The Path to Regulation of Small Unmanned Aerial Vehicles in the United States

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Introduction
This poster presents an overview of proposed regulations that are presented in [1] related to a revised approach to small Unmanned Aerial Vehicles (UAV) regulation in the United States. Prospective strategies for enhancing UAV regulation are considered as is the pathway to develop and implement these regulations. The benefits of changing the UAV regulatory regime are discussed, on both a user/prospective user and societal scale.

Current Regime
From the FAA’s perspective, in order to legally operate a small NAS under the current rule set:
1. The operating entity must apply for and receive a Certificate of Authorization (CoA) from the FAA. This certificate allows the user to operate NAS under a very tightly-defined set of circumstances.
2. A statement of airworthiness for the aircraft itself must be included, despite the fact that many small unmanned aerial systems (sUAS) are built and/or assembled by the operators, who are not aeronautical engineers.
3. The only entities that are issued CoAs are law enforcement and research universities or other public entities: no commercial operators are allowed to apply.

The current CoA process is likely to be overhauled completely:
1. The FAA has been tasked by Congress in the FAA Modernization and Reform Act of 2012 to “develop a comprehensive plan … integration of civil unmanned aircraft systems into the national airspace system” by September 30, 2015.
2. Regulatory reform is included in that mandate, and reform of the current system of regulations is required for several reasons.
3. First, the current framework fails to provide a legal way for commercial, educational and many other desirable uses for UAS.
4. Second, the current framework is poorly defined and unclear as to what falls in many categories.
   - The 2007 policy document further confines
   - Further complicating matters is the FAA’s use of a press statement to purportedly clarify the previous policy document.
   - Third, the current framework treats small and large UAVs/UASs the same.
   - Forth, licensure is segmented by purpose, which could change mid-flight.

Two Classes of UAVs, General Standards
Two classes of small UAVs are proposed with corresponding regulatory requirements. The smaller class, which draws its regulatory inspiration from Section 101 of the Federal Aviation Regulations, will include UAVs under six pounds in weight (and meeting other characteristics). The larger class, which draws its regulatory inspiration from Section 103 of the Federal Aviation Regulations, will include UASs under 254 pounds. General standards have been inspired by both sections.

In all cases, UAV operations will be subject to several principal regulatory requirements:
1. That operation must not create a hazard (it will be left to codes of conduct to define how hazard avoidance is performed)
2. That operation must not involve the dropping of an object that will create a hazard to a non-consenting individual or to the property (real or personal) of a non-consenting individual.
3. That these regulations will not apply to UASs with a current airworthiness certificate which are licensed for operations under a different part of the Federal Aviation Regulations.
4. Operation will not involve the collection of imagery or other data in areas where a bona fide expectation of privacy exists, unless this data is collected under a research-board-approved scheme that protects the privacy of individuals.
5. Operations governed by these regulations will be during daytime only.
6. Operation will be sufficiently far from non-consenting individuals and their real and personal property as to not create a hazard or cause them alarm. The owners of real property shall be entitled to give consent for operations over their property for the purposes of meeting this consent requirement only.
7. All UAVs operated under these regulations shall have the name, address and contact information for their owner displayed in a conspicuous place on the aircraft.
8. The FAA Administrator or his/her designee shall be granted access to inspect a craft operating under these regulations to confirm the applicability of these regulations to the craft.

These UAVs shall not require:
- “Airworthiness certification standards specified for aircraft or to have certificates of airworthiness”
- Operators “to meet any aeronautical knowledge, age, or experience requirements to operate those vehicles or to have airman or medical certificates”

Ultra-Small UAVs
Ultra-Small UAVs shall be deemed to include:
- Remotely piloted or autonomous vehicles with a mass less than four pounds
- Remotely piloted or autonomous vehicles with a mass less than six pounds and a mass to surface area (calculated by dividing the mass by the surface area of the smallest side of the craft) ratio of no greater than 3 ounces per square inch

These vehicles shall be operated:
- With sufficient situational awareness (if remotely piloted) to prevent the creation of a hazard or
- With sufficient autonomous control to prevent the creation of a hazard, and
- At altitudes of no more than 400 feet and
- At altitudes of no less than 200 feet above private property without the consent of the owner of that property
- In a manner that does not create nuisance to non-consenting individuals

Adopting Regulations
Notwithstanding significant larger structural problems, we propose that the FAA promulgate a new regulatory part for small size/mass NAS. This new regulatory part would classify some NAS as small NAS and ultra-small NAS. More stringent regulations for small NAS may be justified by their need to operate in the airspace used by larger craft (and thus subject to FAA regulation under the commerce clause and 49 USC, Chapter 401). Ultra-small NAS would not be subject to those regulations.

Although creating a firm legal framework for these new rules would be ideal, it may be unnecessary. Our proposed regulatory scheme largely leaves the smallest NAS intentionally unregulated since they operate in non-navigable airspace controlled by the appurtenant property owner, which is “regulated” by the common law or state statute regarding nuisance, trespass, privacy, etc. These proposed regulations would likely satisfy stakeholders and avoid the complexity and duration of a Constitutional challenge to FAA authority.

Small NAS
Small NAS shall be deemed to include:
- Unpowered NAS with a mass < 155 pounds or
- Powered NAS with a mass of 254 pounds or less
- Masses shall exclude safety equipment
- Carry no more than 5 gallons of fuel
- Sustaining a speed of no more than 55 knots
- With a power-off stall of no more than 24 knots

These vehicles shall be operated:
- With a teleoperation system capable of consistently providing visibility of at least 180 degrees, centered from the front of the aircraft and at least 60 degrees above the vector of orientation of the aircraft and ten degrees below the vector of orientation of the aircraft
- Autonomously, with the availability of a teleoperation system that allows an operator to immediately assert control over the aircraft and at least one operator for each operating craft
- With this system having a latency of no more than one-quarter of one second
- With an automatic return and landing system capable of operating the UAV
- Not more than 75% of the communications range away from the control transmitter / receiver
- Following the right-of-way yielding listed in FAR 103.13 (UASs shall yield to ultralights and all other craft, unless such yielding creates a hazard)

Acknowledgement
This paper presents an overview of the work detailed in [1]. The text herein has been adapted from this paper.

Reference