Uses and Regulations Covering Unmanned Aircraft Systems in Academia

Impact of Export Controls on Higher Education and Scientific Institutions

May 23-24, 2016

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Introductions

- The technology
- Drone research trends at universities
- Other uses for drones on campus
- Safety and liability concerns: damage to persons & property, insurance considerations, etc.
- What are the current FAA regulations applicable to drone use? A brief history
- The future of airspace regulations
- Operational areas for drones and airspace considerations? Test sites, restricted ranges, indoors, nets, etc.
- Should my campus have a drone policy?
- Exporting drones
Introductions

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• Justine Kasznica, Corporate Attorney, Saul Ewing LLP
• Matt Scassero – Director, UMD UAS Test Site; Maryland Associate Director, Mid-Atlantic Aviation Partnership
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DRONE SURVIVAL GUIDE

X47C © Military Surveillance / Attack

Sentinel © Military Surveillance

nEUROn © Military Surveillance / Attack

Soaring Dragon © Military Surveillance / Attack

Mantis © Military Surveillance

Global Hawk © Military Surveillance

Avenger © Military Surveillance / Attack

Predator © Military Surveillance / Attack

Eitan © Military Surveillance / Attack

Hertl © Surveillance

Reaper © Military Surveillance / Attack

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Hummingbird © Military Surveillance / Attack

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Rustom I © Military Surveillance / Attack

WASP III © Military Surveillance / Attack

Air robot © Surveillance / Attack

Scan Eagle © Military Surveillance

Harpy © Military Surveillance

Heron © Military Surveillance

Raven © Military Surveillance

Air robot © Surveillance / Attack

AR Parrot © Consumer photography

SAIPOR © Military Surveillance

AUECO

Meter

Feet

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10 20 30 40 50 60 70 80 90 100

0
What is an Unmanned Aircraft System (UAS)?

• The vehicle
• The ground control station
• The payload
• The links
• The human!
Research involving UAS
Data Collection – Modular Sensors

• Micasense Rededge multi-spectral camera - agriculture
Post-Flight Processing Capability

• Construct 3-D point cloud from 2-D photogrammetry
• Link image data to points along flight path
• Able to convert data from proprietary formats to CSV
What’s Next?

Emerging Technology Areas in UAS

- **Platform sense and avoid** technology to prevent collisions
- Increasing **autonomy for individual platforms**
- Spatially distributed **sensors** on an individual platform enable integration of measurement information over space as well as time
- **Collaborative autonomy** for coordinated missions
- Multi-hole probes that measure wind vector components to improve flight **navigation and control** in wind using feedback
- System **health monitoring** and robust **fault control**
- System level **command, control and communication**
- Power and propulsion, especially **battery technology**
- **Cybersecurity**
NextGen Education

Exemptions

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Beyond Research
UAS on Campus

• Student Recreational Use

• UAS as Classroom Tools
  – Film, Construction, Agriculture, Environmental Science, Aviation, Engineering, Computer Science/Robotics, Cybersecurity, Fine Arts

• Extra-Curricular Projects/Entrepreneurship

• Dedicated Drone Centers
  – FSU’s Center for Disaster Risk Policy
Beyond Research

UAS on Campus

• Marketing the Campus
  – *Huerta v. Pirker* (UVA)

• Athletics/Sporting Events/Concerts

• Emergency Management
  – Drones for Campus Safety (Olaeris)
  – Campus Police First Responders

• Other Creative UAS Uses
  – Fine Public Art Installations/Contests
  – Drone Delivery Services
    • Zookal, Australia
  – Drone Lending Programs
    • USF Library
Safety and Liability

• As far as FAA and insurers are concerned – these are aircraft
• It is an aviation activity, not a toy or science project
• Traditional aviation insurance versus UAS insurance
  – No actuarial data = overpriced
  – AUVSI now providing DroneGuard UAS insurance; Willis Programs, underwritten by London-headquartered Global Aerospace
Liability assignment

• Who owns it, especially for autonomous systems
  – The pilot who is monitoring?
  – The system designer who set the requirements?
  – The software coder who wrote the s/w?
  – The systems integrator?

• HUGE ethics issue - Autonomous system dilemma

or

=
Drone Crash Brain Damage
Falling drones can hit onlookers in the head causing brain damage

(561) 316-7207 FOR MORE INFORMATION
Liability/Risk

• Drone-Related Incidents
  – Drone-Person Interaction -> Loss
  – Drone-Property Interaction -> Loss
  – Drone Lost/“Missed at Destination”

• Damage/Loss will depend on type of operation
  – RPV v. AAV
  – VLOS v. BLOS
Managing Risk

• Think of Drone as Truck/Car, not Flying Tool/Camera
• Training of Operators
• Knowledge Requirements/Internal Programs
• Performance Standards
• Operational Plan Pre-Procurement
• Injury and Illness Prevention Plan (IIPP)
• Data Management
• Insurance
The Rogue User
Safety Concerns

• FAA: @1000 Near Collisions with Manned Aircraft Reported in 2015 (up 4x from 2014)

• B4UFLY App
The Rogue User

Privacy Concerns

- Hacking/Cybersecurity
- Peeping Toms
- Harassment
- Surveillance/Spying
Current FAA regs

• 2012 FAA Modernization and Reform Act
  – UAS by exception
  – Model aircraft
  – Commercial aircraft – Section 333
  – Public Aircraft – Certificates of Waiver or Authorization (COA)

• May 4th 2016 FAA interpretation
  – Students may fly under model aircraft interpretation
    • ~<55 pounds
    • Community standards (AMA)
    • Part of coursework, no pay
The Section 333 Exemption

• “Blanket” 400 ft COA is issued with Exemption
• As of March 2016, Exemption allows operator to fly any of the sUAS previously approved by FAA
• Key Conditions
  – Night Flying Prohibited
  – Weight: <55lbs (including payload)
  – Speed: No more than 100 mph
  – Altitude: No higher than 400 ftAGL
  – Visual Line of Sight (VLOS) of Pilot in Command (PIC) at all times
  – Visual Observer (VO) must accompany PIC and have VLOS
  – PIC must have at minimum recreational or sport pilot license (April 2015)
  – Valid driver’s license will satisfy medical requirement of PIC (April 2015)
Proposed Small UAS (sUAS) rules

- Went public 23 February 2015
- 60 day public comment period...~ two year reconciliation to final
- Similar to hobby rules, with a few changes...
  - <55#, <100 mph, <500’ AGL
  - May fly autonomously
  - FAA airworthiness certification is not required
  - Autonomous flight is allowed
  - Operations in Class B, C, D and E airspace are allowed with the required ATC permission
  - Operation from watercraft, moving or stationary, is allowed (operation from land and/or air vehicles is not authorized)
  - Operators certificate vice a pilots certificate (FAA training)
  - Micro UAS class proposed (<4.4#), no autonomous flight
To Date, No Final Rules….BUT...

• FAA Registration Required, Even for Hobby Drones (0.55-55lbs) (December 2015)
• FAA Reauthorization Bill (Passed House and Senate)
  – Micro UAS Amendment
  – Higher Education UAS Modernization Amendment (Introduced)
    • Allows for Use of Drones by Higher Ed. Institutions without Separate FAA Authorization
    • Requires Robust University Policy
      – Safety, Privacy, Training, Supervision
  – Privacy Policies required
  – Secretary of Transport can issue exemptions for BVLOS operations
  – New class of air carriers created
• Presidential Memo (2015) NTIA to establish multistakeholder engagement process
  – Best practices concerning privacy, civil rights, civil liberties
Other Legal Considerations

• Check NOTAMS for List of Updated Restricted Areas

• Permanent:
  – White House
  – National Parks
  – Some Airports

• Temporary
  – Stadiums
  – Events
Other Legal Considerations

• Check UAS State Laws
  – Over 26 states have enacted UAS regs or laws, with most states introducing bills, as of 2015
    • Many of these laws address privacy, public safety issues
  – D.C.’s 15 mile radius “No Drone Zone”

• Check Local Laws
  – E.g. Pittsburgh passed ordinance prohibiting drone use in public parks
Get creative with airspace

- Combine restricted and unrestricted airspace
UAS Test Sites

- The FAA Modernization and Reform Act of 2012 required the FAA to establish a program to integrate UAS into the national airspace system at six Test Ranges.
- Awards were announced Dec 30, 2013 to:
Other options
Should We Have a Campus Drone Policy?

• YES.
• YES.
• YES.
Drone Policies

- Effective Drone Policies Require Multi-Stakeholder Participation
  - Prospective Users/Uses
    - Research Faculty
    - Athletic Department
    - Student Projects
    - Campus Programs/Initiatives
    - Campus Police
    - Student Representatives
    - Marketing/Communications
  - Office of General Counsel
  - Emergency Management
  - Other Interested Parties
Drone Policies

Unless “No Drone Policy,” An Effective Drone Policy....

- Needs to Understand and be flexible enough to support diverse USER NEEDS
- Needs to follow Current Federal, State, Local Law
  - Section 333 Petition or Public COA
- Needs to follow existing University Policies
  - Privacy, Safety #1 Concerns
  - Nonthreatening environment
- Needs a process for obtaining approval from University
  - Scope of Operation
  - Operator Qualifications
  - Location/Approvals Granted
- Needs a coordinating function for processing requests to operate
- Needs to recognize risks and plan for damage/injury/loss
  - Insurance
  - Injury Prevention and Incident Response Plan
- If violated, Penalties need to be made clear and need to be ENFORCED!
UAS Export Control
VIII Aircraft and Related Articles
(a)(5) Unarmed military unmanned aerial vehicles (UAVs) (MT if the UAV has a range equal to or greater than 300km);
(h)(12) (UAV) flight control systems and vehicle management systems with swarming capability

9A012 Non-Military “UAVs” or unmanned “airships”, designed to have controlled flight out of the direct ‘natural vision’ of the ‘operator’ and having any of the following:

a.1.a. A maximum 'endurance' greater than or equal to 30 minutes but less than 1 hour; and
a.1.b. Designed to take-off and have stable controlled flight in wind gusts equal to or exceeding 46.3 km/h (25 knots); or
a.2. A maximum 'endurance' of 1 hour or greater;
9A012 (CONT’D):
b.3. Equipment or “components” “specially designed” to convert a manned “aircraft” or a manned “airship” to a “UAV” or unmanned “airship”, controlled by 9A012.a;
b.4. Air breathing reciprocating or rotary internal combustion type engines, “specially designed” or modified to propel “UAVs” or unmanned “airships”, at altitudes above 15,240 meters (50,000 feet).

9A120: UAVs Having:
b.1. Incorporating an aerosol dispensing system/mechanism with a capacity greater than 20 liters; or
b.2. Designed or modified to incorporate an aerosol dispensing system/mechanism with a capacity of greater than 20 liters.

9A610: Controls many parts and components for VIII aircraft
Licensing Requirement: EAR CONTROLLED (EXCLUDING EAR99)

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- For shipping: Licensing requirement for all countries except Canada
- May be eligible for TMP exemption (740.9) but review restrictions in 740.2
Licensing Requirement: ITAR

• Any person who intends to export or to import temporarily a defense article must obtain the approval of the Directorate of Defense Trade Controls prior to the export or temporary import...(22 CFR 123.1)

• Limited exemptions for trade shows, air shows, etc.

• Access controls may be required for foreign person access within the US. See “Defense Service”(22 CFR 120.9)
What about the Payload?

UAVs are often used to fly sensors that are also export controlled.

- **FLIR Cameras**
  - USML XI&XII
  - ECCN 6A002&003
- **Multispectral Camera**
- **Synthetic Aperture Radar**