



# CASE STUDY

# AERIAL LiDAR MAPPING

## Next-Generation Aerial LiDAR Mapping

### SUMMARY

UAV (Unmanned Aerial Vehicle) mapping is a booming industry. One company taking advantage of the technological advances is LiDAR USA with the ScanLook Revolution integrating the VN-300 Dual-Antenna Inertial Navigation System. The combined system provides LiDAR (Light Detection and Ranging) mapping capabilities targeted at applications that require a fast, efficient, cost effective and easy-to-use solution.

The size, weight and power requirements of legacy LiDAR mapping systems primarily limited their use to manned aircraft. Overall hardware and operations costs also resulted in the need to map large areas to maintain financial feasibility. Recent advances in both LiDAR and inertial navigation technology have enabled a new generation of mapping systems that weigh just a few hundred grams and fit in the palm of your hand. LiDAR units are now also affordable enough for small businesses to develop services around this technology with a meaningful return on investment.

### CHALLENGES

Mobile LiDAR mapping requires several components to work synergistically in order to provide a suitable output: a LiDAR scanner, attitude/orientation sensor, positioning system, timing reference system and a vehicle or mobile platform. Traditionally users had to either piece all the components together or buy expensive pre-configured systems designed for survey applications using items such as L1/L2 GPS receivers incorporating RTK (Real-Time Kinematics) positioning techniques in order to get centimeter-level positioning. These types of systems require the additional overhead of communicating with a reference base station or reference network system in order to maintain such accuracy.

LiDAR USA identified an opportunity for a low cost, easy to use system that enables a wider range of users to achieve their mapping requirements without the need for advanced training, complex setup and expensive post processing. Leveraging 18 years of experience in the LiDAR mapping and survey market they developed the new ScanLook Revolution system.

### COMPANY PROFILE



Fagerman Technologies Inc. (dba LiDAR USA) is a world leader in geomatics and developer of new, innovative and affordable mobile mapping systems using the latest tools for scanning, imaging and navigation. A privately held company founded in 1999, LiDAR USA is based in Alabama, USA.

### APPLICATION

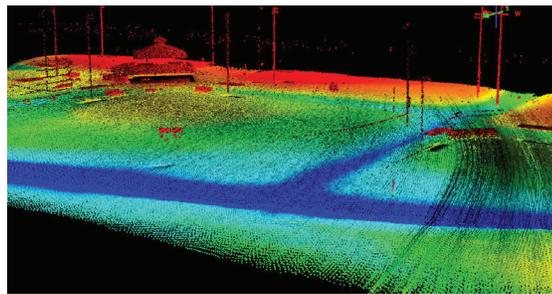
UAV-based mobile mapping

### VECTORNAV PRODUCT

VN-300 Dual Antenna GPS-Aided Inertial Navigation System

### LiDAR USA SOLUTION

ScanLook Revolution



Point cloud generated by LiDAR USA's ScanLook Revolution



## CHALLENGES (continued)

Jeff Fagerman, CEO of LiDAR USA says: "The Revolution system was designed for mapping applications where relative position measurement, rather than absolute centimeter-level position measurement, is important. For example, if you want to know the vegetation encroachment on power lines then you are more interested in the relative distance between the powerline and the trees branches than knowing the absolute position of the tree with 2cm accuracy."

The Revolution is easy to use and includes: LiDAR Scanner, Inertial Navigation System (INS), onboard datalogging and WiFi interface for remote control. All the user has to do is mount the unit and attached GPS antennas and supply power.

## HOW VECTORNNAV HELPED

To keep the Revolution small, accurate and fully featured, LiDAR USA turned to VectorNav for assistance with the INS and selected the VN-300 Dual-Antenna INS. According to Jeff "We evaluated many other inertial navigation systems for this job, but the VN-300 stood out among the rest for its exceptional performance in a wide range of operating conditions and especially for its small size and low weight. The VN-300 is an powerful sensor, it's tiny, only weighs 30 g and has performance comparable to much higher-priced systems."

LiDAR USA selected the VN-300 in part due to the fact that it does not rely on magnetometers for heading estimation. According to Jakub Maslikowski, Director of Sales and Marketing at VectorNav, "relying on magnetometers for accurate heading estimation is typically highly problematic." The VN-300 uses two GNSS receivers and a technique known as Carrier Phase Interferometry that enables the VN-300 to estimate the heading solely from GPS signal measurements when the vehicle is stationary.

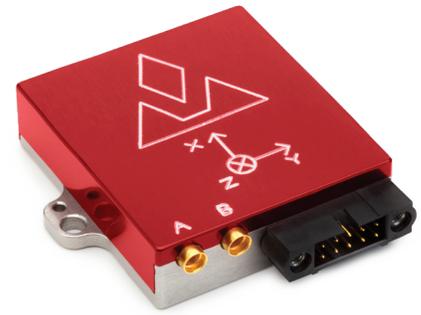
## RESULTS, RETURN ON INVESTMENT AND FUTURE PLANS

Development of the Revolution was a challenging endeavor and required a lot of experimentation and fine tuning. "Working with the VN-300 and the team from VectorNav has been excellent. They're responsive, extremely knowledgeable and a great team to work with" says Jeff. The Revolution is able to solve mobile mapping requirements faster and cheaper than other system on the market, and is available in a number of configurations for customizing to customer requirements. Jeff and the team at LiDAR USA are targeting law enforcement for accident scene reconstruction, archeology and encroachment applications with the Revolution system and are receiving a great response from the market about the performance of the Revolution.

## ABOUT VECTORNNAV

VectorNav Technologies is a leading developer and manufacturer of high performance inertial navigation systems using the latest in MEMS sensor and GPS/GNSS technology. Since its founding in 2008, VectorNav has provided systems integrators in the Military, Aerospace, Marine, and Robotics industries with inertial navigation solutions with best-in-class price to performance ratios.

## VN-300 DUAL ANTENNA INS



### KEY SPECIFICATIONS

#### NAVIGATION

Heading (INS)	0.3 ° RMS
Heading (GPS-Compass)	0.3 ° RMS
Pitch/Roll (Dynamic)	0.1 ° RMS
Max Output Rate	400 Hz

#### PHYSICAL & ELECTRICAL

Dimensions	45 x 44 x 11 mm
Weight	30 g
Max Power Consumption	1.5 W

## ADDITIONAL RESOURCES

#### About LiDAR USA:

[www.lidarusa.com](http://www.lidarusa.com)

#### About VectorNav Technologies:

[www.vectornav.com](http://www.vectornav.com)

#### About the ScanLook Revolution:

[www.lidarusa.com/scanlook-revolution](http://www.lidarusa.com/scanlook-revolution)

#### About the VN-300:

[www.vectornav.com/products/vn300-rugged](http://www.vectornav.com/products/vn300-rugged)

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