



## CASE STUDY

# NEXT-GENERATION AERIAL LIDAR MAPPING

VN-300 Dual Antenna GNSS-Aided Inertial Navigation System

LidarUSA's ScanLook Revolution features an integrated VN-300 Dual-Antenna Inertial Navigation System. The combined system provides easy-to-use, efficient and cost effective LiDAR mapping capabilities targeted at applications such as law enforcement for accident scene reconstruction, archeology and encroachment monitoring.



## Introduction

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.

## Challenge

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 GNSS 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.



# LiDAR USA

Fagerman Technologies Inc.

## 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

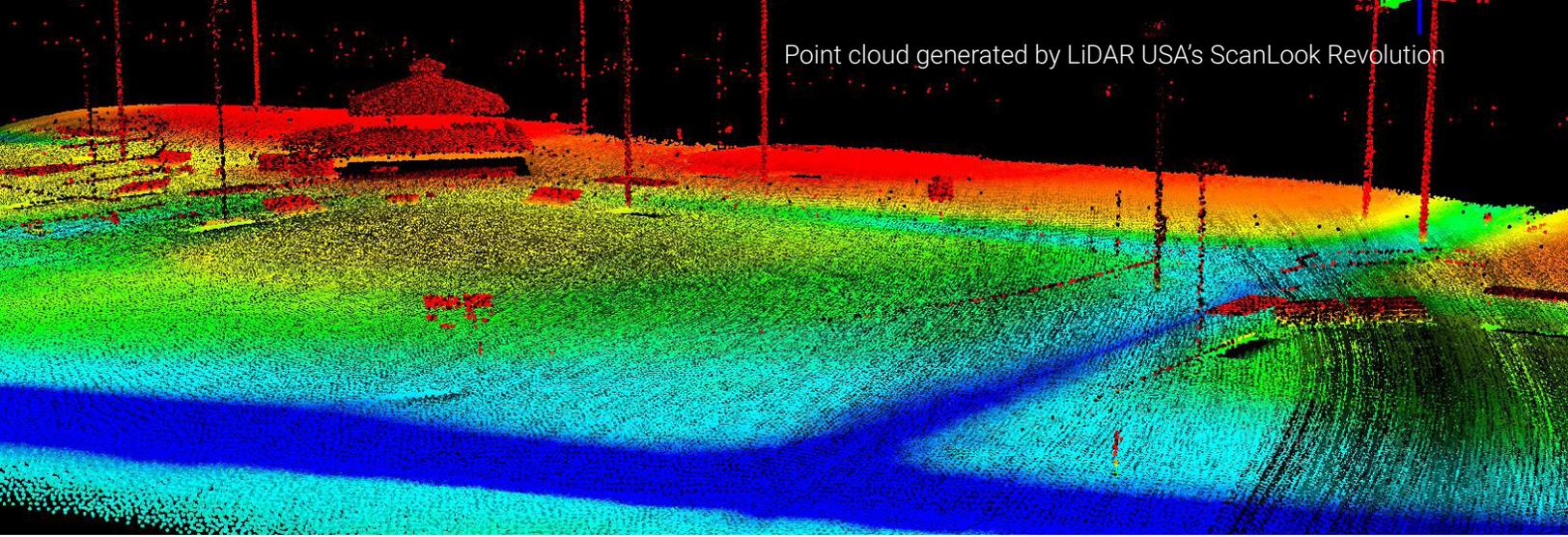
UAV-based mobile mapping

## VECTORNAV PRODUCT

VN-300 Dual Antenna GNSS-Aided Inertial Navigation System

## LiDAR USA SOLUTION

ScanLook Revolution



## How VectorNav 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 a 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 GNSS signal measurements when the vehicle is stationary.

### VN-300 Dual GNSS-Aided INS



VN-300 Rugged

## 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 systems 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.

### KEY SPECIFICATIONS

#### NAVIGATION & IMU

Heading (INS) <sup>1</sup> .....	0.2°, 1σ
Heading (GPS-Compass, 1 m Baseline).....	0.3° RMS
Pitch/Roll (INS) <sup>1</sup> .....	0.03°, 1σ
Accelerometer Range.....	±16 g
Gyroscope Range.....	±2,000 °/s
Max Output Rate (INS).....	400 Hz

#### PHYSICAL & ELECTRICAL

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

<sup>1</sup>. With sufficient motion for dynamic alignment.



## About

VectorNav Technologies is a leading developer and manufacturer of high performance inertial navigation systems using the latest inertial 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.

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