MAPPS Geospatial Products and Services Excellence Awards 2019 Entrant

Category: E. Technology Innovation

The Best of Both Worlds: The RIEGL VUX-240

1. Complexity

With the new and dynamically growing field of unmanned data capture, there have been a surge in projects being flown by these systems in hard-to-reach and/or hazardous areas. Utilizing unmanned sensors and systems for these projects are increasing safety in the field while providing shorter project times, closer distances to the ground, and excellent cost-effective deliverables provided to the end user.

With traditional airborne data collects, larger swaths of data are capable of being rapidly, accurately, and efficiently captured from higher altitudes. These swaths of data provide highly robust and high-resolution data to the end user while meeting some of the most challenging requirements for their projects.

Both unmanned and airborne data collects have their own merits that have been clearly established and are highly beneficial to a multitude of industries. However, there was still a need in the market for a LiDAR solution regarding projects that would need to be flown higher, longer, faster, and with more dense data provided than normal UAV data collects but at a better cost-benefit ratio and less time needed for field deployment than an airborne data collect.

It became critical that a solution was needed that would encompass and exemplify the middle ground between the standard parameters for UAV projects (closer ranges, shorter flight times, higher data resolution) and airborne projects (higher flight altitudes, longer flight times, more data captured at once) that could be used on an array of aerial platforms. With this, the RIEGL VUX-240 lightweight airborne laser scanner was developed and released into the market.

2. Original or Innovative Application / Development of Technologies or Techniques

This scanner, easily able to be installed and used on larger UAS/UA V/ RPAS platforms and small manned airplanes, gyrocopters, and helicopters, is the best of both worlds when it comes to working in both unmanned and traditional airborne capabilities.
Lightweight and versatile, the VUX-240 is known for its high performance, efficiency, and user friendliness.

With its wide 75° field of view and an extremely fast data acquisition rate of up to 1.8 MHz (effective 1.5 million laser shots on the ground), this instrument is perfectly suited for high point density corridor mapping applications. The VUX-240 implements RIEGL’s unique and cutting-edge Waveform-LiDAR technology, allowing echo signal digitization, multiple target capability, online waveform processing, and multiple-time-around processing. The advantages of the online waveform technology allow for quick data processing, as multiple targets are collected, and measurement ranges are calculated in near real time.

Multi-target resolution is the foundation for penetrating even the densest foliage, providing highly accurate digital elevation mapping that delivers base maps for a wide variety of business functions. A continuously rotating polygon mirror wheel enables scan speeds of up to 400 lines per second and up to 15 target returns captured, allowing the VUX-240 to efficiently covered large areas when operated from fast UAVs or aircrafts. Accuracy of the data collected is 20 millimeters and the precision of the data collected is 15 millimeters.

With an effective measurement rate of up to 1,500,000 measurements per second and an operating flight altitude of up to 1,400m / 4,600 ft, the data collected from the scanner produces perfectly linear and parallel scan lines and are the basis for high scan efficiency.

The scanner provides an internal data storage capacity of 1 TeraByte and is equipped with interfaces for an external IMU/GNSS system as well as to control up to four external cameras. WLAN enables direct access to the laser scanner for changing configuration settings and checking the system status, offering an ease of usability even in remote field settings.

The overall weight of the VUX-240 is approximately 4.1 kg without an IMU/GNSS and approximately 4.9 kg with the recommended IMU/GNSS, the Applanix APX-20 UAV, which enables the integrated system to be used on a variety of larger unmanned and smaller aerial platforms.

The VUX-240 also smoothly fits into the small and lightweight RIEGL VP-1 helicopter pod, designed to be mounted on standard hard points and typical camera mounts of manned helicopters. Quick release adapter brackets and minimum external cabling (i.e. power supply, LAN, GNSS antenna) allow for quick system installation and removal.
Main applications for the RIEGL VUX-240 include corridor mapping, power line, railway track, and pipeline inspection, topography in open-cast mining, surveying of urban environments, archaeology and cultural heritage documentation, and agriculture & forestry.

3. Future Value to the Geospatial Profession and the Public

The development of the RIEGL VUX-240 further bridges the gap between unmanned and airborne project requirements. Having a solution available that can serve end users operating in the mid-range between strictly unmanned and airborne projects will help to continue to build upon the ongoing successes of the aerial LiDAR industry while strengthening the growth pattern of the UAS LiDAR industry.

A dual-purpose scanner, one that can serve in both the unmanned and airborne markets, additionally provides people with a competitive edge in the marketplace. The ability to collect data at a higher point density and higher flight altitudes will produce a higher data yield and increase overall safety in the field, productivity and efficiency, thus engaging an excellent return on investment to not only the user but to their end clients, which ultimately trickles down to the public – the true users of all geospatial data and information.