The Lone Star UAS Test Site

An update
Scientific Committee for Oceanographic Aircraft Research
San Diego, CA June 4-5 2014

Mike Starek (presenter)
Assistant Professor at Texas A&M University-Corpus Christi
Lead Institution and State Agency

- **Texas A&M University-Corpus Christi (TAMU-CC)**
  - UAS operations since 2011: 30 flights, 32.1 hours w/ RS-16 UAS
  - 450-square-mile maritime FAA certificate of authorization (COA)

- **Texas A&M University Engineering Experiment Station (TEES)**
  - Seven COAs, 2012-2013
    - Center for Autonomous Vehicles and Sensor Systems: CANVASS
    - Unmanned Flight Laboratory
    - Vehicle Systems & Control Laboratory
    - Helicopter and Unmanned Systems Laboratory
    - Center for Robotic-Assisted Search and Rescue: CRASAR
    - Center for Emergency Informatics: Human-factors research
### The LSUASC Team
(16 entities, 5 affiliated with universities)

<table>
<thead>
<tr>
<th>Texas A&amp;M University-Corpus Christi (TAMU-CC)</th>
<th>Texas Tech University (Lubbock, Texas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas A&amp;M Engineering Experiment Station (TEES)</td>
<td>Bay Area Houston Advanced Technology Consortium (BayTech)</td>
</tr>
<tr>
<td>Camber Corporation (Huntsville, Alabama)</td>
<td>Texas Department of Transportation/Aviation</td>
</tr>
<tr>
<td>Governor’s Office of Aerospace, Aviation and Defense</td>
<td>Jerry Thompson Associates (JTA, Washington, D.C.)</td>
</tr>
<tr>
<td>Chase Field Industrial Complex (Beeville, Texas)</td>
<td>Aviation Specialties (Sierra Vista, Arizona)</td>
</tr>
<tr>
<td>University of Texas at Arlington Research Institute (UTARI)</td>
<td>Modern Technology Solutions Inc. (MTSI, Alexandria, Virginia)</td>
</tr>
<tr>
<td>Southwest Research Institute (SwRI, San Antonio, Texas)</td>
<td>AvMet Inc. (Reston, Virginia)</td>
</tr>
<tr>
<td>University of Texas at San Antonio (UTSA)</td>
<td>Charles Johnson Airport (Port Mansfield, Texas)</td>
</tr>
</tbody>
</table>
Lone Star UAS Test Site Status

• FAA proposal submitted on May 3, 2013
• Awarded by FAA on Dec. 30, 2013

• 2014 actions under way
  - Develop capabilities
    *Mission Control Center, Electronics / Systems Lab, Integrated Data Environment*
  - Advisory board/executive director
  - COA applications proposed to FAA

Outreach
  ▪ Public: safety, privacy, environmental impact
  ▪ Industry, state, national
  ▪ Team R&D
Lone Star UAS Test Site Ranges

6100 mi², 11 geographically diverse ranges, sparsely populated coastlines
Current Active Ranges
(COAs tied to specific platforms)
TAMU-CC Padre Range

- Approx. 38 mi. north to south
- Approx. 450 sq. mi.
- Approx. 36 mi. south of campus (as crow flies)

ALT: SFC to 3000 ft

RS-16
TAMU/TEES Riverside Range

Airspace Dimensions
- ALT: SFC to 400’
- 2.2 NM east-west,
- 1.8 NM north-south

Texas A&M Flight Test Station
- Former military airbase
- 7,000’x150’ runway
- No functioning control tower
TAMU/TEES Disaster City Range

Dimensions of the Airspace:

- ALT: SFC to 200’
- ~0.4 NM east-west
- ~0.3 NM north-south

Center for Robotics Search and Rescue
Dr. Robin Murphy
Gulf Range
(not active)

Open Gulf range within Texas’ waters

- 41 NM x ~11 NM
- ~450 NM²
- ALT – SFC to 18000 ft

Proposed use is for medium to large-scale UAS to launch from Charles R. Johnson Airport in Laguna Madre Range
Lone Star UAS Test Site Research

FAA research focal areas

• UAS system safety and data gathering
• UAS airworthiness
• Command & control link issues
• Control station layout and certification
• Ground and airborne sense-and-avoid technologies
• Environmental impacts of UAS operations

Combinations of R&D team members working on these different aspects
Lone Star UAS Test Site Expertise

- FAA operations and coordination
- UAS acquisition, operations and maintenance
- UAS range operations (autonomous and manual)
- COA development
- Payload integration, assembly & testing
- Control of the ‘air wing’ & mobile Command Centers to reduce vendor costs/negotiation
- Integration/development and verification of ground control station

⇒ Proposal support to estimate costs for range use
⇒ Fees charged for services (e.g. COA or lab use) but not airtime
Command Centers

Mission Control Center

Mobile Control Center

Electronics Lab/ Systems Integration Lab
Support Centers

Coastal Bend Business Incubation Center

CANVASS

Riverside Range

Electronics Lab/ Systems Integration Lab (Notional)
TAMU-CC Support & Research Centers

iCore

Unmanned Systems Lab

Wind Tunnel

Geospatial Computing Lab

Harte Research Institute for Gulf of Mexico Studies

LONE STAR UAS CENTER OF EXCELLENCE AND INNOVATION

Bringing UAS to America’s Skies
TAMU-CC American Aerospace RS-16

Imaging Payload (25 lb): UV, Visible (RGB), Thermal IR
March 2013 Flight over Laguna Madre

Sample images

Research areas include seagrass, shore bird habitat, inundation mapping and model calibration...

Petroleum targets: crude oil, distillate, gasoline, diesel
Example: Shoreline Mapping
Padre Island National Seashore

Gulf of Mexico

~ 2 km swath of overlapping imagery

~15 cm ground resolution at 1200’AGL
~120 m x 170 m area
RS-16 Launch Video

http://www.youtube.com/watch?v=E6jppmODs-0

RS-16 Operations lead by Dr. David Bridges
07. K (1.5 lbs), RGB & Near-IR camera
45 minute flight time, 27 mph wind (max)
up to 10 km², 3cm/pixel resolution

*COA Altitude – SFC to 400 ft
*Can only fly when NAS airspace closes (Sunday 8-10 AM)
Applications for campus:
*Facilities assessment and coastal hazards monitoring*
Thank You SCOAR & Scripps!

Questions?

Lone Star UAS Test Site
http://lsuasc.tamucc.edu/
Dr. Ron George: ronald.george@tamucc.edu

TAMU-CC UAS Coastal Activities
Michael Starek: michael.starek@tamucc.edu
Lone Star UAS Test Site Research

- **UAS system safety and data gathering**
  TAMUCC, UTARI, AvMet Inc.
- **UAS airworthiness**
  TEES, TAMUCC, SWRI
- **Command & control link issues**
  TEES, UTARI
- **Control station layout and certification**
  TAMUCC, TEES, Texas Tech
- **Ground and airborne sense-and-avoid technologies**
  TAMUCC, TEES, SWRI, UTARI
- **Environmental impacts of UAS operations**
  SWRI
Lone Star UAS Test Site Status

- Community and media outreach: **Camber/TAMU-CC**
- MCC, ESIL and IDE initial capability: **Camber/TAMU-CC**
- Advisory board/executive director: **LSUASC UASTS Team**
  - Board members
  - Executive director
- COA applications for airspace proposed to FAA: **TAMU-CC**
- Business plan: **Camber/TAMU-CC**
  - Complex development landscape
  - Working group formed: Camber, TAMUCC, TEES
  - Principles: Diversity, collaboration, fairness