Unmanned Aerial Vehicle Use in Transportation

TexITE Houston Luncheon
August 10th 2016
Overview

• UAV/UAS Basics
• Regulations
• Document Uses
• UAV in Texas
UAV Basics

• Definition
  – An unmanned aircraft vehicle/system (UAV/UAS) is an aircraft without a human pilot onboard – instead, the UAS is controlled from an operator on the ground.

• Size
  – Small <55 pounds
  – >55 pounds
UAV Basics

• Uses
  – Hobbyist
    • Not getting paid
    • Registration
  – Commercial
    • Getting paid for a flight service
    • Section 333 Exemption – Now Part 107
  – Public Agency COA
    • TxDOT, Police Department Etc.
  – Research COA
    • RELLIS (Riverside)
Regulations

• Small UAV Regulations (Non-Hobbyist)
  – <55 (Including payload)
  – Visual Line-of-Sight (VLOS)
  – Daylight Only
  – Yield right-of-way to all other aircraft
  – Max Ground Speed 100mph
  – Max Altitude 400 feet
  – Minimum Visibility 3 miles
  – Remote Pilot Airman Certificate (part 107)
Documented Uses

• Departments of Transportation
  – Eleven DOTs
• International Examples
  – China

  • Arkansas
  • Virginia
  • Florida
  • Ohio
  • Washington
  • Utah
  • Georgia
  • California
  • Michigan
  • North Carolina
  • West Virginia
Arkansas State Highway and Transportation Department

• Traffic Monitoring
  – Collect HD Video
  – Turning Movements, etc.

• Compared UAV, Mast Mounted Camera and Tethered Balloon
  – Abandoned UAV citing FAA restrictions
Virginia Department of Transportation

• Airborne Data Acquisition System (ADAS)
  – Real-Time Traffic Surveillance
  – Monitoring Traffic Incidents
  – Signalized Intersections
  – Environmental Assessment
• Research still being conducted on Virginia Tech “Smart Road”...
Florida Department of Transportation

- Traffic Monitoring (Real-Time)
- Proof of Concept (four year study)
  - Engaged 50 UAV vendors
  - Focus on communication
- Denied COA
  - “See and Avoid”
  - Safe Landing
- Project was canceled due to FAA Regulations
Ohio Department of Transportation

• Data Collection (2002)
  – Freeway Conditions
  – Intersection Movements
  – Network Paths
  – Parking Lots

• Unmanned Aircraft Systems Center
  – Initiative with Indiana
  – Streamlined COA Process
Washington Department of Transportation

• Active Snow Avalanche Control
  – Mountain Slopes Above State Highways
  – Reduce highway closures

• Active Surveillance
  – Aerial Images
Utah Department of Transportation

• Construction Project Monitoring
  – Digital Images to Classifying Wetland Species

• Multiple Flights
  – Southern Parkway Highway

• Favorable Conclusions
  – High Value Tool for Wetland Monitoring
  – Digital Imagery for Roadway Traffic Conditions
Others...

• Georgia Department of Transportation
  – Feasibility Study (2014)
    • Goals and Requirements
    • Staff Interviews
    • Developed Five Systems (Specs)

• California Department of Transportation
  – Feasibility Study (2014)
    • Steep Terrain Investigation
    • Bridge Inspection (2008)
Others...

• North Carolina Department of Transportation
  – UAV Program (2013)
    • Agriculture, surveying, wildlife monitoring, emergency management...

• Michigan Department of Transportation
  – UAV Evaluation Study (2014)
    • Infrastructure inspection and asset management...

• West Virginia Division of Highways
  – Demonstration (2012)
    • Low cost stable platform for aerial images.
International Examples

• Examples of Traffic Monitoring
  – HAWK System
    • Locating injured persons from crash using wireless sniffer. (China)
  – Crash Scene Mapping
    • Waypoint guided UAV using video and photogrammetry (China)
  – Crash Monitoring
    • Mapping using photogrammetry (China)
UAV/UAS in Texas

• Lonestar Center of Excellence
  – Texas A&M Corpus Christi (one of six)
  – Coastal Erosion

• CANVASS – RELLIS (Riverside)
  – TEEX, Aerospace and Dwight Look COE
  – Multi-platform UAS research

• UT-Arlington Robotics
UAV/UAS in Texas

• Use of Micro UAV for Roadside Condition Assessment (2010) TTI SWUTC
  – Roadside Condition Assessment
  – Conducted Field Experiments
    • IH 20 in Tyler
    • IH 35 near Dallas
    • Riverside Campus
  – Favorable outcome
UAV/UAS in Texas

• TxDOT Smart Corridor Project (2014)
  – Use Case Development
    • Incident Management
    • Traffic Monitoring
    • Crash Investigation
  – Unrestricted application development
    • Swarms
    • Flying Signs
    • Wrong-way driving applications
UAV/UAS in Texas

• TxDOT High Speed Mobile Data Collection (2015)
  – UAV Commercial Vendor
  – Photogrammetry and Data Processing
    • 10 miles of FM 3090 near College Station
  – Findings
    • VLOS delays
    • State Property Laws
    • High quality data
UAV/UAS in Texas

- TTI Policy Research Center ConOps
  - Phase 1: ConOps for Incident Management
    - Use Cases
      - Situational Awareness
      - Incident Management
      - Fatal Crash Scene Investigation
      - Quick Clearance
    - UAV Vendor Response Plan
  - Phase 2: Pilot Demonstration
    - Pending Funding
UAV/UAS in Texas

- TxDOT RTI 17-130 Development of TxDOT UAS Flight Operations Manual, Policy Recommendations, and Initial Application Evaluations
  - Co-awarded to TTI, Lonestar and UT Arlington
  - Scoping meeting this Friday w/TxDOT
  - Includes the development of a TxDOT Flight Operations Manual
  - First look at Pavement and Rail Application
Wrap-up...
Wrap-up...
Questions?

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