HYPERSONSPECTRAL DRONE CAMERA SYSTEM FOR APPLICATION DEVELOPMENT

Imec introduces the first embedded computing platform fully dedicated to multi-sensor hyperpectral imaging. This new system platform allows to simultaneously mount one VIS / NIR or one VIS / SWIR based hyperspectral imaging camera, enabling acquisition and processing of hyperspectral imaging data in real-time, all in a very compact form factor, and matching latest commercial drone technologies like the DJI Matrice 200.

THE MOST ADVANCED SNAPSHOT HYPERSONSPECTRAL IMAGING PLATFORM FOR UAV APPLICATION DEVELOPMENT

In applications such as precision agriculture, forestry management, security & surveillance, 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 and wired controls connectivity via standard drone gimbal interfaces like (but not limited to) the DJI Matrice 200. This UAV system solution has been designed with the mindset of enabling end-users with real-time acquisition, processing and down-streaming of the application data at video-rate from drone-based systems.

KEY BENEFITS

- VIS / NIR / SWIR range hyperspectral imaging all combined in one compact and low weight platform for aerial mapping, inspection and surveys
- Real-time, video-rate snapshot acquisition of hyperspectral imaging data with direct image classification on-board
- Full software image processing pipeline: from acquisition to fully stitched orthophoto images or hyperspectral imaging classified image video stream"
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 PLATFORM CONFIGURATION POSSIBILITIES

| Spatial resolution | 2,048 x 1,088 px (VIS, RedNIR, NIR sensors) with 5.5 um pixel pitch  
| Spectral resolution & range | 640 x 480 px (SWIR sensor) with 15 um pixel pitch  
| FWHM | - 10 – 15 nm  
| Acquisition speed | 90 FPS max for single sensor, 40 FPS max for dual-sensor camera  
| On-board (Linux based) processing capabilities | - RAW frames acquisition to local storage at video-rate  
- Saturation detection  
- Focus & elevation stability detection  
- De-mosaicing & radiometric corrections  
- Real-time classification with built-in classifiers  
| On-computer (PC, window based) processing pipeline | - Stitching for orthophoto images  
- Fusion of two camera orthophoto images  
| Output format | ENVI compatible file  
| Embedded HW | nVidia Jetson GPU, 2TB local storage, GPS & RTK, Remote control connectivity  
| Dynamic range | 8 / 10 bit (VIS and NIR range sensors) and 13 bit (SWIR range sensors)  
| Optics | 9 / 12 / 16 / 24 / 35 / 50 mm lenses – F2.0 – C-mount  
| Mechanical | Fully compatible with Gremsy Pixy U and MavLink industry standards  
| Dimensions | 10 x 7 x 6.5 cm  
| Weight | 450 g (without optics)  

UAV PURPOSE MULTI-CAMERA HYPERSONAL Imaging System carrying two hyperspectral imaging cameras (VIS to SWIR range) with embedded computing platform and Skypeport connectivity for seamless acquisition and processing of hyperspectral imaging data in real-time.

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.