

Advanced Sensing Capabilities

Within the Finmeccanica Group's defence electronics sector SELEX Galileo provides leading capabilities in sensing, targeting, navigation and control, space and protection. The Company's sensing capability covers various aspects which include surveillance, tracking, imaging, identification, classification with a primary focus on airborne sensing though technology suitable for land and naval applications.

A strategic objective of SELEX Galileo is to maintain its position as Europe's leading Airborne Radar supplier and to become the leading provider outside of the US. By offering a range of AESA based products to the global market for fixed wing, rotary wing and UAV applications and applying the AESA technology acquired over the last 15 years to a growing and emerging market need, SELEX Galileo has established a multi-product, multi-application AESA radar capability which has given an excellent return on investment.

Proven Technologies

PicoSAR



The **PicoSAR** radar is specifically aimed at small tactical UAVs and lightweight manned platforms. The Company's objective with PicoSAR is to be the first to market with a radar product sized for these platforms which is designed to keep installation costs to a minimum. Aimed at providing a battlefield and land border surveillance capability PicoSAR uses Synthetic Aperture Radar (SAR) and Ground Moving Target Indication (GMTI) to provide situational awareness of up to 20km from the platform on which it is installed.

The radar has already flown demonstrating its capabilities, and has been already ordered by two international customers. PicoSAR is currently undergoing qualification to start this series of production delivery.

The use of common modules (i.e. Transmit/Receive Modules (TRMs), Power Supply Modules, Planks, Receiver/Processors etc) supports a competitive cost base. A Strategic Supply Agreement with RFMD (formerly Filtronic) provides a secure source of low cost GaAs and options for low cost TRM manufacturing.

A road map has been established and will be internally funded to enhance radar capabilities and provide exploitation in Short Wave (SW) to turn radar data into tactical information.

Burst Illumination Ladar (BIL)



The requirement for BIL imaging sub-systems is primarily to provide increased target identification ranges both day and night. Airborne BIL systems are capable of fulfilling the requirement for long-range identification in piloted aircraft, fixed and rotary wing, and UAV/UCAV platforms.

The Airborne BIL system is designed for both targeting pods and EO surveillance and/or targeting Turrets.

Current state-of-the-art airborne electro-optical targeting systems rely exclusively on conventional technologies, such as Thermal Imagers (TI) and TV sensors, for target identification which limit use in poor weather conditions. In addition the constraint on practical system apertures often result in limited identification range performance. In the case of TV sensors twenty-four hour operation is rarely achievable.

BIL is a technology which is able to provide an enhanced capability step in range performance for the identification function whilst providing 24 hour availability by virtue of its integrated laser illuminator. The close integration of the laser and sensor capability is key to achieving the optimum performance of the complete BIL system.

BIL's capability must satisfy the requirement for rapid and unambiguous identification at longer ranges than those achievable with conventional EO systems, with the image generated in real-time and easily interpreted both by end users and autonomously by Automatic Target Identification (ATI) image processing techniques.

It is critical that performance improvements offered by BIL over existing EO technologies are not offset by additional system costs. For this reason the BIL sensor subsystem cost is comparable to that of typical thermal imagers. Systems which incorporate BIL functionality will, in most cases, utilise a laser for range finding and /or designation.

The BIL imaging system consists of three subsystems:

- A Short Wave Infra-Red (SWIR) gated camera subsystem.
- An eyesafe laser illuminator subsystem
- A system control and image/data processing subsystem

The gated camera subsystem incorporates filtering optics, a cryo-cooler and BIL sensor as well as the necessary detector readout electronics. 3D and dual-mode BIL camera functionality is being developed to offer future upgrade capability.

The laser subsystem incorporates a Nd:YAG source producing pulsed energy, which is converted to an eye safe wavelength by an Optical Parametric Oscillator (OPO). For targeting applications the energy is interfaced directly to the host system optics.

The processing subsystem interfaces to the host system to receive command information for BIL and return captured and processed images. The processing subsystem also controls the BIL laser and camera subsystems respectively cueing the firing of the laser and regulating the gating of the camera to collect the return signal for a given/calculated range.

Advanced Targeting

Current airborne EO systems have the ability to detect thermal targets of interest and present the image to an operator on a display. This image can be zoomed to allow the operator to make decisions on the next course of action. There have been recent developments in the use of discriminative imaging technologies for the detection and identification of difficult targets and image processing algorithms to automatically track multiple targets and automatically identify highly probable threats.

Airborne platforms rely extensively on passive EO sensing to positively identify hostile threats but such capability is limited in poor weather conditions and cannot keep pace with the increasing demands for more range, greater precision and enhanced situational awareness that provide forces with better force protection, reduced collateral damage and less fratricide.

This can be achieved by the combination and fusion of data from both EO and RF sensors. SELEX Galileo is in a key position to deliver this capability with system knowledge in both sensing domains.

The development of a next generation of integrated EO/RF sensor is a key strategic objective to exploit emerging and discriminating EO and e-scan radar technology and to enhance SELEX Galileo position in the marketplace. A modular approach is required to address the need of the customers to have spiral upgrade capability to minimise through life costs.

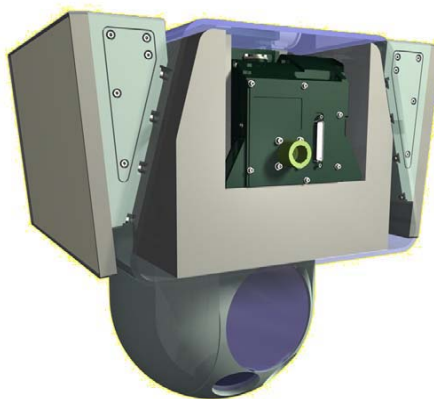
This basic mode can be extended to geo-location of the target and false alarm reduction through combination of Infrared (IR) and Synthetic Aperture Radar (SAR). SAR is a useful technique for detecting metallic objects. When combined with IR, hot metallic objects can be extracted. A further enhancement would cue a narrow field of view BIL sensor for object identification and confirmation. This overall process gives a sensing solution that allows automatic wide area search and improved auto detection, recognition and identification of objects of interest

The development of image processing allows us to operate at the airborne sensing system level providing autonomous geolocation and reconfigurable processing aspects: These capabilities can be proficiently employed within mission planning and the maintenance of databases.

Main functions/capabilities shall be realised:

- SAR to EO designation
- Multiple target track from both EO and Radar plots
- Geolocation
- Comparison of geolocated tracks with stored referenced database
- Data Link Integration
- Real Time Ground Display of targets
- Data transfer to off board sensors
- Network Integrated Sensors
- Integration with Hyperspectral images

PicoSTAR



PicoSTAR is an integrated multi-sensor payload for unmanned aerial vehicle (UAV), helicopter and fixed wing platforms based on the PicoSAR Synthetic Aperture Radar and used an X-band (8-12.5 GHz) Active Electronically Scanned Array (AESA) ground moving-target indicator/SAR as a base. The **PicoSTAR** concept will combine a PicoSAR application with a common sensor processor, a dual-band laser source and a sensor turret that houses the laser optics, a thermal imager (using 3-5 μm 640x512 pixel, Cadmium Mercury Telluride [CMT] detector with 1.57 μm active imaging on the same detector) and a daylight television camera. The PicoSAR application makes use of port and starboard, azimuth and elevation arrays that, in mock-up form, have a depth of approximately 13 mm (0.5 inches). It is possible to mount the arrays up to 2 m away from the sensor ball.

Press Office Contacts

Solange Distefano Pozzuoli
Responsible for Press Office

Tel: +39 06 41883852

Mob. +39 335 7499374

email: solange.distefanopozzuoli@selexgalileo.com

Donna McGrory
Press Officer UK & USA

Tel.: +44 (0) 131 343 5115

Mob: +44 (0) 7793 423082

email: donna.mcgrory@selexgalileo.com