Drones are increasingly becoming widespread. They've become affordable, easy to obtain and simple to fly. This creates new opportunities, but also poses new threats. To mitigate the negative impact of drones on our society, there is a need for both the detection and intervention of the increasing number of small drones in our immediate airspace.
Near misses and collisions between planes and drones at AIRPORTS

Drones that cause disturbance at public EVENTS
Drones used to import weapons and drugs into PRISONS

Drones used to study or damage CRITICAL INFRASTRUCTURE
The ability to detect drones kilometres away in the distance is not enough.

Detection systems need to maintain their capabilities under low visibility conditions and in urban environments full of obstacles and moving objects.

Drones can be pre-programmed and can approach in swarms. Hence the technology should be capable to detect multiple targets simultaneously, and be independent from active radio control.

Last but not least, the system needs to distinguish drones from other moving objects such as birds, in order to prevent false positives.

“ELVIRA®” is Robin Radar System’s purpose built Drone Detection Radar, specifically designed to meet these challenges.

ELVIRA® combines smart software with affordable radar that are specifically built for drone detection.

By doing so, Robin Radar Systems achieved a quality and price level that meets the needs of professional security markets on a global scale.
ELVIRA®’S UNIQUE CAPABILITIES

Unlimited coverage

ELVIRA® covers a full 360 degrees view. It detects larger fixed wing targets at a range of nine kilometres, and smaller multi-rotor drones detected at up to three kilometres. However, completely securing an area, requires more than just range detection. It requires flexibility and reliability. ELVIRA® provides unlimited coverage through its ability to combine multiple radar devices into an integrated sensor network. The output from multiple sensors is incorporated into one unambiguous picture.

Unprecedented tracking capabilities

ELVIRA® has the unique capability to combine advanced Doppler processing with an update rate of 1.3 seconds. This results in unprecedented capabilities of tracking even the most agile drones.
Surveillance by humans and optical systems has advantages, but is also limited by range and visual conditions. That is why effective drone detection systems utilize radar. Specialised radar can detect multiple targets simultaneously, also under low visibility conditions. Since radar does not depend on signals transmitted by drones, it is also able to detect autonomous drones. Where as other sensors may only detect radio transmissions from remote controlled drones.

### Characteristics

<table>
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<th>Detection Methods</th>
<th>Range</th>
<th>Position accuracy</th>
<th>Classification</th>
<th>Autonomous targets</th>
<th>Multiple targets</th>
<th>Low visibility conditions</th>
<th>Price</th>
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<tbody>
<tr>
<td>Human surveillance</td>
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<td>★★★</td>
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<td>✔</td>
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<td>★★</td>
<td>★★</td>
<td>✗</td>
<td>✔</td>
<td>✔</td>
<td>★★★</td>
</tr>
</tbody>
</table>
SYSTEM SPECIFICATIONS

Specifications
- Detection range: 3,000 – 9,000 meters, depending on target size
- Classification range: 1,100 meters
- Beam width: 10° x 10°
- Azimuth resolution: 1°
- Range resolution: 1,5 meters
- Technology: FMCW
- Frequency: X Band 9650 MHz
- Rotation speed: 60 RPM, update rate 1 Hz
- Size (W*D*H): 0,9 * 0,9 * 0,8 meters excl. mount
- Weight: 83 kg
- Power: 230 VAC
- Communication: WiFi/3G/4G
FLEXIBLE INTERFACES
Advanced detection & classification… in one sensor

Classification is the capability to differentiate between drones and birds or other moving objects. This is a critical feature to prevent false positives. To do so, Robin Radar Systems combines multiple variables in real time, including advanced Doppler techniques.

Where other systems may require a combination of multiple sensors to go from detection to classification of targets, ELVIRA® combines detection and classification in just one sensor. This capability saves precious time in the decision process.
Deployable in just 30 minutes

ELVIRA® is designed for fast deployment. The system can be set up by two people and be operational within 30 minutes. The system does not require a special infrastructure or vehicle.

Remote diagnostics

The system’s performance can be monitored from a remote location. If something is not working properly, technical staff can immediately log into the system, perform diagnostics and in most cases, solve it remotely.

Use with commercially available tablets

The output of ELVIRA® is comprised of colour coded tracks. Green tracks are birds. Red tracks indicate drones and their flight path. The resulting live footage can be displayed on any commercially available tablet (currently Android). For orientation, either a Google Earth or a customised map can be selected as background. The display shows its own location and that of other users with tablets.

Stream live footage to any control room

The output of ELVIRA® can also be integrated as a layer on monitors in existing command vehicles or control centres. The system also provides open interfaces (XML) to allow third-party software to connect to the radar and obtain tracks and drone alarms.

Customise alarm zones

Users can define virtual zones that reflect areas of special interest. Both visual and acoustic signals can be linked to the event when drones enter that area. It offers the flexibility to define multiple alarm zones linked to different alerts.
Record all data

To enable case evaluation, all tracks and alarms are stored in a spatial SQL database.

Integrate with other systems

There is no ‘silver bullet’. Solutions differ per case and require integration of various systems. We believe in the power of cooperation between companies, based on integration of modular systems. ELVIRA® is designed to be the preferred primary radar within a ‘system of systems’. Ready for integration with other detection systems, existing command centres and new forms of intervention.

Optional camera for visual confirmation

The radar’s micro Doppler capability provides the necessary confirmation that a target has mechanical propulsion. Users typically require a visual picture of the target in order to take further action. ELVIRA® can be equipped with a high-resolution pan-tilt camera for visual confirmation of the target. When a drone is detected, the camera zooms into its direction for a controller to acquire an image and report details.
Robin develops radar systems that are specifically designed to track small objects. We do that by combining affordable sensors with smart software. Robin systems are used by military and civil airports to prevent collisions between birds and planes. Ecologists and Energy companies use Robin systems to assess and mitigate the environmental impact of wind farms on birds.

Robin originated as a project within the Dutch Research Institute for Applied Science (TNO). In cooperation with the Royal Dutch Air Force and later the European Space Agency (ESA), they started developing unique algorithms to use radar to detect birds. The company was spun out of TNO in 2010.

In 2012 two funds invested in Robin Radar. Inkef Capital is a 100% daughter of ABP, one of the largest pension funds in the world. The Inkef Capital is a 100% daughter of ABP, one of the largest pension funds in the world. Mainport Innovation Fund that compris of KLM, Schiphol Airport, Delft University and the Rabobank.

**Number one after Nuclear Security Summit**

In preparation for the Nuclear Security Summit in 2014, government agencies considered threats posed by Micro UVS’s or ‘drones’. Numerous technologies were tested. None of them were able to detect drones in a sufficient way. The few military systems that were able to detect drones at all, showed difficulties with urban environments and provided false alarms because they were unable to distinguish drones from birds.

As a result, the Dutch Ministry of Justice openly challenged the industry to offer solutions for detection and elimination of drones. 38 companies responded. Robin Radar Systems ranked #1 and received a contract to further develop its technology.

**G7 Security Services chose Robin Radar**

Security Services at the G7 summit in Bavaria on the 7th and 8th of June 2015 used ELVIRA® to protect world leaders against unauthorised drones. It was used in combination with systems developed by a team led by ESG, the specialist German electronics and IT firm, which included defence manufacturer Diehl BGT Defence.
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