

AVIATION/UAS Program at ECSU

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



AUVSI AAM Educator's Conference



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.

NC PROMISE
A COMMITMENT TO ACCESS AND AFFORDABILITY

\$500 PER SEMESTER IN-STATE TUITION
\$2,500 PER SEMESTER OUT-OF-STATE TUITION

NC PROMISE
A COMMITMENT TO ACCESS AND AFFORDABILITY

\$500 PER SEMESTER IN-STATE TUITION
\$2,500 PER SEMESTER OUT-OF-STATE TUITION

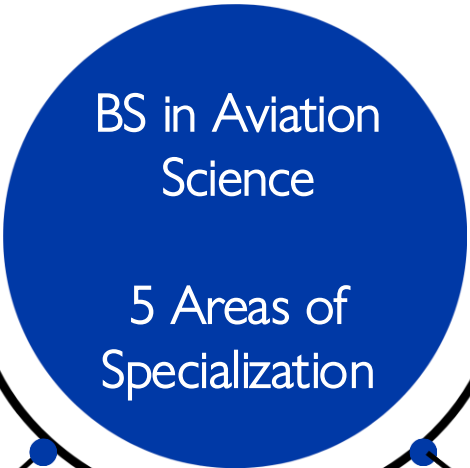
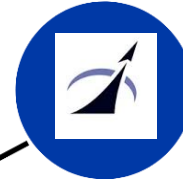


Program Offerings

Flight Education



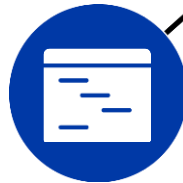
Professional Aeronautics



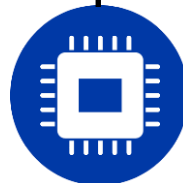
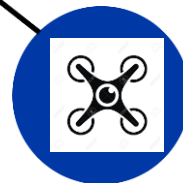
Most affordable flight training program

Available with online option

Aviation Management



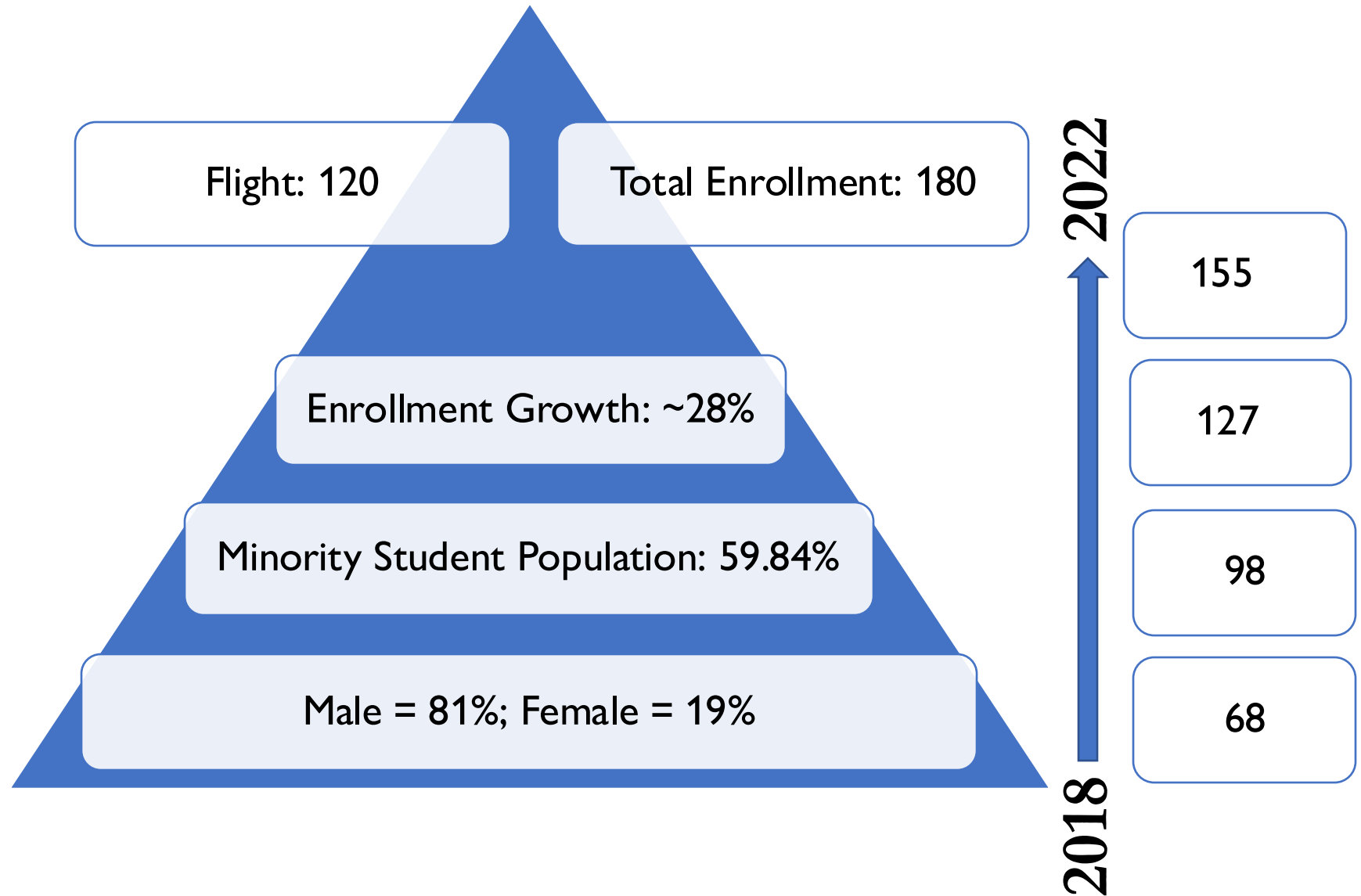
UAS



Avionics

\$34 Million for a new School of Aviation building

Aviation Science By Numbers



Growing Our Fleet



Grown from 3 to 12 aircraft in the last five years



Private Pilot . Instrument . Commercial . CFI-CFII-MEC . Multi-Engine Instructor

FAA and AABI Accreditation



AABInternational
2022

Leading the World in the Advancement
of Aviation Education Accreditation

CERTIFICATE OF ACCREDITATION

presented to

ELIZABETH CITY STATE UNIVERSITY

for the following Aviation Program:

B.S. in Aviation Science: Concentration in Aviation Management (AABI Management)
B.S. in Aviation Science: Concentration in Flight Education (AABI Flight Education)

Period of Accreditation: February 25, 2022, to February 28, 2027

Aviation Accreditation Board International

presented this 25th day of February 2022



**1000 hrs. to become an airline
pilot compared to 1500hrs –
Quicker pathway to airlines**



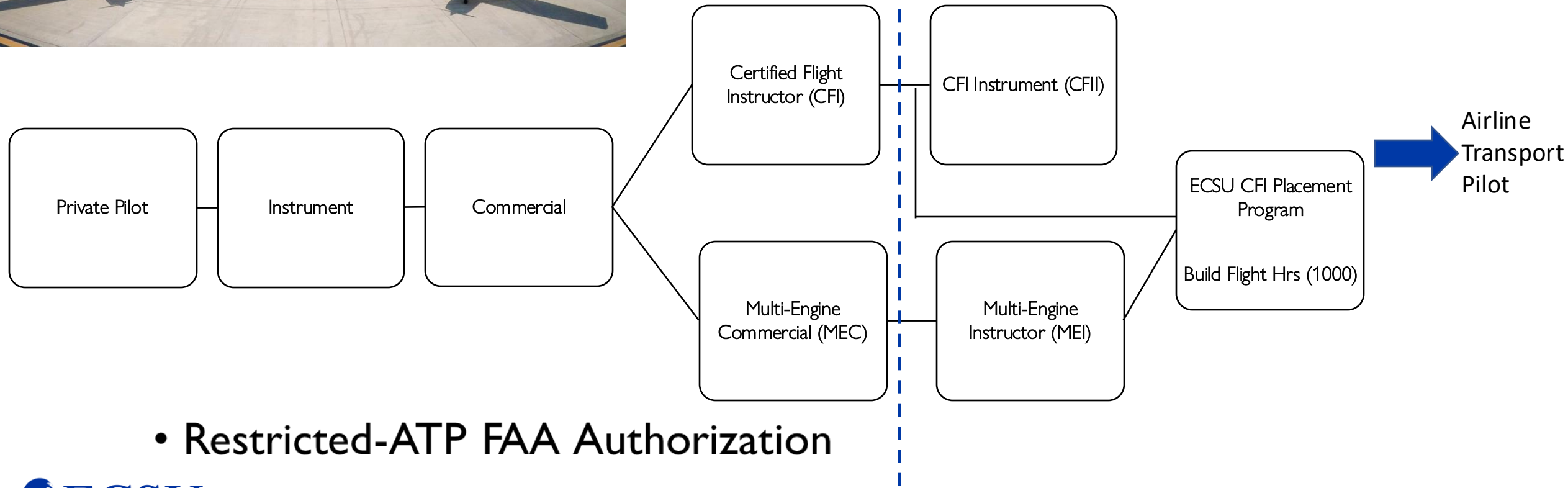
**FAA Designates ECSU a UAS-CTI
School as Aviation Program
Enrollment Growth Continues**

**ECSU Joins 40 Other Institutions in the World
with AABI Accreditation**

**ECSU received ATC-CTI
designation - one of only 3
HBCUs.**



Airline Transport Pilot (ATP) Pathway



- Restricted-ATP FAA Authorization

Historic V-22 Osprey Landing



Opportunities for ECSU's UAS Program



400+ Commercial UAV Applications Saves...Time, Resources & Lives

Precision Agriculture
Cell Tower Inspect
Plant Fertility Assess
Plant Water Content
Plant Disease Detect
Weed Mapping
Invasive Plants
Insect Attack Warning
Vegetation Identification
Selective Harvesting
Canopy Management
Herd Tracking
Telecommunications
High Altitude Imagery
Maritime Surveillance
Media
Traffic Monitoring
Disaster Relief
Real Estate Photography
Meteorology
Hurricane Monitoring
Cryosphere Research
Bridge Inspection
Transmission Line
Inspect
HAZMAT Inspection
Emergency Medical
Supply
Aerial Surveying
Damage Assessment
Insurance Claim
Appraisal
Concert Security
Sports Video
Runway Inspection
Virtual Tours
Coffee Harvest
Shark Watch
Shark Warning
Shark Repelling
Atmospheric Profiling

Cinematography
Virtual Tours
Hydrologic Modeling
Geomorphic Model
Flood Risk Assess
Law Enforcement
Pollution Monitor
Photogrammetry
Tidal Zone Mapping
Solar Panel Inspect
Anti-Piracy
Algae Proliferation
Rail Track Bed Inspect
Ocean Research
Saltwater Infiltration
Landmark Inspection
Illegal Ship Bilge
Venting
Emergency Com
Terrain Mapping
Sand Bank Shift
Hydrometric Mapping
Traffic Accident Analysis
Highway Design
Parking Utilization
FedEx Unmanned
Cargo
Instant Consumer Grat
Advertising
Coastline Surveillance
Pavement Roughness
Animal Rights Groups
Prevent Extinction
Ant-Whaling
Aerial Biology
Flood Warning
Insurance Adjuster
Mosquito Breed Detect
Crime Scene
Photography
Geomorphology

Entomology
Forestry Inspection
Fisheries Management
Species Conservation
Wildlife Inventory
Mineral Exploration
Remote Aerial Survey
Forest Fire Surveillance
Forest Fire Mapping
Volcano Monitoring
Remote Aerial Mapping
Oil Spill Tracking
Avalanche Prevention
Ice Pack Monitoring
Poaching Patrol
Insurance Claims
Public Safety
Firefighting
Golf Resort Market
Search and Rescue
Training
Meteorology
Stadium Events
Inspect Pipelines
Power Restoration
Newspaper Delivery
Fire Prevention
Wind Turbine Blade
Fire Risk Assess
Marine Sanctuary
River Discharge
Ship Collision
Maritime Mammals
Train Crashes
Golf Course Alligator
Patrol
Cloud Seeding
Communication Relay
Training

Pipeline Inspection
Chimney Inspection
Inspect HAZMAT
Motion Pictures
Inspect Landmarks
Aerial Photography
Manage Fisheries
Transmission Line
Inspect Icebergs
Real Estate Marketing
Crop Dusting
Aerial Land Survey
Volcano Monitoring
Surveillance
Predict Hurricane
Predict Earthquake
Wildlife Research
Archaeology
Food Delivery
Com Relay
Crop Dusting
Oil Rig Inspection
Predict Earthquake
Crime Investigation
Landslide Prediction
Predict Earthquakes
Railroad Track Inspect
Forest Management
Cloud Measurement
Aerosol Measurement
Coastal Water Quality
Maritime Surveillance
Work Documentation
Geophysical Survey
Plant Phenotyping
Airborne Internet Hub
Saltwater Infiltration
Marathon Monitoring
Invasive Species
Preserve Petroglyphs

Wildlife Research
Archaeology
Com Relay
Crop Dusting
Monument Inspect
Windmill Inspect
Dam Inspection
Nuclear Inspection
Runway Inspection
Urban Planning
Gravel Pit Inventory
Crop Dusting
Preserve Culture
Petroglyph
Preservation
Oil Discovery
Predict Landslides
Discover Quake Faults
Highway Design
Traffic Flow Analysis
Crash Reconstruct
Prevent Graffiti
Poaching Patrol
Sports Event
Mineral Exploration
Journalism
Meteorology
Sea Level Rise
Roof Inspection
Fishing Enforce
Wind Turbine Brake
Oil Spill
Detect/Monitor
Forest Health
Tree Illness Monitor
Criminal Car Tracking
Nuclear Radiation
Meas
Cartography
Emission Compliance
Atmospheric Sampling
Defibrillator Delivery

Crowd Control
Training
Traffic Accident
VIP Security
Topographic Maps
News Coverage
HAZMAT
Biological Agent Detect
Event Security
Port Security
Construction Progress
Forensic Photography
Air Sampling
Entomology
Avalanche Rescue
Medical Supply Delivery
Customs & Border
Atmospheric Profile
Cloud Properties
Coastal Patrol
Ozone Chemistry
Highway Roughness
Hurricane Genesis
Coastal Change
Boston Marathon
Seismology
Archeology
Bank erosion
Climate Monitoring
Internal Tornado Measure
Forest Regeneration
Volcano Ash
Measurement
Tree Growth
Construction Document
Traffic Control
Graffiti Reduction
Site Survey
Gold Prospecting

Asset Tracking
Vegetative Index
Mapping
Maritime Traffic
Weather Monitoring
Global Positioning
Athletic Perf
Improvement
Volumetrics
City Planning
Research
Change Detection
Flood Management
Insurance Damage
Assess
GIS Database
Environment
Assessment
Aerial Security
Road/Hwy Assessment
Fire Damage
Assessment
Aerial Cell Tower Relay
Ocean Research
Water Sampling
Tsunami Detection
Building Thermal
Analysis
Terrain Research
Irrigation Mapping
Nuclear Accident
UAV Sensor Research
Water Tower Inspect
Antenna Pattern Tracing
Magnetic Field Survey
Tsunami Debris
Commercial Fishing
Crime Forensics
Criminal Investigation
Tour Guide
Find Classes Big School

Meteorology
Monitor Moisture Level
Crop Growth
Crop Production
Plant research
Crop Pest Eating
Locust Monitoring
Predator Control
Evidence Gathering
Follow Kid to Bus Stop
Detect Mosquito Breed
Alligator Patrol
Airborne Pathogen
Crime Scene Photog
Cartography
Traffic Control
Insurance Adjuster
Direction Finding
Antenna Patter Measure
Irrigation Management
Highway Design
Pizza Delivery
Document Delivery
Textbook Delivery
Sushi Delivery
Netflix Delivery
Instant Gratification
Same Hour Delivery
Beer Delivery
Animal Rights Protection
Marine Life Monitor
Counting Birds
Hydrology
Water Sampling
Insect Detection
Anti Whaling
Bear Protection
Power Restoration
Cell Tower LOS

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



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 and Electives**

- 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 for Public Safety Operations
- UAS Flight Simulation
- UAS Sensor Data Analytics

- **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

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

FAA Designated UAS-CTI Program

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



UAS Lab Resources



Typhoon

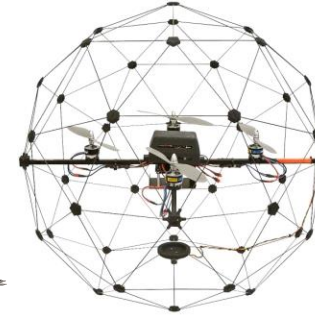
Albiris



RF70



DJI Mavic Enterprise



Q-Ball



eBee Ag



eBee SQ



eBee RTK



eBee X



sensefly S.O.D.A. 30



sensefly Aeria X



sensefly Aeria X



M600 with LiDAR



DJI Inspire



Next generation Aerial Image processing software. Simply powerful.

DragonFlyer X



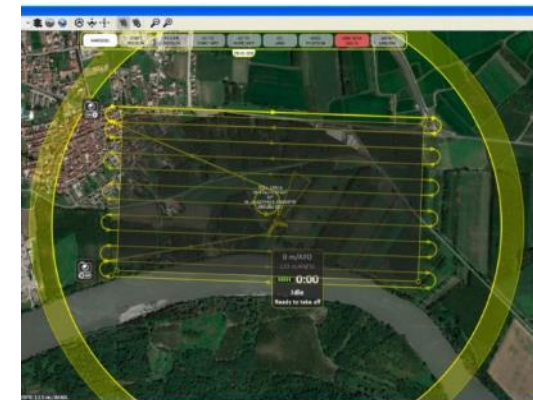
Aeromapper EV3



DJI Phantom



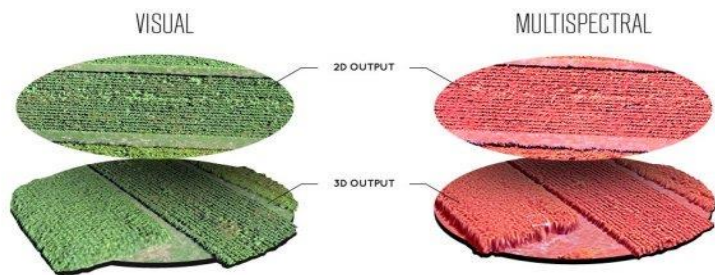
BFD SE-8



Sensor Payload



Zenmuse X3



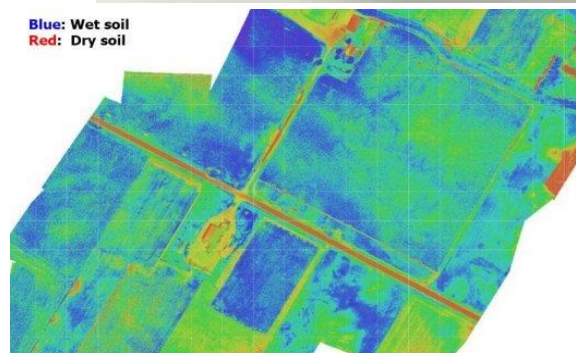
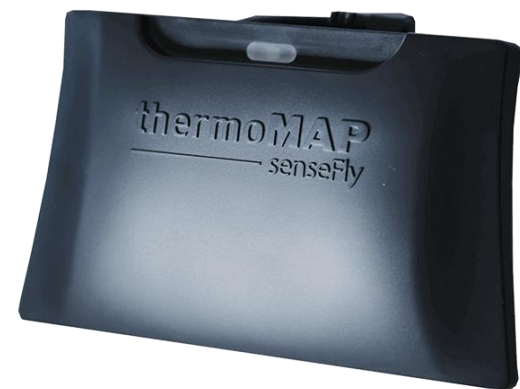
MicaSense Red Multispectral



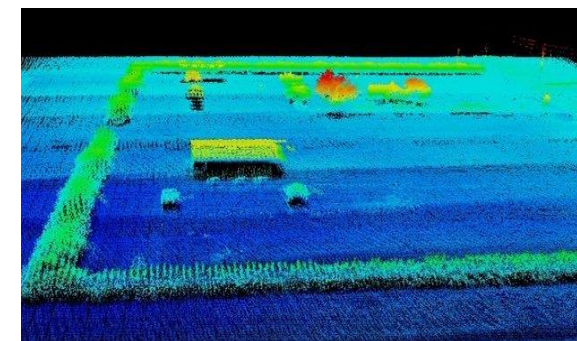
LiDAR



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

AVIATION/STEM Outreach Programs

- NASA Aviation/Aerospace Career Academy
- Residential



- Drone Exploration Academy
- Residential



- National Summer Transportation Institute
- Residential



Preparing Next Gen Aviators

NASA Aviation/Aerospace
Career Academy



FAA Aviation Workforce
Development



NATIONAL SUMMER
TRANSPORTATION INSTITUTE
CAREERS IN TRANSPORTATION

A group photo of 16 cadets and staff members in flight suits, standing in front of a blue backdrop with the "SUPER-16" logo and the Elizabeth City State University Aviation logo.

Aviation
ELIZABETH CITY
STATE UNIVERSITY

"SUPER - 16"

**The SUPER-16 Jr. ROTC
U.S. Air Force
and U.S. Navy Cadets**

Colin Copeland	Thomas Korsmo	Alison North	Aleksandria Troy
Julie Ghent	Emmanuel Li	Kamron Reis	Xitlali Vazquez
Jimmy Hall, Jr.	Noah Lorkowski	Justin Rodriguez	Joshua Ward
Blessings Kibet	Ethan Mace	Sofia Roush	Cheyenne Wood

Hosted 16 cadets from 11 states. We will host 24 new cadets from the DET-1 unit in the summer of 2023

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.

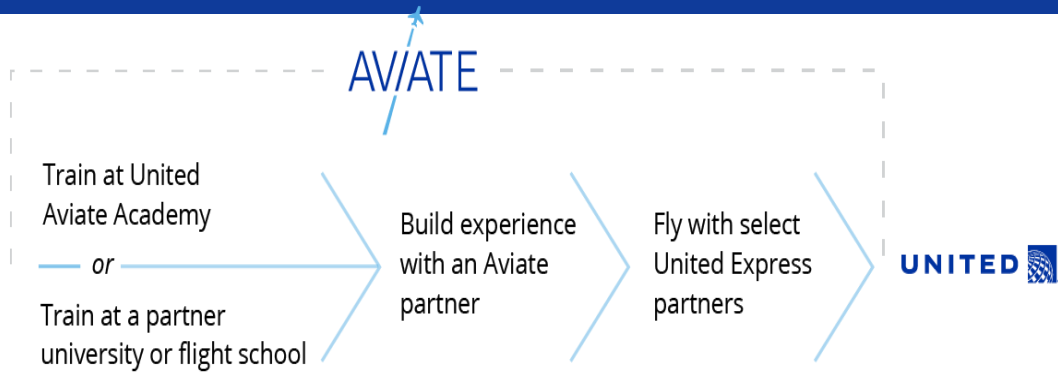
Launch Date: Fall 2022

Num of Participants = 80 students

Government & Community College Partnerships



Corporate Partnerships



Exciting New Partnership!

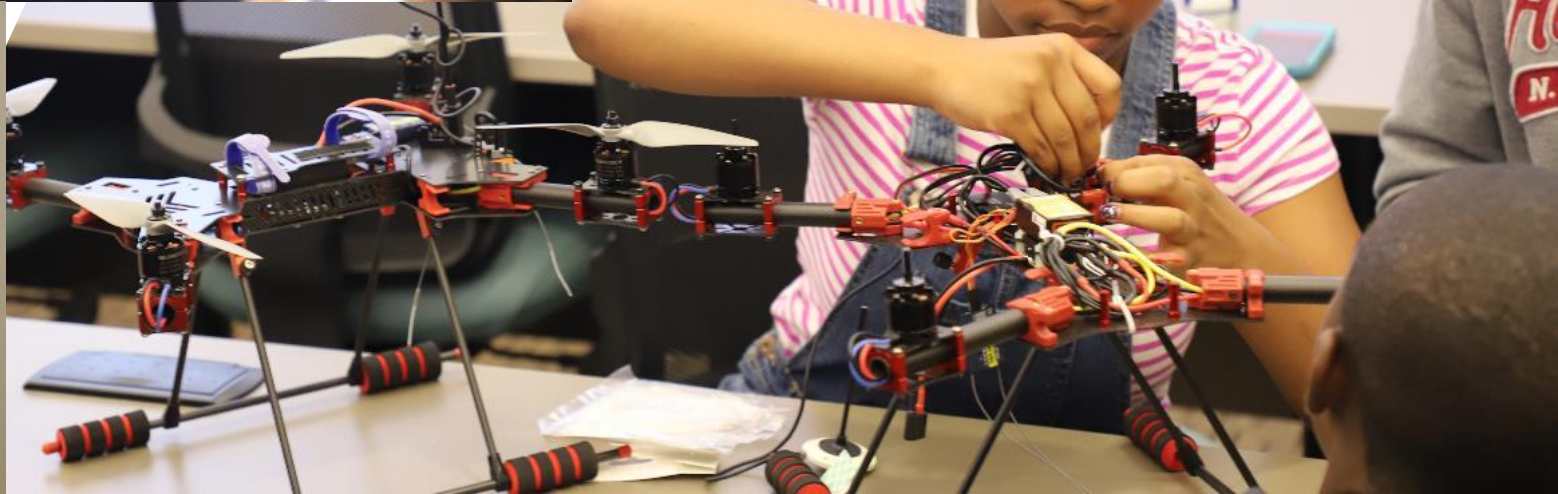


- ✓ Expand aviation education in North Carolina
- ✓ Strengthen and diversify aviation workforce
- ✓ Build unmanned aircraft system (drone) traffic management system in state



United Airlines Accepts its First ECSU Aviation Science Student to AVIATE Pilot Career Training Program



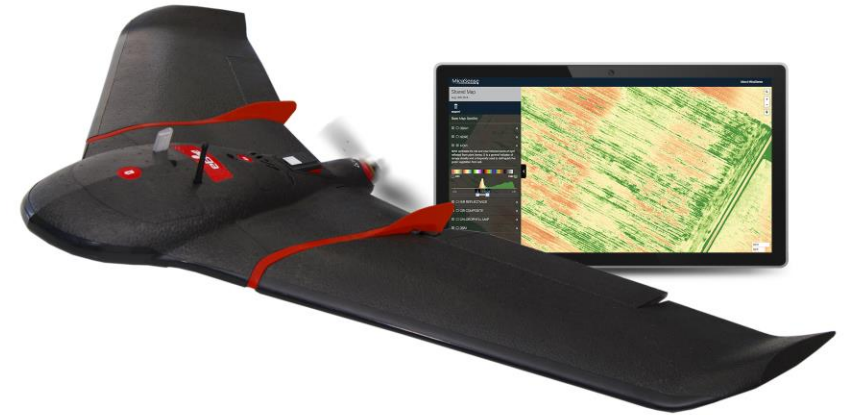


UAS Certificates and Training

- 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



UAS Pavilion



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

Advanced UAS Training & Manufacturing

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



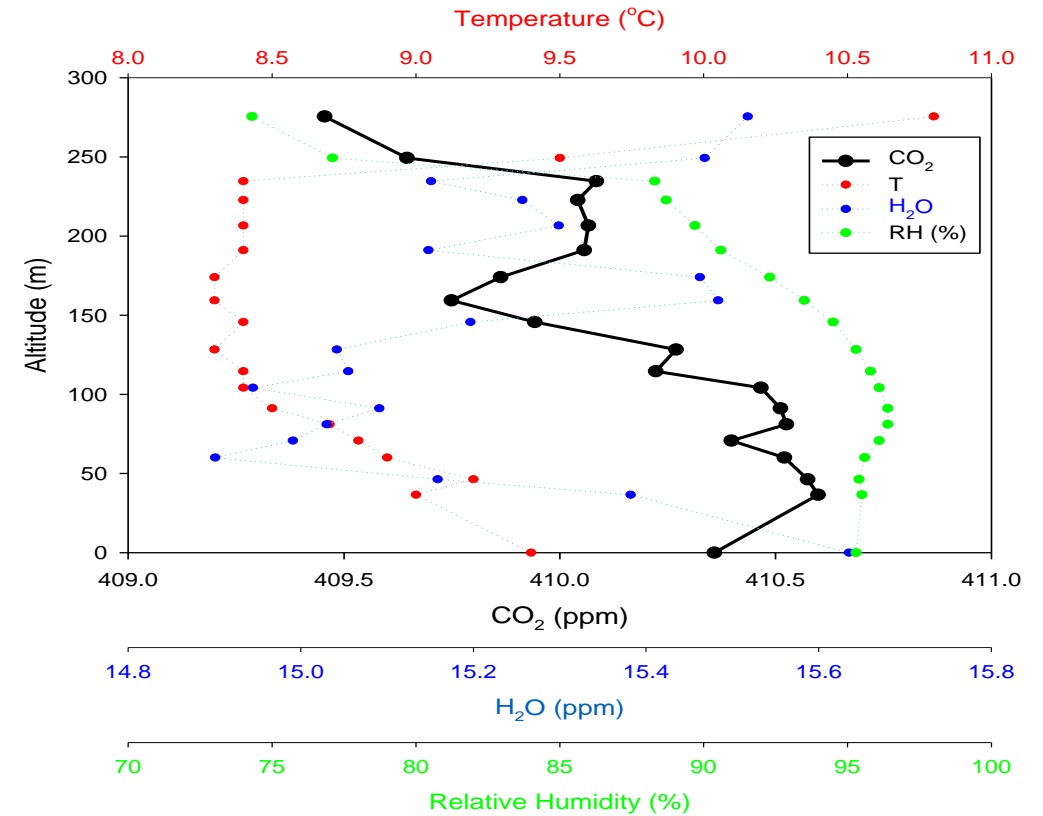
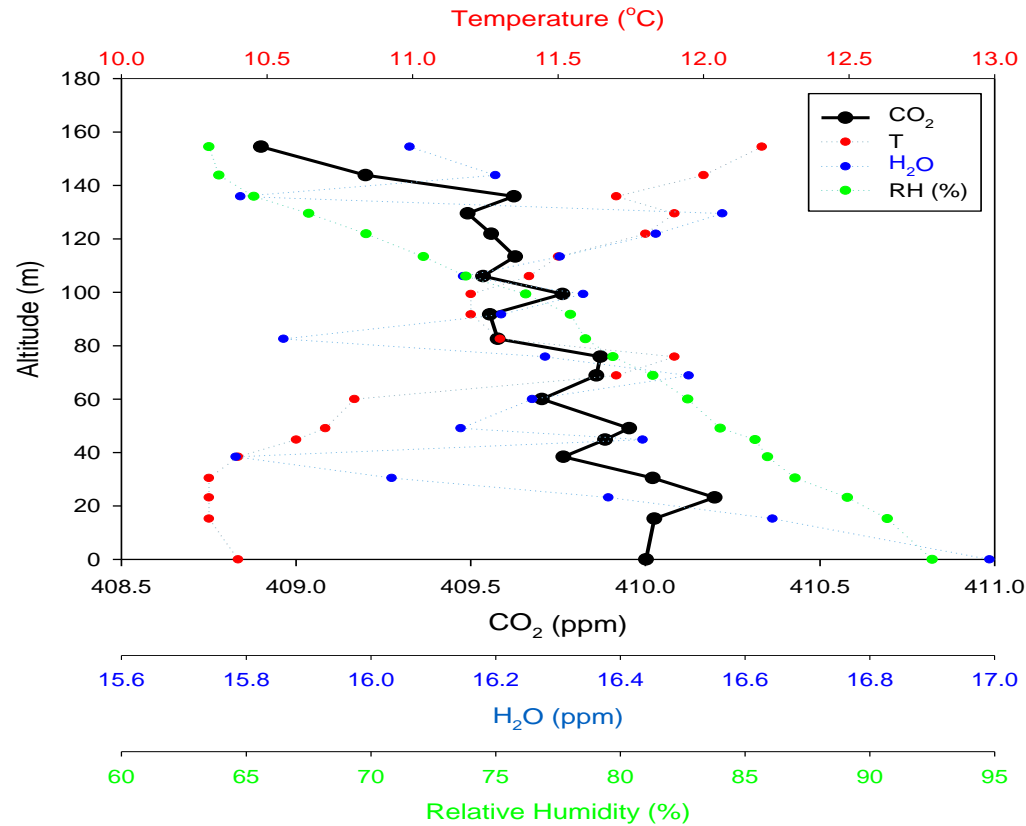
**ECSU Awarded \$576,333 from
NASA to Advance Aerospace
Manufacturing**

Research Project

Vertical Profiles of CO₂ in the Lower Troposphere at Mauna Loa Observatory

- Limited studies of the vertical and horizontal variations of carbon dioxide at these locations
- Significant improvement in sensor technology - capable of collecting atmospheric samples or carrying sensors for trace gases determinations
- DJI Matrice 600 Pro with a payload capacity of 6 kg and flight time of 18 mins was used with:
 - Carbon dioxide sensor
 - Water vapor sensor
 - Temperature sensor, and
 - Relative humidity sensor
- The drone with the sensors ascended from surface to 275 meters abruptly and then descend to a preset altitude and hovering for a minute for data acquisition
- Multiple vertical profiles of carbon dioxide were obtained at the observatory within about one hour

Results



A comparison of two vertical profiles of CO₂ shows that CO₂ at 120 m decreased by 0.5 ppm from that of surface. There were more rapid decreases in CO₂ above 120 m.

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



Pine Island Sanctuary



Northern Priority Area



Southern Priority Area

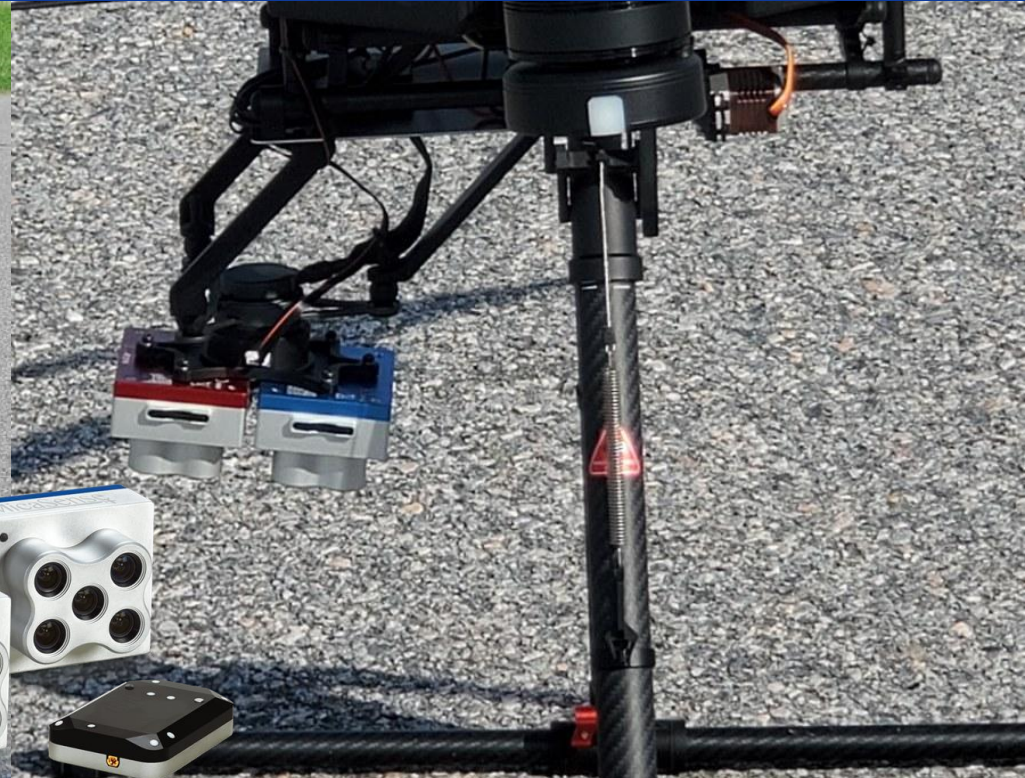
Drone Technology Used



DJI Mavic 2 Pro Enterprise (Quadcopter)



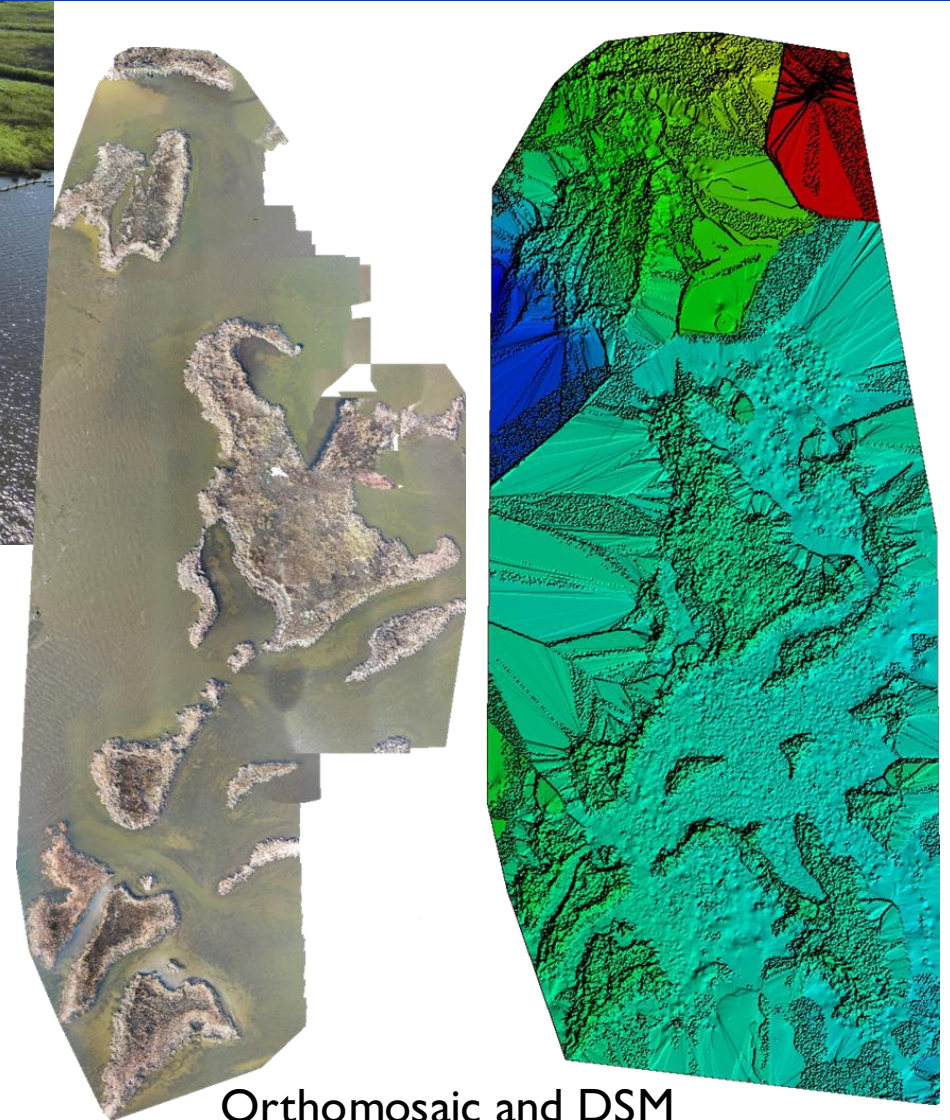
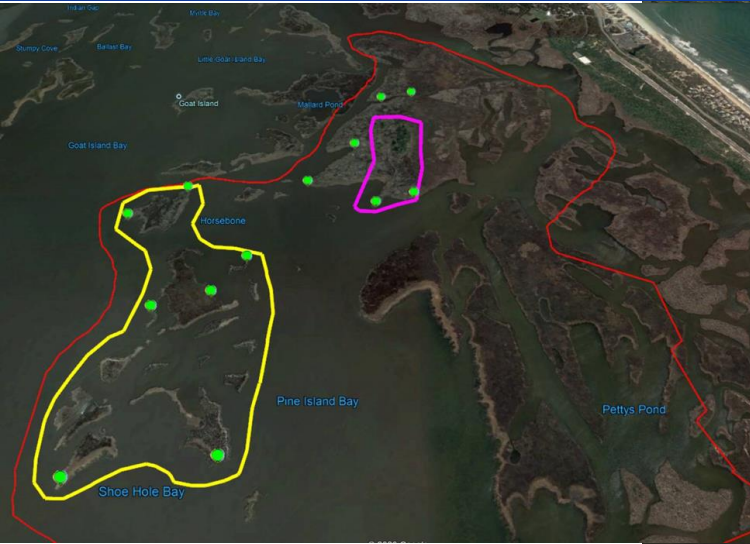
DJI Matrice 600 (Hexacopter)



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



Orthomosaic and DSM

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

Take Flight.



Aviation

Affordable education.
Rewarding in-demand careers.

Q & A

Kuldeep S. Rawat, Ph.D.
Dean of SAHT
Elizabeth City State University
Phone: 252-335-3846
Email: ksrawat@ecsu.edu



 **ECSU**
ELIZABETH CITY STATE UNIVERSITY
FOUNDED 1891