RADAR BASED SECURITY SYSTEMS

THE COMPLETE PICTURE

KELVIN HUGHES
security

SITUATIONAL INTELLIGENCE, THE WORLD OVER

EARLY WARNING IS CRITICAL.
EXTEND THE PERIMETER.

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security

Kelvin Hughes Security, a dedicated division of the Kelvin Hughes Group, brings together many years of diverse experience of the design, integration and operation of radar and security systems. Covering multiple sectors, including government, military, transportation and the protection of Critical National and economic Infrastructure (CNI) the Security Division is able to focus the Company's experience of complex, multi-system projects and proven ability to lead, manage and integrate products from multiple vendors.

Kelvin Hughes Security has developed highly capable, flexible and scalable, radar-based situational awareness solutions and has a proven expertise in managing the complex interfaces, between civilian and governmental authorities, security operators and local populations. It is these interfaces that characterise security situations.

The introduction of SharpEye™ solid-state, pulsed Doppler X-band radar has revolutionised the role of radar in the ground surveillance and land based security environment, providing true all-weather capability, together with the ability to implement specialised clutter suppression techniques, tuned to the environment. SharpEye™ extends the detection range, for walking persons, vehicles or low-level air-targets, providing the operator with more time to focus available sensors on the recognition, identification and classification of targets and tasking of appropriate response forces.

CxEye™ Display and Integration software provides the operator with a simple human interface and a powerful ability to coordinate target interrogation by multiple sensors. CxEye™ records images and can export the track data and those images to multiple recipients.

Kelvin Hughes Security solutions are designed to incorporate proven standardised technologies into a scalable system. The use of open industry standards provides the assurance that Kelvin Hughes security systems can readily share data and information with third party vendors, including full C4SIR system integrators.

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THE SOLUTION TO YOUR SECURITY

The advantage of a highly capable radar sensor for security and surveillance applications such as border protection, perimeter security, base protection, airport perimeter protection, oil and gas and other critical infrastructure sites including harbours and ports, is it provides early warning and time to develop a response to a threat whilst reducing some of the need for solid barriers and wire fences and other formal security controls.

Area or line surveillance has typically been achieved using a range of techniques and sensors such as physical barriers and microwave intrusion detection systems, which all have limitations in one way or another.

Radar detection provides earlier detection.

Our solutions provide complete situational awareness.

Passive sensors linked to microwave sensor systems and CCTV will provide an alarm capability - however, the threat is already on your doorstep by the time the system alarms.

Moreover, where the requirement is for surveillance of a large area, or where the terrain inhibits the construction of perimeter fencing, or where earlier warning that humans are operating near a restricted area, then an alternative approach is needed.

DETECT

Kelvin Hughes is leading the way in solving these detection issues. SharpEye X-Band solid state pulse Doppler radar detection technology addresses all the short comings of other traditional methods of detection. SharpEye™ has longer range detection and high performance in adverse weather.

RECOGNISE & IDENTIFY

SharpEye™ SxV self-contained, small, lightweight radome package enables a simple and effective mechanism to combine with an innovative pan and tilt mechanism to integrate electro-optical cameras and other useful sensors with the radar and deploy on a single mast. We call this a Single Mast Solution (SMS).

CLASSIFY

CxEye™ display and interfacing software from Kelvin Hughes is the next part to the security solution. CxEye™ is designed to support the novel features of SharpEye™ radar, providing the power to integrate situational awareness radar with state-of-the-art camera technologies and other sensors. It provides a means of command and control, and can be networked through multiple iterations of the software into a much larger real time C4I.

The premise of the CxEye™ software is to assist the operator to evaluate and coordinate a response through a 'detect, recognise, identify and then classify' methodology. Each track can be categorised on screen with clear symbols and 'tote' table information.

The classifications of the target tracks are hostile, neutral, or friendly, then sub-categorised as a walking person, car, truck, armoured vehicle or aerial target.

The software provides clear and unambiguous situational awareness, providing early warning from the radar, detailed picture evidence from the camera and the continuous tracking ability of the radar. Swift and simple classification of all tracks establishes what is happening, where and who is doing it. A clear 'situational picture' facilitates a controlled response.

In summary, there are significant security advantages to the use of modern X-Band Doppler pulse radar for land-based surveillance.

- Much improved situational awareness
- Early warning (as opposed to simply intruder alert)
- Operational flexibility
- Adaptability

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SHARPEYE™ SxV
RADAR TECHNOLOGY

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- Compact, lightweight & portable unit
- 360° Radar picture coverage
- No maintenance requirements
- Highly sensitive transceiver
- Low power consumption
- X-Band
- Extremely reliable solid state transmitter
- Doppler processing removes ground and weather clutter

SHARPEye™ SxV
MOBILE SURVEILLANCE

SharpEye™ has been developed to deliver superior radar performance and reliability in both land and sea theatres being on par with significantly more expensive military systems, it is the world's first affordable solid state radar offering high reliability and low cost of ownership.

SharpEye™ SxV delivers an improvement in sub-clutter visibility by approximately 30dB against other radar technologies. This means targets with small Radar Cross Sections (RCS) such as walking persons, animals, UAV's and drones and waterborne equivalents such as RHIBs and small wooden boats can be detected even in the presence of heavy land, rain and sea clutter.

Doppler processing enables detection of extremely small and slow moving targets in poor weather conditions day or night. SharpEye™ has a low peak output power yet has a greater detection performance than an equivalent

magnetron radar. A number of benefits come from this approach including low probability of detection by ESM equipment and low power consumption.

Other key features made available through the patented pulse sequence and low peak power include jamming resistance, counter surveillance and covert mode (reduced probability of intercept).

Radar technology utilising the principles found in SxV ensures the confidence of the user in that situational awareness is being achieved reliably and consistently through the increased probability of detection of small targets and through detecting these targets at greater ranges.

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A SINGLE MAST
SOLUTION

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The Single Mast Solution (SMS) is a novel method of efficiently providing a detection and identification capability that can be deployed as one system quickly and operated reliably.

Kelvin Hughes developed the SMS to accommodate the radar at the highest point unencumbered by any structural RF blocks whilst providing a 360° pan and tilt system capable of carrying additional dual sensor low and high mass payloads.

Typically a security SMS would in addition to the SxV radar also include a long range electro-optic camera and night vision sensor. However, ultra-long range units can be fitted as well as loud hailing acoustic devices and additional sensors.

FEATURES:

Through shaft for mounting on fixed platforms

360° continuous rotation

Virtually zero backlash

IP67 environmental protection (IP68 option)

Absolute positioning feedback for radar control

Highly ruggedised for extreme environments

Harmonic drive trains

45° per second pan and tilt speed

TYPICAL OPTIONS:

HD or SD video cameras with powerful optical zoom

Thermal Imaging Camera

Long Range Daylight Camera

Acoustic Hailing/Deterrence Device

Searchlight

CLASSIFY, COMMAND, CONTROL

CxEye™ is a self-contained application that provides radar tracking and display, and camera video display. Designed to work with SharpEye™ radars it provides the control of radars and cameras as well as receiving radar and camera video data.

With dual modes the software can operate as a local node and as a C2, providing a flexible and scalable software platform.

Key functions:

- Radar video scan conversion and display

- Radar target tracking

- Fusion of tracks from multiple radars

- Rule based threat evaluation

- Alarm generation when targets enter user defined areas

- Camera and video display (picture-in-picture)

- Camera control, including slew-to-cue based on a designated radar track

- Snapshots of camera video, including history

Key features:

- Open source mapping

- Touchscreen compatible

- Integrated distance measuring tool

- Screen recording

- Target tote

- Target classification and filtering

- Selected target data display

- Ruler and data display providing target lock and intercept range and bearing

- Target history

CxEye™ simplifies the task of the surveillance operator. Operators are able to perform complex tasks with minimal interaction with the display. Whether in the field, a vehicle or a deployable system, the user will have a display which will perform the task of picture compilation and threat assessment without the need for extensive training.

Detection, tracking, track fusion, identification and threat assessment is seamlessly performed and presented in a user friendly manner on hardware appropriate to the user's needs.

SITUATIONAL INTELLIGENCE
ANYWHERE

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Kelvin Hughes recognises the pitfalls in promising a security solution solely based on the radar itself. Unless a viable deployment solution that integrates with the users infrastructure is designed into the overall system, the customer will not experience the full benefit of a radar based security system.

Security solutions are developed from a suite of technologies selected based on requirements, they can be provided by Kelvin Hughes or designed and delivered in partnership with a system integrator depending on the scale of the project and breadth of integration required.

Kelvin Hughes offers a range of solutions based on the single mast system for lone static surveillance nodes. These range from manned or unmanned, vehicle mounted with an in-vehicle operator, display integration or simply a ruggedised laptop display, through to permanent installations deployed as radar node installations connected to a command centre or as part of a containerised manned radar and surveillance installation.

The site of the radar based security solution and the other sensor technology employed also requires a complete system approach to be taken with respect to

power sources, whether it be generator or solar powered, communication of data if required for example via microwave satellite links and also sustainment systems for semi-permanent or mobile patrol based solutions. Kelvin Hughes will design a complete package, work with the customer or as part of a consortium according the requirements of the customer.

As part of the deployment solutions Kelvin Hughes is able to offer a long range variant of SharpEye™, incorporating a higher power output and larger antenna. The SharpEye™ LongRange radar can be mounted on a fixed tower or elevated on a scissor lift platform from a trailer or container solution.

FACTS & FIGURES

ALL KELVIN HUGHES ULTRA-HIGH RELIABILITY SOLID STATE RADARS FEATURE:

X-Band

Doppler processing

Pulse Compression of return signal

Interoperability

Integrated transceiver & GPS

Fast power-up: 25 sec (5 sec from standby)

Simple mounting options
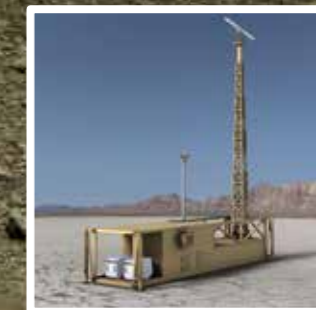
Graceful degradation

Concurrent long & short range detection

Continuous system health monitor and built-in self-test

Gigabit Ethernet radar output

Automatic acquisition of air & surface targets

360° and sector scanning

DRIVING INNOVATION.
MEETING THE TOUGHEST CHALLENGES.

FOREWARNED
IS FOREARMED

Critical National Infrastructure (CNI) owners, operators, border security providers and governments today are faced with a growing number of diverse threats. Terrorism and criminal activities is ever evolving and as demonstrated by an attack on a gas processing facility, local and regional events often have global implications.

Organisations often adopt a layered security system but so often a crucial layer is omitted: the early warning mechanism that creates more time for an intervening response to be mobilised. Physical barriers and security personnel alone may permit the threat to overwhelm a situation before a response can be mobilised.

One of the outcomes of a security review is often a recommendation to improve an operations ability to detect, delay and stop potential threats is by reinforcing electronic protective measures.

Consider a 30km road that passes through a semi-remote area and is the main access route to a facility such as a air base, power station or oil and gas production site. The facility is designed so as to have a physical perimeter such as wire fences and at specific access points, crash barriers and guards and is surrounded by mainly open ground. There is a guard house, gate and checkpoint 5km each side of the facility on the road. This has created a perimeter close to the central operations, assets and people.

In addition, a 3 node SharpEye™ SxV radar and electro-optical camera security system has been deployed on semi-permanent trailers with battery, generator and solar power

generation features along with microwave links for system communications.

The 3 node system provides radar track information of a several hundred square kilometre area along with real time video and thermal camera feeds. This information is viewed through CxEye™ software in each of the guard houses, in a security main control room within the facility and also at police headquarters in the nearby town where police and military personnel are stationed.

The government typically provide the security and protection against terrorist and gang threats for the area and the facility is responsible for monitoring threats local to its perimeter. The facility and the local government have joined forces in developing a middle ground security system aimed at providing early warning to threats through an extended invisible radar based perimeter.

The sole purpose of this element of the layered security system is to provide early warning of potential threats to allow sufficient time to investigate using the radar and camera information along with local intelligence and also mobilise a response and if needed an intercept mission deployed. In addition, should an alarm need to be sounded within the facility and notifications to all other control rooms and guard houses, this can be initiated by any of the CxEye™ control stations within the network.

The main security control room provides the overall command and control of the nodes and cameras, collecting threat information, classifying it and sharing intelligence with the control room at the police headquarters. Each guard house is able to interrogate the nodes from their system and contribute to the overall situational awareness picture.

If an attack or illegal activity should occur, this will be detected much earlier - whether from a single source or multiple flanks approaching by the main road or off-road.

DETECT
RECOGNISE
IDENTIFY
CLASSIFY

SITUATIONAL INTELLIGENCE, THE WORLD OVER

TRUSTED
THE WORLD OVER

KELVIN
HUGHES
security

We are one of the longest established technical equipment and instrument makers with heritage dating back to the 1800's. Kelvin Hughes Limited, as it is known today was formed in 1947 and notably the name Kelvin is after part founder Lord Kelvin, a prolific inventor and is famously associated with the thermometric scale referred to as the Kelvin Scale and he was instrumental in the first transatlantic telegraphs.

Today Kelvin Hughes continues the long trend of innovation and world firsts through its supply of security, surveillance and maritime surveillance radars. In 2006, Kelvin Hughes unveiled the world's first affordable fully coherent solid state radar sensor SharpEye™ enabling Doppler processing techniques to be applied to radar sensor technology providing full tactical and surveillance capabilities to the command, cost-effectively.

Now with SharpEye™ at the heart of our solutions we can provide users with situational awareness in all theatres, whether on land, onshore or at sea.

KEY FACTS

Kelvin Hughes has three divisions:

- Security Systems
- Maritime Systems
- ChartCo

Kelvin Hughes has Security offices and operations in:

- Enfield, United Kingdom
- Washington, United States
- Singapore
- Tunis, Tunisia

Kelvin Hughes employs over 400 people worldwide.

Over 3,500 radars installed worldwide, of which, more than 600 are SharpEye™ solid state systems. Approximately 400 of these SharpEye™ systems are in government, defence, surveillance and security applications.

Quality Management System:	ISO 9001:2008
Environmental Management Standard:	ISO 14001:2004

Military Aviation Authority: RA1027 ATM equipment approved organisation

THE SERVICE WE DELIVER

The Kelvin Hughes team provides outstanding service throughout the life of our products and organises the business to recognise the varying service requirements needed at the different stages of a security radar system acquisition.

- Project Management
- Radar Trials Delivery
- Integrated Logistics Support (ILS)
- Spares and Support
- Training
- Incremental Capability Upgrades

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