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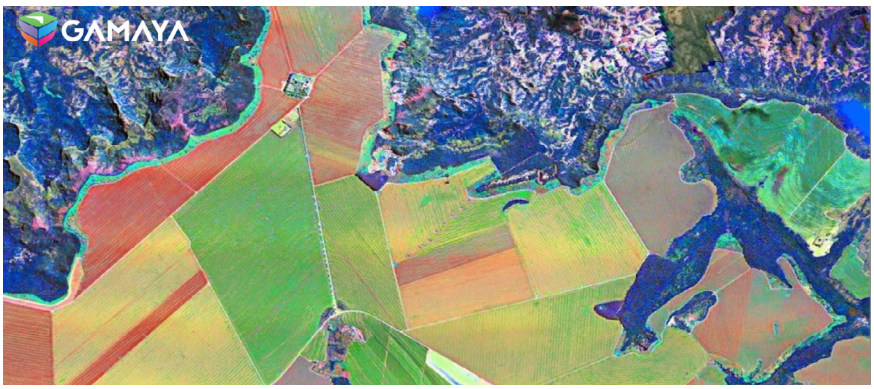
SNAPSHOT HYPERSPECTRAL UAV PAYLOAD FOR RESEARCH

Do you want to reduce flight preparation and total flight time? Do you want to get orthophoto hypercubes ready for post-processing by your algorithms? Imec snapshot hyperspectral platform allows to simultaneously mount two hyperspectral cameras either VIS or NIR or SWIR spectral range. It outputs high-quality stitched hyperspectral cubes, making it easier to develop applications in research projects. Focusing on a user-friendly experience, it comes in a very compact form factor, and can be connected in one click to the latest commercial drone like the DJI Matrice 600.

HYPERSPECTRAL IMAGING PLATFORM FOR UAV APPLICATION DEVELOPMENT

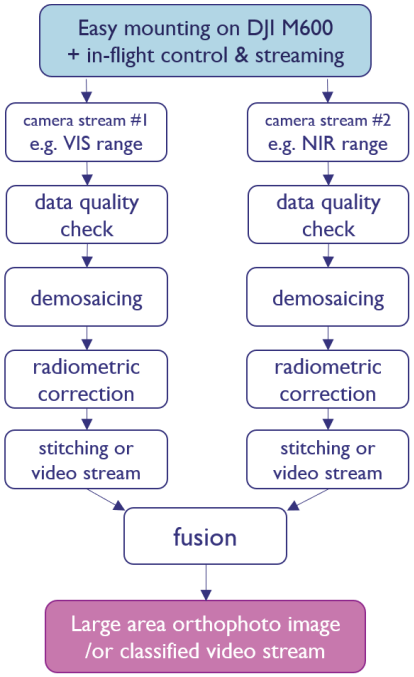
This UAV system solution has been designed with the mindset of enabling researchers in applications such as precision agriculture, forestry management, security & surveillance, to expedite the acquisition of hyperspectral data without efforts. The ability to mount several hyperspectral imaging sensors on unmanned aerial vehicles (UAVs) is of crucial importance. imec UAV platform is supported by a powerful embedded computing platform featuring NVIDIA Jetson GPU, integrated storage, wireless control via standard drone interfaces like (but not limited to) the DJI Matrice 600.



Orthophoto hyperspectral aerial images of large test field of soybean cultures in Brazil: the color image is augmented with spectral features information recolored images to show where specific variations within crop cultures (e.g. disease pattern) are being observed to support precision agriculture decisions – Courtesy of GAMAYA.

KEY BENEFITS

- **Large spectral range choice in VIS/NIR/SWIR**, with combination of two cameras (under custom request)
- **Longer flight, less preparation** with video-rate snapshot acquisition of hyperspectral imaging data
- **Ready to use data**, with imec software for radiometric corrections, image stitching, images fusion
- **Easy to use**, with Gremsy Pixy U gimbal and ground controller application for live preview and tuning of cameras parameters during flight



Software processing pipeline (high level overview) starting with RAW frame acquisitions from two hyperspectral imaging sensors (e.g. VIS + NIR) to fully stitched orthophoto images.

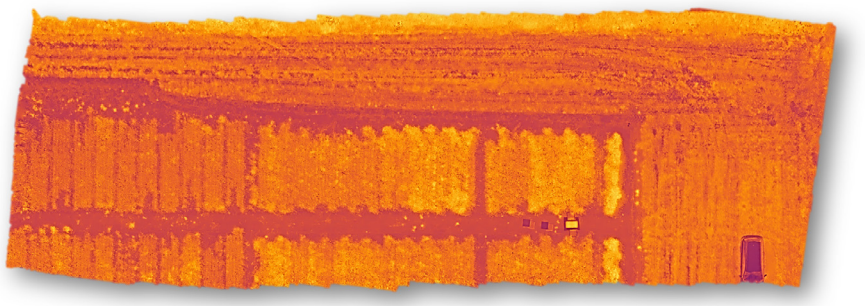
UAV purpose multi-camera hyperspectral Imaging system carrying two hyperspectral imaging cameras (VIS to SWIR range) with embedded computing platform and Skyport connectivity for seamless acquisition of hyperspectral imaging data in real-time. Non-contractual picture.

HSI UAV PLATFORM CONFIGURATION POSSIBILITIES

Spatial resolution	**Standard configuration** 2,048 x 1,088 pixels, 5.5um pixels **On-demand customization** 640 x 480 pixels, 15um pixels (SWIR)
Spectral resolution & range	**Standard configuration** 30+ bands, 470 to 860nm range, VIS+RedNIR **On-demand customization** 40+ bands, 470 - 970nm range, VIS+NIR 30 + bands, 675nm - 975nm + 1100nm - 1700nm, NIR + SWIR
FWHM	10 – 15 nm
Acquisition speed	**Standard configuration** 40fps max for dual sensor stream **On-demand customization** 90fps max for single sensor stream
Software for acquisition & pre-processing	**Standard configuration** *Ground control application compatible with DJI Matrice 600* - RAW frames acquisition control for local storage at video-rate - Saturation detection *After-flight pre-processing software pipeline (Windows)* - Demosaicing and radiometric corrections (ENVI format) - Geo-tagging of each spectral image from GPS/RTK data from M600 drone - Stitching in orthophoto images - Fusion of two orthophoto images **On-demand customization** - Real-time classification with built-in classifiers - Light spectrometer - Mavlink interface
Embedded hardware	nVidia Jetson GPU, 2TB local storage
Dynamic range	**Standard configuration** 8 / 10 bits **On-demand customization** 13bits (SWIR)
Optics	16 / 25 / 35 / 50mm lenses - F2.0 - C-mount
Gimble	Gremsy Pixy U
Mechanical dimensions	10cm x 7cm x 6.5cm
Weight (without optics)	450 g or 650g (SWIR version)

APPLICATIONS

- Precision agriculture
- Forestry management
- Security & surveillance
- Industrial inspection of pipes, roads, solar panels, windmills
- General hyperspectral imaging R&D 'out of the lab' in outdoor environments



NDVI (vegetation vigor index) orthophoto stitched images acquired from several test flights data by imec team in Belgium. The full HW & SW pipeline platform has been early on validated in order to ease the integration and deployment of this unique technology in low altitude drone projects.

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