NGAT Overview "Unmanned Aircraft: Making Aviation an Every Day Thing"

November 2015

NC STATE UNIVERSITY

The FAA's Center of Excellence for UAS Research

ASSURE

Alliance for System Safety of UAS through Research Excellence

www. ASSUREuas.org

NGAT Program History

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- Launched in 2012 under NCDOT Division of Aviation Leadership
  - **Goal: Develop NC UAS Ecosystem**
- Began UAS flight operations March 2013 at Hyde County Airport
- 20 active COAs with weekly operations at one or more sites
- Established as an NC State Consortium in 2015
  - NGAT Consortium at NC State University- *a consortium of academia, industry, and government agencies created to provide a research and application–oriented, technology transfer-focused organization for conducting aviation technology development, investigations, and field trials*
- Core member of ASSURE Alliance selected May 2015 for the FAA UAS Center of Excellence research program for 5 years.

DIVISION OF AVIATION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Golden LEAF FOUNDATION

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"NextGen"

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- Satellite Based Navigation and Surveillance (not radar)
- Digital Data Exchange (not voice)
- Automation Assisted Air Traffic **Management** (not Air Traffic Control)
- Improved Weather Decision Tools
- Reduced Aircraft Environmental Footprint
- Improved Connectivity for Situational Awareness
- Increased Airspace Capacity
  - More airport utilization
  - Rise of personal aircraft
  - UAS integration

… in NC

- Built here

- Needed here

- Will fly here

Building a UAS Ecosystem in NC

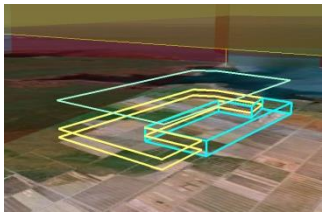
User Capability Requirements

Initial Design and Development

PRECISIONHAWK

M A E mechanical & aerospace ENGINEERING

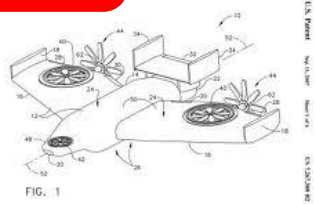
Testing



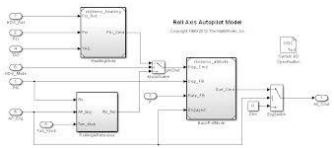
Training

Policies

Production Design



Manufacturing



Fielding

Sustainment / Maintenance

UAS: Potential Use Cases

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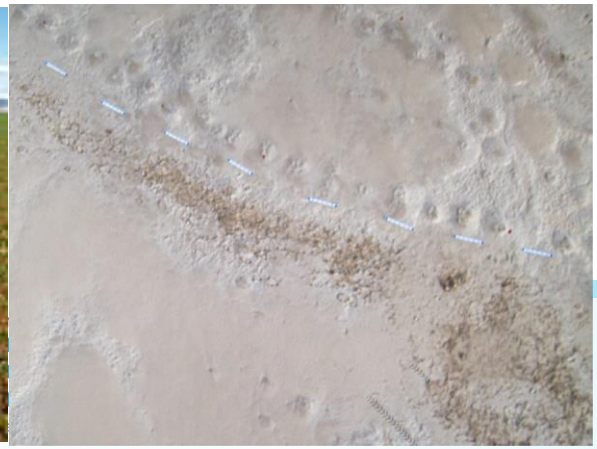

- Emergency Response
- Mapping / Aerial Photography
- Homeland Security
- Agriculture
- Mining
- Forestry
- Wildlife Resources
- Transportation
- Investigation
- Drug Enforcement
- Anti-terrorism
- Law Enforcement
- First Responder Support
- Weather Research
- Disaster Analysis
- Airport Planning
- Entertainment
- Insurance Assessments
- Others

NGAT UAS Operations: Today

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- Flight summary
  - Started 3/21/2013
  - 20 approved COAs (8 more pending)
  - At least one flight per week
  - 500+ flights
  - ~120 hours of flight time
- Research:
  - Airspace integration
  - Agriculture
  - Surveying
  - Control and Communications
  - Airworthiness Analysis
- Aircraft Maintenance
- Data Management
  - Structure
  - Reporting

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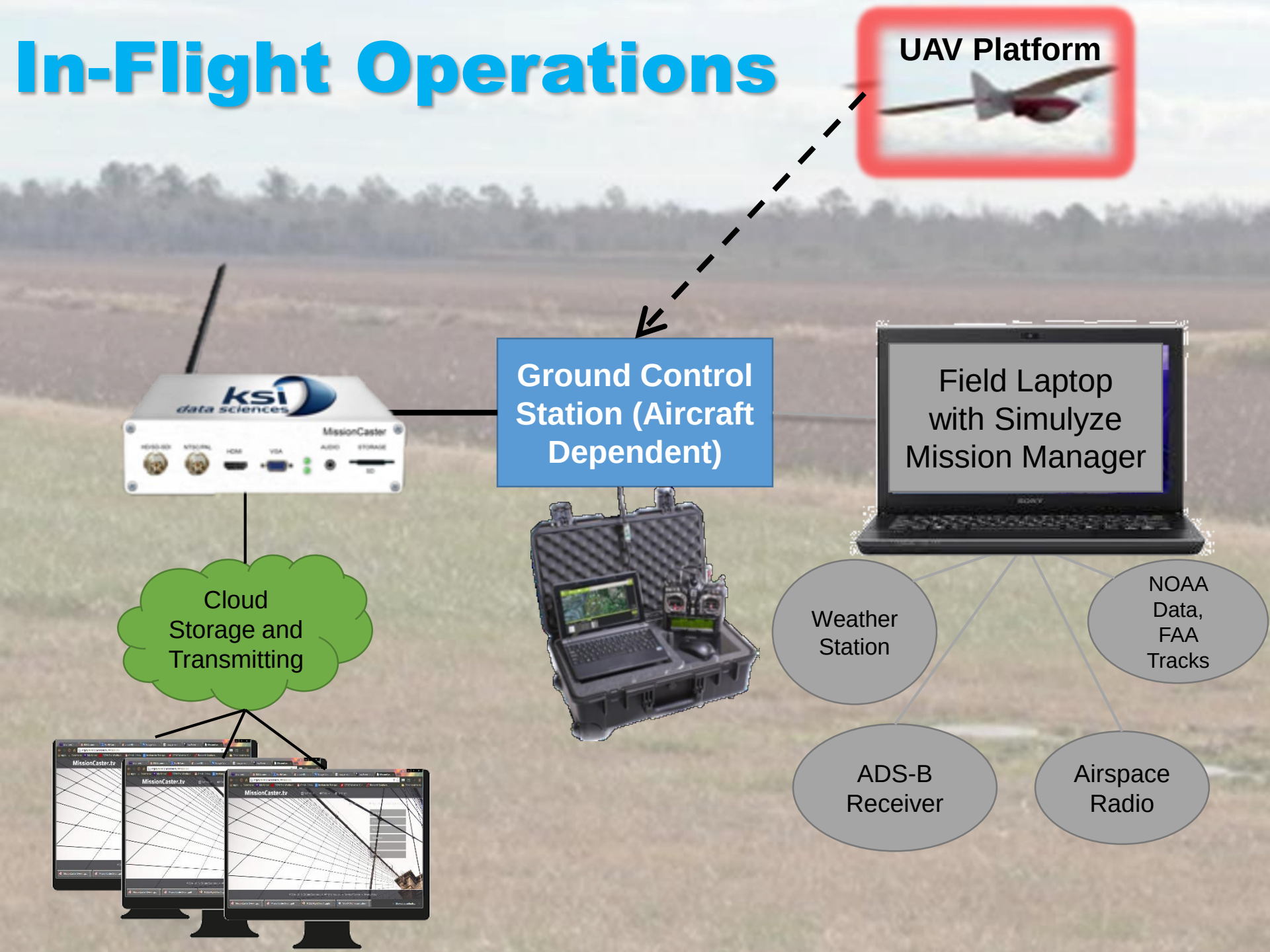
In-Flight Operations



NGAT Imagery from Lake Wheeler Farm

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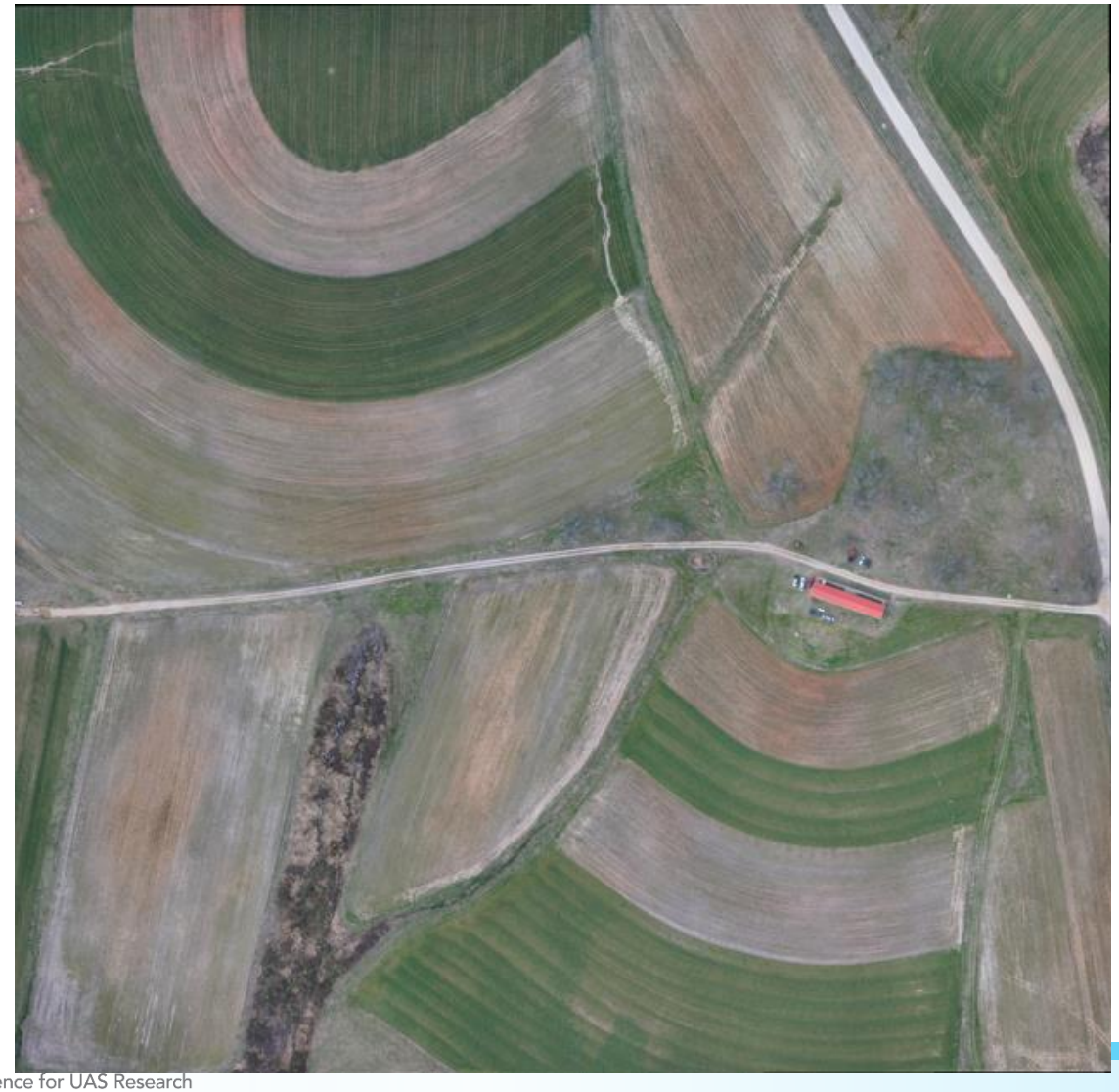

NGAT Imagery from Lake Wheeler Farm

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NGAT Imagery from Vernon James N2 Research

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NGAT Survey Imagery

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UAS Data Assessment

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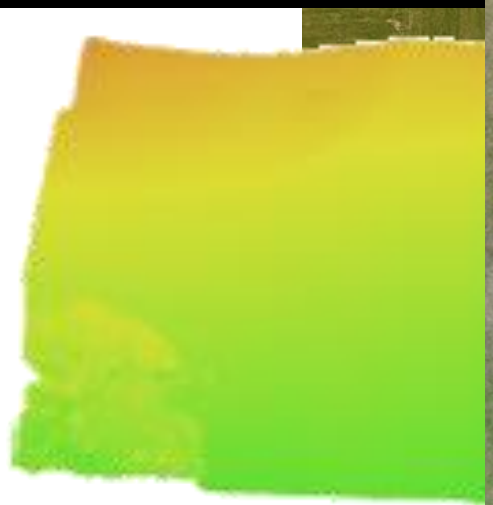

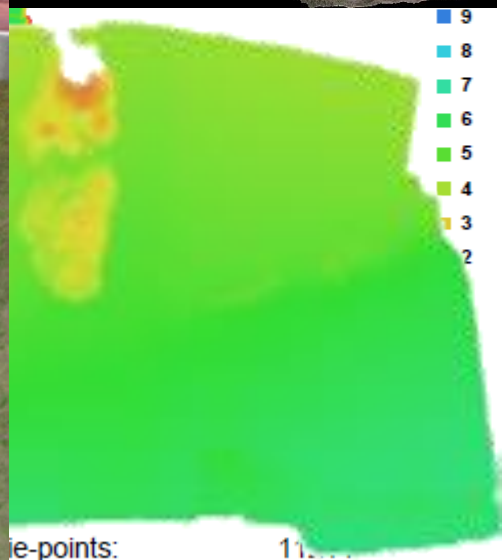

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Point Clouds

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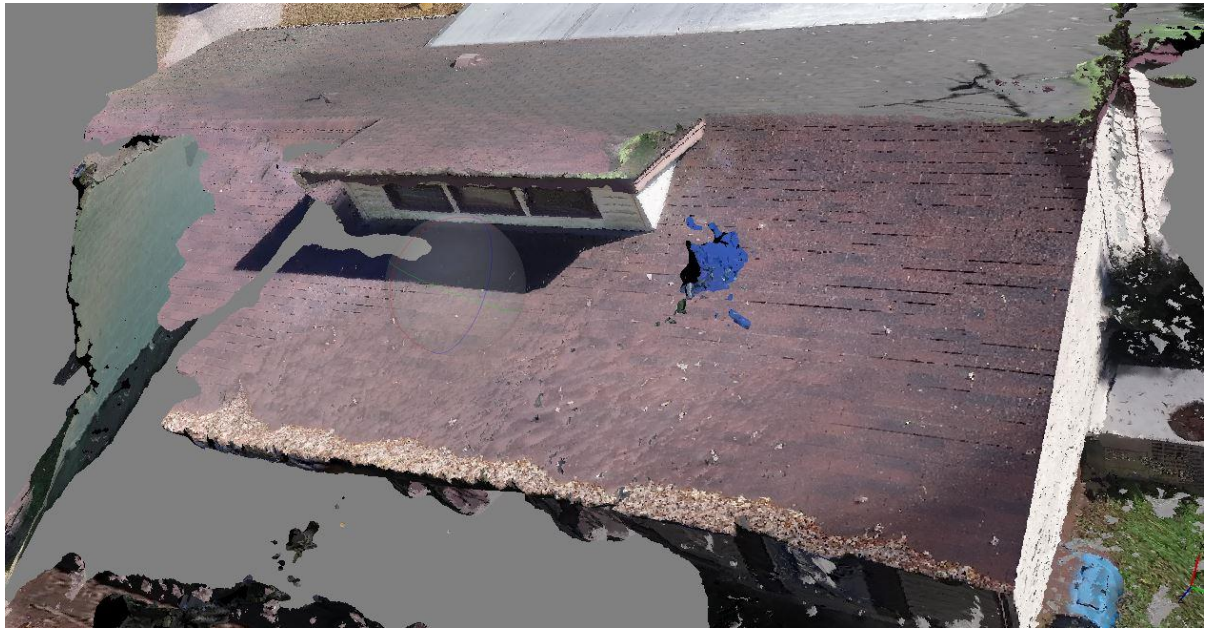
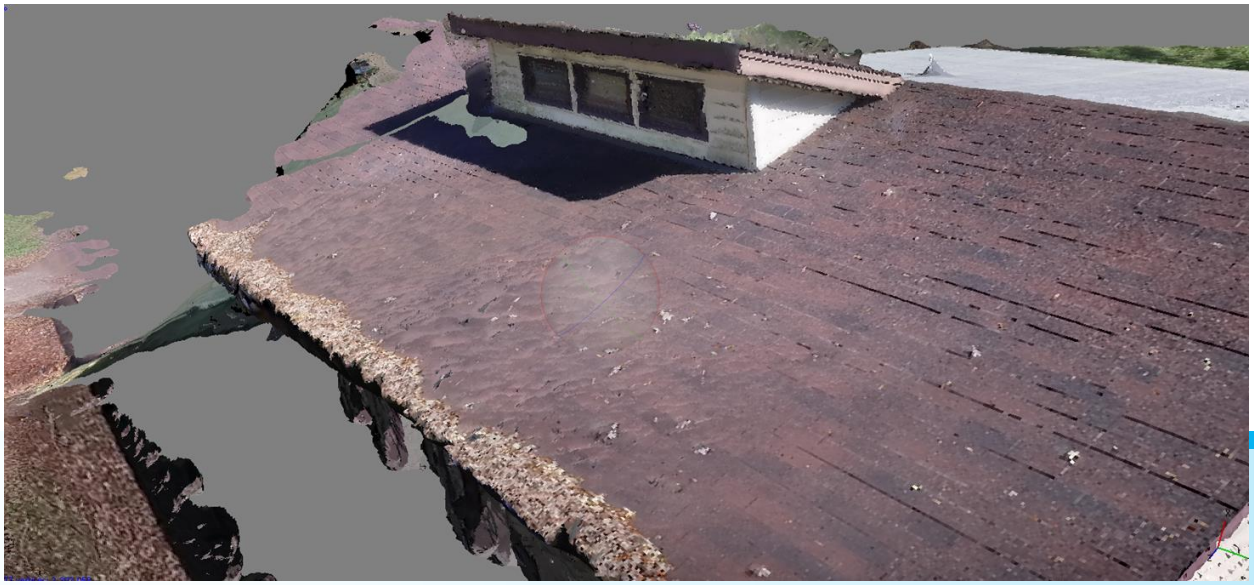




CORE TEAM

Alabama
UNIVERSITY of ALABAMA in HUNTSVILLE

Alaska
UNIVERSITY of ALASKA in FAIRBANKS

Arizona
EMBRY AERONAUTICAL UNIVERSITY-PRESCOTT

California
UNIVERSITY of CALIFORNIA DAVIS

Florida
EMBRY RIDDLE AERONAUTICAL UNIVERSITY

Kansas
KANSAS STATE UNIVERSITY
UNIVERSITY of KANSAS
WICHITA STATE UNIVERSITY

Montana
MONTANA STATE UNIVERSITY

New Mexico
NEW MEXICO STATE UNIVERSITY

North Carolina
NORTH CAROLINA STATE UNIVERSITY

North Dakota
UNIVERSITY OF NORTH DAKOTA

Oregon
OREGON STATE UNIVERSITY

Ohio
THE OHIO STATE UNIVERSITY

Pennsylvania
DREXEL UNIVERSITY

AFFILIATE TEAM

Alabama
AUBURN UNIVERSITY
TUSKEGEE UNIVERSITY

Indiana
INDIANA STATE UNIVERSITY

Louisiana
LA TECH UNIVERSITY

Canada
CONCORDIA UNIVERSITY

United Kingdom
UNIVERSITY of SOUTHAMPTON

ASSURE A-6: Surveillance Criticality

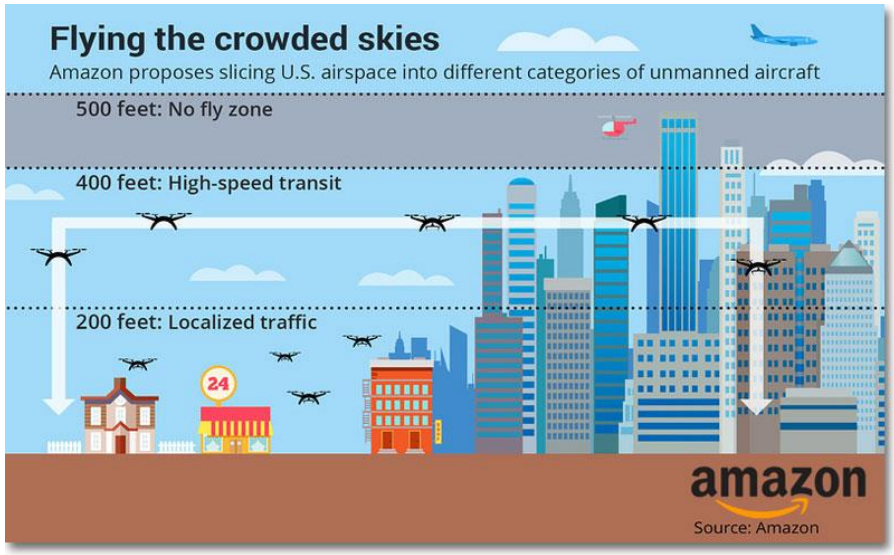
Title: Surveillance Criticality for SAA– Low Altitude Operations

ASSURE Team: NCSU (lead), ERAU, UND, MSU, OHSU, ORSU

Purpose: This research is designed to develop a safety assessment process to determine the contributions of technology, pilots and controllers in aircraft separation assurance and collision avoidance. This assessment will be used in an operational UAS ConOps to evaluate the potential hazards, failure modes, effects, and criticality of select ABSAA technologies.

Technology Focus:

- TCAS
- ADS-B
- GBSAA
- Cellular based SAA (LATAS)



Impacts

- RTCA/ ASTM F-38
- UTM
- ADS-B Spectrum Management strategies

Statewide UAS Operations: Goal 2016

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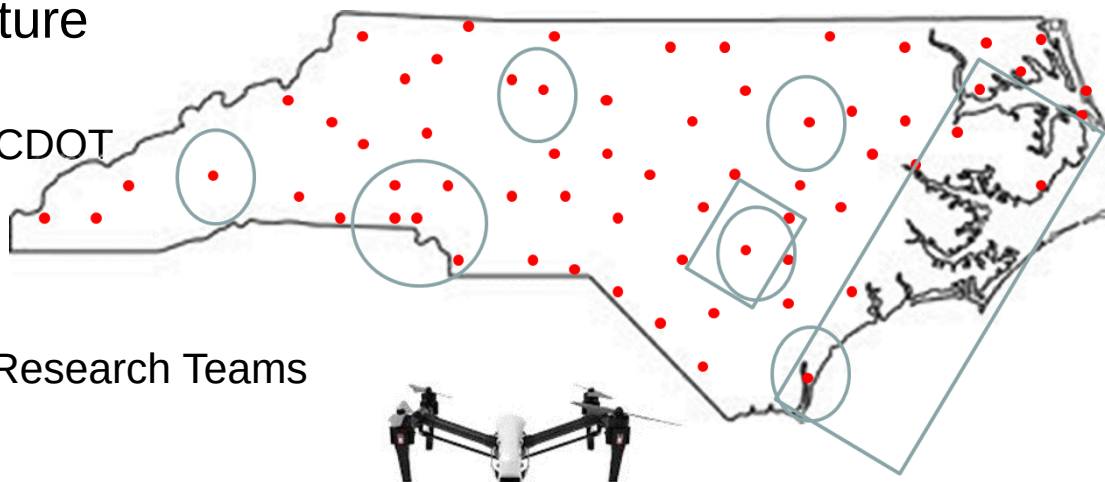
- NGAT/NCSU Provides structure
  - FAA mechanism/reporting
  - Training to meet NCSU and NCDOT requirements
  - SOPs/Best Practices
  - Data Management
  - SMARTeams = SMall Aircraft Research Teams
- FAA coordination
  - Section 333 Exemption Request is submitted
  - Statewide COA request to be submitted before the end of October- Class G Airspace, 700' altitude, 8 aircraft types (all less than 20 lbs), daylight ops only
- Enables
  - Applied researchers to conduct approved operations
  - Safe airspace integration in NC
  - More performance data for researchers (ASSURE)



UAS "Approved" Operations Summary

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Today

- Limited Operations
  - Certificates of Authorization (COAs): public agencies
  - Section 333 Exemptions- private/commercial
  - Special/Restricted Airworthiness Certificates
- Hobbyists

Not-so-Distant

- Line of Sight Operations
  - Part 107 Commercial Rule for Small UAS Operations
  - Agency operations
- Limited Operations
  - COAs: public agencies
- Hobbyists

Future Operations

- Part 107 LOS Operations
- Limited Beyond-LOS Operations
- NextGen integrated airspace

UAS Resources

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- NGAT Website: www.itre.ncsu.edu/ngat
  - Consortium information
  - Research activities
  - News and Events
- NCDOT UAS Program Office: http://www.ncdot.gov/aviation/uas/
  - State statutes, regulations, guidelines
  - Fact Sheets
  - Licensing/Permitting Program Information
- FAA UAS : https://www.faa.gov/uas/
- Know Before You Fly : http://knowbeforeyoufly.org/
- AUVSI : www.auvsi.org
- 333 Exemption Holder Map: http://www.suasnews.com/faa-drone-333-exemption-holders/

For More Information

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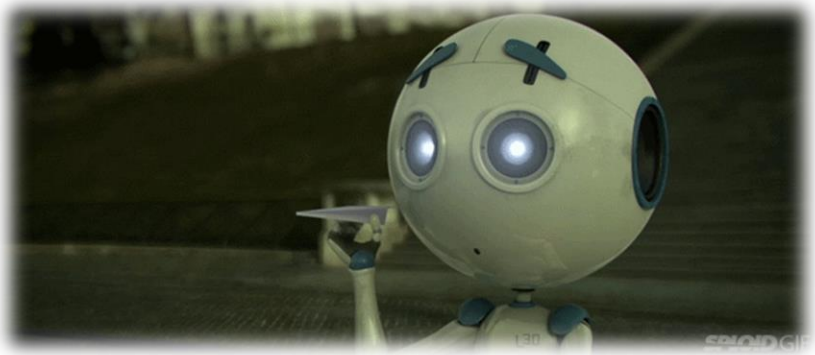

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(Tanisha Wyatt)

It is not really necessary to look too far into the future; we see enough already to be certain it will be magnificent. Only let us hurry and open the roads.

- *Wilbur Wright*

UAS: Knowledge Requirements

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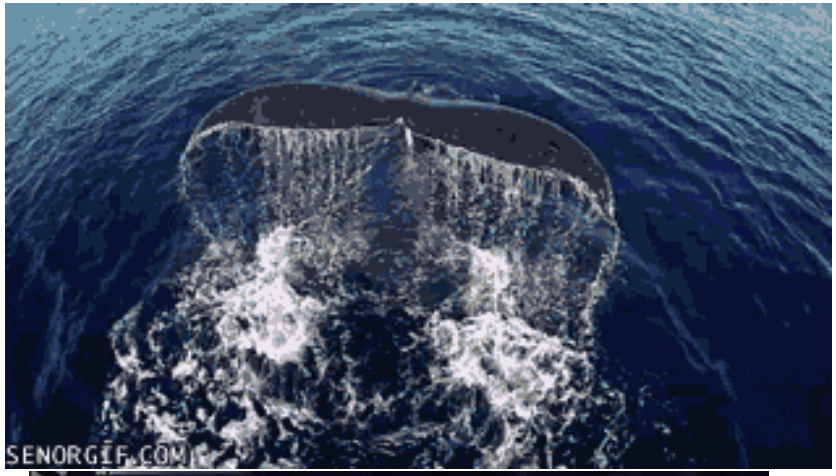

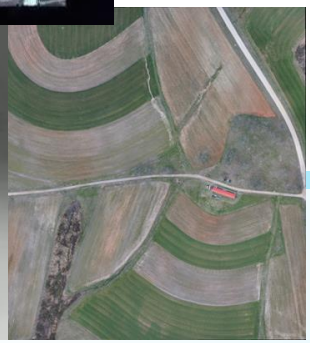

- Engineering
  - Aerospace
  - Computer Science
  - Electrical
- Applied Science
  - Agriculture
  - Remote Sensing/GIS
- Fundamental Sciences
  - Earth Science
  - Math
  - Physics
- Human Factors
- Aviation Operations
- Political Science
  - Policies
  - International Law
- Social Science
  - Ethics
  - Human behavior
- Business
- Manufacturing