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Autonomous Drones: Set To Fly, But May Not Comply

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There is finally an autonomous selfie drone to help you take videos of yourself doing all of the things that your Instagram followers may or may not care about. California-based startup Skydio has unveiled the R1, a "fully autonomous flying camera" that uses 13 cameras and a supercomputer to "make intelligent decisions, plan real-time movements and navigate complex environments" to capture 4K video of its subject.

The autonomous functionality enables the subject to simply "swipe up" on their smartphone and let the drone do the rest, staying trained on the subject, capturing footage and avoiding any obstacles even as the subject mountain-bikes down a wooded trail. Aimed at "athletes, adventurers and creators alike," the R1 carries a price tag of $2499 and can be purchased from the company's website.

But while the selfie stick on steroids aims to take the guesswork and drudgery out of flying the drone, it can't do the same for regulatory compliance. A drone that flies itself may run afoul of a number of Federal Aviation Administration regulations, even if it has fancy obstacle detection and personal tracking. Federal law, it turns out, is harder to avoid than a tree or a rock.

What Regulations and Requirements Apply, and Can the Selfie Drone Actually Meet Them?

If the "adventurer" in question is using the R1 recreationally, the drone may qualify as a model aircraft and be subject to a lighter set of regulations. However, it's not enough to just open the box and start

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Practice Areas

Uncrewed Aircraft Systems (UAS)

shredding: A mandatory set of safety guidelines still applies.

Section 336 of the FAA Modernization and Reform Act of 2012 (FMRA) allows recreational unmanned aircraft systems users to largely escape the FAA's regulatory authority, but to qualify for the exemption, the drone must be operated "in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization." In practical terms, this means that the operations must conform to the guidelines promulgated by the Academy of Model Aeronautics, the only organization that currently fits this description.

Although use of autonomous UAS control software is permitted under the AMA safety guidelines, there are some key restrictions that should help prevent selfie drones from harming or aggravating innocent bystanders. First, the AMA only permits use of autonomous UAS where the operator can "deactivate the autopilot automated flight at any time to resume manual control" of the aircraft. (The R1 appears to have this feature, promising to give users "as much or as little control as [they] want through the mobile app," though it is unclear whether the level of control permitted is sufficient under the AMA guidelines.)

In addition, the AMA safety code requires modelers to, among other things:

- Keep the UAS within visual line of sight;
- Refrain from flying the UAS "in close proximity to crowds of people at outdoor sporting events, music festivals, political gatherings, firework displays or beaches";
- Maintain a distance of at least 25 feet from other individuals;
- "Avoid" flying their UAS directly over "unprotected people, animals, vessels, vehicles or structures;"
- Notify air traffic control before flying within five miles of airports; and
- Yield the right of way to other manned aircraft.

The FAA also has a role in keeping people safe from recreational selfie drones, as the FMRA expressly authorizes the FAA to pursue enforcement against anyone who operates a model UAS in a way that "endanger[s] the safety of the national airspace system." In addition, federal law requires that all small UAS weighing above .55 pounds, including those used for recreational purposes, be registered with the FAA. Although last year the D.C. Circuit invalidated the FAA's interim final rule on registration as applied to recreational UAS, Congress recently reinstated the requirements.

For commercial users, like the millennial posting drone selfies on the sponsored Instagram account that pays for his or her student loan debt, there are even stronger regulatory protections in place. The FAA has broad authority under Section 333 of the FMRA to regulate commercial UAS, and has implemented its Part 107 regulations to impose conditions and limitations on small commercial UAS operations.

In addition to requirements like those in the AMA safety guidelines providing that commercial UAS must remain within visual line of sight, may not be operated over people, must yield to other aircraft and may not be operated recklessly, Part 107 imposes several additional restrictions relevant to selfie drone operations:

- Operators must hold a remote pilot certificate with a small UAS rating, which requires passing an aeronautical knowledge test administered by the FAA and background check by the U.S. Transportation Security Administration;
- Operations may not be conducted at night, from a moving vehicle or aircraft or in a manner that "interferes with operations and traffic patterns of any airport";
- ATC authorization is required for operations in most classes of airspace;
- Operators may not operate multiple UAS simultaneously; and
- Accidents must be reported to the FAA within 10 days.

The FAA contemplated autonomous operations when it promulgated Part 107, finding that "the rule[s] will allow autonomous small UAS operations," but, similar to the AMA guidelines, "the remote pilot in command must retain the ability to direct the small unmanned aircraft to ensure compliance with the requirements of part 107."

The important question with all of these requirements — for recreational and commercial UAS alike — is whether an autonomous drone like the R1 could actually meet them. For instance, the R1 is designed to sense and avoid obstacles to stay trained on its subject, but can it tell when those obstacles are other people? If It can, can it then take the necessary steps to avoid flying over or too close to them? What about other aircraft — is the R1's control software sophisticated enough to sense and avoid either manned aircraft or other drones?

If the answers to any of these questions is no, even the most attentive of operators may be unable to resume manual control in time to meet FAA and AMA requirements. Similarly, the AMA safety guidelines have been developed by a group of careful and responsible hobbyists whose focus traditionally has been on flying the aircraft as an end goal; an aircraft that flies itself and is focused on the operator is, in some sense, the opposite of what model aircraft have traditionally been. Does a selfie drone really fit within the intent of the AMA's safety guidelines?

Flying Toward an Autonomous — and Dystopian — Future?

Assuming that they can meet regulatory and other safety requirements, innovations like the R1 could have an important role in the advancement of UAS technology. In requiring that commercial UAS pilots retain the ability to control the aircraft in the Part 107 rulemaking, the FAA was animated by the concern that "[w]hile sense-and-avoid equipment may one day be integrated into an autonomous aircraft to aid the pilot in

avoiding hazards ... there is insufficient data to establish that UAS equipage is able to, at this time, detect other nearby aircraft in a manner that is sufficient to provide a substitute for the human pilot's ability to see and avoid those aircraft."

Thus, the R1 not only promises to create an entirely new category of selfies, but is also poised to provide important information to the FAA and industry regarding the potential of sense and avoid technologies. And Skydio isn't the only entity exploring autonomous UAS operations.

For starters, DJI's Phantom 4 boasts sense and avoid technology and the ability to track a moving subject. It's also possible that operations authorized under the U.S. Department of Transportation's new UAS Integration Pilot Program will explore new applications for autonomous UAS. For instance, the mayor of Louisville, Kentucky, filed an application seeking to operate UAS that can autonomously fly to gunshot sites and assess the scene for first responders.

Positives aside, the New York Times frets that the R1 represents the first wave in a dystopian future where everyone will be followed by a personal surveillance drone. While these privacy concerns are real, as with so many other things about drones, it may not ultimately be the aircraft that presents the biggest problem. Whether run by the government or by private companies, a network of cheap and ubiquitous ground-based cameras running a variant of Skydio's pattern recognition software would be a far more effective surveillance tool than a buzzing, intrusive swarm of drones with 16 minutes of flight time. Grounding or restricting autonomous drones based on privacy concerns without thinking about license plate readers, for example, is grinding a very small tip off of a very large iceberg.

In sum, the selfie drone promises that everyone (well, everyone with $2500) can use a drone without a second thought, but FAA regulations aren't set up for full autonomous operation yet. The agency will want to have a lot more confidence in the technology before it's ready to lift the obligations that apply to all drone users. In the meantime, "athletes, adventurers and creators alike" should treat operation of the R1 with the same seriousness and attention to regulatory detail as any other drone.