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DOMESTIC PRESENCE IN THE SKIES: WHY AMERICANS SHOULD CARE ABOUT PRIVATE DRONE REGULATION

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ABSTRACT

The concept of an unmanned aerial vehicle has largely been considered one of America's most innovative and advantageous military accomplishments within the past two decades. However this technology, while not armed with Hellfire missiles or powerful high-altitude long endurance capabilities, is rapidly becoming available to private citizens for lower altitude and short range operations. As these drones are also becoming reasonably affordable, federal and state regulations are just now emerging to respond to safety, security, and privacy concerns regarding private drone operation. This paper seeks to provide an overview of what private drones are, the state and federal regulations currently being developed, as well as those already in place, and proposes the implementation of registration and licensing procedures for private drone operation.

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INTRODUCTION

Within the past decade, drone strikes and the concept of Unmanned Aerial Vehicles (UAVs) have become not only commonplace among major news headlines, but continue to lead the way for modern warfare tactics and strategy. With precision missile and surveillance capabilities, Predator drones have led to the successful elimination of high-valued targets listed as terrorists by the United States. However such success is not absolute, with several documented mishaps ending with civilian casualties. While the United States Military continues to implement UAVs overseas, American citizens should become cognizant that drone activity above U.S. soil is on the precipice of a market explosion comparable to that of Apple in the 1980's.² Yet these drones will not be operated by military personnel under specific military orders, but by fellow citizens, local governmental officials, and even neighbors regulated by yet-to-be developed laws and restrictions.

Thus the driving question becomes, what limitations will be developed for individuals who purchase and operate private drones? With some drones currently on sale for as little as \$300, potential problems are primed to become actual issues. Additionally, federalism concerns arise regarding whether the regulation of drones will be left to the States to decide how to craft restrictions within their jurisdiction, or whether the Federal government is better suited to enforce private drone regulations. This paper will attempt to shed light not only on the capabilities and functions of privately owned drones, developed for use by private individuals, but will also look to the developing regulations already emanating from both state and federal governments, and how those regulations will shape the expansion of the private drone market.

² Tim Fernholz, *The Private Drone Industry Is Like Apple in 1984*, QUARTZ (Jan. 25, 2013), <http://qz.com/46893/the-private-drone-industry-is-like-apple-in-1984/>.

While legislators still have yet to determine the exact guidelines for private drone operation, the logical solution seems to be registration and licensing of unmanned aerial vehicle operation, either with the federal government or the several states.

I. PRIVATE DRONES

Unmanned aerial vehicles currently exist under various classifications depending on size and capability. This section will first address how agencies attempt to define and classify what a drone is, and then shift to the actual composition of various drone designs.

A. Classifications

Unmanned aircraft have been known by many names, including “drones, remotely piloted vehicles (RPV), unmanned aerial vehicles (UAV), models, and radio control (R/C) aircraft,” but today are generally referred to as unmanned aerial systems (UAS) to encompass various aerial vehicles which are remotely piloted without a pilot.³ As can be expected, the technology associated with private drones is developing at a rapid and unrelenting pace, with manufacturers implementing already well-developed technology, such as GPS, real-time streaming video connection, and high resolution cameras, to enhance the abilities and sophistication of privately manned aerial vehicles. On the heels of such progress, law-makers are still attempting craft appropriate legislation in response to the many concerns citizens possess regarding privacy and safety with UAS flying above.

³ *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap*, U.S. DEPARTMENT OF TRANSPORTATION: FEDERAL AVIATION ADMINISTRATION, (Nov. 7, 2013), http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CCQQFjAB&url=http%3A%2F%2Fwww.faa.gov%2Fuas%2Fmedia%2Fuas_roadmap_2013.pdf&ei=HV4oVbuHEomGyQTm8oHwCg&usg=AFQjCNG49jblwiI3-APRm6ZmV-xdfKyRpw&sig2=2rFeAtcnKvU2sjIBLoCksw&bvm=bv.90491159,d.aWw&cad=rja.

Within the context of policy development and regulation, the FAA has noted that a primary hindrance to uniform restrictions on Unmanned Aerial Systems is their lack of universal design.⁴ Even larger issues arise when attempting to interpret current FAA regulations and determine which regulations apply to a certain UAS.⁵ When breaking down any privately available drone, the components and versatility of assembly makes nearly every drone unique, even though components perform the same functions. Depending on the scale of the drone, the exact same setup can lead to extravagant performance differences.

Without consensus on classifications for UAS flight in civil airspace, current definitions are consistent with nomenclature used by research and military communities.⁶ Classifications such as micro, mini, tactical, medium altitude and high altitude unmanned combat air vehicles (UCAV) are implemented to refer to UAS depending upon their mission requirements.⁷ Most civilian UAS applications which will be available for purchase fall within the micro and small UAS categories, however the large performance ranges and varying capabilities of privately owned drones create classification issues.⁸ For instance, Micro UAS are between 1 and 4.5 pounds, less than three feet in size, travel anywhere from 10 to 25 miles per hour, fly at less than 3,000 feet, and possess an endurance of less roughly 1 hour.⁹ Small UAS weigh between 4.5 and 55 pounds, are less than 10 feet in size, fly to an altitude of up to 10,000 feet, can travel between

⁴ Integration of Civil Unmanned Aircraft Systems, *supra* note 3.

⁵ *Id.*

⁶ Unmanned Aircraft System (UAS) Service Demand 2015-2035, U.S. AIR FORCE, AEROSPACE MGMT. SYS. DIV., http://ntl.bts.gov/lib/48000/48200/48226/UAS_Service_Demand.pdf.

⁷ *Id.*

⁸ *Id.*

⁹ Unmanned Aircraft System, *supra* note 6, at 117.

50 and 75 miles per hour, and possess an endurance of 1 to 4 hours.¹⁰ The smallest drones, categorized as nano, have severely limited capabilities as they weigh less than 1 pound, are less than 1 foot in size, fly less than 400 feet in altitude, travel at less than 25 miles per hour, and have an endurance of less than 1 hour.¹¹ But these categorizations are not absolute, as variances in performance output and overall design can place a drone in multiple categories.

B. General Design

Without doubt, the intended application of each drone dictates every aspect of a drone's composition. Beginning with the basics, most private drones are composed of centralized battery operated power system, although some savvy engineering students have successfully developed gas powered drones.¹² This power system is typically mounted near the center of each drone on the drone's frame, and powers a varying number of rotors and propellers mounted around the exterior of the drone's frame, often referred to as quadcopters, hexacopters, or octocopters depending upon the number of propellers used to send the drone into flight.

The frame of drones falls within one of two categories, either fixed-wing or rotary.¹³ Fixed-wing structures are comparable to the model airplanes of the past, and imitate small scale versions of commercial airliners, military aircraft, and smaller privately owned aircraft. Rotary drones, on the other hand, resemble the type of automated flying machines fit for the latest box-

¹⁰ *Id.*

¹¹ Unmanned Aircraft System, *supra* note 6, at 117.

¹² "Incredible HLQ (Heavy Lift Quadcopter)", Incredible HLQ Engineering Team, 2014, https://www.kickstarter.com/projects/1671680066/incredible-hlq-heavy-lift-quadcopter?ref=home_location; "Parrot AR. Drone 2.0 Elite Edition," PARROT, <http://ardrone2.parrot.com/>; "Information on Building your own UAV", Build A Drone, <http://www.buildadrone.co.uk/multicopter-drone-components.html>

¹³ *UAV: Fixed Wing or Rotary?*, SUAS NEWS, (Sept. 24, 2013), <http://www.suasnews.com/2013/09/25214/uav-fixed-wing-or-rotary/>.

office sci-fi hit. Often resembling the central hub and spokes of a western wagon wheel, these drones utilize the thrust of multiple propellers mounted in a circular fashion around the center of the drone's fuselage. Comparable to the upward thrust of a helicopter, drones are able to use multiple-propellers to travel in all directions and hover.¹⁴

Pilots of privately operated drones have a multitude of options to control their UAS, from downloadable phone applications which force a drone to respond to the varying tilt angles of the cell phone, to immensely complicated radio transmitters and receivers that command drones to maintain a particular altitude, hover, return to a certain point, or even land at a fixed and convenient location.¹⁵ Autopilot platforms are software driven, thus it is easy to comprehend how the possibilities for what a drone can do on its own is nearly endless at the hands of skilled and creative programmer. Currently available to the public, GPS flight controllers utilize multi-processor systems, inner dampeners, controllers, gyroscopes, accelerometers and barometers to send critical data to a drone's internal computer, which analyzes the data and optimizes flight capabilities.¹⁶

Beyond the design of a drone, and of primary interest to this paper, is what types of technology and devices can be carried by drones. Amazon recently created a flurry of interest regarding their development of automated drone delivery systems, Prime Air, capable of 30

¹⁴ *UAV: Fixed Wing or Rotary?*, SUAS NEWS, (Sept. 24, 2013), <http://www.suasnews.com/2013/09/25214/uav-fixed-wing-or-rotary/>; Glenn Derene, *The Art of Flying Your Very Own Drone*, POPULAR MECHANICS, (Oct. 22, 2013), <http://www.popularmechanics.com/technology/aviation/diy-flying/the-art-of-flying-your-very-own-drone-16068825>.

¹⁵ *Parrot AR. Drone 2.0 Elite Edition*, PARROT, <http://ardrone2.parrot.com/> (last visited Mar. 20, 2015); *Information on Building your own UAV*, BUILD A DRONE, <http://www.buildadrone.co.uk/multicopter-drone-components.html> (last visited Mar. 20, 2015).

¹⁶ *DJI Naza GPS Flight Controller*, BYOD, <http://www.buildyourowndrone.co.uk/DJI-NAZA-GPS-Flight-Controller-p/dji-nazagps.htm> (last visited Mar. 20, 2015); Chris Anderson, *A Newbie's Guide to UAVs*, DIY DRONES (Mar. 28, 2009, 2:00 PM), <http://diydrones.com/profiles/blogs/a-newbies-guide-to-uavs>.

minute delivery of small packages weighing less than 5 pounds.¹⁷ While intriguing, Amazon's Prime Air has been criticized as a public relations stunt more than an actual program development, as obvious obstacles of thievery, weather conditions, payload capabilities and flight time have yet to be addressed directly by Amazon officials.¹⁸ The real concern created by private drones appears once high-definition cameras, recorders, and weapons are attached and flown without proper regulation, restrictions, or due regard for the rights of others.

Wireless video add-ons are currently capable of transmitting real-time video with no interference at a 3 kilometer range, and can be extending to over 14 kilometers with additional transmission equipment.¹⁹ Real-time footage can be sent to small screens mounted directly to drone controllers, or even to specially developed goggles which matches the operator's view with that of the drone.²⁰ Major companies, including Verizon Wireless, have already begun to advertise and prepare for the upcoming drone market explosion, creating cell phone applications which receive real time video footage from drone surveillance cameras, and further allow the user to directly upload their recorded footage to their computers, popular social media websites, or even YouTube.²¹

In addition to surveillance capabilities, some drone owners have not left behind the concept of military-capable drones, and have created trigger mechanisms which operate

¹⁷ *Amazon Prime Air*, AMAZON, <http://www.amazon.com/b?node=8037720011> (last visited Mar. 20, 2015).

¹⁸ Doug Gross, *Amazon's drone delivery: How would it work?*, CNN TECH (Dec. 2, 2013, 5:57 PM), <http://www.cnn.com/2013/12/02/tech/innovation/amazon-drones-questions/>.

¹⁹ Robert Krogh, *New 5.8 Ghz wireless video system 1200mW Long Range*, DIY DRONES (Sept. 1, 2012, 12:00 AM), <http://diydrone.com/profiles/blogs/new-5-8-ghz-wireless-video-system-1200mw-long-range>.

²⁰ *Wireless Video LCD Goggles Downlink Kit*, STEADIDRONE, <http://shop.steadidrone.eu/product/wireless-video-lcd-goggles-downlink-kit/> (last visited Mar. 30, 2015).

²¹ Brian Plaskon, *Rediscover the Magic of Flight with the Parrot AR.Drone 2.0*, VERIZON (Dec. 16, 2014), <http://www.verizonwireless.com/news/article/2013/12/ar-parrot-drone.html>.

handguns and paintball guns attached to the drone.²² In another widely viewed video, although touted as fake, has raised concerns regarding the possibility of accurate and easily controlled machine guns mounted to drones. While drone manufactures have not advertised for the ability of drone owners to weaponize their drone, the mechanisms needed to arm a drone are nowhere near complicated enough to deter drone owners from attempting to attached smaller pistols and lightweight handguns to the drone. Combined with real-time high-definition video footage, sophisticated programming, agile maneuvering capabilities, and long-range drone applications, it is not beyond comprehension that an armed drone placed in the wrong hands could potentially lead to life-threatening circumstances.

Fortunately one such plot has already been discovered and foiled. Recently captured by FBI agents, Rezwan Ferdaus, an admitted Islamic extremists, hatched a plan to attack the United States Capitol Building and the Pentagon by flying several model aircrafts loaded with C4 explosives into the buildings.²³ Ferdaus's plot envisioned flying small global positioning system (GPS) operated drones from several locations before launching ground assaults in the Capitol.²⁴ His drone of choice was a fixed wing F-86 sabre model air plane, and while he possessed over 25 pounds of C4 to load onto the plane, model air plane experts were very doubtful that such an attack could be carried out without drawing a significant amount of attention to Ferdaus during

²² *Flying Drone Armed with a Handgun*, MILITARY.COM (June 8, 2013), <http://www.military.com/video/guns/pistols/flying-drone-armed-with-handgun/2487684756001/>; Evan Ackerman, *Man Puts (Paintball) Gun on Quadrotor But Don't Panic*, IEEE SPECTRUM (Dec. 13, 2012), <http://spectrum.ieee.org/automaton/robotics/diy/paintball-gun-on-quadrotor-but-dont-panic>.

²³ D.J. Marks, *Massachusetts Man to Plead Guilty in Model Plane Terror Plot*, ABC NEWS (July 10, 2012), <http://abcnews.go.com/Blotter/massachusetts-man-plead-guilty-model-plane-terror-plot/story?id=16748584>.

²⁴ Carmen M. Ortiz, *Ashland Man Charged with Plotting Attack on Pentago and U.S. Capitol and Attempting to Provide Material Support to Foreign Terrorist Organization*, DEPT. OF JUSTICE (Sept. 18, 2011), http://www.investigativeproject.org/documents/case_docs/1691.pdf.

the attack.²⁵ Requiring a significant runway and competent pilot, the F-86 sabre model was far from ideal for a calculated attack.²⁶ Although Ferdaus was captured when trying to purchase the explosives from undercover agents, his plot shows that an attack by a private drone operator is quite possible, and with more developed drones becoming widely available, the likelihood of successful attacks being undertaken continues to increase.

Critics of Ferdaus's attack mocked the lack of plausibility associated with his plan, as take-off and control of this particular model airplane requires a large space of land and a proficient operator.²⁷ But this unmanned aerial vehicle was modeled after a fighter jet as a fixed wing propulsion vehicle vastly different than the types of drones becoming available for purchase. Instead, these drones incorporate sophisticated software and communication systems which allow for uncomplicated flight operation and control. New UAS are also designed for vertical take-off, and can even be programmed for autonomous flight operations such as taking off, hovering, returning to take-off location, and landing. In fact, one of the most popular drones currently on the market, the Parrot AR 2.0, is capable of phone and iPad interface controls, simple controls capabilities, and fairly sophisticated flight performance.²⁸ One such operator demonstrated the various capabilities of his Parrot AR 2.0, and it does not take much imagination to visualize the same type of drone spying on others in the near vicinity.²⁹

²⁵ Kevin Johnson, *Man Accused of Plotting Drone Attacks on Pentagon*, *Capital*, USA TODAY (Sept. 29, 2011), <http://usatoday30.usatoday.com/news/washington/story/2011-09-28/DC-terrorist-plot-drone/50593792/1>; Neal Ungerleider, *The Science Behind the Drone Terrorism Attack*, FAST COMPANY (Sept. 29, 2011, 12:45 AM), <http://www.fastcompany.com/1783721/science-behind-drone-terrorism-attack>.

²⁶ Ungerleider, *supra* note 25.

²⁷ *Model Airplanes a New Terrorist Weapon? Experts Say They Pose Little Threat*, FOXNEWS.COM (Sept. 30, 2011), <http://www.foxnews.com/us/2011/09/29/could-model-airplanes-be-next-terrorist-weapon/>.

²⁸ *Linus Tech Tips: Parrot AR Drone iPad Controlled Remote Control Aircraft Test Flight*, YOUTUBE.COM (Aug. 4, 2011), <https://www.youtube.com/watch?v=bkKeijmgXW0>.

²⁹ *Id.*

II. CURRENT FEDERAL REGULATIONS

With increase in market availability of unmanned aerial vehicles comes the need for regulation. Recent estimates indicate that by 2035, federal and state sector agencies, including first responders, metropolitan police, and local governments, will possess nearly 36,000 UAS vehicles.³⁰ The current U.S. market includes over 200 model aircraft manufacturers, with the total number of radio controlled or autonomous flying models exceeding 500,000, with most capable of commercial UAS applications.³¹ Clearly the sheer number of potential UAS available for flight in the NAS has pressured the FAA to develop policies capable of managing and overseeing the safe operation of these UAS, though regulations are still in research and development phases of enactment.

The Federal Aviation Administration (FAA) currently asserts authority over the regulation of private drone use, stating that “a key activity of the FAA is to develop regulations, policy, procedures, guidance material, and training requirements to support safe and efficient UAS [unmanned aerial systems] operations in the NAS [National Airspace System], while coordinating with relevant departments and agencies to address related key policy areas of concern such as privacy and national security.”³² The FAA has compiled a list of potential

³⁰ *Unmanned Aircraft System (UAS) Service Demand 2015-2035*, U.S. DEPARTMENT OF TRANSPORTATION, 133 (Sept. 2013), http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCQQFjAA&url=http%3A%2F%2Fntl.bts.gov%2Flib%2F48000%2F48200%2F48226%2FUAS_Service_Demand.pdf&ei=64YCU9-TLa3p0QHrYDoBw&usg=AFQjCNFG1XuduiEKzrkHDBCaihi4_vhADw&bvm=bv.61535280,d.dmQ

³¹ *Id.*

commercial and civilian UAS applications, of which include “security awareness, disaster response (including search and support to rescuers), communications and broadcast (including news/sports event coverage), cargo transport, spectral and thermal analysis, critical infrastructure monitoring (including power facilities, ports, and pipelines), and commercial photography (aerial mapping, charting, and advertising).”³³ While not an exhaustive list, the FAA’s consideration of the numerous applications available for drones exemplifies just how versatile this upcoming market has become.

The FAA, in order to assure the safety of the NAS, crafts regulations and policies based upon three areas of concern: (1) equipment; (2) personnel; and (3) operations and procedure.³⁴ For UAS applications, the FAA summarized four key points from the *FAA Notice of Policy: Unmanned Aircraft Operations in the National Airspace System*, which must be met in order for limited operations to be undertaken by UAS pilots.³⁵ Each point is aimed at ensuring the safety of the general public, other UAS users, and manned airplanes being flown within the NAS.³⁶ Specifically,

[1] regulatory standards need to be developed to enable current technology for unmanned aircraft to comply with Title 14 Code of Federal Regulations; [2] In order to ensure safety, the operator is required to establish the UAS airworthiness either from FAA certification, a Department of Defense (DOD) airworthiness statement, or by other approved means; [3] Applicants also have to demonstrate that a collision with another aircraft or other airspace user is extremely improbable; [4] And the pilot-in-command concept is essential to the safe operation of manned operations – the FAA’s UAS guidance applies this pilot-in-

³² Integration of Civil Unmanned Aircraft Systems, *supra* note 3.

³³ *Id.*

³⁴ Integration of Civil Unmanned Aircraft Systems, *supra* note 3.

³⁵ Unmanned Aircraft Operations in the National Airspace System, 72 Fed. Reg. 6689 (proposed Feb. 13, 2007) (to be codified at 14 C.F.R. pt. 91).

³⁶ Integration of Civil Unmanned Aircraft Systems, *supra* note 3.

command concept to unmanned aircraft and includes minimum qualification and currency requirements.³⁷

The FAA is also influenced by RTCA, Inc., a private not-for-profit corporation that collects information regarding communications, navigation, surveillance, and air traffic management system issues.³⁸ Within the context of UAS integration into the NAS, the RTCA recommended 8 requirements summarized by the FAA as follows: “[1] UAS must operate safely, efficiently, and compatibly with service providers and other users of the NAS so that overall safety is not degraded; [2] UAS will have access to the NAS, provided they have appropriate equipment and the ability to meet the requirements for flying in various classes of airspace; [3] Routine UAS operations will not require the creation of new special use of airspace, or modification of existing special use airspace; [4] Except for some special cases, such as small UAS (sUAS) with very limited operational range, all UAS will require design and airworthiness certification to fly civil operations in the NAS; [5] UAS pilots will require certification, though some of the requirements may differ from manned aviation; [6] UAS will comply with ATC instructions, clearances, and procedures when receiving air traffic services; [7] UAS pilots (the pilot-in-command) will always have responsibility for the unmanned aircraft while it is operating; [8] UAS commercial operations will need to apply the operational control concept as appropriate for the type of operation, but with different functions applicable to UAS operations.”³⁹

Currently, UAS operations are not authorized in Class B airspace, which exists over major urban areas containing “the highest density of manned aircraft in the National Airspace

³⁷ *Id.*

³⁸ *Id.* at 11.

³⁹ Integration of Civil Unmanned Aircraft Systems, *supra* note 3.

System.”⁴⁰ To gain approval from the FAA to operate a UAS, an operator must either obtain an experimental airworthiness certificate for private sector aircraft to do research and development, training, and flight demonstrations; or must obtain a Certificate of Waiver or Authorization for public aircraft.⁴¹

However, Class B prohibitions still apply to UAS.⁴² Public entities who request and receive a Certificate of Waiver or an Authorization for uses such as law enforcement, firefighting, border patrol, disaster relief, search and rescue, military training, and other government operational missions, are then allowed to operate UASs in a defined block of airspace with restrictions specific to the unique use of the UAS within that zone.⁴³ The most notable restriction placed upon operators is the requirement that the operator coordinate with an appropriate air traffic control facility; a restriction which can severely increase the costs of UAS operations and limit the use of UASs in emergency situations. Since 2009, the issuance of Certificates of Waiver or Authorization has more than tripled, from 146 to 545 as of December 4, 2013.⁴⁴

As for privately operated UASs, the FAA Advisory Circular 91-57 establishes the requisite operating standards for UAS pilots-in-command.⁴⁵ Aimed at avoiding hazard, the

⁴⁰ *Fact Sheet – Unmanned Aircraft Systems (UAS)*, FED. AVIATION ADMIN. (Jan. 6, 2014), http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=14153.

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Fact Sheet – Unmanned Aircraft Systems*, *supra* note 40.

⁴⁴ *Id.*

⁴⁵ *Id.*; Advisory Circular, June 9, 1981, DEPARTMENT OF TRANSPORTATION: FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/documentLibrary/media/Advisory_Circular/91-57.pdf.

Advisory Circular is also meant to “create a good neighbor environment with affected communities and airspace users.”⁴⁶ The circular mandates operators

[1] select and operating site that is of sufficient distance from populated areas. The selected site should be away from noise sensitive areas such as parks, schools, hospitals, churches, etc.; [2] Do not operate model aircraft in the presence of spectators until the aircraft is successfully flight tested and proven airworthy; [3] Do not fly model aircraft higher than 400 feet above the surface. When flying aircraft within 3 miles of an airport, notify the airport operator, or when an air traffic facility is located at the airport, notify the control tower, or flight service station; [4] give right of way to, and avoid flying in the proximity of, full-scale aircraft. Use observers to help if possible; [5] do not hesitate to ask for assistance from any airport traffic control tower or flight service station concerning compliance with these standards.⁴⁷

The most obvious logistical obstacle for policy development is how to accurately respond to UAS systems operating in the NAS with varied and potentially unreliable performance capabilities. Without a pilot in an aircraft, or without proper communications equipment, navigation and awareness of other airplanes is greatly diminished.⁴⁸ The ability for smaller UAS to change flight patterns or adhere to current operational rules has not been well researched, requiring the FAA to open 6 test site facilities around the country to collect data and better understand how the integration of UAS into the NAS will occur.⁴⁹ These operators were meant to achieve “cross-country geographic and climatic diversity and help the FAA meet its UAS research needs.”⁵⁰ These facilities include the University of Alaska (developing a set of standards for unmanned aircraft categories, state monitoring, and navigation), the State of Nevada

⁴⁶ Advisory Circular, June 9, 1981, DEPARTMENT OF TRANSPORTATION: FEDERAL AVIATION ADMINISTRATION, http://www.faa.gov/documentLibrary/media/Advisory_Circular/91-57.pdf.

⁴⁷ *Id.*

⁴⁸ Integration of Civil Unmanned Aircraft Systems, *supra* note 3.

⁴⁹ *Id.*

⁵⁰ Fact Sheet – Unmanned Aircraft Systems, *supra* note 40.

(concentrating on UAS standards and operations as well as operator standards and certification requirements), New York's Griffiss International Airport (developing test and evaluation processes, along with verification and validation processes under FAA safety oversight), the North Dakota Department of Commerce (developing airworthiness essential data and validating high reliability link technology), Texas A&M University in Corpus Christi (developing system safety requirements for UAS vehicles and operations with a goal of protocols and procedures for airworthiness testing), and the Virginia Polytechnic Institute and State University (Virginia Tech – conducting UAS failure mode testing and identifying and evaluating operational and technical risk areas).

A recent FAA Reauthorization Bill further directed the FAA to restrict government public safety agency's operation of unmanned aircraft weighing 4.4 or less.⁵¹ Specifically, these UAS “must be flown within the line of sight of the operator, less than 400 feet above the ground, during daylight conditions, inside Glass G (uncontrolled) airspace and more than 5 miles from any airport or other location with aviation activities.”⁵² But this regulation is limited only to public use of drones, not private use. In fact, the FAA has only promulgated guidelines for operating drones under certain conditions, but has yet to enact restrictions on what operators are not allowed to do with their drone, such as flying over other individual's property or home while recording video or taking pictures. Under these guidelines, perhaps an aggrieved party can rely upon other privacy oriented laws within their state to seek injunctive relief from such flights, or even damages if warranted, but the potential for privacy violations seems clearly severe enough to warrant direct and explicit legal prohibitions.

⁵¹ FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, § 334(c) (2012); Fact Sheet – Unmanned Aircraft Systems, *supra* note 40.

⁵² Fact Sheet – Unmanned Aircraft Systems, *supra* note 40.

III. STATE REGULATION

Since the FAA is charged with “ensuring the safe and efficient use of U.S. airspace,” most state laws and regulations are effectively pre-empted if they concern airspace regulation.⁵³ States still have the power and authority to regulate use of UAS by public officials and government entities, yet restrictions on private individual’s use of UAS falls under the authority of the FAA.⁵⁴ Regardless, in 2013 43 states introduced 130 bills and resolutions addressing UAS issues, leading to 13 states enacting 16 new laws and 11 states adopting 16 resolutions.⁵⁵ The following ten state laws and proposed legislation exhibits the emerging and evolving nature of drone regulation across the nation. In general, states have similar ideas on the current need of enacted legislation to respond to concerns regarding drones, but most state laws limit their regulation to that of state agencies.

A. Florida

Florida’s recent law, titled the Freedom from Unwarranted Surveillance Act, specifically targets the use of drones by law enforcement entities.⁵⁶ The law prohibits any law enforcement agency from collecting evidence by means of drone technology.⁵⁷ The law carries one exception, whereby a police agency may implement drones to “counter a high risk of a terrorist attack by a

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ 2013 Unmanned Aircraft Systems (UAS) Legislation, NCSL (2014), <http://www.ncsl.org/research/civil-and-criminal-justice/unmanned-aerial-vehicles.aspx>.

⁵⁶ Joe Sutton & Catherine E. Shoichet, *Florida Gov. Rick Scott signs Law restricting drones*, CNN U.S. (Apr. 28, 2013, 1:42 PM), <http://www.cnn.com/2013/04/25/us/florida-drone-law/>; S.B. 92, 2013 Leg., Reg. Sess. (Fl. 2013).

⁵⁷ S.B. 92, 2013 Leg., Reg. Sess. (Fl. 2013).

specific individual or organization if the United States Secretary of Homeland Security determines that credible intelligence indicates that there is such a risk.”⁵⁸ If violated, the aggrieved party is entitled to bring a civil action for relief to prevent or remedy such violations.⁵⁹ But this action extends only to law enforcement agencies collecting evidence by means of drone technology, not that of private individuals.

Aggrieved parties are entitled to file a civil action in order to “prevent or remedy a violation of this act.”⁶⁰ All evidence obtained in violation of this section is not admissible as evidence in a criminal prosecution within the state, but the law fails to consider or address the use of evidence in a civil action.⁶¹ Thus if an individual, not a law enforcement agency, gathers information or evidence with the use of a drone, Florida’s law takes no steps to exclude such evidence in a civil matter.

B. Hawaii

Hawaii’s legislature, recognizing “its duty to protect Hawaii residents from threats to their constitutional rights to privacy,” introduced Senate Bill 2608 earlier this year which targets the use of unmanned aircraft technology.⁶² This bill seeks to amend the Hawaii Revised Statutes by strictly prohibiting the gathering of information including, but not limited to images, photographs and recordings by unmanned aircraft.⁶³ Prohibitions extend to law enforcement agencies, state or

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ S.B. 92, 2013 Leg., Reg. Sess. (Fl. 2013).

⁶² S. 2608, 27 Leg., Reg. Sess. (Haw. 2014).

⁶³ *Id.*

local public agencies, persons, and entities.⁶⁴ Therefore any operator of a UAS in the state of Hawaii is bound to the regulations Senate Bill 2608 imposes.

803-C allows for five exceptions to the general prohibitions, granting the use of drones in limited circumstances by law enforcement agencies.⁶⁵ These exceptions include the receipt of credible intelligence by the United States Secretary of Homeland Security that the use of unmanned aircraft is required to counter a terrorist attack, by issuance of a search warrant not exceeding 30 days, use of unmanned aircraft necessary to assist in search and rescue activities, use by any branch of the military, or if unmanned aircraft needed to assist with disaster relief.⁶⁶ Aggrieved parties may seek a remedy, including actual and general damages, attorney's fees, and other damages in an amount no less than \$1,000. Further, if information collected by an unmanned aircraft was publicly disclosed without an aggrieved party's permission, then they can collect the same damages in an amount no less than \$10,000.⁶⁷

C. Idaho

Senate Bill 1067 focused on restricting drone surveillance by persons, entities and state agencies for the purpose of gathering evidence pertaining to criminal conduct or violations of Idaho's law unless explicitly authorized to do so by an issued warrant.⁶⁸ When unconnected to gathering evidence relating to a violation of law, the bill further prohibited surveillance of any individual, property owned by an individual, farm or agricultural industry without the consent of

⁶⁴ *Id.* at 803-B.

⁶⁵ *Id.* at 803-C.

⁶⁶ *Id.*

⁶⁷ S.B. 2608, 27 Leg., Reg. Sess. §803-F (Haw. 2014).

⁶⁸ S.B. 1067, 62nd Leg., 1st Sess. (Idaho 2013).

that individual.⁶⁹ However, if an individual owns a facility on the land of another, they are not restricted from implementing a UAS to inspect the facility.⁷⁰ Exceptions are incorporated to allow law enforcement agencies to use unmanned aircraft if an exigent circumstance exists, defined as a law enforcement agency possessing “reasonable suspicion that, under particular circumstances, swift action to prevent imminent danger to life is necessary.”⁷¹ Remedies allow aggrieved parties to collect all appropriate relief, and no evidence obtained by an unmanned aircraft without a valid warrant is admissible in a court of law.⁷²

Additionally, SB 1134, which was signed into law April 11, 2013, more broadly address civilian UAS by defining unmanned aircraft systems as “unmanned aircraft vehicle, drone, remotely piloted vehicle, remotely piloted aircraft or remotely operated aircraft that is a powered aerial vehicle that does not carry a human operator,” but not including “model flying airplanes or rockets.”⁷³ The restrictions under this law carry the prohibition of the use of unmanned aircraft systems for surveillance purposes unless by warrant, except in situations where such surveillance is used for emergency response for safety, search and rescues, or controlled substance investigation.⁷⁴ The law further specifies that surveillance of individuals and their property, such as their property’s curtilage, is prohibited without written consent of the owner.⁷⁵ Aggrieved

⁶⁹ *Id.* at § 3 (2).

⁷⁰ *Id.*

⁷¹ *Id.* at § 4 (21-215).

⁷² *Id.* § 5 (2).

⁷³ S.B. 1134, 2013 Leg., 1st Sess. (Idaho 2013).

⁷⁴ *Id.*

⁷⁵ *Id.*

individuals are entitled to file a civil action for any violation of this law for the greater of \$1,000 or actual and general damages including reasonable attorney's fees.⁷⁶

D. Illinois

Illinois has recently enacted two laws targeting the use and operation of drones within the state. The first, HR 1652, was established in response to actions by People for the Ethical Treatment of Animals (PETA). PETA announced plans to use privately controlled drones to spy on and interfere with hunters in the state in an attempt to gather evidence of hunters engaged in illegal activities.⁷⁷ HR 1652 amends Illinois' Fish and Aquatic Life Code by making it a misdemeanor for anyone who "uses a drone in a way that interferes with another person's lawful taking of wildlife or aquatic life."⁷⁸ Compared to other states, this is one of the most active stances against the use of privately controlled UAS, and may indicate Illinois' willingness to restrict the use of drones when that use infringes upon the rights of others.

Additionally, SB 1587 prohibits the use of drones by law enforcement agencies in all situations except five.⁷⁹ These five exceptions include countering a high risk of a terrorist attack, after obtaining a search warrant based upon probable cause, when swift action is needed to prevent imminent harm to life or to forestall the imminent escape of a suspect of the destruction of evidence, when the agency is attempting to locate a missing person, and solely for the

⁷⁶ *Id.*

⁷⁷ Christopher Zara, *PETA Hunter Drones Shot Down By Illinois Law? 'Air Angels' Will Still Fly, Says Animal-Rights Group*, INT'L BUS. TIMES, Jan. 03, 2014, <http://www.ibtimes.com/peta-hunter-drones-shot-down-illinois-law-air-angels-will-still-fly-says-animal-rights-group-1525978>.

⁷⁸ Illinois General Assembly, Public Act 098-0402, <http://ilga.gov/legislation/publicacts/fulltext.asp?Name=098-0402>

⁷⁹ Illinois General Assembly, Public Act 098-0569, <http://ilga.gov/legislation/publicacts/fulltext.asp?Name=098-0569>.

purposes of crime scene and traffic crash scene photography.⁸⁰ Legislators also saw fit to allow information that is obtained under these exceptions to be retained for longer than 30 days if there is “(1) reasonable suspicion that the information contains evidence of criminal activity; or (2) the information is relevant to an ongoing investigation or pending criminal trial.”⁸¹ This information may be disclosed to another government agency, and can be admitted into evidence if the information is found to fall under a “judicially recognized exception to the exclusionary rule of the 4th Amendment of the U.S. Constitution or Article I, Section 6 of the Illinois Constitution.”⁸²

E. Maryland

Legislators in Maryland began 2014 by introducing multiple pieces of legislation restricting the ability of law enforcement to use and implement drones for surveillance purposes, with one legislator stating “drones shouldn’t be flying over our homes, spying on us in our backyard.”⁸³ To this effect, Maryland’s recent legislation is proposing one of the most detailed and comprehensive laws restricting the use of drones. HB 847 and SB 926 first approach the definition of “drone” in a different manner than other states by focusing on the level of immediate control an individual has over the vehicle rather than the vehicle’s design, defining drone “as unmanned aerial vehicle or aircraft that is operated without the possibility of direct

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ John Wagner, *Bipartisan group of Md. Lawmakers seeks limits on drones, other law-enforcement surveillance*, WASH. POST, Jan. 14, 2014, http://www.washingtonpost.com/local/md-politics/bipartisan-group-of-md-lawmakers-seeks-limits-on-drones-other-law-enforcement-surveillance/2014/01/14/af1c0738-7d38-11e3-93c1-0e888170b723_story.html.

human intervention from within or on the aircraft.”⁸⁴ As for operation of drones by an agent of the state, Maryland’s law restricts such operation unless a warrant for drone surveillance has been issued by a court.⁸⁵ If issued, the warrant is only valid for an initial period of 24 hours and must specifically target an individual listed in the warrant.⁸⁶ The maximum extension for a warrant of this nature is 30 days.⁸⁷

Most state laws end with this kind of restriction, however Maryland presses forward and goes as far as to restrict the implementation of biometric matching technology or facial recognition software on any non-target individuals, and also explicitly prohibits agents from equipping drones with a weapon.⁸⁸ Warrantless use of drones are permitted only in the extreme circumstances, such as an emergency involving the immediate danger of death or serious physical injury, conspiratorial activities threatening the national security interest, or conspiratorial activities characteristic of organized crime.⁸⁹ The law further allows for oversight of drone use by requiring agencies to initiate investigative proceedings if an abuse of drone use or violation of this law is suspected.⁹⁰ Also, in June of each year agents who have used drones in the previous year must report and make public on the agencies website each time the agent used a drone.⁹¹ No laws effect the private operation and use of drones by private individuals or companies.

⁸⁴ H.R. 847, 431st Gen. Assemb., Reg. Sess. (Md. 2014).

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Id.* at §E (1-2); (G).

⁸⁹ *Id.* at §H(1)(I)(1)(A-C).

⁹⁰ *Id.*

⁹¹ H.R. 847, *supra* note 84.

F. Montana

Proposed legislation in Montana seeks to prohibit the collection of data by unmanned aerial vehicles with the use of sensors or other recording devices such as cameras, microphones, thermal detectors, chemical detectors, radiation gauges, or wireless receivers.⁹² This is not limited to government agents, but any person operating a UAV within the state.⁹³ A violation of this law can lead to a maximum \$500 fine and not more than 6 months in a county jail.⁹⁴ No evidence obtained in violation of this law is admissible in a court of law.⁹⁵ Peace officers within the state are prohibited from operating drones for surveillance of an individual unless authorized by a court ordered warrant.⁹⁶ If a state or federal agency chooses to implement drones strictly for monitoring of public lands or international borders, then no warrant is needed.⁹⁷

G. Oregon

Oregon's drone laws are primarily crafted to allow for the use of drones by government entities within the state in very limited circumstances, with most uses being prohibited.⁹⁸ Not only is evidence inadmissible when gathered by the unlawful use of drones, but such evidence is also not available to establish probable cause or reasonable suspicion to believe that an offense

⁹² S.B. 196, 2013 Sen., Reg. Sess. (Mont. 2013).

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ *Id.*

⁹⁷ *Id.*

⁹⁸ *See* H.R. 2710, 77th Leg. Assemb., Reg. Sess. (Or. 2013).

has been committed.⁹⁹ Drones are only available to law enforcement agencies for surveillance purposes if a court of law issues an appropriate warrant, or when police possess probable cause to believe a crime has, is, or is about to be committed. However if exigent circumstances exist, whereby obtaining a warrant for the use of a drone would be unreasonable, then these law enforcement agencies may circumvent the warrant requirement.¹⁰⁰ Appropriate use of drones under HB 2710 include search and rescue activities, assisting individuals in emergency situations, during a state of emergency as declared by the Governor, for reconstructing crime scenes, or for training law enforcement agencies.¹⁰¹

Oregon's law further defines the use of drones by public bodies, defined as state government bodies, local government bodies and special government bodies are prohibited from operating drones in Oregon airspace unless registered with the Oregon Department of Aviation.¹⁰² Registration of possession of drones requires the name of the public body, name and contact information of the individuals operating the drone, identifying information for the drone, and further requires annual reporting of drones use and purpose of use in the preceding year.¹⁰³ Unless approved by the Federal Aviation Administration, all data and evidence gathered by drones operated by public bodies is inadmissible in a court of law.¹⁰⁴

Legislators even went as far to explicitly prohibit the use of weaponized drones by public bodies, including a drone capable of firing a bullet, projectile, directing a laser, or otherwise

⁹⁹ H.R. 2710, 77th Leg. Assemb., Reg. Sess., § 2(2)(b) (Or. 2013).

¹⁰⁰ H.R. 2710, 77th Leg. Assemb., Reg. Sess., § 3(1)(b) (Or. 2013).

¹⁰¹ H.R. 2710, 77th Leg. Assemb., Reg. Sess., §§ 4-7 (Or. 2013).

¹⁰² § 174.109 *Public Body Defined*, OREGONLAWS.ORG, <http://www.oregonlaws.org/ors/174.109> (last visited April 10, 2015).

¹⁰³ H.R. 2710, 77th Leg. Assemb., Reg. Sess., §8 (5)-(6) (Or. 2013).

¹⁰⁴ H.R. 2710, 77th Leg. Assemb., Reg. Sess., § 11 (Or. 2013).

being used as a weapon.¹⁰⁵ Concerning individuals within the state, Oregon's law makes it a Class A felony for anyone to cause a drone to fire a bullet or projectile, direct a laser, cause a drone to be flown into another aircraft, or gain control of a drone operated by the FAA or the armed military services – constituting a Class C felony.¹⁰⁶

Civil remedies allowed under this law focus on individuals who interfere with or take control of a drone licensed by the FAA or operated by the Armed Services entitle the operator of the drone to damages of not less than \$5,000 and reasonable attorney's fees.¹⁰⁷ Unlike other states, Oregon has also looked to protect landowners who don't want drones flying over their property. When an operator has flown their drone over a landowner's property at an altitude of less than 400 feet, and has been informed by the landowner not to fly their drone over the landowner's property, the landowner may then bring a civil action for treble damages and injunctive relief.¹⁰⁸ Attorney's fees may be collected if the damages claimed are not in excess of \$10,000.¹⁰⁹ Finally, this law is applicable to the entire state and prohibits local legislators from enacting laws affecting the use of drones in Oregon.¹¹⁰

H. Tennessee

¹⁰⁵ H.R. 2710, 77th Leg. Assemb., Reg. Sess., § 10 (Or. 2013).

¹⁰⁶ *Id.* at §13.

¹⁰⁷ *Id.* at §14.

¹⁰⁸ Or. H.R. 2710, § 15. H.R. 2710, *supra* note 98, § 15.

¹⁰⁹ *Id.*

¹¹⁰ *Id.* at §17.

Passed in May of 2013, Tennessee enacted the Freedom from Unwarranted Surveillance Act which seeks to regulate the use of drones within the state.¹¹¹ This law identifies drones by their operational capabilities, which are defined as “a powered, aerial vehicle that: (A) does not carry a human operator; (B) Uses aerodynamic forces to provide vehicle lift; (C) Can fly autonomously or be piloted remotely; (D) Can be expendable or recoverable; and (E) Can carry a lethal or nonlethal payload.”¹¹² The law focuses only on the use of drones by law enforcement agencies, strictly prohibited such use in all situations except to counter a high risk of a terrorist attack as determined by the United States Secretary of Homeland Security, by issuance of a search warrant, or if the law enforcement agency determines the use of a drone is needed to prevent imminent danger to life.¹¹³ If violated, aggrieved parties may initiate a civil action for all appropriate relief, and evidence gathered in violation of this law is inadmissible in a court of law.¹¹⁴ Tennessee leaves private operators of drones unregulated.

I. Texas

Texas legislature finalized state drone laws as of May 24, 2013, restricting the allowable image collection methods by unmanned aerial vehicles.¹¹⁵ The law makes no reference to other uses of unmanned aerial vehicles, but rather attempts to protect the reasonable privacy rights of Texans. Such images include “any capturing of sound waves, thermal, infrared, ultraviolet,

¹¹¹ S. 796, 108th Gen. Assemb., Reg. Sess. (Tenn. 2013).

¹¹² S. 796, 108th Gen. Assemb., Reg. Sess., §1(b)(1)(A-E), (Tenn. 2013).

¹¹³ *Id.* at § 1 (d)(1-3).

¹¹⁴ *Id.* at § 1 (e), (f).

¹¹⁵ Benjamin Minegar, *Texas Legislature Gives Final Approval to Drone Legislation*, May 27, 2013, JURIST, <http://jurist.org/paperchase/2013/05/texas-lawmakers-give-final-approval-to-drone-legislation.php>; See TEX. GOV'T CODE ANN. 912 (West 2013).

visible light, or other electromagnetic waves, odor, or other conditions existing on or about real property or an individual located on that property.”¹¹⁶ No violation occurs if the operator of the drone previously received express consent from the landowner to capture images of the property.¹¹⁷ Exceptions to the law include issuance of a valid search warrant, law enforcement officers in pursuit of an individual with probable cause to believe the suspect has committed a felony, fire suppression or rescue of a person whose life is in imminent danger, real property within 25 miles of the United States border for the purpose of enforcing border laws, if the image is captured without magnification or other enhancement from no more than 6 feet above the ground, or if the image is taken of public property or of an individual on that public property.¹¹⁸ Any such violation is categorized as a Class C Misdemeanor, punishable by a fine of not more than \$500.¹¹⁹

Violations rise to the level of a Class B misdemeanor if images obtained in violation of Section 423.002 if “a person possesses, discloses, displays, distributes, or otherwise uses” the image.¹²⁰ Conviction of a Class B felony can lead to a fine of not more than \$2,000 and “confinement in jail for a term not to exceed 180 days.”¹²¹ It is an affirmative defense to this violation if the owner of the image destroyed the image as soon as they became aware that it was obtained in violation of Section 423.¹²² Further, only images conforming to Texas’s law are

¹¹⁶ TEX. GOV’T CODE ANN. §423.001 (West 2013).

¹¹⁷ TEX. GOV’T CODE ANN. §423.002 (West 2013).

¹¹⁸ TEX. GOV’T CODE ANN. §423.002 (c)(1)-(6) (West 2013).

¹¹⁹ Tex. Penal Code § 12.23.

¹²⁰ TEX. GOV’T CODE ANN. § 423.004 (West 2013).

¹²¹ TEX. PENAL CODE ANN. § 12.22 (West 2013).

¹²² TEX. GOV’T CODE ANN. § 423.004(d) (West 2013).

eligible for disclosure purposes, thus any unlawfully obtained image is exempt from legal discoverable means.¹²³ Any person found to be the subject of an illegal obtained image under Section 423 is entitled to file a civil suit against the operator of the unmanned aerial vehicle, whereby a \$5,000 fine and reasonable attorneys' fees can be assessed for each image of the plaintiff or the plaintiff's property which has been "captured, possessed, disclosed, displayed, distributed, or otherwise used."¹²⁴

J. Virginia

It seems Virginia is poised to wait and see how other states approach and enact drone regulations, as bills passing through both the House (H 2012) and Senate (S 1331) do not attempt to restrict or prohibit any specific uses of unmanned aerial vehicles within the state.¹²⁵ Instead legislators simply imposed a state-wide moratorium on the utilization of unmanned aircraft systems prior to July 1, 2015 by state government and law enforcement agencies.¹²⁶ As Section 2 of both bills indicate, states agencies are required to develop model protocols for the use of unmanned aircraft systems by law-enforcement agencies, further giving evidence that legislators still have yet to determine how to address unmanned aerial vehicles operations in the state.¹²⁷ Exceptions to the moratorium apply in instances where the activation of an Amber, Senior, or Blue alert has been issued, where an unmanned aircraft system is determined to be necessary to

¹²³ 2013 Tex. Sess. Law Serv. Ch. 1390 (H.B. 912) (West).

¹²⁴ 2013 Tex. Sess. Law Serv. Ch. 1390 (H.B. 912) (West).

¹²⁵ See generally, S.B. 1331, Reg. Sess. (Va. 2011); H.B. 2012, Reg. Sess. (Va. 2013).

¹²⁶ *Id.*

¹²⁷ S. 1331, Gen. Assemb., Reg. Sess. (Va. 2013); H. 2012, Gen. Assemb., Reg. Sess. (Va. 2013).

alleviate an immediate danger to any person, or for training exercises related to such uses.¹²⁸ No weaponized drones are allowed within the state.¹²⁹

IV. WHY DRONE LAWS ARE NEEDED

When looking at state and federal regulation of privately operated UAS, it is clear that consideration for the security and privacy interests of citizens is far from sufficiently addressed when considering the capabilities of UAS in a quickly evolving marketplace. For just \$300, a civilian can purchase and operate a Wi-Fi connected drone capable of recording streaming 720p resolution footage from a front facing and downward facing camera directly to an individual's electronic device.¹³⁰ Accessories available just for this model include extended-life batteries, flight recorders, controllers with built-in screens broadcasting real-time footage during operation, and even OLED glasses worn by the operator, giving in-flight vision to the operator.¹³¹ While the technology is impressive, the privacy implications are unnerving. Even with this relatively inexpensive and basic drone, neighbors or local citizens in possession of this technology now have the ability, without express legal restriction beyond general FAA guidelines, to freely operate their drone in airspace not exceeding 400 feet above the ground.

And not only can these individuals operate the drone overhead, but they have the ability to record streaming video footage and capture still images without first obtaining written consent by those in the videos or pictures. While state regulations have sought to restrict governmental

¹²⁸ S. 1331, Gen. Assemb., Reg. Sess. (Va. 2013); H. 2012, Gen. Assemb., Reg. Sess. (Va. 2013).

¹²⁹ *Id.*

¹³⁰ *Parrot AR.Drone 2.0 Elite Edition Quadricopter - Wifi - Free App iOS & Android - Record HD 720p movies - Sand: Electronics, AMAZON*, http://www.amazon.com/Parrot-AR-Drone-Elite-Edition-Quadricopter/dp/B00FS7SSD6/ref=sr_1_2/182-5225229-8894448?ie=UTF8&qid=1394733569&sr=8-2&keywords=parrot+drone (last visited Mar. 1, 2015).

¹³¹ *AR.Drone 2.0. Parrot new wi-fi quadricopter*, PARROT, <http://ardrone2.parrot.com/> (last visited Mar. 1, 2015).

use of drone surveillance, individuals implementing drones for such purposes have yet to be directly addressed, thus leaving the door open for anyone with a drone to essentially spy on anyone within operating range. With a click of a button, these recorded videos can be posted on popular internet sites such as YouTube for the entire world to view. For more criminally minded individuals, drones could provide a quick and efficient way to scope out the property of others, determine if homeowners are home, or conduct reconnaissance prior to breaking and entering the property. With drone prices steadily decreasing as the market expands, this may provide a cheap and reliable way for burglars to gather information about a home and surrounding property without physically entering the property. Since drone registration and operation requirements are yet to be implemented, an operator whose drone is discovered hovering over the land of another need only quickly fly the drone back to their operating position, or even allow the drone to be captured in lieu of detection or arrest.

Finally, individuals have already shown that drones are capable of transporting and firing weapons with a fairly high degree of accuracy. For instance, one individual has successfully mounted a fully automatic paintball gun to a drone, and is able to aim and position the gun through real-time streaming video footage.¹³² While not fatal, the use of paintballs armed with pepper spray could potentially incapacitate a victim prior to a theft or assault by the drone operator. Unlike drones armed with registered weapons, tracing the attacker would likely prove extremely difficult considering the availability of drones and potential they have for being manipulated. In instances where individuals choose to instead arm their drone with a firearm, such as a small pistol or light machine gun, a drone operator may now carry out a fatal attack without physically being present.

¹³² Casey Chan, *An Awesome Guy Made a Flying Drone Armed with a Paintball Gun*, GIZMODO (Dec. 12, 2012, 11:00 PM), <http://gizmodo.com/5968058/an-awesome-guy-made-a-flying-drone-armed-with-a-paintball-gun>.

With advancing technology and predicted market explosion of civilian owned drones, the list of possible drone uses is seemingly endless.¹³³ Fortunately legislators are currently in a position to develop appropriate policy responses before civilians become victim to the whims of unregulated drone operators. The FAA is actively researching appropriate regulations, and Advisory Circular 91-57 is good start, but is in need of clear and unambiguous operator flight guidance and procedure to assure the safety of others within the vicinity of a drone. This would help operators coordinate flights to avoid in-air collisions, and would likely serve as an educational tool to make operators aware of various conditions which could place a drone in a potentially harmful situation.

If drones gain popularity as predicted, it would even seem appropriate for the FAA, or individual states (if granted by the FAA), to enact licensing and registration requirements to properly operate a drone beneath the 400 foot Federal limit. Not only would individuals gain useful information regarding the operation of their drone, but authorities would also be aware of who is operating drones and who possesses a drone. Similar to the registration of firearms in various states, serial numbers and descriptions of the drone would likely help deter would-be criminals from spying on or attacking fellow citizens.

Instead of outright bans on drones, registration requirements would enhance operator responsibility, safety, and liability for others who are injured by the operation of a drone. In addition, weaponized drone bans similar to those enacted in Virginia and Oregon will likely gain popularity across the country as legislators become aware of potential airborne attacks. In an age where random mass shootings are unfortunately becoming commonplace, the argument against weaponized drones seems to be fairly straightforward, in that realistic need and use of a

¹³³ Anderson, *supra* note 2.

weaponized drone hardly comes close to outweighing the potential for disaster. Similar to prohibitions on spring-loaded firearms, or booby traps, the justification for protection of property will not overcome the value of life. Further, similar to such firearm contraptions, the lack of physical presence and threat to the landowner reinforces the argument that no imminent danger to life or body was present to legally authorize the use of force by the land owner.

CONCLUSION

At this point in time American citizens need not panic or fear that an attack will be conducted by a drone operated by another citizen. Yet citizens should be aware that drone technology is rapidly developing and becoming widely available without regulations in place to limit the who, when, where, why, and how of private drone operation. Fortunately both State and Federal governments are turning their attention to drones and addressing the issue, but much research and debate still remains to be undertaken. Hopefully within the near future the knowledge gained from FAA test sites will provide enough information for lawmakers to make adequate and appropriate policy decisions regarding the operation of drones within society.