Headwall is the proud recipient of these honors and more...

Turnkey and Payload Packages

Airborne Hyperspectral for Remote Sensing

FEATURES

- Complete solutions or payloads for compatible UAVs
- Factory integrated & flight tested
- Best-in-class SWaP (Size, Weight, and Power)
- Hyperspectral sensors from VNIR to SWIR (400 to 2,500 nm)
- Built-in GPS/IMU, solid-state storage
- Optional LiDAR for high-resolution DEM (Digital Elevation Model) creation & 3D point clouds

DATASHEET

REVISION NOV 2022 REV A

EASILY DEPLOYED SYSTEMS FOR REMOTE-SENSING MISSIONS

Headwall's **Nano HP**™ and **Co-Aligned VNIR-SWIR** sensors are designed for airborne and ground-based imaging. These exceptionally small, light, and power-efficient sensors in the most widely used wavelength ranges (400 to 2,500 nm) can be purchased as part of integrated "turnkey" systems.

You can also purchase payloads for integration onto compatible UAVs, and also as part of integrated "turnkey" systems that include the drone. These include the DJI Matrice 300 RTK1, DJI Matrice 600 Pro, as well as the FreeFly Alta X that is made in the USA and supports NDAA-compliance.

Optional sensors and accessories such as LiDAR and thermal-imagers[2] can be incorporated into payloads suitable for your needs.

Figure 1. Headwall UAV systems utilize a quick-release mechanism between the drone platform and the payload that allows easy removal of the sensor suite for transportation or storage. Some systems may be configured for use on a Field Rotary Kit to gather ground-truth data in the field.

PORTABLE & ROBUST SYSTEMS FOR HYPERSPECTRAL REMOTE-SENSING UAV MISSIONS WORLDWIDE

Because you may travel to locations that give additional meaning to the word "remote" in remote sensing, Headwall turnkey systems feature UAVs that fold and disassemble to more easily transportable sizes that can be quickly deployed in the field.

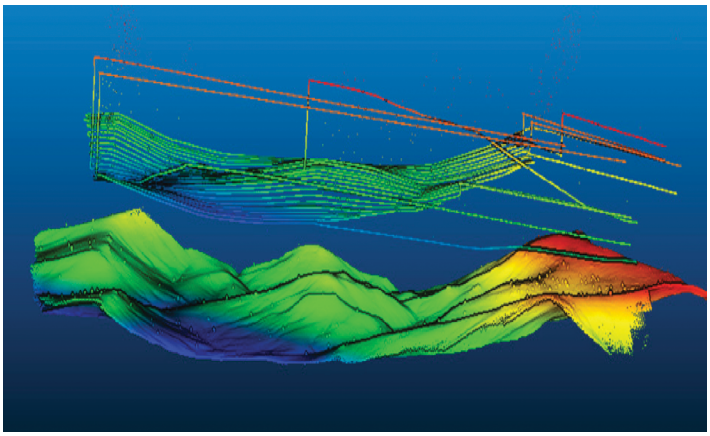
Rechargeable batteries supply power to all systems, and additional batteries as well as chargers are available to extend your missions.

We host workshops and often present on topics such as best practices for planning and undertaking remote-sensing missions so that our customers can learn from our own experiences.

Training sessions, both in person and online, are given by experts who are not only makers but users of our systems, and have successfully completed missions at a variety of locations around the world.

The FreeFly Alta X UAV can be folded into a more compact shape for transport to and from your mission location.

FEATURE	HEADWALL	COMPETITION
Turnkey Systems, Everything You Need	☑	⊗
Industry-Leading SWaP	☑	⊗
Compact, Solid-State Hyperspectral Data-Acquisition System	☑	⊗
Available LiDAR and LiDAR-Hyperspectral Data-Fusion Options	☑	⊗
All-Reflective, Aberration-Corrected Optical Spectrometer Design	☑	⊗
Factory-Made Holographic Gratings	☑	⊗



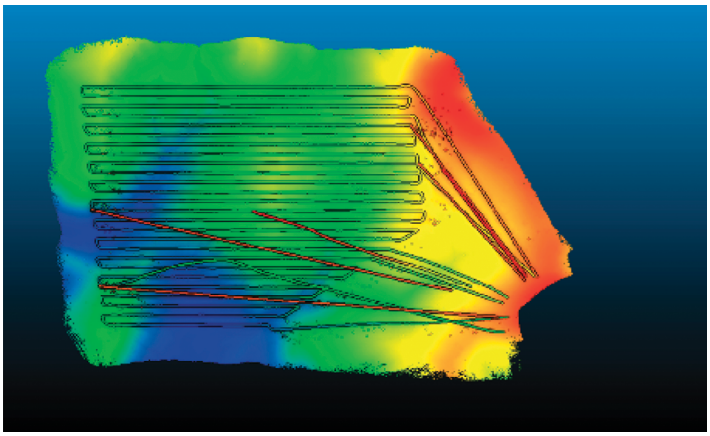


Figure 2. The images above are 3D point clouds generated from an optional LiDAR sensor that was part of the payload during a hyperspectral UAV mission to Cuprite, Nevada by a team from Headwall and the University of Arizona. LiDAR allows high-resolution digital elevation models (DEMs) to be created to enable more precise flight operations as well as more accurate orthorectification of the hyperspectral imaging data.

Headwall UAV systems are programmed to follow terrain at a constant altitude above ground level. The hyperspectral data that is captured from the air is post-processed and orthorectified so that a consistent nadir view of the mission area is achieved.

You can see on the left that the aircraft enters and departs the capture area along straight lines. While inside the 'capture polygon' designated as part of the flight plan, the hyperspectral sensor is activated and a "lawnmower" pattern is flown as shown in the image on the right.

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SPECTRAL RANGE	VNIR, 400–1000nm	SWIR, 900–2500nm	VNIR, 400–1000nm	SWIR, 900–2500nm
MODEL	**NANO HP™**	**Micro 640**	**CO-ALIGNED HP™**	
Spectral Bands	340	267	340	267
Spatial Pixels	1020	640	1020	640
Camera Technology	CMOS	MCT	CMOS	MCT
Pixel Pitch	5.86 µm	15 µm	5.86 µm	15 µm
Aperture	f/2.5			
Slit Length	6 mm	10.4 mm	6 mm	10.4 mm
Dispersion/Pixel	1.76 nm	6 nm	1.76 nm	6 nm
Entrance Slit Width	20 µ			15 µ
Spectral FWHM	6 nm	8 nm	6 nm	8 nm
Frame Rate (Sustained)[3]	250 Hz	200 Hz	250 Hz	200 Hz
ADC Bit Depth	12-bits	16-bits	12-bits	16-bits
Cooling	No	Stirling-Cooled	No	Stirling-Cooled
Spectrograph Design	Aberration-Corrected		Co-Aligned & Aberration-Corrected	
Digital Interface	GigE	CameraLink	GigE	GigE
GPS/IMU	Internally Mounted High-Performance with PPK[4]			
Data Storage on Payload	480 GB Solid-State		480 GB Solid-State for Each Sensor	
Weight (sensor only)	1.05 kg / 2.32 lbs	1.9 kg / 4.2 lbs	4.0 kg / 8.8 lbs[5]	
Dimensions (sensor only)	132 x 102 x 73 mm	75 x 126 x 212 mm	272 x 211 x 165 mm[5]	
Power req (typical / max)	14.4 W / 36 W	24 W / 24 W	14.4 W / 36 W	37 W / 40 W
Operational Temp Range	0 – 40 °C	-30 – 50 °C	0 – 40 °C	
Storage Temp Range	-20 – 60 °C	-40 – 60 °C	-20 – 60 °C	
Compatible UAVs	DJI Matrice 300, DJI Matrice 600 Pro, FreeFly Alta X	DJI Matrice 600 Pro, FreeFly Alta X	DJI Matrice 600 Pro, FreeFly Alta X	

For UAV specifications, see manufacturer documentation such as: www.dji.com or www.freeflysystems.com

[1] RTK (Real-Time Kinematic) feature not currently utilized for positioning. See Headwall White Paper, "RTK vs. PPK Explained" for more information.

[2] Subject to availability by the manufacturer

[3] Configuration dependent

[4] High-Performance GPS/IMU utilizes Post-Processing Kinematics (PPK) for increased measurement accuracy over Standard GPS/IMU

[5] Weight and size of the Co-Aligned HP VNIR-SWIR sensor includes lenses, data handling and storage, and Headwall High-Performance GPS-IMU but excluding LiDAR

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