

UAS Program at ECSU

Strengthening Aviation/UAS Education and Workforce in the Region, State, and Beyond





Founded in 1891

**1 of the 17 constituents of
the UNC System**



- **A 21-county region that accounts for 43% of Tier 1 counties statewide**
- **One of the largest employers**
- **Regional impact exceeding \$235 million**

In 2017, we launched a campaign...



NC PROMISE



\$500 / SEMESTER IN-STATE TUITION **\$2500** / SEMESTER OUT-OF-STATE TUITION

APPLY TODAY! | www.ecsu.edu/ncpromise

ECSU IS A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA SYSTEM.



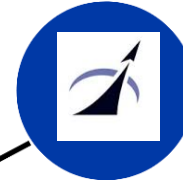
25'200 OUT-OF-STATE TUITION
AND FEES

Program Offerings

Flight Education



Professional Aeronautics



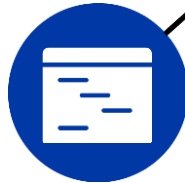
BS in Aviation
Science

5 Areas of
Specialization

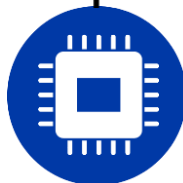
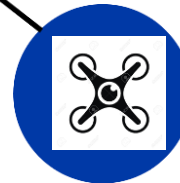
Most affordable flight training program

Available with online option

Aviation Management



UAS



Avionics

\$34 Million for a new School of
Aviation building

Opportunities for ECSU's UAS Program



B.S. Degree in Unmanned Aircraft Systems – Fall 2019

ECSU's Drone Program Receives US Dept of Education and SACSCOC Approval

Robert Kelly-Goss POSTED ON MAY 3, 2019

0 503 Views



FAA Designated UAS-CTI Program

**FAA Designates ECSU a UAS-CTI
School as Aviation Program
Enrollment Growth Continues**



ECSU UAS Curriculum

- **Aviation Core**

- Basic Aerodynamics
- Aviation Human Factors
- Aviation Safety
- ATC and NAS
- Aviation Management
- Aviation Meteorology
- Aviation Research Methods and Stats

- **Engineering/Technology**

- Introduction to Engg. Technology
- Introduction to Computer Science
- Computer Aided Design
- Circuit Analysis
- Instrumentation and Measurement System

- **UAS Specific Core**

- Introduction to UAS
- UAS and the NAS: Laws and Regulations
- UAS Sensors and Payload
- UAS Applications Lab 1 (Design/Integration)
- UAS Applications Lab 2 (Pre. Ag/Surveying/Inspection)
- UAS Cybersecurity

- **Business and Accounting Courses**

- Introduction to Business
- Principles of Management
- Principles of Economics I
- Financial Accounting

- **Electives (Area of Interest Specific)**

- Law Enforcement
- Emergency Management
- GIS/Remote Sensing
- Renewable Energy

ECSU UAS Program Capabilities

- Training/Education
 - UAV Pilot
 - Sensor Operator
 - Mission Planning
 - Data Processing
 - System Design & Integration
- Outreach
 - Drone Exploration Academy
- Applied Research
 - Precision Agriculture (crop health monitoring)
 - Infrastructure (solar, wind turbine, pipeline, powerline, etc.) Inspection
 - 3D Mapping
 - Public Safety (Emergency Management, Law Enforcement, etc.)
 - Thermal Imagery (Counter poaching, drug interdiction, etc.)
 - Homeland Security
 - Forestry
 - Transportation Planning
 - Landfill Management

UAS Lab Resources



Typhoon

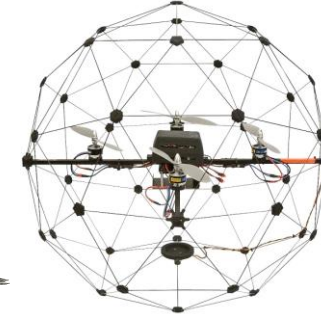
Albiris



RF70



DJI Mavic Enterprise



Q-Ball



eBee Ag



eBee SQ



eBee RTK



eBee X



M600 with LiDAR



DJI Inspire



DragonFlyer X



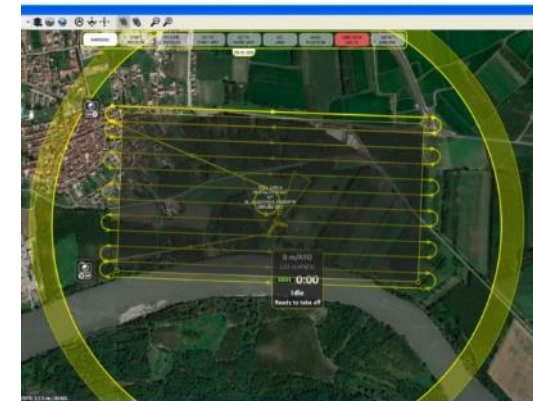
Aeromapper EV3



DJI Phantom



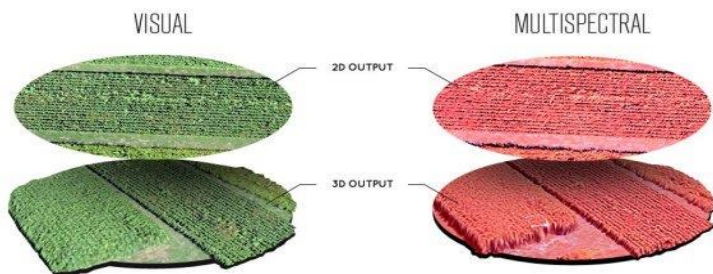
BFD SE-8



Sensor Payload



Zenmuse X3



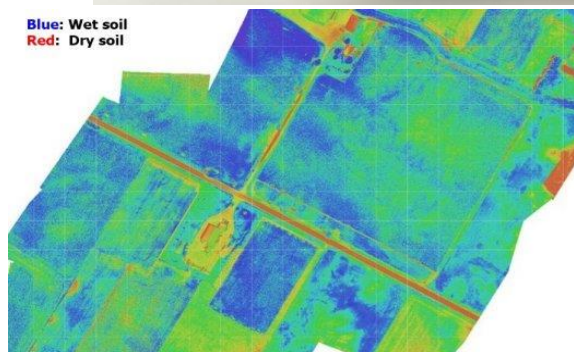
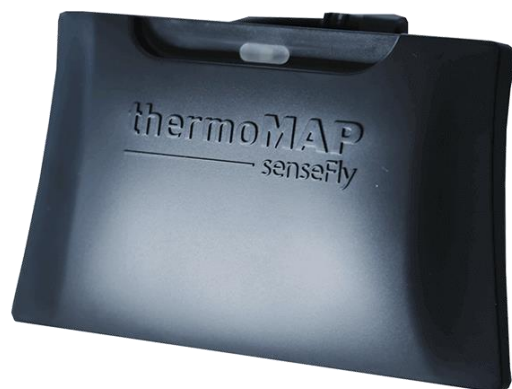
MicaSense Red Multispectral



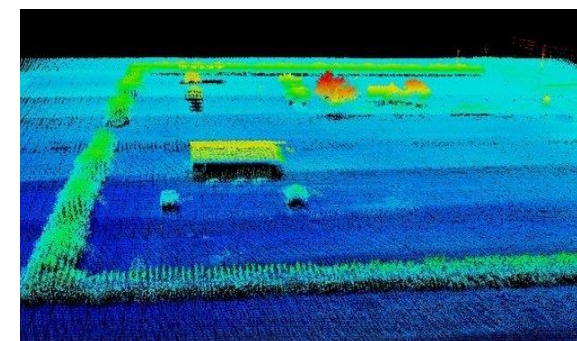
LiDAR



Hyperspectral



Thermal



High-Fidelity UAS Simulation and Training Lab



Training Scenarios

- Pipeline Inspection
- Wind Turbine Inspection
- Anti-Poaching
- Law Enforcement

UAS Mobile Command Unit

- The mobile command unit is outfitted with computer stations capable of programming UAVs in the field and receiving information in real time.



Mobile Command-and-Control Unit

UAS & Emergency Management



Students conducting a tactical meeting to develop a plan to drop off essential supplies after a hurricane

First Responders Training

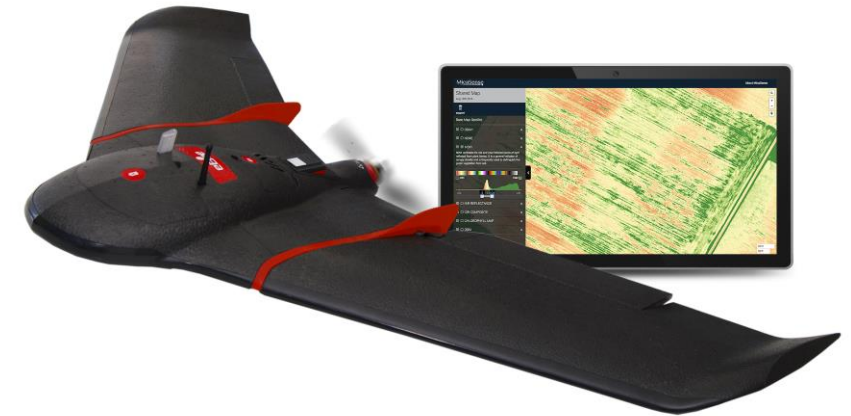


UAS Certificates and Training

- Developing certificate and training programs
 - **4-day (24 hours) Part 107 FAA UAS Certification short course**
 - **9-month (180 hours) of Certificate program** in UAS Operations
 - **Day-long UAS technology and career awareness seminars**

Help close the skills gap and increase the pool of highly qualified individuals with skills in UAS, aligned to Region's and North Carolina's current and future needs.

- Training/Education
 - UAV Pilot
 - Sensor Operator
 - Mission Planning
 - Data Processing
 - System Design & Integration
- UAS applied skills in the area of
 - Precision Agriculture (crop health monitoring)
 - Infrastructure (solar, wind turbine, pipeline, powerline, etc.) Inspection
 - 3D Mapping
 - Public Safety (Emergency Management, Law Enforcement, etc.)
 - Forestry
 - Transportation Planning



AVIATION/STEM Outreach Programs

- NASA Aviation/Aerospace Career Academy
- Residential



- Drone Exploration Academy
- Residential



- National Summer Transportation Institute
- Residential



FAA Aviation Workforce Development

Partner with the USDOT and the FAA in expanding the United States aircraft pilot and unmanned aircraft system operators and support the related professional development for teachers.

- Offer a year-round structured curriculum that will contain the instructions, hands-on activities, and experiences that will increase students' knowledge about aviation and aviation careers.
- Build the interest, skill, knowledge, and competencies necessary for high students to achieve FAA certifications.
- To increase aviation career knowledge of area high school students with emphases in the areas of aircraft piloting, UAS operations, and relevant FAA certification requirements.
- Train a more diverse student population, historically underserved and underrepresented, with the intent to prepare them for college and careers in aviation-related disciplines.
- Provide professional development opportunities and support for high school teachers in integrating aviation topics into their curriculum.

Benefits to the students:

- 6 credits of college course work, tuition covered
- Covered cost for FAA private pilot ground written exam
- Covered cost for PART 107 Drone Pilot License
- Cost for the FAA Medical Examination covered
- Weeklong College Residential experience during summer
- 20 students will receive up to \$4,000 in scholarship to pursue Aviation or UAS degree.

Launch Date: Fall 2022

Num of Participants = 80 students



UAS for Conservation Research Project

- The long-term goal of this research partnership was to provide baseline data and analyses to inform marsh restoration planning and design led by Audubon North Carolina (ANC) in Currituck Sound
- The restoration will help to:
 - increase resilience of the existing marshes in the Mid-Currituck Marsh Complex to sea level rise and other threats,
 - reduce flood and storm surge risk for nearby communities, and
 - create or enhance habitat for priority bird species in Currituck Sound.
- The raw UAV- derived remotely sensed data was processed using Pix4D software to produce:
 - a geo-referenced orthorectified 3 waveband image mosaic and
 - two 3D-derived elevation layers: DEM, a representation of the elevation of the ground surface or bare-earth, and digital surface model (DSM) which includes the elevation of both natural and built features

Project Site

Audubon North Carolina's Pine Island Sanctuary is located in Corolla, North Carolina, within the Mid-Currituck Marsh Complex in Currituck Sound. The Sanctuary encompasses both western and eastern sides of the sound and is located in Currituck County, North Carolina



Western Priority Area



Northern Priority Area



Southern Priority Area

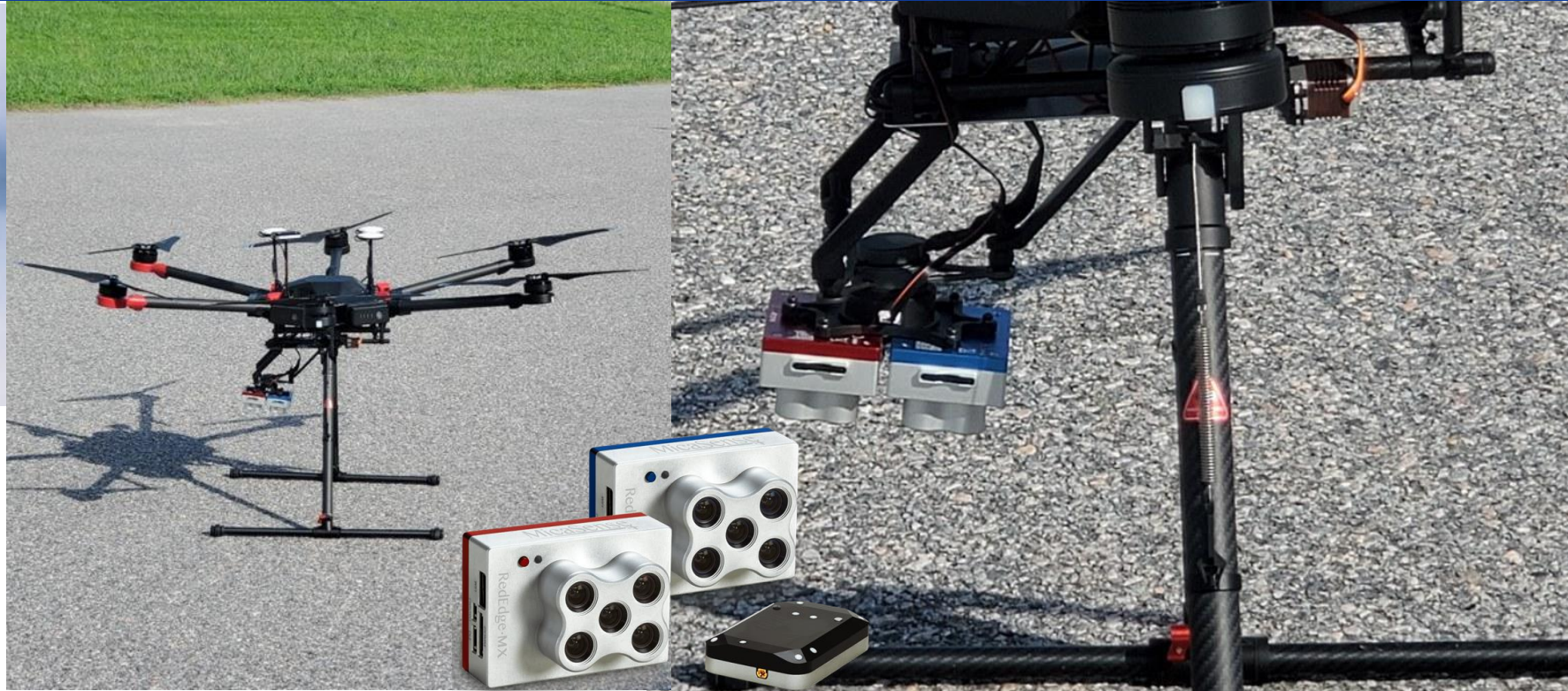
Pine Island Sanctuary

Drone Technology Used



DJI Mavic 2 Pro Enterprise (Quadcopter)

DJI Matrice 600 (Hexacopter)



10-band Dual Camera Multispectral Sensor Mounted on M600

The team also evaluated the possibility of using a fixed-wing eBee SQ drone. However, due to limited area for take-off and landing around the priority sites, it was decided to conduct flights using only the rotary drones.

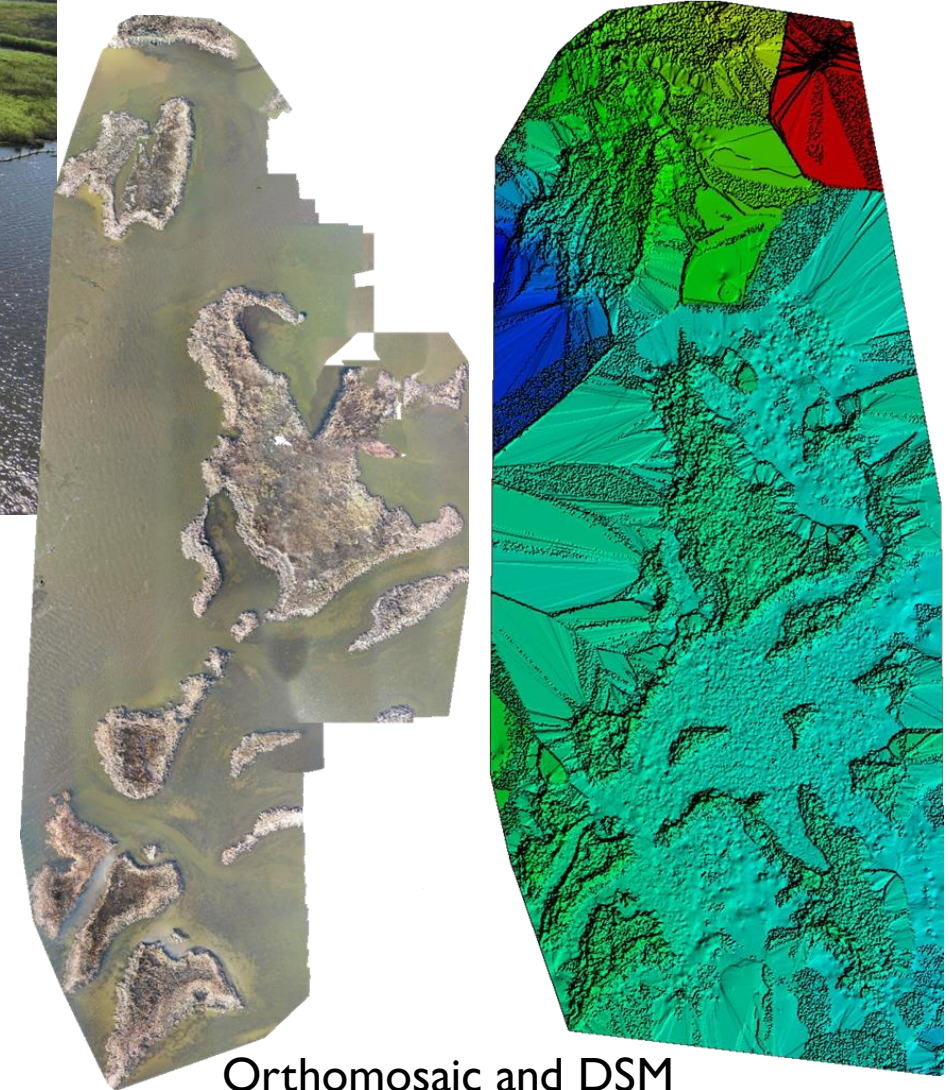
Results and Further Work



Depicting positions of Ground Control Points

- **Future Directions:**

- Detect and Monitor Estuarian Shoreline Changes
- Classify marsh vegetation based on drone aerial imagery
- Compare LANDAST data with 10-band Multispectral sensor data



Orthomosaic and DSM

UAS Pavilion



Drone Pavilion: An Outdoor Netted Facility: 250 X 100 X 50

Wake Tech CC Partnership



- \$10.6 million land acquisition in Eastern Wake County
- ECSU will have an on-campus presence
- Focus on Emergency Management and Unmanned Aircraft Systems
- Training for First Responders
- 2+2 Articulation Agreements

Advanced UAS Training & Manufacturing

Long Endurance, High Payload
UAVs for Medical/Emergency
Delivery & Disaster Recovery



**ECSU Awarded \$576,333 from
NASA to Advance Aerospace
Manufacturing**

Q & A



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