



**Strategic
Counter-UAS
Systems**



Overview

+ AUDS IS THE
WORLD'S FIRST
FULLY INTEGRATED
COUNTER-UAS
SYSTEM

Countering the threat caused by rogue drones is now a global issue and an increasing concern for the military, government and homeland security forces across every continent. It is expected that unmanned aircraft systems (UAS) will be used increasingly for malicious purposes as they can carry cameras, weapons, toxic chemicals and explosives and are being used increasingly for terrorism, espionage and smuggling purposes.

The AUDS counter-UAS system was developed by a consortium of UK defence companies to address the growing threat from malicious and errant unmanned aircraft systems.

Utilising robust battle proven technology from Blighter Surveillance Systems, Chess Dynamics and Enterprise Control Systems, this fully integrated mission-deployed TRL-9 rated system, can detect, track and defeat a drone in approximately 15 seconds at a range of up to 10 km (6 miles).

The AUDS system detects the drone using state-of-the-art electronic scanning micro-Doppler radar, tracks it using high precision infrared and daylight cameras and advanced video tracking software, before using a non-kinetic radio frequency (RF) inhibitor to defeat the drone. Using AUDS, an operator can effectively take control of the drone and force a safe landing.

AUDS is field proven to detect all types of drones including fixed wing and quadcopters. The consortium is also committed to constantly evolving the AUDS platform to respond to new threats and stay ahead in the dynamic UAS countermeasures market.

AUDS is a strategic system designed for use by the military, police, other government and non-government agencies for protecting high value critical national infrastructure and personnel.



+ AUDS IS
DEPLOYED
ON CURRENT
OPERATIONS

- **HOSTILE DRONE LAUNCH**
- > **INBOUND THREAT DETECTED AND TRACKED ON AUDS RADAR**
 - Visual and audible alarm on entry to alert zone
 - Automatic slew-to-cue of AUDS EO System from AUDS Radar cue
- > **VIDEO TRACKING ON AUDS EO SYSTEM**
 - Track Search / Acquisition / Lock
 - Hostile threat identified
- > **AUDS RF INHIBITOR ENABLED**
- **DRONE DEFEATED**



Threat Landscape

The rise of the consumer and prosumer drone markets has highlighted the wide range of existing and new potential threats within the counter-UAS threat landscape. These threats can be classified into two broad categories – Malicious and Errant:

Malicious intent

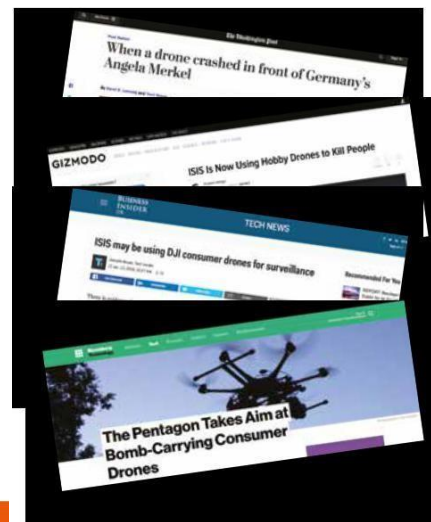
- **Militant groups are exploiting consumer drones for:**
 - Battlefield reconnaissance
 - Dropping small bombs/IEDs
 - Propaganda footage for recruitment videos
- **Acts of terrorism:**
 - Flying drone into the flight path of commercial airliner
 - Creating fear by causing temporary closure of airports, stadiums or disruption of national public events
- **Drug smuggling:**
 - Prosumer and custom-built drones are being used for international cross-border smuggling of narcotics
- **Industrial espionage:**
 - Hostile surveillance by rival manufacturers for reasons of IP theft (vehicle proving grounds and test tracks)
 - Breaching secure perimeters for cyber hacking and covert information gathering



+ AUDS IS SPECIFICALLY DESIGNED TO MITIGATE THE RISKS CAUSED BY ROGUE DRONES

Errant operation

- **Unwanted surveillance by Paparazzi**
 - VIP privacy intrusion
- **Untrained users around sensitive areas**
 - Airports
 - Key national sites (administrative buildings: courts, parliaments, etc.)
 - Power stations
- **Incursions by inquisitive operators**



AUDS has been designed to help mitigate all of the above threats



Toy drones



Consumer drones



Prosumer drones



Professional drones



DETECT



DETECT – AUDES Radar

The AUDES Radar is a modular non-rotating, electronic-scanning (e-scan) system using power efficient PESA (passive electronically scanned array) and FMCW (frequency modulated continuous wave) technologies to provide reliable, small and slow UAS detection even in complex environments.

The AUDES Radar is optimised for the detection of small drones carrying video cameras, wireless communication systems, narcotics, explosives and other nefarious payloads. The radars use 'D3' (Digital Drone Detection) technology that enables them to extract the tiny radar reflections from modern plastic bodied drones even when they are flying close to the ground or near buildings (where clutter reflections are relatively large). The radar's Ku-band operating frequency is ideally suited to detecting the small structures used to construct compact drones such as the control wires, battery pack, motor and wireless communications system.

Configuration options provide radar coverage of 180° or 360° in azimuth. Vertical elevation coverage is configurable, with options for 10°/15° (M10S Antennas) or 20°/30° (W20S Antennas). The radar is modular with no component weighing more than 30 kg (66 lb.).

The AUDES Radar can detect a miniature UAV at a range of up to 3.6 km. Drone speeds ranging from hover-drift to over 400 km/h are all detected. Target tracking software and extensive zone filtering facilities allow drones to be detected while minimising the risk of nuisance alarms from birds.

+ AUDES IS BASED UPON ROBUST BATTLE PROVEN TECHNOLOGY AND IS THE FIRST FULLY INTEGRATED SYSTEM TO ACHIEVE TRL-9 STATUS

TRACK



Track – AUDES EO System

The AUDES EO System is hosted as a removable EO sensor pod that easily attaches to the AUDES positioner, which is based on an in-service two-axis stabilised mount. The AUDES positioner has been designed to accommodate a wide range of sensors and payloads and offers excellent stabilisation performance, allowing high magnification sensors to be fitted for observation of small and fast moving targets at extreme ranges. The azimuth axis has a centrally mounted special signal and coaxial slip-ring assembly to allow continuous rotation at speeds up to 90°/s.

The AUDES EO sensor pod employs a dual camera system, comprising a medium wave thermal imager (TI) and a high definition (HD) daylight camera. Additional sensors or active elements can be provided within the pod.

The TI is coupled with the latest generation of advanced image processing electronics to deliver superior imaging performance in addition to enhanced narrow FoV 'full resolution e-zoom' capability.

The third-generation Piranha 46 daylight TV camera is fully sealed and ruggedized for harsh environments. The camera has a built-in IR cut filter which can provide good low light functionality for imaging at dusk and in the dark.

The modular configuration allows easy, tool-less assembly and provides simplicity for maintenance and repair; all EO sensors can be easily accessed and removed using standard tools (e.g. Allen keys).



Galaxite solutions



The AUDES RF Inhibitor is a purpose-designed multi-band system, engineered for maximum effectiveness against UAS command and control (C2) links. RF inhibition can be activated either selectively or simultaneously across the 400 MHz to 6 GHz spectrum, targeting five threat 'bands' which are designed to defeat the C2 links commonly deployed throughout the UAS threat landscape (i.e. 433 MHz, 915 MHz, 2.4 GHz, 5.8 GHz and GNSS bands).

The AUDES RF Inhibitor uses software defined radio (SDR) source generation, delivering an inhibition waveform best suited for counter-UAS operations. Changes and new threats may be accommodated under software control.

High gain directional antennas, coaxially mounted with the AUDES EO sensor pod, transmit the inhibition waveforms ensuring that the antennas illuminate the target UAS. The antennas have a nominal 20° beamwidth that provides the designed power density at the target UAS and mitigates collateral impact.

The AUDES Operator Console provides control and configuration:

- **Spatially:** Directional antennas
- **Spectrally:** SDR defined threat bands
- **Temporally:** Duration of operation
- **Dynamically:** Power level

The AUDES RF Inhibitor operation has maximum system flexibility across complex environments and operating concepts, enabling mitigation of potential collateral impact, by utilising the most appropriate Electronic Attack (EA).

Note: The response of a UAS to RF inhibition is dependent upon its design and manufacture, including the programming of any auto-pilot function and the actions of the UAS operator.



All the system elements of AUDES: Radar, EO System and RF Inhibitor are fully integrated into the operator console. The AUDES Operator Console requires a single operator and comprises two screens.

One screen displays the AUDES Radar GUI (or 'HMI') which alerts the operator to drone intrusions into protected airspace. The second screen displays the AUDES EO/RF Inhibitor GUI (or 'VMS'). The screens can be stacked vertically or sit side-by-side and are operated through a wired keyboard, mouse and optional joystick. Ruggedised laptops or third-party existing C2 consoles can also be used. AUDES uses an open architecture and can receive information from existing systems or cue other effectors. An option for mission recording can also be included.



AUDES Radar GUI



AUDES EO/RF Inhibitor GUI

AUDS Configurations

AUDS is available in three standard configurations: AUDS Deployable System, AUDS Field-Mast System and AUDS Fixed System. All systems require just a single operator.

AUDS Deployable System

Combined quadmast and quadpod based system which can be temporarily deployed to building rooftops by a two-man team. The system components are split into cases which are manoeuvrable and highly portable, allowing installation on building rooftops, which are commonly accessed through tight doorways, hatches and up ladders/staircases. The system can be powered from a single mains socket and set-up time is typically less than one hour.

The AUDS Radar is mounted on a light-weight telescopic quadmast. A single quadmast is required for 180° of radar coverage, whilst two quadmasts are required for 360° of radar coverage. The telescopic quadmast is elevated using a pneumatic handpump. The AUDS EO/Inhibitor is mounted on a separate military-grade quadpod.

AUDS Field-Mast System

Rugged, heavyweight field-mast based system which is designed for semi-permanent installation at forward operating bases (FOBs), airbases and critical infrastructure sites. Both the AUDS Radar (180° or 360°) and the AUDS EO/Inhibitor are co-mounted on the heavy-duty, military-grade telescopic field-mast. The telescopic field-mast is elevated using an electric pneumatic pump.

AUDS Fixed System

For applications where AUDS is being installed permanently to protect a critical infrastructure site or along a national border, it is typically supplied as a set of fully integrated modules but without any form of mounting structure or platform (i.e. no quadmast, quadpod, field-mast or mounting frame is supplied). Such systems are typically installed by a Systems Integrator (SI) who take responsibility for the specifying, installation and commissioning of the complete AUDS system.



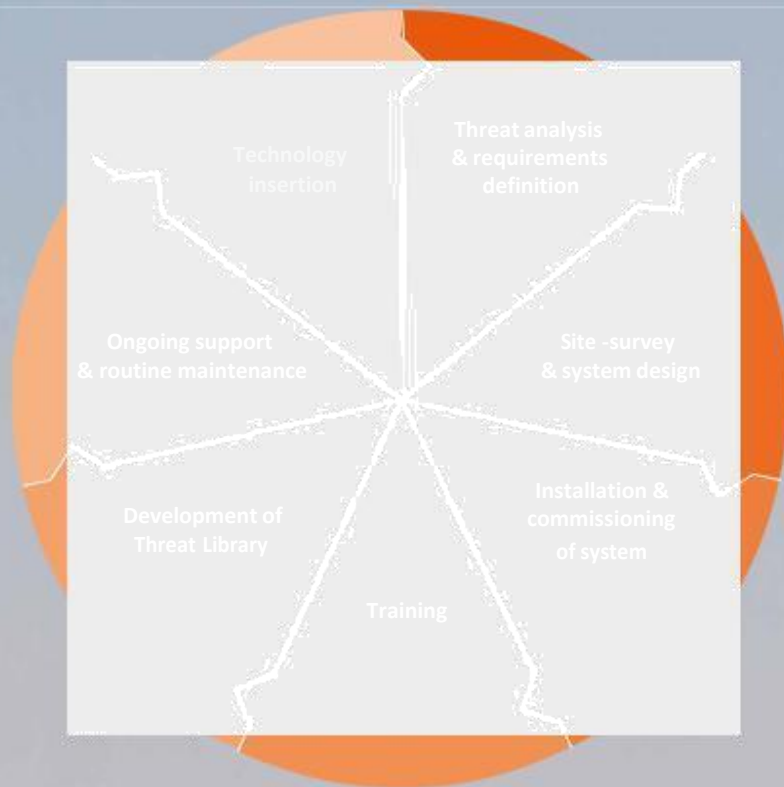
In addition to the three standard configurations of AUDS described above, it can be deployed on vehicles and trailers and also to a maritime environment (e.g. on-board a super yacht).

Support Services

The AUDS team is committed to providing the support services required for the deployment of its world leading counter-UAS systems.

The AUDS team will work with end-users, security staff and systems integrators to ensure optimum performance and capability throughout the life of the system. This starts with understanding the threat, choosing the appropriate system configuration and installation site. The AUDS team will support installation and commissioning of the system including training of operators and maintainers. Crucial to the long term effectiveness of AUDS is ongoing threat analysis and rapid adaptation of the system to ensure that AUDS maintains its strategic advantage over all developing threats.

These support services include:



AUDS Deployable System



AUDS Field-Mast System



AUDS Fixed System



Errors and omissions excepted. The AUDS team reserves the right to modify specifications without notice. The AUDS radars are protected by a number of international patents. The Anti UAV Defence System (AUDS) is patent pending. Purchase of this equipment is subject to export licence approval.



Galaxite solutions