Interoperability to unlock the UAS and UAM Airspace

March 30, 2021
Areas of Expertise

ARCHITECTURE  ENGINEERING  GEOSPATIAL
Woolpert at a Glance

1911
Founded in Dayton, Ohio

40+
Offices Worldwide

1000+
Global employees
The map data provided in this presentation provided for informational and communication purposes only.

Arlington, VA
Atlanta, GA
Austin, TX
Calgary, Alberta CA
Charleston, SC
Charlotte, NC
Chesapeake, VA
Chicago, IL
Cincinnati, OH
Cleveland, OH
Columbia, SC
Columbus, OH
Dayton, OH
Denver, CO
Fairview Heights, IL
Fort Worth, TX
Greenville, SC
Houston, TX
Indianapolis, IN
Jackson, WY
Jefferson City, MO
Johannesburg, RSA
Kansas City, MO
Lexington, KY
Miami, FL
Orlando, FL
Pittsburgh, PA
Portland, OR
Tampa, FL
Richmond, VA
San Jose, CA
Stennis, MS
St. George, UT
St. Louis, MO
Toledo, OH
Virginia Beach, VA
FAA Aerial Imagery and Mapping – 2,100 Projects at over 1,900 Airports
Current Woolpert UAS/UAM Engagements

- **ATRD Project to Develop Vertiport Advisory Circular**
- **Pavement Inspection**- Development of an Advisory Circular and Demonstrations at Savannah, Reno and Cincinnati- Data Standards and Operational Guidelines
- **Obstructions**- Surveys of Safety Critical Obstruction Data, Woolpert tasked with Technical Work to develop standards, testing at William J. Hughes FAA Tech Center, Granbury, TX, Cincinnati-West, Lanai
- **ARFF**- Developing best practices for using UAS for live monitoring of ARFF event and accident reconstruction in conjunction with the NTSB
- **Perimeter Security**- developing best practices for perimeter inspections, working with the Tech Center and with Knoxville airport as part of Safe Skies Alliance work
- **Large UAS Airfield Design**- incorporating multiple existing Advisory Circulars while defining special considerations for large UAS
• How Do We Unlock the Potential?
• How do we accomplish an equivalent technological maturity to the 100+ years of automobiles and aircraft?
• 3 Key Building Blocks-Safety-Capacity-Common Language
• What does crawl-walk-run look like?
• Layers of awareness: Central/Network monitoring and flight intent distribution, Communication of Intent, Adjustments to Trajectories, Scheduling of Vertiport Resources

• System Components
• Vehicles
• Vertiports
• En Route Unmanned Traffic Management
Current Approach

- The FAA is encouraging open-source solutions and distributed providers
- Performance-Based Solutions that are influenced by a Congress of Industry
- NASA’s NARI efforts to participate with manufacturers/sites
- FAA and State BEYOND programs to demonstrate repeatable, scalable environments
- Move away from exception-based decisions and create system solutions
- Consider Payload/Package solutions, Inspection solutions, People-moving solutions
Safety

• An efficient and capable system will depend on the exchange of intent information

• A safe system will depend on layers of safety, not relying on any single component for safety

• Design to safety standards that reflect the Risk Management Safety framework the FAA has developed in the last 15 years

• Safety depends on understanding the intent of each vehicle/facility

• Situational awareness created by sharing intent also enables capacity
Interoperability

• More intent information is needed than an identification and a current position
• Will it be TCAS-like? Connected to flight control systems?
• Initially will it be pure visual skills?
• Standardization of Vertiport details
• Standardization of obstacle data
• NOTAM’s?
• Trajectory Based Operation problem and solution, but calculated trajectories will need to be commonly understood
• The emerging markets of UAS and UAM will still need to share airspace—will “no transponder” flights be updated to a Remote ID-type of standard?
• Likely to be a central automation system that will help facilitate connections, on-board software to provide solutions
Capacity

- Capacity is closely linked to Interoperability
- The FAA doesn’t own the airspace, the U.S. public owns the airspace
- How can the FAA meet their goal to be the “neutral shepherd” that facilitates access to airspace fairly?
- Segregation of Airspace is a solution that only works in low volume
- Integrated Airspace is necessary to preserve airspace rights of transit
- Example: A single two-lane road can carry approx. 1500 cars per hour in one direction. Do we expect to operate at a similar scale? If so how many vertiports are required?
- Node-to-node or point-to-point?
- Will it be a new kind of airspace? Multi-mode requirements?
• Will a vehicle land, change out batteries and be ready for a new flight quickly? Or will it need to land and charge?
• If batteries weigh 2000-3000 lbs, what does that do to the vertiport design?
• Would a vertiport look like an automatic carwash with a lane that the vehicle lands, passengers disembark, batteries are changed out, new passengers load and it departs?
• Will vertiports be single pads owned by individual entities?
• Due to challenges of power reserves/endurance, queuing for an arrival spot will be undesirable
Thank You!

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DW Digital Imagery & Associates, LLC

Utilizing Underwater Drone Technology for Aquatic Surveys & Search / Rescue Operations
Company History & Industry Experience

- Established as An LLC: June 30, 2017 / Frisco, TX
- Founder/Owner/CEO: Jonathan Denton
- Currently Have 4 Drones In our Fleet including 1 underwater drone
- Service Geography: (North / East) Texas & Southern Oklahoma

- Aerial drones are all manufactured and supported by DJI
- Aquatic drones are all manufactured and supported by QYSEA
- All Pilots FAA Part 107 Certified / TWIC Clearances
- Fully insured for all industry jobs ($1,000,000 Liability)
- 8 Years Combined Drone Technology Experience
- 15 Years Combined Experience
  - GIS
  - Remote Sensing
  - Real-Estate Photography
  - Surveying & Insurance Inspections
  - Aquatic Surveys

- Current Partners:
  - Subcontract Drone Aerial Services:
  
- Custom Solutions & Technology Consulting:
Reputable Brands Currently on the Market

QYSEA Fifish Models & Capabilities

- **QYSEA Fifish V6** – Basic Model *(Price: $1,500)* – Extra Lighting Attachments Available
- **QYSEA Fifish V6S** *(Price: $3,200)* – Grabbing & Light Attachments
- **QYSEA Fifish P3** *(Price: $3,500)* - Longer battery Life & 1,000 ft. in Depth
- **QYSEA Fifish V6 Pro Plus** *(Price: $12,000)* - 1,500 ft. in Depth, Stabilizing Sonar in 4 Knots of current, Measurement Laser for Inspections
- **QYSEA Fifish W6** *(Price: $30,000)* – 1,500 ft. in Depth, Stabilizing & Mapping Sonar, Extra Lighting & Grabber Attachments

- **Topacc Chasing M2** – *(Price: $5,200)* – Mapping Sonar, 1,500 ft. depth, Extra Grabber & Lighting Attachments
- **Geneinno Titan T1** – *(Price: $3,000)* – 2,000 ft. depth along with extra Grabber Attachment
New Service: Underwater Inspection Service Capabilities & Technology

Services Offerings
• Aquatic surveys for water treatment structures (tanks & retention ponds, dams, swimming pools, maritime shipping, and elevated storage tanks).
• Search and Rescue footage for first responders
  ➢ Deliverables
  ➢ High-resolution photos and videos for analysis.

Mobile Technology
• All data is captured using industry standard apps on (IOS – Apple) Tablets:
  • QYSEA Fifish V6 mobile app

Sensor & Camera Technology
• Cameras: 32 Mega-Pixel Resolution for Still Photos
• Video Capabilities: 2.7K, 4K & 6K Quality
Bringing Added Value

- Cost-effective & more efficient than hiring a certified diver.
- Industrial grade lighting for extremely murky and turbid situations
- Affordable sonar capabilities for Bathymetry mapping and 3-D measurements
DWDI Turnaround for Reporting

• Reporting generated by DWDI ranges from 24 – 72 hrs. for individual jobs

• Fifish V6 app downloads videos and still photos directly to the remote controller when inspections are finished.
  ➢ DW Digital Imagery will deliver final images and video through Private AWS cloud server.
Project Examples

• Shipyard Inspections
• Maintenance
• Exploration
Future Offerings

• 5 cm accuracy Survey-grade sonar mapping with underwater drone technology
• Consulting Services for First Responders
Contact info

- Location: Frisco, TX: For more information visit our Website: www.dwdigitalimagery.net and click on the Services tab from the main page.
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  - Email: dwagisp@gmail.com
  - Phone: 469-583-4485
SmartDrone

Smart. Accurate. Affordable LiDAR technology
Who is “SmartDrone”?  

- **Industrial** manufacturer of small drones that help customers optimize their *time, money and resources!*
- Privately-held company, backed by *investor capital*. Opened the doors in **April 2020**
- Team of **World-class engineers**, image scientists and IoT specialists, who are also **Part 107 certified remote pilots**
- Work with **Land Surveyors** to increase the efficiency of their *data collection* and meet customer expectations
- Preparing to launch our first product – called, the *Discovery* platform that will retail for **less than $50K**
Lots of other surveying/mapping drones...
SmartDrone’s Value-Proposition

- **Size** - Smaller than 90% of the drone-based LiDAR solutions available in the market
- **Accuracy** – LiDAR collection that meets and/or exceeds the national standards for **1-foot contours**
- **In-Field Validation** – Ability to **process data** in the field, without the need for internet connectivity
- **Ease of use** - Shorter learning curve. Can be powered-up and flying within 5 mins
- **Open-source software** - Don’t have to pay for expensive data processing software or subscriptions
- **Everything** - you need to get started comes in an **airline-rated carry case**
- **Concierge-level** - technical support and **warranty coverage**

Size: 3ft x 3ft x 1.5ft
LiDAR vs Photogrammetry

**LiDAR**

**Pros:**
- More accurate and reliable data
- Canopy penetration (trees & vegetation)
- Shorter processing times (mins vs hours)
- Reduced risk with less reliance on human input

**Cons:**
- Can be expensive, with high start-up costs

**Photogrammetry**

**Pros:**
- Inexpensive, low start-up costs

**Cons:**
- Cannot penetrate canopy (trees & vegetation)
- Less accurate data
- Longer processing times (hours vs mins)
- More cost associated with data processing

Size: 6ft x 6ft x 3ft

Size: 1ft x 1ft x 1ft
QGround Control - Mission planning App

QGround Control -

- **FREE** download on either iOS or Android
- Flight/Mission planning software
- Works on MAVLink enabled drones
- Supports PX4 Pro and ArduPilot
- Grid, Cross-hatch or Waypoint missions
- **Plan, Upload, Fly!**

http://qgroundcontrol.com/
CloudCompare – Data processing & analysis

CloudCompare -

- **FREE**, Open-source SW
- Point cloud viewing and analysis
- Runs on Windows, MacOS & Linux
- **Tons of functionality**
  - Rastering, ground elevations, etc
  - Overlay of multiple files
  - Colorized point clouds
  - Contour lines

https://www.danielgm.net/cc/
Stay tuned for more details on the official product launch (May 2021)

Continuing to do market validation and customer research

- Targeting Land Surveyors now
- Will be looking at other adjacent industries in the coming months

Networking with local organizations to get “plugged into” the drone market in TX

If you have any questions or want to find out more about SmartDrone –

- Check out our website: www.smartdrone.us
- Send me an email: eric@smartdrone.us
- Or give us a call: 1.888.708.8818
Thank you for your time and support!

Eric Green
1-888-708-8818
eric@smartdrone.us
Introduction to AUVSI
Our Vision

It starts with a world where...

Unmanned systems are everywhere

They help prevent significant loss of lives, positively impacting the way we live

They diminish physical boundaries and increase human potential
Our Focus

We provide our members with a unified voice in advocacy for policies and regulations that encourage growth and innovation;

We provide education within the industry, and to the public and media on the safe and beneficial uses of unmanned systems;

We enable market growth by providing our members with custom resources to collaborate with the community and realize their full potential within the industry;

We provide outstanding member service to the organizations and individuals that make up the AUVSI community.
Our Advocacy Priorities

Our policy priorities are created through a consensus process with our membership.

We work with policy and regulatory bodies in the US and internationally, most notably ICAO, FAA, Congress, and the US Departments of Transportation and Defense.

State level advocacy focuses primarily on preemption to maintain uniformity of policy and regulation to the greatest extent possible.
New For 2021

UNMANNED SYSTEMS & ROBOTICS DATABASE

Department of Defense Unmanned Systems Budget Report

All Things Unmanned
Our Chapters
Our Membership Options

Organizational Membership extends to all employees of an organization, includes access to all our resources and participation in our advocacy work.

Industry
- In the business of unmanned systems
- Dues based on revenue
- Standard, Enhanced, Premium options

Startup
- First product released within a year, <$1M in revenue
- Flat rate for Standard Membership

Associate
- Government agencies, educational institutions, non-profit trade associations, societies or charities
- Flat rate of $600

Individual Membership covers one person and is focused on accessing our knowledge resources.
AUVSI’s PREMIERE EVENT – XPO21
VIRTUAL + IN-PERSON

AUVSI XPONENTIAL 2021 is now an expanded hybrid event series, incorporating virtual and in-person experiences to support our mission to convene the unmanned and automated systems community and accelerate innovation and market adoption. This new approach will allow us to continue offering the most comprehensive and relevant sessions on tech and policy developments, while hosting the leading marketplace for B2B connections and transactions.
## ADDITIONAL OPPORTUNITIES

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<thead>
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<th>Event Name</th>
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<tr>
<td></td>
<td>Virtual</td>
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<tr>
<td>BAM Business of Automated Mobility Forum</td>
<td>Virtual</td>
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<tr>
<td>FAA UAS Symposium</td>
<td>2 Episode Event</td>
<td>June 9 – 10</td>
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<tr>
<td></td>
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<tr>
<td>AUVSI Xponential</td>
<td>In-person Event</td>
<td>August 16 – 19</td>
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HB 1758 (Krause) - Relating to the operation and use of an unmanned aircraft.
  • Heard in House Homeland Security & Public Safety Committee on 3/25

HB 2161 (Raymond) - Relating to analyzing and mitigating transportation security threats in this state.
  • Referred to House Homeland Security & Public Safety Committee on 3/25

HB 2957 (Geren) / SB 1583 (Hughes) - Relating to inspections and examinations by the Railroad Commission of Texas of certain sites and facilities conducted using unmanned aircraft.
  • Referred to House Energy Resources & to Senate Natural Resources/Economic Development Committee
87th Legislative Session

HB 3251 (Thompson) - Relating to the use of unmanned aircraft.
  • Referred to House Homeland Security & Public Safety Committee

HB 3403 (Cyrier) - Relating to the operation of an unmanned aircraft that is outside the direct line of sight of the operator of the aircraft.
  • Referred to House Transportation Committee

SB 149 (Powell) - Relating to the prosecution of the offense of operation of an unmanned aircraft over certain facilities.
  • Referred to the Senate Natural Resources/Economic Development Committee
Questions and Comments

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