Cartographic Potential of New Technologies: Aerial Data Collection

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Aerial Data Collection

Small Format, Low Speed, Low Altitude, High Res

#getvertical_ds
Introduction

- BS Geography/Cartography, Frostburg State University (The real FSU), 1987
- MBA, Duke University, 1995
- Graduate Certificate in Geospatial Intelligence Analytics 2016
- PhD candidate, Penn State University, Data Analytics concentration in Remote Sensing
- United States Army Officer, Retired in 2001
- CACI, International 2001-2005,
  - NRO Liaison Officer
  - ESRI Project Officer
- CEO, DividedSky Aerial Solutions, LLC 2014
  - FAA Section 333 Exemption #11883
- Private Pilot Certification, November 2014
- Remote Pilot Certification, August 2016
Flying **Drones as a Business**

- Started the company in June 2014
- Provide safe, legal, professional and affordable flight services
- We deliver high quality imagery and data products
- Applied for and obtained our FAA Exemption #11883 in June 2015
- Issued FAA Remote Pilot Certification in August 2016
- Ongoing interactions in multiple market segments across a wide operating area
- Educating people, businesses and the government agencies about sUAS drones and how to use them safely and legally
What We Do

Small Format Aerial Data Collection

Planning/Staging/Launch/Flight/Recovery
- FAA Authorization
- Crew Member Proficiency
- COA Request/Compliance
- Safety/Risk Mitigation
- Insurance
- Data Security

Post Flight Processing & Storage

Color Grading
Video Editing
3D Modeling
Full Motion Video
NDVI Processing
IR, LiDAR & Thermal Output and Interpretation
GIS Data Processing
(collection/preparation/input/processing/output/storage)

DIVIDEDSKY AERIAL SOLUTIONS
Safety/Integration in the NAS

• 1st Priority
• FAA Part 107 Compliance
  • Waivers as required
• The National Airspace System
  • Understanding Classes of Airspace
  • Understanding Aviation operational concepts
  • ATC communications
  • Play well with manned aircraft
Put the Drone to Work

Streamline the creation of professional imagery products from drone captured data for visualization and analysis in a multitude of commercial and government uses.

• Think of the drone providing the micro level of remote sensing data as part of the overall data collection plan.
• Fixed wing, helo, satellites provide the macro level of data in the collection plan.
• Combining commercial off the shelf equipment and software with higher end sensors and ground control systems to produce high data end products.

Products We Interface with:

• Drone 2 Map
• ARCGIS
• QGIS
• Global Mapper
• Lockheed Martin Hydra Fusion
• HYPACK
• Sony
• Canon
• GoPro
• Velodyne
• UgCS
• Autodesk Civil 3D Engineering Suite
Uses

- Land Analysis
- Infrastructure and Asset Inspection
- Monitoring
- Agriculture
- Transportation Planning
- Remote Sensor Management
- Actionable Intelligence
By Products

• Enable smarter decision making
• Be the first to benefit from innovation
• Streamline Enterprise applications
• Imagery on Demand
• Deliverables within minutes, not days
• Leverage GIS investment
Drone2Map (ESRI Product)

- Estimated 60% cost savings over traditional surveying techniques. (McKim&Creed)
- Proof of Concept beach mapping project
  - North Carolina Wrightsville Beach
  - Collected imagery with a Sony R10C camera, attached to a 3DR Solo
  - Processed the imagery on the spot and produced the high res orthomosaic and the color shaded relief derived from a DSM
Drone2Map Results

• 75 acres of topographic data within one hour at a 1.05 inch resolution
• Produced course orthorectified photomap and DEM in the field
• Within four hours produced
  • High res 2D and 3D image map products
  • Published as a web map in ARCGIS Online
• Yielded a resolution of 104 points per square meter
  • Previously collected LiDAR data for the same area only yielded three points per square meter
  • The 3D mesh was able to precisely reveal tire tracks on the beach, impossible with previously collected data
Drone2Map Products
Hydra Fusion

• Lockheed Martin’s answer to big data
• Unmanned systems are no longer a stand alone activity

• Assortment of maps, images, video and intelligence being broadcasted to operators, site managers and project leads in a common operational picture
Flight Planning
Autopilot Software

Fixed and rotary wing support.
sUAS Aerial LIDAR
Consulting and Training

- Flight Operations Manual Development
- Safety Manual
- Risk Mitigation Strategy Development
- Maintenance Planning and Execution
- Crew Member Training and Proficiency Testing
Currently Working On

• Integration of LiDAR data to include terrestrial point clouds with aerial point clouds
• SLAM technology to create point clouds on the fly in real time
• RTK base/rover concept with the drones using RTK for geolocation data within the drone IMU (achieving sub centimeter level accuracy)
Small Format, Low Speed, Low Altitude, High Res

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