens and offer flexibility in the range of user input methods that are supported, including:

- Joystick
- Keyboard
- Gaming controller
- Mouse or trackball
- Touchscreen



VSD-Camera Advanced

VSD-Camera Advanced adds support for third-party video tracking systems and AI-based classifier modules. It also supports receipt and display of AIS and ADS-B streams and can make use of navigation data sources for automatic orientation and positioning of a vehicle platform.

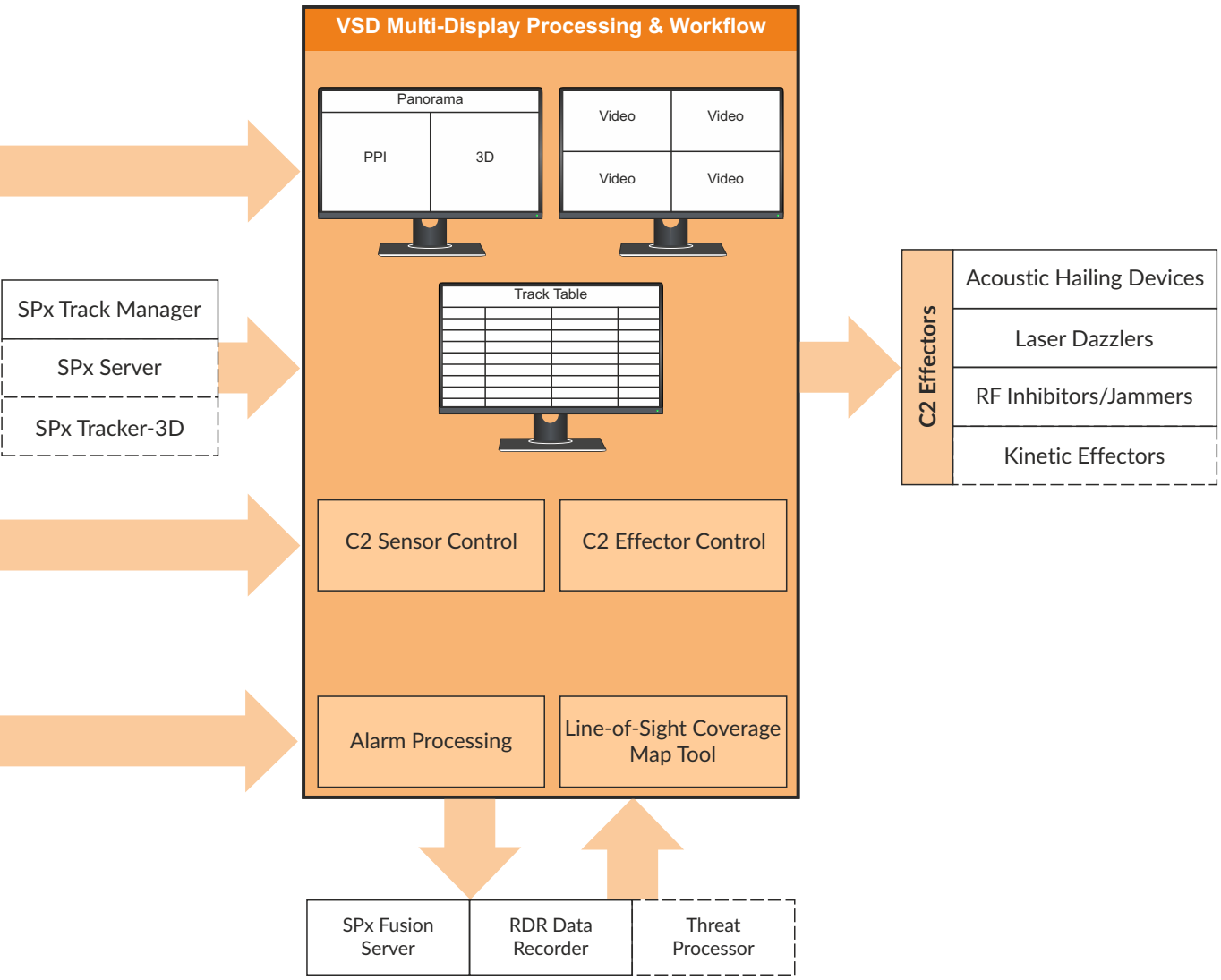
A useful line-of-sight coverage map tool is also included to help identify optimum sensor platform locations that have minimal blind spots. Optional support for record/replay functionality is available in VSD-Camera Advanced through the purchase of Cambridge Pixel's RDR Data Recorder software.

VSD-C2 Standard – Single C2 Sensor/Effector Type

As a complement to camera control, VSD-C2 Standard adds support for a single type of C2 sensor (or C2 effector). Compatible C2 sensor types include 2D and 3D ground-based radars, acoustic direction finding sensors, laser rangefinders and radio direction finding sensors. Supported C2 effector types include acoustic hailing devices (e.g. LRAD), laser dazzlers and RF inhibitors/jammers.

VSD-C2 Standard provides alarm processing across regions/zones and gates, as well as the capability to display both scan converted primary radar video and secondary track data. Support for MIL-STD-2525D format overlay symbology is also included. Track data can be displayed in a multi-column radar track table window, which is sortable.

Where required, VSD-C2 Standard includes licences for both SPx Fusion Server (for primary and secondary track correlation) and SPx Track Manager (for radar format conversion). Support for 2D and 3D radar tracking can optionally be purchased in the form of licences for Cambridge Pixel's SPx Server (2D tracking) or SPx Tracker-3D software products. As with VSD-Camera Advanced, optional support for record and replay functionality is available through the purchase of Cambridge Pixel's RDR Data Recorder software.



VSD-C2 Advanced – Multiple C2 Sensor/Effector Types

Whereas VSD-C2 Standard supports just a single type of C2 sensor or C2 effector, VSD-C2 Advanced includes support for up to four different types of C2 sensors/effectors. By supporting multiple sensors and effectors, more advanced, multi-step workflows or control chains can be implemented. Also, for enhanced situational awareness, VSD-C2 Advanced includes support for 3D visualisation windows and a novel panorama window feature.

The panorama window is a picture which is captured at system set-up (or on-demand) by automatically panning and sequentially snapshotting camera sensor video to build-up an ultra-wide static picture (covering up to 360° in azimuth). Operators can use the panorama window to quickly cue cameras (and/or effectors) to reference features in the captured image, as well as to real-time overlaid target tracks from the C2 sensors.

Planned future updates to VSD-C2 Advanced include multi-level user access control, networked wide-area C2 (with auto discovery of VSD nodes) and support for On the Move (OTM) operation (please contact Cambridge Pixel for details). As cost options, VSD-C2 Advanced can also be configured to support kinetic effectors and optionally include an automatic threat processing feature (please contact Cambridge Pixel for details).

VSD Case Study

Spydar Portable UAS Detection System for Counter Drone Operations

Spydar uses a specialised configuration of Cambridge Pixel's VSD operator display application. It provides an easy-to-use display of detections from a portable radar and both panoramic and 'area of interest' live feeds from the camera array.

Developed by HBS Consulting, the system innovatively combines an array of super-high-resolution cameras and an Echodyne EchoGuard radar. The camera assembly fits directly on the EchoGuard radar such that the two sensor systems have a comparable field of view and sensitivity, dispensing with the need for an expensive and complex PTZ optical subsystem.

Radar tracks are highlighted both on the PPI pane and on the panoramic view. A simple touchscreen control interface is provided, allowing the operator to change range settings and grab screenshots for recording purposes.

> *"It has been a pleasure to collaborate with Cambridge Pixel. I was surprised how quickly and easily they were able to provide a completely tailored solution."*
>
> **Graham Beall, Managing Director, HBS Consulting**

VSD Specification

Supported ICDs, Standards & Protocols*

- AIS, ADS-B & NMEA-0183
- ASTERIX
- MIL-STD-2525D
- SAPIENT (BSI Flex 335)
- SEIWG 0101
- Others: Please contact Cambridge Pixel for details

* Please contact Cambridge Pixel for details of supported categories, types and levels

Supported Cameras, Video Tracking Systems & AI-based Classifier Modules

EO/IR Cameras:

- Distribution protocols: ONVIF, MPEG-TS, RTP & RTSP
- Encoding formats: AVC/H.264 & HEVC/H.265
- ONVIF protocol PTZ cameras: Profile S devices
- OpenWorks Engineering: Vision Flex & Vision Guard
- Pelco compatible PTZ cameras: Pelco-D devices
- Teledyne FLIR: Ranger HRC, HDC series & PT-Series
- Others: Please contact Cambridge Pixel for details

Video Tracking Systems & AI-based Classifier Modules:

- Chess Dynamics Vision4ce: CHARM & DART
- OpenWorks Engineering: SkyAI
- Vizgard: FortifAI
- Walaris: AirScout
- Others: Please contact Cambridge Pixel for details

Supported C2 Sensors*

2D & 3D Ground-based Radars:

- APS: FIELDctrl radar family
- Blighter: A800 Mk 2, A400/C400/B400 series, B303 & B202 Mk 2
- Echodyne: EchoShield & EchoGuard
- Hensoldt: Spexer 600, Spexer 360 Enhanced & Spexer 360
- Leonardo DRS RADA: ieMHR (RPS-80, RPS-81, RPS-82 & RPS-84)
- Robin Radar Systems: IRIS & ELVIRA
- Teledyne FLIR: Ranger R20SS series, R8SS series, R6SS, R5D, R5, R3D, R3, R2 & R1
- Weibel Scientific: XENTA-M & XENTA-C
- Others: Please contact Cambridge Pixel for details

Acoustic Direction Finding Systems:

- Squarehead Technology: Discovair G2
- Others: Please contact Cambridge Pixel for details

Laser Rangefinders:

- Safran Vectronix: LRF series
- Others: Please contact Cambridge Pixel for details

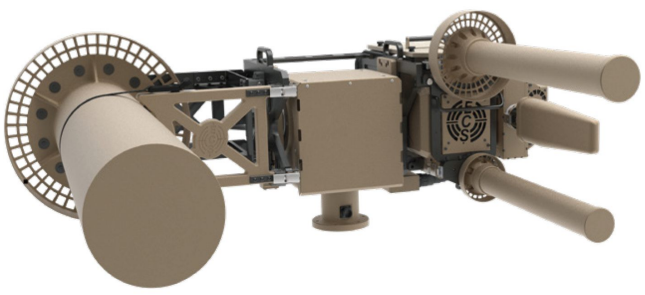
Radio Direction Finding & ESM Systems:

- CRFS: RFeye Array
- TCI: Blackbird
- Others: Please contact Cambridge Pixel for details

* Please contact Cambridge Pixel for details of interface (e.g. data-only or sensor control & data)

Supported C2 Effectors

Acoustic Hailing Devices:



- Genasys: LRAD 950NXT
- Others: Please contact Cambridge Pixel for details

Laser Dazzlers:

- Wavelength Solutions / Passive Force: Medusa series
- Others: Please contact Cambridge Pixel for details

RF Inhibitors/Jammers:

- Enterprise Control Systems (ECS): Claw RF Inhibitor
- Others: Please contact Cambridge Pixel for details

VSD Summary Feature Matrix

Software Feature	VSD-Camera Standard	VSD-Camera Advanced	VSD-C2 Standard	VSD-C2 Advanced
2D tiled map window with camera FOV & bearing overlay	✓	✓	✓	✓
Camera tour support	✓	✓	✓	✓
Configuration setup wizard	✓	✓	✓	✓
Customisable video preset buttons	✓	✓	✓	✓
Multi-camera PTZ control & live video windows	✓	✓	✓	✓
Multiple display support	✓	✓	✓	✓
Slew-to-cue support	✓	✓	✓	✓
Touchscreen, joystick, gaming controller, mouse & keyboard	✓	✓	✓	✓
AIS / ADS-B data receipt & display		✓	✓	✓
Line-of-sight coverage map tool		✓	✓	✓
Navigation data support[1]		✓	✓	✓
Video tracking systems & AI-based classifier modules support		✓	✓	✓
Record and replay (via RDR Data Recorder)		○	○	✓
C2 sensor/effector support - **single type** from either list			✓	✓
Supported C2 sensor type list:				
2D & 3D ground-based radars			✓	✓
Acoustic direction finding sensors			✓	✓
Laser rangefinders			✓	✓
Radio direction finding sensors			✓	✓
Supported C2 effector type list:				
Acoustic hailing devices (e.g. LRAD)			✓	✓
Laser dazzlers			✓	✓
RF inhibitors/jammers			✓	✓
Alarm processing (regions/zones & gates)			✓	✓
Live primary radar video & secondary track PPI display			✓	✓
MIL-STD-2525D symbology support			✓	✓
Multi-column radar track table window			✓	✓
Primary & secondary track correlation (via SPx Fusion Server)			✓	✓
Radar format conversion (via SPx Track Manager)			✓	✓
Radar tracking (2D via SPx Server or 3D via SPx Tracker-3D			○	○
C2 sensor/effector support - **up to four types** from above lists				✓
3D visualisation window				✓
Multi-level user access control [2]				✓
Networked wide-area C2 with auto discovery [2]				✓
On The Move (OTM) operation [2]				✓
Panorama window (static picture)				✓
Kinetic effector support[3]				○
Threat processing [3]				○

[1] Nav data is currently only used for automatic orientation and positioning of a stationary vehicle platform

[2] Supported in planned future release

[3] Please contact Cambridge Pixel for details

✓ Software feature included as standard

○ Software feature available as a cost option

VSD Ordering Guide

Part No.	Product Description
283-601	VSD-Camera Standard runtime licence
283-602	VSD-Camera Advanced runtime licence
283-603	VSD-C2 Standard runtime licence
283-604	VSD-C2 Advanced runtime licence
283-650	NRE to create customised version of VSD

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