

Autonomous Optical Technology and Physical-Capture Systems for C-UAS

OpenWorks Engineering develops technology and products for world leading security and counter terrorism authorities.



SkyWall products are deployed around the world as part of integrated systems, protecting high-profile assets during counter-UAS missions.

SKYWALL
SAFER AIRSPACE

CONTENTS

1. SkyWall Integrated Solutions
2. SkyWall Net Capture Systems
3. SkyWall Autonomous Optical Technology

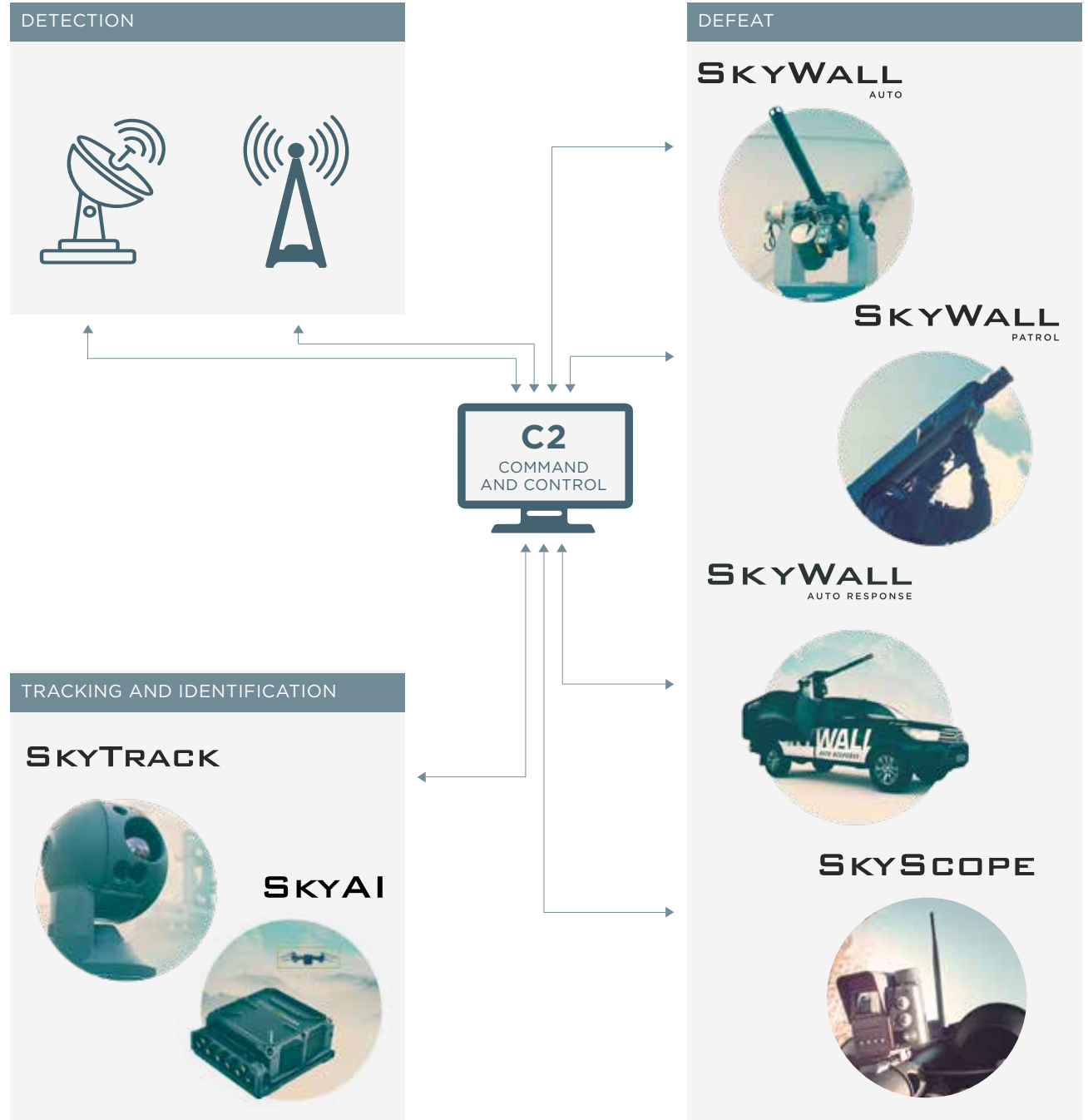


Classification: 78% quadcopter

Section 1.

INTEGRATED SOLUTIONS

All SkyWall products are designed to be integrated with a simple to use software development kit. Many C-UAS systems already have the SkyWall interface implemented.



Section 2.

HANDHELD AND AUTONOMOUS NET CAPTURE SYSTEMS

SkyWall Net Capture systems are operationally-deployed and provide the ability to physically capture a drone in a specifically designed 'drone entangling' net. They are often used in conjunction with electronic countermeasures for a layered defence, or in environments where electronic attack cannot be deployed.

SkyWall Net Capture systems are already deployed at major sites across Europe, North America and Asia. They provide protection at international airports, nuclear power stations and critical national infrastructure sites, such as the Pentagon.



SKYWALL
PATROL

HANDHELD DRONE CAPTURE



SKYWALL
AUTO

AUTONOMOUS DRONE CAPTURE



SKYWALL
AUTO RESPONSE

AUTONOMOUS DRONE
CAPTURE VEHICLE

Projectile based net capture provides a multi-shot capability that is easy to deploy quickly.

KEY FEATURES:

- Physical Drone Capture - No Electronic Countermeasure, Predictable Outcome
- Proportionate Response
- Fast Multiple Target Engagement
- Very Low Collateral Damage Risk
- Target Captured for Forensic Investigation

SKYWALL
NET CAPTURE

COMPATIBLE PROJECTILES:



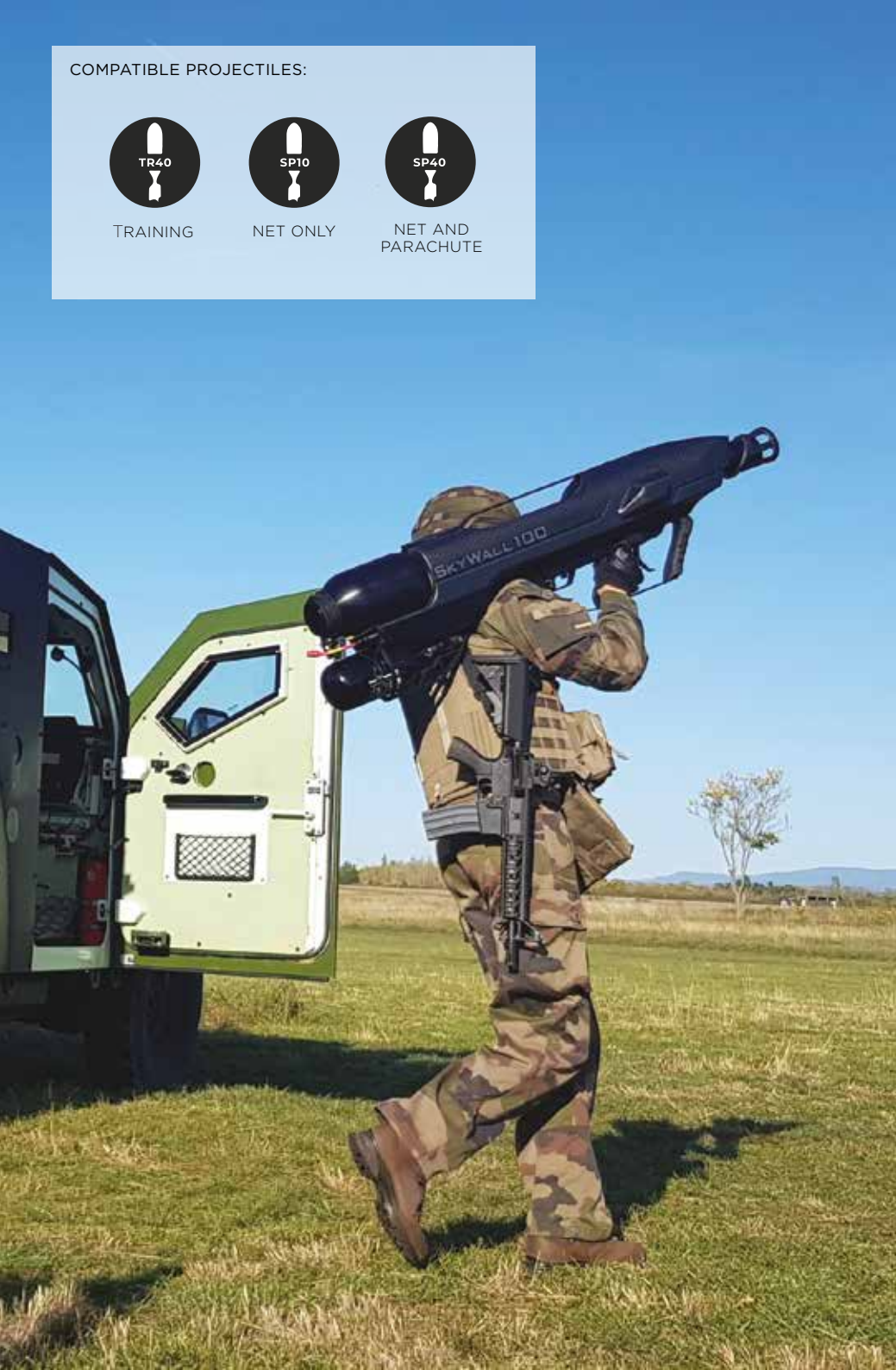
TRAINING



NET ONLY



NET AND
PARACHUTE



SKYWALL

PATROL



HANDHELD NET CAPTURE

SkyWall Patrol is a handheld system that gives a mobile operator the ability to physically capture a drone in a specifically designed 'drone entangling' net. It uses compressed air to launch a projectile up to the drone after the operator has targeted it using the onboard SmartScope.

SkyWall Patrol can be used as a standalone drone defence system but can also be integrated with a wider security system, using the SkyLink module, to offer a highly capable counter drone package.

A single SkyWall Patrol system can protect an area or multiple systems can be deployed from mobile units to protect a large site.

The SkyWall Patrol system has a number of built in safety features that ensure it can only be operated when all safety critical elements are functioning correctly. The launcher has a continuous monitoring system to give further protection.

The onboard SmartScope helps capture moving targets by locking on to the drone and adjusting the operators aim before programming the projectile prior to launch.

KEY FEATURES:

- Physical Drone Capture - No Electronic Countermeasure, Predictable Outcome
- Proportionate Response
- Handheld - Highly Portable
- Very Low Collateral Damage Risk

SkyWall physical capture is deployed in conjunction with electronic counter-measures for a layered defence, or in environments where electronic attack cannot be deployed.



TRAINING



NET ONLY



NET AND
PARACHUTE

The SkyWall launchers can be used with a range of SkyWall projectiles. There is a parachute projectile to control the descent of the captured drone, minimising collateral damage risk. If the parachute is not required, the net-only projectiles can offer an increase in range and capture rate.

SKYWALL PROJECTILES CAN BE RESET AND USED MULTIPLE TIMES.



SKYWALL

AUTO



AUTONOMOUS NET CAPTURE

SkyWall Auto is a remotely operated system that can physically capture a drone in a specifically designed 'drone entangling' net. It uses compressed air to launch a projectile up to the target drone after classifying and tracking it autonomously.

SkyWall Auto can be used as a standalone drone capture system but can be integrated with a drone detection and security system to offer a highly capable and easy to operate counter drone solution.

A single SkyWall Auto system can protect a high-value asset and multiple systems can be networked and deployed to protect a large site.

The SkyWall Auto launcher can be used with a range of SkyWall projectiles. The onboard targeting enables the system to have a high capture rate by adjusting the launcher aim based on the movement of the target and programming the projectile prior to launch.

A computer vision tracking module called SkyAI allows the system to autonomously follow targets, minimising the operator skill level required.

KEY FEATURES:

- Physical Drone Capture - No Electronic Countermeasure, Predictable Outcome
- Proportionate Response
- Long Range Net Capture
- Can be Integrated for Full Autonomy
- Very Low Collateral Damage Risk

Add physical defeat to any C-UAS system, for a low collateral damage last line of defence or non-electronic attack option.



COMPATIBLE PROJECTILES:



NET ONLY



NET AND PARACHUTE

SkyWall Auto can deploy quickly from undercover to provide physical capture to large areas.



SKYWALL

AUTO RESPONSE

AUTONOMOUS DRONE
CAPTURE VEHICLE

<https://youtu.be/nCZLjCG1Fsk>

Section 3.

AUTONOMOUS OPTICAL DETECTION AND TRACKING TECHNOLOGY

The SkyWall Autonomous Optics products make use of the latest developments in deep-learning neural network classification to quickly and reliably detect and classify a target. They achieve industry leading tracking performance by controlling the camera motion using AI.



SKYTRACK

OPTICAL DETECTION
AND TRACKING



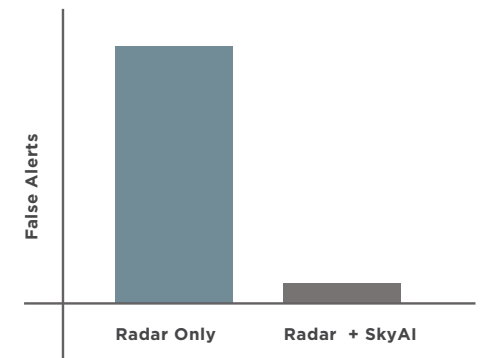
SKYAI

AI DETECT/CLASSIFY/TRACK
MOTION CONTROL

False alarms from primary sensors are rejected, reducing operator distraction. Targets can be tracked against complex backgrounds without disruption and SkyAI motion control ensures targets are not lost even if they momentarily disappear behind trees or buildings.

SkyAI software allows for easy integration to achieve an autonomous handover from detection sensors, making use of the proven SkyWall interface and well supported SDK.

Reduce false alarms with fast acting optical detection and tracking technology powered by AI.



The next generation of high-definition target classification and tracking, with built-in SkyAI control.



SKYTRACK



OPTICAL DETECTION AND TRACKING

SkyTrack offers low-cost high performance target acquisition and tracking in an easy to integrate package.

Featuring HD daylight and the latest HD infrared sensors coupled with powerful deep learning artificial intelligence, SkyTrack autonomously locks on to the target and provides the operator with a close up view for threat assessment. Tracking accuracy is capable of keeping a laser on a class 1 UAS.

A range of configurations and hardware options are available.

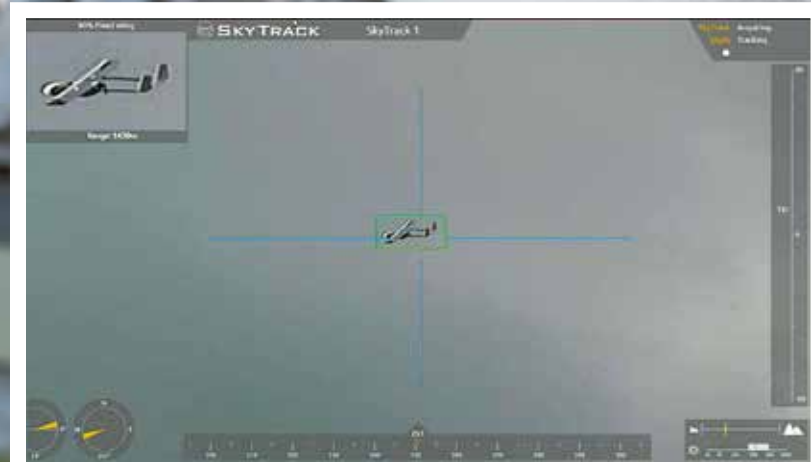
SkyTrack can be integrated into existing command-and-control systems and be used to cue up effectors. An eye-safe laser range finder is also available, allowing SkyTrack to provide highly accurate 3-dimensional coordinates, and trajectory prediction, of a tracked target.

Manufactured and designed in Europe, SkyTrack offers an exportable and non-ITAR solution. A simple and easy to integrate interface is openly available.

KEY FEATURES:

- Low Cost - High Performance
- Built-in AI Deep Learning
- Manual or Autonomous Target Selection
- Externally Cued or Manual Operation
- Simple Integration
- HD Day and Night Operation
- UAS and non-UAS Targeting

Discover true autonomous target detection and tracking with motion control, powered by SkyAI.



<https://youtu.be/XmEsc7XwJls>

SKYWALL
SAFER AIRSPACE

SKYAI



EXTERNAL CONTROLLER

AI DETECT-CLASSIFY-TRACK MOTION CONTROL

SkyAI uses the latest developments in deep-learning neural network classification to quickly and reliably detect a target and achieve an industry leading tracking performance by controlling the camera motion.

False alarms from primary sensors are rejected, reducing operator distraction. Targets can be tracked against complex backgrounds without disruption and SkyAI motion control ensures targets are not lost even if they momentarily disappear behind trees or buildings.

SkyAI software allows for easy integration to achieve an autonomous handover from detection sensors, making use of the proven SkyWall interface and well supported SDK.

SkyAI can be integrated with most PTZ camera systems. A range of cost effective solutions using widely available Bosch or Axis cameras are

available alongside high-performance military optical systems.

Standard protocols are supported out-of-the-box, with other protocols added on request. A range of computing hardware configurations are available to suit military and security missions.

Non-UAS targets can be trained into the system to provide a multi-role capability, for conventional land, sea or air threats.

KEY FEATURES:

- Reduces Cognitive Load
- Uses Advanced Artificial Intelligence to Detect, Classify and Track the Target Type of Your Choice
- Simple Integration with Existing Camera Systems
- Intuitively Connects to the C2 Software of Your Choice
- Multiple Camera Inputs Possible



Before SkyAI, C-UAS systems gave a high false alarm rate and required persistent monitoring by human operators.

OPENWORKS

STOCKSFIELD HALL,
STOCKSFIELD
NORTHUMBERLAND,
NE43 7TN
UK

T: +44 1434 400 469

E: Info@openworksenineering.com

W: www.openworksenineering.com

SKYWALL
SAFER AIRSPACE

OPENWORKS

STOCKSFIELD HALL,
STOCKSFIELD
NORTHUMBERLAND,
NE43 7TN
UK

T: +44 1434 400 469

E: Info@openworksenineering.com

W: www.openworksenineering.com