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Via Electronic Filing  
Docket Operations, M-30  
U.S. Department of Transportation (DOT)  
1200 New Jersey Avenue SE  
Room W12-140, West Building Ground Floor  
Washington, DC 20590-0001

**Re: Docket No. FAA-2015-0150; Notice No. 15-01**  
**Operation and Certification of Small Unmanned Aircraft Systems**

The Electronic Frontier Foundation (EFF) is grateful for this opportunity to respond to the Federal Aviation Administration's request for comments on its proposed rules for Small Unmanned Aircraft Systems (sUAS).<sup>1</sup> EFF is a nonprofit civil liberties organization with more than 27,000 dues-paying members. It has worked for almost 25 years to protect consumer interests, innovation, and free expression in the digital world and to ensure that our rights grow instead of diminish as we use new technology.<sup>2</sup>

One of EFF's primary missions is to champion the rights of coders, makers, and innovators to experiment with and use new technology with as few restrictions as necessary.<sup>3</sup> It is this mission that motivates our comments today.<sup>4</sup> We feel that in general

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<sup>1</sup> Docket ID FAA-2015-0150-0017, available at <http://www.regulations.gov/contentStreamer?documentId=FAA-2015-0150-0017&disposition=attachment&contentType=pdf>

<sup>2</sup> For more information on EFF, please see <https://www.eff.org>.

<sup>3</sup> See <https://www.eff.org/issues/innovation>

<sup>4</sup> EFF has conducted a long-running campaign to investigate law enforcement use of UAS, and to advocate for warrant requirements for their use. (See, e.g., <https://www.eff.org/foia/faa-drone-authorizations/>.) While we continue to be concerned about the privacy dangers raised by UAS use by both law enforcement and the public, we restrict our comments today to their privacy-neutral uses.



the proposed rules are a step in the right direction. It is certainly the case that *some* uses of sUAS should require registration (without going through the onerous process of airworthiness certification), and operator certification (without the training necessary for an actual pilot's license). Additionally, for *some* use cases, the operational limitations laid out in the rules (visual line of sight, no nighttime flight, etc.) are commonsense restrictions with which we agree.

However, we believe the proposed rules paint with too broad a brush—even if the FAA adopted the proposed micro-UAS rules. In particular, we believe the FAA should further relax its rules concerning a class of UAS we dub “low-altitude micro-UAS”—UAS with a takeoff weight of at most two kilograms, made of frangible materials, operating at low-altitudes well below the navigable airspace (e.g. 200 feet or less), far from airports (e.g. five miles or more).

There are a variety of innovative, privacy-neutral applications for low-altitude micro-UAS, including precision agriculture,<sup>5</sup> environmental monitoring,<sup>6</sup> building inspection,<sup>7</sup> education,<sup>8</sup> journalism,<sup>9</sup> and art,<sup>10</sup> all of which could be performed with

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<sup>5</sup> See, e.g., Grassi, Matthew, “5 Actual Uses For Drones In Precision Agriculture Today,” DRONELIFE (Dec. 30, 2014). <https://web.archive.org/web/20150423203047/http://dronelife.com/2014/12/30/5-actual-uses-drones-precision-agriculture-today/>.

<sup>6</sup> See, e.g., Martin, Adama, “Using Drones to Capture Environmental Violations Makes Perfect Sense,” The Wire (Jan. 25, 2012).

<https://web.archive.org/web/20150423203252/http://www.thewire.com/technology/2012/01/using-drones-capture-environmental-violations-makes-perfect-sense/47872/>.

<sup>7</sup> See, e.g., Fricke, Glenn, “My Review of the AR Drone for roof inspections,” InterNACHI Inspection Forum (Jun. 12, 2012). <https://web.archive.org/web/20150420120723/http://www.nachi.org/forum/f77/my-review-ar-drone-roof-inspections-72588/>.

<sup>8</sup> See, e.g., Schroyer, Matthew, “Drones for Schools,” Robohub (Sep. 24, 2013).

<https://web.archive.org/web/20150327060534/http://robohub.org/drones-for-schools/>.

<sup>9</sup> See, e.g., <http://www.dronejournalismmlab.org/> or Lavrinc, Damon, “Forget the Helicopter: New Drone Cuts Cost of Aerial Video,” WIRED (May 17, 2012).

<https://web.archive.org/web/20141128013225/http://www.wired.com/2012/05/drone-auto-vids/>.



minimal risk to people, property, or manned aircraft. Unfortunately the proposed rules would stifle such applications. They would make it harder for farmers, environmentalists, inspectors, teachers, reporters, and artists to use micro-UAS as a tool in their professions without having to become full-time micro-UAS operators. At the same time the proposed rules would have little effect on the small amount of risk these applications pose. We implore the FAA to modify the proposed rules and create a set of exemptions for low-altitude micro-UAS flight, so that these sort of low-risk, high-payoff applications can be conducted in an innovation-promoting permission-less system.

The remainder of our comments are organized as follows. We begin by explaining in detail the problems inherent in the proposed rules, focusing on how they will stifle innovative, low-risk uses of low-altitude micro-UAS. We then outline a set of modified rules for low-altitude micro-UAS, which we believe would enable innovation while still ensuring safety. We also provide a legal argument, which would allow the FAA to adopt such a set of modified rules, before concluding.

### **The Proposed Rules Would Stifle a Variety of Innovative Low-Altitude Micro-UAS Applications That Pose Minimal Safety Risk**

In this section we explain how the proposed rules would stifle innovative low-altitude micro-UAS applications, without significantly improving public safety.

We begin with the registration requirement.<sup>11</sup> If enforced evenly and without discrimination, such a rule would require the registration of all micro-UAS used for a non-hobby purpose—even tiny toy quadrotors. As Judge Patrick Geraghty noted in *Huerta v. Pirker*, by this logic “a flight in the air of, *e.g.*, a paper aircraft, or a toy balsa wood

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<sup>10</sup> See, *e.g.*, Squatriglia, Chuck, “Robots Perform Shakespeare,” WIREd (Nov. 18, 2009).

<https://web.archive.org/web/20140820035048/http://www.wired.com/2009/11/robots-perform-shakespeare/>

<sup>11</sup> Proposed in the notice of proposed rulemaking (NPRM) as 14 C.F.R. 107.13(b).



glider, could subject the ‘operator’ to the” registration requirement.<sup>12</sup> As an example of the ridiculousness of this requirement, imagine if an elementary school wanted to hold an outdoor paper airplane contest as part of its science curriculum (clearly a non-recreational use, since it would be conducted for an educational purpose). In such a scenario, every single paper airplane would have to be registered before it could be flown. Perhaps more realistically, the registration requirement would also be triggered if a high school, as part of its technology curriculum, held a quadrotor-building competition. Surely it is not the intent of the FAA to require high school students to register and display markings on their amateur-built micro-UAS they built for purely educational (and thus non-hobby) purposes. Indeed, we cannot fathom a legitimate government interest in requiring the registration of (or display of markings on) low-altitude micro-UAS, given the minimal risk they pose to safety.

Of course the example of the high school technology class brings us to the proposed age restriction.<sup>13</sup> While the age restriction may or may not be triggered in the scenario described above (since some high school students are 17 or more years of age) it would certainly be triggered if a middle school teacher wanted to let her students fly a toy quadrotor outside as part of a class (again, a non-recreational use). Given the proper supervision (not to mention the fact that many toy micro-UAS can be safely operated by children<sup>14</sup>), we cannot fathom any reasonable objections to allowing low-altitude micro-UAS to be operated by children under the age of 17, especially when supervised by an adult.

We are also concerned about the requirement that sUAS operators obtain an “Operator Certificate” before flying.<sup>15</sup> At first blush this requirement sounds reasonable;

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<sup>12</sup> Dkt No. CP-217 (NTSB March 6, 2014), available at <http://www.nts.gov/legal/alj/Documents/Pirker-CP-217.pdf>.

<sup>13</sup> Proposed in the NPRM as 14 C.F.R. 107.61(a).

<sup>14</sup> “Review of 12 Fun Drones for Kids,” Dronethusiast (Dec. 10, 2014).

<https://web.archive.org/web/20150423203902/http://www.dronethusiast.com/12-drones-for-kids/>.

<sup>15</sup> Proposed in the NPRM as 14 C.F.R. 107.13(a).



nobody wants inexperienced pilots flying UAS willy-nilly in populated areas. But the test for the Operating Certificate is a written one only, which means it won't test for any sort of piloting skill.<sup>16</sup> Instead, it tests for knowledge of “team management,” “airport operations,” “airspace classifications,” and “the effects of drugs and alcohol.”<sup>17</sup> We argue that these topics are clearly irrelevant for low-altitude micro-UAS flight far away from airports. After all, why would an artist flying his drone far from an airport need to know about airspace classifications or airport management, as long as he knows he must be at least five miles away from an airport and keep his micro-UAS under a certain altitude?

While the suggested self-certification process for micro-UAS operations would mitigate this flaw to some degree, it would still require a low-altitude micro-UAS operator to wait for the FAA to respond to her request for an Operator Certificate before flying. Given the huge backlog the FAA currently faces in processing requests to operate UAS,<sup>18</sup> and the likelihood that there will be a surge in applications for UAS operation once the rules are enacted,<sup>19</sup> a low-altitude micro-UAS operator could expect to wait a very long time before receiving a reply. Given that self-certification would in practice accomplish very little to enhance safety, we believe it would be easiest if the FAA simply exempted low-altitude micro-UAS operators from the certification requirement.

Furthermore, from a civil liberties point of view we are concerned about the requirement that applicants for an Operator Certificate (for any class of sUAS operation) must first pass a TSA background check. The TSA (in conjunction with the FBI) has a spotty record when it comes to performing background checks, putting people on no-fly

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<sup>16</sup> We should point out that we support the FAA's conclusion that no piloting test should be necessary, especially as it concerns micro-UAS. Many commercial micro-UAS, especially quadrotors, feature automatic hovering and stabilization algorithms that make them trivially easy for unskilled operators to control.

<sup>17</sup> See the proposal in the NPRM for 14 C.F.R. 107.73(a).

<sup>18</sup> Jansen, Bart, “Amazon urges faster FAA approval of drones,” USA Today (Mar. 24, 2015).  
<http://www.usatoday.com/story/money/2015/03/24/amazon-drones-faa-senate-hearing/70376382/>.

<sup>19</sup> “Aviation schools prepare for boom in demand for drone pilots,” CBS News (Dec. 12, 2013).  
<https://web.archive.org/web/20140215133534/http://www.cbsnews.com/news/aviation-schools-prepare-for-boom-in-demand-for-drone-pilots/>.



lists for dubious reasons, including refusing to become an FBI informant,<sup>20</sup> questioning the government’s national security apparatus,<sup>21</sup> or even just by mistake.<sup>22</sup> Additionally, it is unlikely that terrorists or other potential wrongdoers would bother to get an Operator Certificate (and would likely be able to avoid scrutiny by flying any UAS as a “hobby”). Given these issues, we are unclear what actual security goals the FAA intends the background check requirement to accomplish. This requirement appears to be what renowned security expert Bruce Schneier has termed “security theater:” wasteful at best, and harmful at worst.<sup>23</sup>

We are also concerned about some of the restrictions the rules would place on the operation of low-altitude micro-UAS. For example, there would be little danger to people or property if a farmer used a micro-UAS to monitor her crops in a rural, unpopulated area by flying it low to the ground beyond her visual line of sight (VLOS)—especially if such a micro-UAS could fly autonomously (i.e. by following GPS waypoints) and had the capability to return home or automatically land in case of an error. Despite the minimal danger, the prohibition on beyond-VLOS flight would prevent such an application.<sup>24</sup>

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<sup>20</sup> Sadeghi, Shirin, “U.S. Citizen Put on No-Fly List to Pressure Him Into Becoming FBI Informant,” The Huffington Post (June 7, 2012)

[https://web.archive.org/web/20150416132133/http://www.huffingtonpost.com/shirin-sadeghi/kevin-iraniha-no-fly-list\\_b\\_1579208.html](https://web.archive.org/web/20150416132133/http://www.huffingtonpost.com/shirin-sadeghi/kevin-iraniha-no-fly-list_b_1579208.html).

<sup>21</sup> Greenwald, Glenn, “U.S. filmmaker repeatedly detained at border,” Salon (Apr. 8, 2012).

[https://web.archive.org/web/20150403142418/http://www.salon.com/2012/04/08/u\\_s\\_filmmaker\\_repeatedly\\_detained\\_at\\_border/](https://web.archive.org/web/20150403142418/http://www.salon.com/2012/04/08/u_s_filmmaker_repeatedly_detained_at_border/).

<sup>22</sup> Egelko, Bob, “She got on the no-fly list because the FBI checked the wrong box,” SFGate (Feb. 7, 2014).

<https://web.archive.org/web/20150131202321/http://blog.sfgate.com/stew/2014/02/07/she-got-on-the-no-fly-list-because-the-fbi-checked-the-wrong-box/>.

<sup>23</sup> Schneier, Bruce, “Beyond Security Theater,” New Internationalist (Nov. 2009).

[https://web.archive.org/web/20150102205541/https://www.schneier.com/essays/archives/2009/11/beyond\\_security\\_thea.html](https://web.archive.org/web/20150102205541/https://www.schneier.com/essays/archives/2009/11/beyond_security_thea.html)

<sup>24</sup> Proposed in the NPRM as 14 C.F.R. 107.31.



Similarly, there would be little danger from a student filmmaker using a micro-UAS to take footage of a well-lit nighttime sporting event, especially if he were flying adjacent to the field (i.e. not over people) and lower than the surrounding stands. Again, despite the minimal danger the proposed prohibition on nighttime flight would prevent such an application.<sup>25</sup>

Finally, estimating crowd size via aerial photography at protests is an important and innovative application of micro-UAS.<sup>26</sup> A journalist who flew a micro-UAS weighing less than a pound in order to estimate crowd size at a protest would pose very little danger to the people underneath. However, the prohibition on flying over persons not involved in the UAS' operation would prevent such an application.<sup>27</sup>

These examples represent important applications that the FAA could allow without introducing overly complex regulations, while still fulfilling its mandate to ensure safety.

### **A Modified Set of Rules for Low-Altitude Micro-UAS Operation**

Given the above scenarios, we propose the following modified rules for low-altitude micro-UAS operation. The FAA should:

1. Exempt low-altitude micro-UAS from any registration or marking requirements.
2. Exempt operators of low-altitude micro-UAS from needing an Operator's Certificate (either by taking a knowledge test or by self-certifying).
3. Allow children of any age to operate low-altitude micro-UAS, or at the very least, allow children under the age of 16 to operate low-altitude micro-UAS under the supervision of an adult.

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<sup>25</sup> Proposed in the NPRM as 14 C.F.R. 107.29.

<sup>26</sup> Choi-Fitzpatrick, Austin, "Drones Will Change the Way We Estimate Crowd Sizes, and That's a Big Deal," Slate (Dec. 1, 2014).

[https://web.archive.org/web/20150324212335/http://www.slate.com/blogs/future\\_tense/2014/12/01/drone\\_technology\\_can\\_help\\_estimate\\_crowd\\_size.html](https://web.archive.org/web/20150324212335/http://www.slate.com/blogs/future_tense/2014/12/01/drone_technology_can_help_estimate_crowd_size.html).

<sup>27</sup> Proposed in the NPRM as 14 C.F.R. 107.39.



4. Allow beyond VLOS flight of low-altitude micro-UAS, so long as:
  - a. The UAS only flies over property that the operator owns or for which the operator has previously obtained permission from the owner or their representative to fly over, and,
  - b. The operator reasonably believes that the UAS will not fly over people who are not part of its operation.
  - c. If the FAA deems it necessary, require low-altitude micro-UAS flown beyond VLOS to have a functioning return-home or auto-landing capability that would be triggered automatically in case of a UAS fault (such as loss of the control signal).
  - d. If the FAA deems it necessary, require low-altitude micro-UAS flown beyond VLOS to operate under an even lower altitude restriction (e.g., 50 or 100 feet).
5. Allow nighttime flight of low-altitude micro-UAS, so long as:
  - a. The UAS does not fly over people who are not involved in its operation, and,
  - b. The UAS is equipped with lights that make it visible from the ground and air to some minimum distance (e.g., 1,000 feet), and,
  - c. The UAS is maintained within the operator's VLOS at all times. (Nighttime operation and beyond-VLOS operation would thus be mutually exclusive).
  - d. If the FAA deems it necessary, require low-altitude micro-UAS flown beyond VLOS to operate under an even lower altitude restriction (e.g., 50 or 100 feet).
6. Allow low-altitude micro-UAS flight over people not involved in the aircraft's operation, so long as the aircraft's takeoff weight is below some lower threshold (e.g., one pound or less).



Additionally, the FAA should not require applicants for an Operator Certificate (for any class of sUAS—not just for low-altitude micro-UAS) to undergo a TSA background check prior to receiving their Certificate.

The adoption of these rules would be beneficial for the public as well as the FAA. From the public’s perspective, these rules would allow for flexible use of low-altitude micro-UAS in a large number of scenarios (such as those described above) that would have minimal safety risk.<sup>28</sup> These applications will be driven largely by people for whom the operation of a micro-UAS would not be central to their professions, but instead simply be another tool they could use to carry out their jobs. In other words, the operators for these sorts of applications are unlikely to be full-time professional UAS operators. As a result, it is these sorts of operators who are most likely to decide that even though micro-UAS use would be beneficial, these benefits would be outweighed by onerous regulations (especially the proposed certification, registration, and marking requirements). By adopting the more relaxed rules we describe above, the FAA would be enabling these non-professional (but still non-hobby) operators to fly their micro-UAS in a permission-less regulatory regime. This would encourage investment and innovation without sacrificing safety.

### **Legal Justification for the Modified Micro-UAS Rules**

Of course the FAA has other obligations beyond safety, i.e. statutory obligations that it must fulfill as a matter of law. We turn now to these statutory obligations, and explain how the low-altitude micro-UAS rules we propose above are compatible with them. In the NPRM, the FAA claims that

“because a small UAS involves the operation of an ‘aircraft,’ this triggers the FAA’s registration and certification statutory requirements. Specifically,

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<sup>28</sup> Koebler, Jason, “Small Drones Aren't a Threat to Airplanes If You Don't Fly Them Near Airports,” Motherboard (Dec. 22, 2014).

<https://web.archive.org/web/20150414180709/http://motherboard.vice.com/read/small-drones-arent-a-threat-to-airplanes-if-you-dont-fly-them-near-airports>.



subject to certain exceptions, a person may not operate a civil aircraft that is not registered. 49 U.S.C. 44101(a) . . . Finally, a person may not serve in any capacity as an airman on a civil aircraft being operated in air commerce without an airman certificate. 49 U.S.C. 44711(a)(2)(A).”

We believe this overstates the FAA’s requirements. Take 49 U.S.C. 44101(a), which states that “a person may operate an aircraft only when the aircraft is registered under section 44103 of this title.” Despite this straightforward requirement, the FAA has seen fit in previous rulemakings to exempt certain types of aircraft from this requirement. For example, 14 C.F.R. 103.7(c) states that “Notwithstanding any other section pertaining to registration and marking of aircraft, ultralight vehicles are not required to be registered or to bear markings of any type.” It is thus clearly within the FAA’s authority to exempt certain classes of aircraft from the registration and marking requirements. Since the government interest in registration and marking of low-altitude micro-UAS is certainly no greater than its interest in the registration and marking of ultralight vehicles, we ask the FAA to use its authority to exempt low-altitude micro-UAS from the marking and registration requirements.

Similarly, 49 U.S.C. 44711(a)(2)(A) states that “A person may not . . . serve in any capacity as an airman with respect to a civil aircraft . . . without an airman certificate authorizing the airman to serve in the capacity for which the certificate was issued.” However, the FAA is not statutorily bound to apply this requirement to all airmen: 49 U.S.C. 44701(f) specifically states that the “The Administrator may grant an exemption from a requirement of a regulation prescribed under . . . any of sections 44702–44716 of this title if the Administrator finds the exemption is in the public interest.” Indeed, the FAA has used this authority to exempt operators of ultralight vehicles from the certification and age requirements. It is clearly the case that the operation of ultralights is more complex, and requires more aeronautical knowledge, than the operation of low-altitude micro-UAS. Given that the Administrator has found that exempting ultralights from the certification requirement is in the public interest, it is clear that he should find



that exempting operators of low-altitude micro-UAS from the certification requirement would also be in the public interest.

## **Conclusion**

For some time now the FAA has taken a strict approach to the regulation of micro-UAS, enforcing rules without any flexibility, and with a focus on enforcing its perceived interpretation of the letter of the law, as opposed to focusing its enforcement efforts on safe sUAS operation.<sup>29</sup> As a result, the micro-UAS industry in this country has stagnated, with companies and entrepreneurs moving overseas to countries with less hostile regulatory regimes.<sup>30</sup> This rulemaking is an opportunity for the FAA to adjust its course and allow innovation in the micro-UAS space to blossom, without endangering anyone's safety. Low-altitude micro-UAS flight represents a unique category of sUAS operation that encompasses a wide variety of innovative, beneficial, privacy-neutral uses that pose few safety risks. By taking a more permissive approach to regulating low-altitude micro-UAS flight, the FAA will guarantee a much smoother (and just as safe) beginning to the integration of sUAS into the national airspace.

Sincerely,

s/Jeremy Gillula, Ph.D.

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<sup>29</sup> For example, instead of focusing on safe sUAS use the FAA has focused on whether or not there is *any* commercial aspect to the operation of an sUAS. *See, e.g.*, <https://www.scribd.com/doc/258492727/FAADoc-2-pdf>.

<sup>30</sup> *See, e.g.*, Wagstaff, Jeremy, "Game of drones: As U.S. dithers, rivals get a head start," Reuters (Mar. 9, 2015). <https://web.archive.org/web/20150410160427/http://www.reuters.com/article/2015/03/09/us-tech-drones-idUSKBN0M40VM20150309>. *See also* Nicas, Jack, "Regulation Clips Wings of U.S. Drone Makers," Wall Street Journal (Oct. 5, 2014). <https://web.archive.org/web/20150127195000/http://www.wsj.com/articles/regulation-clips-wings-of-u-s-drone-makers-1412546849>.