



SIM.GA HYPERSPECTRAL SYSTEM

The SIM-GA is a modular avionic hyperspectral system, mainly composed of:

- an Electro-Optical Head (EOH) with two sensors
 - Visible and Near InfraRed (VNIR) spectral range from 0.4 to 1.0 μm ,
 - Short Wave InfraRed (SWIR) spectral range from 1.02.5 μm ,
 - and an Inertial platform with integrated GPS (INS/GPS), to take record the aircraft position and attitude;
- An Instrument Control Unit / Pre-Processing Computer (ICU/PPC) that controls the optical head and stores data in internal HD memory.

This instrument is one of the components of the SIM.GA system (Avionic Multisensors Hyperspectral System) that will include four hyperspectral/ multispectral optical heads (VNIR, SWIR, MIR and TIR), thus providing, with the different configurations, a spectral coverage from the visible band (0.4 μm) to the thermal infrared (12 μm) band.

The sensors and the INS/GPS in the EOH are placed side by side on a common alignment plate and enclosed in a protective casing. The “modular” approach allows a flexible

arrangement of instrument accommodation with only the change of the mechanical interface, making it suitable for use on different platforms, including Unmanned Aerial Systems (UAS) and ultra light aircrafts.

OPERATING MODES

Airborne Operations

The basic configuration of HYPERSPECTRAL SYSTEM is designed for use on airborne platforms. A “pushbroom” scanning mode (like nadir) is used to acquire the spectral data cube. To derive geo-registered images, the flight data coming from a dedicated GPS/INS unit are logged continuously in synchronisation with hyperspectral data.

Land operations

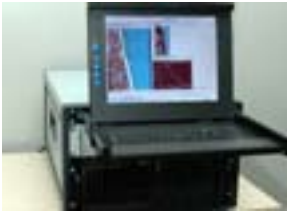
The ‘ground system’ uses the same optical head as the avionic system together with a scanning platform synchronised with the image acquisition. In this mode the instruments can be used as ‘static’ cameras for applications where the linear platform movement needed for pushbroom mode is not available.



Typical installations



Airborne configuration



Console



Ground configuration

Platforms

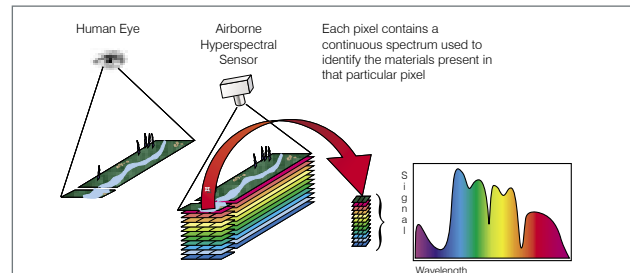
The development follows a modularity principle aimed to the definition of a flexible system to be utilised on manned or unmanned platforms for different applications, such as:

- UAS (Falco and Nibbio of SELEX Galileo)
- Light aircraft for remote sensing missions devoted to civilian/scientific applications
- Medium range aircraft (e.g. ATR) for maritime and coastal surveillance and patrol
- Multi-mission Maritime Aircraft (MMA) for high altitude surveillance.

Typical Applications

Area surveillance for:

- Anomaly detection
- Target detection/identification
- Classification/Material Mapping.



TECHNICAL CHARACTERISTICS

HOW HSI works

	VNIR Channel		SWIR Channel	
Spectral Range	400 - 1000 nm		1000 - 2500 nm	
Spectral Sampling	≈ 1.2 nm		≈ 5.8 nm	
# Spectral Sampling	500		256	
# Spectral Pixels	1024		320	
Focal Length (*)	24 mm	17 mm	22.5 mm	30.7 mm
Nominal IFOV per pixel	0.5 mrad	0.7 mrad	1.3 mrad	1 mrad
Spatial Resolution @ 1000 m	0.5 m	0.7 m	1.3 m	1 m
Swath @ 1000 m	512 m	715 m	415 m	320 m
Filed of View (FOV)	± 14°	± 19°	± 12°	± 9°
F#	2.0		2.0	
Quantisation Bits	12 bits		14 bits	
Detector	Camera CCD		CMT cooled at 200 K	
Maximum Frame Rate	57 fps		100 fps	
Weight	25 Kg			
Power (peak)	16 W		250 W	

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