



Drone Policy Overview

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Modern advances in unmanned aerial systems (UAS), or drones, have meant the proliferation of these aircraft throughout the United States (U.S.) that include uses for military, government, commerce, and recreation. Coinciding with advances in technology, increased access to drones, and decreased operational complexities, regulatory models have not been able to adapt to the evolving aerial environment. UAS were initially developed in a military context in World War I and World War II for reconnaissance, ultimately leading to the weapon-bearing Predator Drone firing Hellfire missiles in Afghanistan as early as 2001 [1]. In contrast, civilian UAS, almost exclusively until just recently, have been operated as model remote-controlled aircraft for recreational and hobby purposes since gaining popularity in the 1960s [2]. Today, civilian drone capabilities have increased to the point where companies such as Amazon are testing unmanned package delivery services; in the future packages will most likely be delivered within 30 minutes of order placement [3]. In addition to the various applications of drones creating challenges for finding and establishing practical regulatory frameworks, the technologies and capabilities are advancing at a much faster rate than the regulatory pace that are restricting the abilities for companies to fully integrate drones into their operations while, at the same time, increasing the potential for privacy invasions and public endangerment.

The number of drones sold in the U.S. and registered with the Federal Aviation Administration (FAA) have increased exponentially over the last few years; in fact, the number of properly licensed drones in the U.S. currently outnumber the number of licensed manned aircraft by 5,000, for a total of 325,000 registered drones in early 2016 [4]. The economic outlook for this emerging technology is also increasing alongside the growth in drone purchases. The commercial drone market was valued at \$2.3 billion in 2016, and it is expected to nearly double to \$5 billion by 2025 [5].

Fragmentation between current federal and state drone policies is creating tension between policymakers at the different levels and creating demands for jurisdictional answers. As a result of evolving technologies, there are also large legal gaps where current regulatory frameworks do not apply and new frameworks do not yet exist. The FAA defined civilian drones as aircraft and

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published specific regulations when new guidance or regulations are created, they fit into the framework that exists for manned aircraft regulation. This requires a nuanced understanding that only those who are already very familiar with manned aircraft regulation can grasp. Widespread public knowledge of drone regulations does not exist, and no larger purpose-based classification system yet exists. As a whole, the United States is not ready or equipped to handle this massive surge in drone use from all sectors, and as a result, the rights and safety of both private citizens and drone users are at risk.

With an already large and continuously growing industry that spans the country, users ranging from hobbyists to multinational corporations, and drones ranging from small recreational toys to missile delivery systems, it is unsurprising that U.S. governing bodies have struggled to effectively legislate these unmanned aircraft and its associated technologies. One of the major challenges associated with promulgating effective drone regulation is the incredible diversity of drones and purposes for which drones can be used. The objective of this brief on current drone use is to examine the existing landscape of drone policy in the military, public, commercial, and individual sectors. Ultimately, a classification scheme based on drone activity upon which regulations could be built, is proposed as a guide.

Approaches and Results

For the purpose of this brief, the current status of drone regulation for various users was investigated. Specifically, four different groups of drone users in the United States were identified as the primary users of drones: the military, the government, private companies, and individuals. Each group uses drones for widely varying sets of purposes, and thus faces very different regulatory challenges. In the following sections, the findings for each group will be addressed separately, with final recommendations reflecting the overall lack of regulatory frameworks for drones.

Military

The volume and variation of uses of drones by the U.S. military has vastly changed in recent decades. Today, drones are employed by every branch of the United States military in a number of

different roles ranging from providing real time intelligence and surveillance to ground commanders, to performing strike missions against enemy targets, to being used as targets for missile training operations. However, similar to civilian drone issues, the pace of policy and regulation has not kept pace with the rapidly growing number of drones in use by the U.S. military around the world.

The regulation of military drone policy is lacking, particularly with regards to training of drone pilots [6]. For instance, manned aircraft have very specific restrictions about when and where they can operate, usually dependent upon guidance by high-level decision makers. However, throughout the global war on terror, multiple branches of the United States military and numerous government agencies have implemented drones extensively against those suspected of acting in support of or alliance with terrorist organizations [7]. This relaxed use of drones compared to manned aircraft strikes has, in many instances, had detrimental impacts to the integrity of the United States, particularly when collateral damage involves civilians and even if the reports are speculative or unconfirmed [8]. Because the risk for loss of life of American servicemen may be greater when combat operations are using manned aircraft, it does not mean that drones can be the automatic replacement tool.

Inconsistencies between manned and unmanned aircraft regulation exist for pilot training requirements. The length of training required in order to become a pilot with the U.S. Air Force, compared to a comparable U.S. Army drone pilot are different [6]. While one job requires finely tuned flight knowledge of the aircraft and systems, both jobs put operators in possession of tremendous firepower and responsibility. Regulations pertaining to the training of drone operators are currently lacking in the military context and they must expand in order to cover the rising demands of society. The Government Accountability Office (GAO) released a report stating that 37% of the drone pilots for the Army and Air Force are temporarily reassigned manned aircraft pilots, and nearly 84% of the drone units are not meeting their minimum annual training time requirements [6]. One particular concern that possibly stems from pilots not being properly trained and policies not being explicitly clear is misuse of data that invades expectations of privacy, particularly with regards to the privacy of Americans on U.S. soil. As the role of drones in surveillance functions grows within the US military, regulations

and policies governing how they can be employed in training and in live missions must be cemented and nested alongside civilian law in order to protect the American people.

Government

Between 2012 and 2013, a “Drone Census Database” compiled with data collected through Freedom of Information Act (FOIA) requests, showed that the FAA had authorized over 100 United States government drone operations and data on the government use of drones in the U.S. [9, 10]. After an analysis of the database, a preliminary purpose-based classification system for government drone use was created. The purpose of this initial classification is to evaluate the different ways drones are currently being used by government agencies and to highlight the need for policy regulation based more on the intended use of the drone than the operational capacity of the drone.

Purpose-Based Classification of Government Drone Use:

1. Crime Prevention/Detection
 - a. Department of Homeland Security (DHS)
 - b. Customs and Border Patrol (CBP)
 - c. Federal Bureau of Investigation (FBI)
 - d. Local law enforcement
2. Surveillance
 - a. FBI
 - b. DHS
 - c. CBP
3. Disaster Relief
 - a. Federal Emergency Management Agency
 - b. DHS
 - c. Local law enforcement
4. Scientific Data Collection
 - a. Research institutions (e.g. NOAA, NASA)
 - b. Public Universities

Private Companies

Just as local, state, and federal governments are increasing their use of drones for a variety of functions, commercial operators are also finding uses for drones. Industry commercial drone operations have gained popularity over the last

several years to include agriculture inspection, photography, film and news, land and infrastructure surveying, utility inspection, wildlife management, and medical supply delivery. The United Nations Children’s Fund is even using drones to provide test results to rural locations in Africa [11]. Drones provide unique advantages to many industries that can use the small, unmanned vehicles to accomplish otherwise tedious tasks. Every industry uses different variations of drones, but generally, commercial drones often have a camera, rotary blades (e.g. quadcopter), and, increasingly, GPS capabilities.

In order to ensure the safety of users and observers of commercial drones, the FAA enforces Small UAS Rule (Part 107). The regulations of this rule include specific requirements such as pilot vetting by the TSA, drone registration for all drones between .5 and 55 pounds, flying within 400 feet above ground level, and remaining in the visual line of sight (VLOS) of either the pilot or an observer. Also, drones cannot be flown over people or from a moving vehicle without applying for a waiver from the FAA [12].

While these regulations create safer conditions for drone operations, they restrict various opportunities for commercial drone activities. Requiring drones to stay within the visual line of sight of an observer or pilot means companies that wish to use drones for shipping or delivery purposes cannot fly very far. Thus, more research must be done to develop drone technology properly. AT&T and Qualcomm have already begun this research. They are attempting to develop technology that would allow drones to communicate with 4G cell towers to receive important information and commands from air traffic control systems [13]. Developing this form of technology will make drones more useful for private companies who plan to use the potential benefits drones can offer to maximize their productivity and efficiency.

Individuals

A small drone for recreational or commercial use can be purchased at costs ranging from \$40 to \$2000 depending on the capabilities. Some of the more expensive drones that fall within the guidelines of Part 107 are able to reach heights of 1640 feet and can reach distances of up to 4 miles from the operator. Hobby drones can often fly for up to 30-40 minutes and are equipped with cameras for

recording. The ability of many of these drones to record surrounding environments are exposing privacy issues that have yet to be addressed by the federal government or by states in a uniform manner. Federal oversight was delegated to the FAA for the development of safety standards and practices through the FAA Modernization and Reform Act of 2012 [14]. Despite the terminology of a comprehensive plan and a vision outlining the safe integration of drones into the National Air Space, the ultimate regulations resulting in Part 107 and the associated “Special Rule for Model Aircraft” for hobbyists does little to clarify exactly when, where, and how operators can effectively use drones in a safe manner [12]. In addition, despite identifying the potential for privacy infractions by drone operators [12], not a single regulation pertains to maintaining privacy of citizens. The current regulatory guidance from Part 107 and official rule interpretations leave the states to pass further laws and enforce privacy standards and expectations. However, regardless of the extent of the reach of the FAA for drone operations, the FAA does not have the enforcement mechanisms or staff power to execute the current regulations except by relying on other law enforcement officers to assess initial problems [15, 16]. This lack of enforcement guidance may add confusion and complications to the expectations of local law enforcement when encountering drones, unless there are specific policies and practices in place.

At present, only 12 states have laws specifically addressing non-government operators of drones and the privacy rights of other citizens. Currently, 18 states have laws requiring law enforcement to obtain search warrants before using drones [11]. Although these states may have laws regarding drones and privacy, law enforcement agencies do not yet have the sufficient education and training to properly or effectively monitor community drone use [17]. Hobbyist drone associations provide some education about proper drone practice, but as drones’ capabilities grow, there is a need for clear legal oversight.

Conclusion

In conclusion, regulatory gaps exist between current federal and state drone policies. In some areas where regulatory guidance would benefit operators, regulations are poorly constructed or nonexistent. Even when regulations do exist, it is

difficult for a national agency such as the FAA to enforce every violation of the law, particularly when drones are an addition to the manned system. Striking a balance between maximizing the potential of drone technology while maintaining the privacy and safety of citizens is a difficult process in every area researched. The U.S. is not adequately prepared for the growing surge in drone operations across all aspects of society. While the U.S. does have one of the safest airspaces in the world, the steady increase in the numbers of drones in the sky and the rapid evolution of technological capabilities of the drones are presenting many challenges for the safe integration of drones into the National Airspace System.

Implications and Recommendations

Leaving the drone regulatory landscape as it is now having implications for drone users, public safety, and individual privacy. The lack of clear and concise regulations and laws regarding drone operations, particularly emphasizing the variety of uses for drones across the United States, may leave businesses without the ability to use the full potential of the technology, result in safety hazards to objects and people in the air and on the ground as small drones fill up the airspace close to the ground, and allow for unintended invasions of privacy as data collected by cameras in the air could be easily distributed across the internet. The federal government should do more than make suggestions about drone operator protocol and law enforcement action [18]. The federal government should strive to provide detailed legislation about how states should navigate drone protocol, and what standards they should meet. Further recommendations include determining which law enforcement agencies should be tasked with implementing drone policy in practice, creating educational programs for safe drone operation, and deciding how future policies will accommodate growing commercial and hobbyist drone operators.

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