

# Keep Calm but Don't Carry on: New Drone Regulations in the United States

SARA M SMYTH\*

---

## *Abstract*

*This article examines how the expanding application of drone technology is challenging existing legal and aviation regulatory systems in the United States. These challenges have required the Federal Aviation Authority ('FAA') to regulate drones in unique ways. Various regulatory attempts by states have complicated the establishment of uniform national regulations. Military drone use has added to the airspace congestion and near miss scenarios. Additionally, privacy concerns and nuisance drone use by private citizens bring the effects of drones outside the scope of simple aviation regulation. It is submitted that effective national regulation needs to be established in spite of these many challenges. These regulations must carefully balance encouraging innovation of drone technology and protecting those impacted by drone use.*

## **1 Introduction**

This article examines the regulation of aerial systems that are remotely or autonomously controlled, without a pilot on board.<sup>1</sup> These devices are frequently called 'drones'; though, military and legal jargon speak of 'remotely piloted aircraft' ('RPAs'), 'unmanned aerial vehicles' ('UAVs'), or 'unmanned aerial systems' ('UASs').<sup>2</sup> The drone was created for military use and, for most of its existence, it has been under strict control and has mainly flown on military bases or in foreign countries as part of classified operations.<sup>3</sup> Yet, owing to market-fuelled growth and advancements in consumer technologies, like smartphones, drones of all shapes and sizes are now flown in areas and under circumstances where manned aircraft both have and have not flown.

As a cultural narrative, drones inspire fear, paranoia and fantasy. As a technical symbol, they incorporate centuries-old technology with that which is just coming

---

\* JD, LL.M, PhD. This article reflects the law and technological environment as at the date of approval for online publication on 14 July 2017. At that time, Dr Smyth was an Associate Professor at La Trobe University School of Law, Melbourne, Australia.

<sup>1</sup> Gregoire Chamayou, *A Theory of the Drone* (New Press, 2015) 11.

<sup>2</sup> Ibid. See also Marc Rotenberg and David Brody, 'Protecting Privacy: The Role of the Courts and Congress' (2013) 39(3) *Human Rights* 1, 1 <[http://www.americanbar.org/publications/human\\_rights\\_magazine\\_home/2013\\_vol\\_39/may\\_2013\\_n2\\_privacy/protecting\\_privacy\\_courts\\_congress.html](http://www.americanbar.org/publications/human_rights_magazine_home/2013_vol_39/may_2013_n2_privacy/protecting_privacy_courts_congress.html)>.

<sup>3</sup> Adam Rothstein, *Drone* (Bloomsbury, 2015) 45.

to market.<sup>4</sup> They are ultramodern, sleek, mysterious, omnipresent, yet ever-changing. Their use comprises a vast, unpredictable and potentially deadly landscape. They are neither computer, nor car, nor airplane, nor robot – they are an amalgamation of all these 20<sup>th</sup> century innovations, yet, their 21<sup>st</sup> century use and development is largely unknown.

This article begins with an overview of recreational and commercial drone use. These machines must operate alongside manned aircraft, despite differences in size, mission requirements, and functionality. There have been few safety requirements to govern their use, let alone to securely integrate them into domestic airspace. The Federal Aviation Authority ('FAA') oversees nearly all aircraft operations in the United States and provides for the safe and efficient use of the national airspace ('NAS'), including the secure integration of drones.<sup>5</sup> This article looks closely at these efforts, which have been underway for some time. The article then considers other legal protections that can be used to safeguard against drone misuse, including state drone laws and the torts of trespass, privacy and nuisance. The article concludes that the current regulatory framework is not sufficient for the challenges that widespread drone use presents going forward.

## 2 *An Overview of the Commercial Drone Industry*

For a fraction of the price of an airplane or helicopter, drones can fly through dangerous areas without risking human lives, provide detailed information about people and things far below, and flutter past traffic jams to deliver goods on time. Recreational drones are now inexpensive, small and relatively durable, even when assembled from a hobbyist kit.<sup>6</sup> And, when it comes to the commercial drone, there is no end to the jobs it can do.

One of the first and most useful applications for commercial drones was in the field of oil and gas, where drones were hand-launched to create 3D aerial maps in remote areas of Northern Alaska.<sup>7</sup> Drones have also been used by the

---

<sup>4</sup> Ibid 140–1.

<sup>5</sup> United States Department of Transportation, 'A Brief History of the FAA', *Federal Aviation Administration* (4 January 2017) <[https://www.faa.gov/about/history/brief\\_history/#origins](https://www.faa.gov/about/history/brief_history/#origins)>. The NAS is the 'common network of US airspace; air navigation facilities, equipment and services, airports or landing areas ... Included are system components shared jointly with the military.'

<sup>6</sup> Rothstein (n 3) 43.

<sup>7</sup> Sarah E Kreps, *Drones – What Everyone Needs to Know* (Oxford University Press, 2016) 110. See also Federal Aviation Administration, 'FAA Approves First Commercial UAV Flights over Land' (Press Release, 10 June 2014) <[https://www.faa.gov/news/press\\_releases/news\\_story.cfm?newsId=16354](https://www.faa.gov/news/press_releases/news_story.cfm?newsId=16354)>; Federal Aviation Administration, 'FAA Opens the Arctic to Commercial Small Unmanned Aircraft' (Press Release, 24 September 2013) <<https://www.faa.gov/>

construction industry to look into dangerous or difficult to reach sites. They are useful for carrying out environmental assessments and they have been used to assess forest fires.<sup>8</sup> They are also a great boon to the agriculture industry for topographical assessment and other objectives that save time and money for farmers and the farming industry.<sup>9</sup>

Other real-life commercial uses include wine producers using drones to monitor when their vineyards need watering; and, farmers who use them to monitor crops for disease, assess yields, and determine when fertiliser is needed.<sup>10</sup> Drones have also been flown inside oil tanks to look for rust or cracks, as well as to monitor sites polluted with harmful agents like asbestos or radioactive materials, and to search for leaks along gas pipelines.<sup>11</sup> Similarly, they have been used to safeguard against railway hazards, like overhanging branches on rail lines.<sup>12</sup> In addition, drones have been used for inspection and relief purposes in the wake of large-scale disasters, like the 2015 Nepal earthquake and the 2011 Japan Fukushima nuclear accident.<sup>13</sup> They have also dispensed medical supplies in developing countries. They have been used by Hollywood movie moguls and cable news and sports networks, like CNN and ESPN, as a cost-effective alternative to obtaining aerial footage by helicopter.<sup>14</sup>

Drones seem to be an ever-present feature of contemporary news media, which frequently reports on commercial and recreational drone mishaps, including when drones have flown too close to manned aircraft and situations when they have landed close to heads of state.<sup>15</sup> These incidents expose the security concerns

---

news/updates/?newsId=73981>. This was how British Petroleum and AeroVironment were first able to conduct the remote surveys of the pipelines, roads and equipment at Prudhoe Bay, Alaska.

<sup>8</sup> Kreps (n 7) 111, 116.

<sup>9</sup> Ibid 111, 112.

<sup>10</sup> 'Airborne Innovation', *The Economist* (Paris, 5 December 2015) <<http://www.economist.com/news/business/21679454-most-successful-drone-firms-could-be-those-do-not-make-them-airborne-innovation>>.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> Kreps (n 7) 116.

<sup>14</sup> Ibid 114.

<sup>15</sup> Carol D Leonnig and Terri Rugar, 'When a Drone Crashed in Front of Germany's Angela Merkel,' *Washington Post* (online, 26 January 2015) <[https://www.washingtonpost.com/news/post-nation/wp/2015/01/26/when-a-drone-crashed-in-front-of-germanys-angela-merkel/?utm\\_term=.8095bacd8cd2](https://www.washingtonpost.com/news/post-nation/wp/2015/01/26/when-a-drone-crashed-in-front-of-germanys-angela-merkel/?utm_term=.8095bacd8cd2)>. For example, a drone landed in front of German Chancellor Angela Merkel at a September 2013 campaign event and, more recently, an inebriated off-duty employee for a US government intelligence agency accidentally crashed a small quadcopter onto the White House lawn in the middle of the night. See, eg, Michael D Shear and Michael S

surrounding the use of drones.<sup>16</sup> The safe integration of the commercial drone industry into the NAS depends on technological innovation as well as regulatory restrictions. These rules are essential because people have been flying drones dangerously or illegally in the US and elsewhere.<sup>17</sup> There is clearly a need for regulators to tackle these problems, and this is discussed below. Firstly, looking at some of the technical challenges with the safe integration of drones into domestic airspace.

### 3 Challenges with Integrating Drones into National Airspace

In the United States, the FAA authorises all drone operations in the National Air Space ('NAS'). The NAS encompasses an average of more than 100,000 flights per day, including commercial carriers, general aviation (medical, corporate and privately owned planes), and military aircraft.<sup>18</sup> To make it easier for planes to

---

Schmidt, 'White House Drone Crash Described as U.S. Worker's Drunken Lark,' *The New York Times* (New York, 28 January 2015) A15.

<sup>16</sup> Steven Swinford, 'Drone Believed to have Hit British Airways "May Have Been Plastic Bag"', *The Telegraph* (online, 21 April 2016) <<http://www.telegraph.co.uk/news/2016/04/21/drone-believed-to-have-hit-british-airways-flight-may-have-been/>>. Earlier this year, a drone allegedly hit a British Airways Airbus A320 jet at around 1,700 feet in the air as it came in to land at London's Heathrow airport; however, the British Transportation Minister Robert Goodwill was quick to acknowledge that the 'drone' may have been nothing other than a free-floating plastic bag. Nevertheless, the incident underscores the fact that drone sightings from pilots have increased in the last couple of years and that there are inherent dangers in operating non-military drones in commercial airspace.

<sup>17</sup> Alex Brown, 'This Fireworks Drone is Awesome and Illegal,' *The Atlantic* (online, 7 July 2014) <<https://www.theatlantic.com/politics/archive/2014/07/this-fireworks-drone-is-awesome-and-illegal/442164/>>. For example, in 2014, an Ohio man recorded a Fourth of July fireworks show with a small quadrotor that hovered perilously close to the explosions at 500 feet in the air. See also Julia Talanova, 'Drones Crashing Big Sporting Events Including U.S. Open, College Football - CNN,' *Sunraynews* (online, 6 September 2015) <<http://sunraynews.com/drones-crashing-big-sporting-events-including-us-open-college-football-cnn/>> which documents how, in 2015, a drone disrupted the US Open tennis event; and, another drone crash-landed inside the University of Kentucky football stadium during pre-game festivities at the Wildcats' home opener. That same year, California firefighters were forced to halt aerial fire-fighting several times due to threats posed by recreational drones; see Amanda Ripley, 'Playing Defense Against the Drones,' *The Atlantic* (online, November 2015) <<https://www.theatlantic.com/magazine/archive/2015/11/playing-defense-against-the-drones/407851/>>.

<sup>18</sup> US Government Accountability Office ('GAO'), *Unmanned Aircraft Systems: Measuring Progress and Addressing Potential Privacy Concerns Would Facilitate Integration into the National Airspace System* (GAO Publication No 12-981, 2012) 4-5 ('Measuring Progress').

operate in this busy space, NAS is divided into classes, with the entry and use of each class having different requirements.<sup>19</sup>

Most commercial aircraft operate at altitudes between 18,000 and 60,000 feet above sea level, which is known as Class A.<sup>20</sup> Classes B, C, and D make up the airspace immediately surrounding airports, mandating safe approach and departure.<sup>21</sup> Classes B and C are used to control traffic flow around airports with heavy and moderate traffic; while Class D is used for traffic control at smaller airports, often with no control tower.<sup>22</sup> Operations within Classes A, B, C, and D are strictly controlled, and each class has specific requirements, such as contact and clearance from air-traffic control, and communication between the airport and the pilot.<sup>23</sup> The other two airspace classifications are E and G, which are not as extensively regulated as Classes A–D. Class E is everything above 60,000 feet and everything below 18,000 feet, down to about 700 feet above the ground that is not already classed B, C, or D.<sup>24</sup> Class G is everything between Class E and the ground and it is completely uncontrolled.

Small UAVs comprise most drones that operate in the NAS. These UAVs typically weigh less than 55 pounds, fly below 400 feet, and are often used to conduct surveillance, reconnaissance and inspection missions. For example, they are deployed to assist with search and rescue missions, wildfire monitoring, and crime scene surveillance.<sup>25</sup> This means that they typically fly in Class G airspace, which is everything below roughly 700 feet off the ground, where no radio communication is required at all.

Given the expected proliferation of small drone aircraft in the coming years, the activity in Class G airspace is likely to experience significant growth. As well, many drones are capable of flying from Class G directly into Class E, and beyond.<sup>26</sup> This presents a challenge because below 18,000 feet, there is wide variation in the types of aircraft and aircraft activity, including planes taking off and landing, which affects the integration of drones into the NAS, particularly at low levels.<sup>27</sup> As previously mentioned, increased UAV traffic has affected

---

<sup>19</sup> US Department of Transportation, 'Aeronautical Information Manual: Official Guide to Basic Flight Information and ATC Procedures', *Federal Aviation Administration* (2014) (for sale by the Supt. of Docs., US GPO) <[https://www.faa.gov/air\\_traffic/publications/media/AIM\\_Basic\\_4-03-14.pdf](https://www.faa.gov/air_traffic/publications/media/AIM_Basic_4-03-14.pdf)>.

<sup>20</sup> Rothstein (n 3) 46.

<sup>21</sup> Ibid.

<sup>22</sup> Aeronautics and Space – Class D Airspace, 14 CFR § 71.61 (2012).

<sup>23</sup> Rothstein (n 3) 46.

<sup>24</sup> Ibid.

<sup>25</sup> Although some can have longer endurance and operate beyond line of sight.

<sup>26</sup> Rothstein (n 3) 46.

<sup>27</sup> US Government Accountability Office, *Measuring Progress* (n 18) 5.

commercial aviation, particularly during takeoff and landing;<sup>28</sup> and, we are likely to witness a rise in the number of accidents, including property damage and personal injury cases, when these devices fail or are misused. In the next section, we will look more closely at some of the technical and operational challenges surrounding the safe integration of drones into the NAS.

### 3.1 Sense and Avoid Technologies

As discussed above, many drones, particularly small ones, operate at altitudes below 18,000 feet, sharing airspace with other aircraft and objects. A concern is that they cannot detect, sense, and avoid aircraft and airborne things the way human pilots do. As FAA director Michael Huerta recently put it, the 'see and avoid' principle 'is a bedrock principle of aviation ... the pilots take action to avoid one another.'<sup>29</sup> Many drones are equipped with cameras and high-tech sensors; however, they do not match the capabilities of a human pilot. As well, most small UAVs cannot detect signals that other aircraft use to identify themselves, as they are too small and light to carry such equipment.

Given these limitations, a central objective behind the FAA's drone policy is to prevent UAVs from interfering with other aircraft, particularly large aircraft that carry passengers.<sup>30</sup> It has focused heavily on reducing the risk of collision between manned aircraft and UAVs operating at various altitudes *before* they can be safely integrated into the NAS. This has meant that the FAA has been imposing strict limits on where UAVs can fly as well as mandating line-of-sight requirements to mitigate the risk of collisions between UAVs and other aircraft.

### 3.2 Vulnerabilities in Command and Control

Another issue is the fact that command and control systems are not standardised nor are there standard 'fail-safes' in place if the link between a drone and a ground control station is lost due to environmental or technical problems.<sup>31</sup> Some small drones have an integrated Global Positioning System ('GPS') receiver and an autopilot system, which can automatically return them to land at their home base in the event of a communications failure. The same technology further enables the operator to pre-program no-fly zones, preventing the UAV from entering unauthorised areas. But without systems for avoidance, recovery and landing, in a 'lost link' scenario, there could be a loss of control of the drone in mid-air, and the potential for collisions, crashes, or other dangerous mishaps.

---

<sup>28</sup> Swinford (n 16).

<sup>29</sup> Sara Fisher, 'FAA to Ramp Up Drone Education, Regulation,' CNN (online, 1 December 2014) <<http://edition.cnn.com/2014/11/30/politics/faa-drone-education-regulation-safety/>>.

<sup>30</sup> Kreps (n 7) 130.

<sup>31</sup> Rothstein (n 3) 47.

Pilots clearly need to communicate with their drones and they typically use radio waves, which provide a connection between the ground transmitter and the UAV, allowing the operator to relay commands and navigational information. However, drones use public radio spectrum, typically the same used for Wi-Fi, which smartphones and tablets can use without accessories. In heavily populated areas, the radio frequency is congested and not secured in any way. The connection between a UAV and its operator can thus be lost or disrupted, including by deliberate interference through ‘spoofing’ or ‘jamming’.<sup>32</sup>

### 3.3 Human Vulnerabilities and Unreliability

One of the primary reasons for the military’s development of drone technologies was to reduce risk to military personnel. Yet, until very recently, UAV mishap rates were much higher than those of manned aircraft. The separation of pilot and aircraft, which was supposed to eliminate risk, has created new vulnerabilities, including the inability of a pilot to be continually aware of their sensory surroundings during flight, delays in control and communications loops, and difficulties in monitoring the physical environment surrounding the aircraft.<sup>33</sup>

What accounts for so many drone mishaps? A 2005 study illustrates that the causes can be broken down into five categories: power and propulsion (37%); flight controls (25%); human error (17%); communications (11%); and miscellaneous/other (10%).<sup>34</sup> Together, human operational or maintenance errors were said to be the cause of as many as 68% of UAV accidents.<sup>35</sup> Behind the statistics, the stories told by military insiders about these accidents are

---

<sup>32</sup> Richard D Easton and Eric F Frazier, *GPS Declassified: From Smart Bombs to Smart Phones* (Potomac Books, 2013) 2. See also Matthew Schroyer, ‘FCC’s Historic Fine for GPS-Jamming Equipment Is Sign of Hazards Ahead for Drones’, *Professional Society of Drone Journalists* (19 June 2014) <<http://www.dronejournalism.org/news/2014/6/fccs-historic-fine-for-gps-jamming-is-sign-of-hazards-ahead-for-drones>>.

Vulnerabilities further arise from the fact that some drones rely on GPS information to determine location, navigation and time. As mentioned above, a drone equipped with a GPS receiver can relay its location to the controller and log the aircraft’s takeoff spot in case it needs to return home unassisted. However, this information is also vulnerable to interception and misuse. For instance, in 2014, the FCC issued its largest fine ever – \$34.9 million – against a Chinese company that made and marketed nearly 300 models of signal jammers for cell phones, GPS and other signals. These are the very kinds of tools that can be used to interfere with drones.

<sup>33</sup> US Government Accountability Office, *Measuring Progress* (n 18) 18.

<sup>34</sup> William T Thompson, Major Anthony P Tvaryanas and Stefan H Constable, *US Military Unmanned Aerial Vehicle Mishaps: Assessment of the Role of Human Factors Using Human Factors Analysis and Classification System (HFACS)* (Report, March 2005)

<sup>35</sup> *Ibid.*

chilling. In many cases, catastrophe has been narrowly averted due to sheer luck.<sup>36</sup>

The number of domestic drone mishaps has increased as the military has relocated some of its UAVs home from overseas and flown them more frequently in airspace shared with other aircraft.<sup>37</sup> However, most flights take place without incident and investments in reliability upgrades and other advancements have made military drones increasingly safe to operate. Mishap rates per flight hour have declined steadily over the past number of years. Still, flying a UAV is extremely difficult, and pilot errors have continued to pose a problem, even for highly-trained military drone operators. In addition, there will always be risks posed by mechanical defects and bad weather.<sup>38</sup>

## 4 Progress Toward Integrating Drones into the NAS

### 4.1 Research and Development Efforts

Congress recognised the difficulty of safely integrating UAVs into the NAS and decided that the FAA should ensure that drones can be safely flown under controlled conditions, and that technical and operational difficulties are overcome before drones are put into general use alongside manned aircraft. Research and development efforts have been underway for some time,

---

<sup>36</sup> Craig Whitlock, 'When Drones Fall from the Sky,' *The Washington Post* (online, 20 June 2014) <[http://www.washingtonpost.com/sf/investigative/2014/06/20/when-drones-fall-from-the-sky/?utm\\_term=.ec2ea7a257d5](http://www.washingtonpost.com/sf/investigative/2014/06/20/when-drones-fall-from-the-sky/?utm_term=.ec2ea7a257d5)>. In November 2008, for example, a Predator crashed into a US military base in Afghanistan; and, in September 2009, an armed Reaper flew out of control over the same hostile territory after its handlers lost control of it, and it had to be shot down by US fighter jets in Tajikistan. Likewise, an armed Predator crashed near Kandahar in January 2010 because its US pilot did not realise that it had been flying it upside-down; and, later that year, another armed Predator crashed overseas after its US-based operator pushed the wrong button on his joystick and put it into a spin.

<sup>37</sup> Craig Whitlock, 'Crashes Mount as Military Flies More Drones in U.S.,' *Washington Post* (online, 22 June 2014) <[http://www.washingtonpost.com/sf/investigative/2014/06/22/crashes-mount-as-military-flies-more-drones-in-u-s/?utm\\_term=.b716aeacfd8](http://www.washingtonpost.com/sf/investigative/2014/06/22/crashes-mount-as-military-flies-more-drones-in-u-s/?utm_term=.b716aeacfd8)>. While most US military drone accidents occur overseas, some have taken place in the United States; although, fortunately, no one has been killed in any of these incidents. For example, in June 2012, an RQ-4 surveillance drone, part of the Navy's Broad Area Maritime Surveillance program, crashed into a wildlife refuge on Maryland's Eastern Shore, igniting a fire. In November 2013, in upstate New York, a Reaper plunged into Lake Ontario about 12 miles from the lake's eastern shore. And, in April 2014, a large reconnaissance drone crashed next to an elementary-school playground in Lickdale, Pennsylvania, just a few minutes after students went home for the day. It barely missed the school and it tumbled past the playground, eventually colliding with a passing car - miraculously, no one was hurt.

<sup>38</sup> *Ibid.*



particularly with respect to the following crucial issues: upgrading the sense-and-avoid capabilities of UAVs; the training and certification of ground-based pilots; and the development of new safety standards, including 'lost link' scenarios and collision avoidance.<sup>39</sup> Various federal agencies are working with the FAA, including the National Air and Space Association ('NASA') and the Department of Defense ('DOD').<sup>40</sup> A variety of academic institutions, corporate entities, and local and state governments are also assisting in this effort.<sup>41</sup>

On 14 February 2012, President Obama signed the FAA *Modernization and Reform Act of 2012* ('FMRA')<sup>42</sup> into law. Pursuant to that Act, Congress directed the FAA to propose a rule to integrate small UAVs into the national air space system by the end of fiscal year 2015. As well, the FAA had to establish a program to integrate drones into the NAS at six test ranges by August 2012.<sup>43</sup> The FMRA called for limited drone flights at these test ranges in advance of the 2015 deadline for the safe integration of UAVs into the NAS. The FAA missed its 2012 deadline; however, after a rigorous selection process, the FAA announced its decision on 30 December 2014, and all six test sites became operational by mid-August of 2014.<sup>44</sup> It is anticipated that findings from these test sites will help address critical issues. Namely, UAV detection and avoidance (together with the effects of UAV operations on air traffic management) and sense-and-avoid technologies (including visual and radar sensing). The development of standards and technologies for command and control communications, manoeuvrability,

---

<sup>39</sup> Matthew L Wald, 'FAA Picks Diverse Sites to Carry Out Drone Tests,' *The New York Times* (online, 30 December 2013) <<http://www.nytimes.com/2013/12/31/us/politics/us-names-domestic-test-sites-for-drone-aircraft.html>>.

<sup>40</sup> US Government Accountability Office ('GAO'), *Unmanned Aerial Systems: Efforts Made Toward Integration into the National Airspace Continue, but Many Actions Still Required*, Testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives (GAO Publication No 15-254T, 2014) ('*Efforts Made Toward Integration*').

<sup>41</sup> Ibid 11-13.

<sup>42</sup> *FAA Modernization and Reform Act of 2012*, Pub L No 112-95, 126 Stat 11.

<sup>43</sup> United States Department of Transportation, 'UAV Test Site Frequently Asked Questions', *Federal Aviation Administration* (3 February 2017) <[https://www.faa.gov/uas/research/test\\_sites/](https://www.faa.gov/uas/research/test_sites/)>.

<sup>44</sup> United States Department of Transportation, 'Fact Sheet - Unmanned Aircraft Systems (UAV)', *Federal Aviation Administration* (15 February 2015) <[https://www.faa.gov/news/fact\\_sheets/news\\_story.cfm?newsId=18297](https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=18297)> ('UAV Fact Sheet'). The six sites include the University of Alaska – Fairbanks; the State of Nevada; Griffiss International Airport (Rome, NY); the North Dakota Department of Commerce; Texas A&M University – Corpus Christi; and Virginia Polytechnic Institute and State University (Virginia Tech). The FAA also selected Mississippi State University to lead a team of 15 universities that have a commitment to UAV research and to operate as the FAA's National Center of Excellence for Unmanned Aircraft Systems.

ground control stations, airworthiness, lost link procedures, and integration with air traffic control are other critical issues.

## 4.2 Federal Legislative Initiatives

The need to maintain a uniform, federally-administered NAS free from inconsistent laws has been an important objective in the US for some time. In 1973, the Supreme Court struck down a municipal anti-noise ordinance placing a curfew on flights from a regional airport. Recognising the ubiquitous nature of the federal regulatory scheme, the Court observed that:

The *Federal Aviation Act* requires a delicate balance between safety and efficiency, and the protection of persons on the ground. ... The interdependence of these factors requires a uniform and exclusive system of federal regulation if the congressional objectives underlying the *Federal Aviation Act* are to be fulfilled.<sup>45</sup>

Similarly, in a more recent case, the Ninth Circuit Court of Appeals stated:

The purpose, history, and language of the *FAA (Act)* lead us to conclude that Congress intended to have a single, uniform system for regulating aviation safety. The catalytic events leading to the enactment of the *FAA (Act)* helped generate this intent. The *FAA (Act)* was drafted in response to a series of fatal air crashes between civil and military aircraft operating under separate flight rules. ... In discussing the impetus for the *FAA (Act)*, the Supreme Court has also noted that regulating the aviation industry requires a delicate balance between safety and efficiency. It is precisely because of 'the interdependence of these factors' that Congress enacted 'a uniform and exclusive system of federal regulation.'<sup>46</sup>

Thus, Congress vested the FAA with authority to regulate airspace use, management and efficiency; along with air traffic control, safety, and navigational facilities, and aircraft noise.<sup>47</sup> Congress also directed the FAA to 'develop plans and policy for the use of the navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace.'<sup>48</sup>

The FAA's authorising statute defines an aircraft as 'any contrivance invented, used, or designed to navigate or fly in the air.'<sup>49</sup> The FAA regulations further define an aircraft as, 'a device that is used or intended to be used for flight in the air.'<sup>50</sup> Since a drone is a device that is 'intended to be used for and designed to be

---

<sup>45</sup> *City of Burbank v Lockheed Air Terminal Inc*, 411 US 624 (1973).

<sup>46</sup> *Montalvo v Spirit Airlines*, 508 F 3d 464, 471 (9<sup>th</sup> Cir, 2007), citing *City of Burbank v Lockheed Air Terminal Inc.*, 411 US 624 (1973).

<sup>47</sup> 49 USC §§ 40103, 44502, and 44701-35 (2010).

<sup>48</sup> 49 USC § 40103(b)(1) (1958).

<sup>49</sup> *Ibid* § 40102(a)(6).

<sup>50</sup> 14 CFR § 1.1 (1962).

flown in the air', it meets the definition of 'aircraft' within the FAA's statute and regulations.<sup>51</sup> As a result, the FAA is mandated to oversee all drone operations in the NAS, including UAVs used as public and military aircraft; UAVs used as civil (commercial) aircraft; and UAVs used as model aircraft.<sup>52</sup> Each of these categories, and their associated rules and restrictions, is explained in detail below.

### 4.3 Public (Governmental)

The 'public' users of UAVs include government entities such as public colleges and universities and federal, state, and local governments, including military and law enforcement organisations.<sup>53</sup> Public aircraft operations within the NAS are limited to specific government functions, such as law enforcement, firefighting, border patrol, disaster relief, search and rescue, military training and so on.<sup>54</sup> Qualified academic institutions, such as a state college or university, may only use public UAVs to carry out aeronautical research according to terms set by the FAA.<sup>55</sup> The FAA authorises these operations on a case-by-case basis, depending on the safety of the proposal, aircraft ownership, the operator, the purpose of the flight, and the individuals on board.<sup>56</sup>

Public applicants must apply online for a 'Certificate of Waiver or Authorization' ('COA') to fly a UAV in civil airspace.<sup>57</sup> The average time to obtain an authorisation for non-emergency operations is approximately 60 days; the FAA maintains that it has expedited procedures to grant one-time COAs for time-sensitive emergency missions such as disaster relief and humanitarian aid, sometimes in just a few hours.<sup>58</sup>

---

<sup>51</sup> *Huerta v Pirker*, NTSB Order No EA-5730, 2014 WL 8095629, at \*5 (NTSB 17 November 2014). The National Transportation and Safety Board decided that drones are 'aircraft' as the word is defined under federal statutes and regulations, and therefore, CFR 91.13 (the regulatory prohibition of careless or reckless aircraft operations) applies to drones.

<sup>52</sup> *FAA Interpretation of the Special Rule for Model Aircraft*, 14 CFR Part 91, 11 (2014) <[https://www.faa.gov/uas/media/model\\_aircraft\\_spec\\_rule.pdf](https://www.faa.gov/uas/media/model_aircraft_spec_rule.pdf)>.

<sup>53</sup> *Know Before You Fly, Public Entities* (2015) <<http://knowbeforeyoufly.org/for-public-entities>>.

<sup>54</sup> 49 USC § 40102(a)(41) (1958).

<sup>55</sup> United States Department of Transportation, 'Certificates of Waiver or Authorization (COA)', *Federal Aviation Administration* (17 April 2017) <[https://www.faa.gov/about/office\\_org/headquarters\\_offices/ato/service\\_units/systemops/aaim/organizations/uas/coa/](https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/aaim/organizations/uas/coa/)> ('COA').

<sup>56</sup> *Know Before You Fly* (n 53).

<sup>57</sup> United States Department of Transportation, 'COA' (n 55).

<sup>58</sup> *Ibid.* Public entities that have been issued COAs include the US Air Force, the US Army, DARPA, the FBI, NASA, some county and municipal law enforcement agencies, as well as several public universities.

If granted, the COA allows an operator to use a defined block of airspace, for a specific period – usually up to two years – for a specific purpose.<sup>59</sup> The COA also typically imposes special provisions unique to the proposed operation. For instance, a COA may require flying only under Visual Flight Rules ('VFR') and/or only for the duration of certain time periods, such as during daylight hours.<sup>60</sup> Most COAs require coordination with an air traffic control facility and may require a transponder on the UAV to operate in certain types of airspace.<sup>61</sup>

#### 4.4 Civil (Commercial)<sup>62</sup>

As mentioned above, in February 2012, through the *FMRA*, Congress directed the FAA to propose a rule to integrate small UAVs into the national air space system by 30 September 2015. However, on 17 June 2015, FAA Deputy Administrator Michael Whitaker confirmed that the FAA would not complete the integration by that deadline.<sup>63</sup> Instead, the FAA anticipated establishing a final rule by June 2016, and, as discussed below, it succeeded in meeting that deadline.<sup>64</sup> FAA director Michael Huerta gave a long list of reasons for why the FAA moved so slowly to develop rules to facilitate the domestic integration of drones. Huerta explained:

In 2012, there were thousands rather than hundreds of thousands of drones. In 2012, nobody was flying drones near airports. Nobody was shooting down drones over their homes. Nobody was crashing a drone into the trees near the White House.<sup>65</sup>

In the interim, before it released its long-awaited final rule on 21 June 2016, the FAA authorised drone operators to fly their UAVs under exemptions provided by Section 333 of the *FMRA*. Section 333 granted the Secretary of Transportation

---

<sup>59</sup> United States Department of Transportation, '00-1.1A - Public Aircraft Operations', *Federal Aviation Administration* (12 February 2014) <[https://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document.information/documentID/1023366](https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1023366)>.

<sup>60</sup> United States Department of Transportation, 'UAV Fact Sheet' (n 44).

<sup>61</sup> *Ibid.*

<sup>62</sup> Know Before You Fly (n 53). According to the FAA, the commercial use of UAVs includes, 'any commercial use in connection with a business,' such as selling photos or videos taken from a UAV (eg professional real estate or wedding photography and professional cinema photography for film and television production); and using UAVs to provide professional services (eg security, mapping, land surveys, or telecommunications).

<sup>63</sup> Rachel Stohl, 'Grading Process on US Drone Policy', *Stimson Center* (23 February 2016) <<https://www.stimson.org/content/grading-progress-us-drone-policy-0>>.

<sup>64</sup> *Ibid.*

<sup>65</sup> Sean Gallagher, 'FAA Chief to Impatient Drone Industry: "Sorry We're so Slow"', *Ars Technica* (5 July 2016) <<http://arstechnica.com/information-technology/2016/05/faa-chief-announces-advisory-panel-on-drones-as-industry-checks-its-watch/>>.

the authority to determine whether certain UAVs posing a low risk to public safety and no threat to the NAS could operate safely in the NAS prior to the FAA's completion of its then-proposed UAV rulemakings.<sup>66</sup> These decisions were made on a case-by-case basis, thus (at least partly) accounting for the FAA's lengthy delay in completing the final rulemaking process.

On 15 February 2015, the FAA released a draft of its 'proposed rule'. The draft rule, which applied to commercial drones weighing less than 55 pounds, allowed commercial operators to fly their devices within their line of sight during daylight hours under 500 feet and below 100 miles per hour.<sup>67</sup> Commercial drone pilots also needed to register their drones with the FAA and hold a valid pilot's license. To mitigate the risks posed by the lack of onboard sense-and-avoid technologies, the FAA imposed the private pilot's license requirement. This was so that even if drone operators could not see and avoid other aircraft, they would at least have an educated understanding of where other aircraft would be operating and know the rules about which altitude to use and how to avoid a head-on collision.<sup>68</sup> Note that this requirement was subsequently relaxed, as explained below.

The public comment period for the proposed rule closed on 24 April 2015, and the FAA received 4,500 comments, including complaints from privacy advocates who objected that privacy and surveillance issues were not addressed.<sup>69</sup> This begs the question of why drones have been met with so much public resistance. Why are they so upsetting for many and, thus, so controversial?

At a 2012 Board of Supervisors meeting in Oakland, California, a discussion about a sheriff's application to purchase a drone drew staunch opposition from local residents. 'I do not want flying spy robots looking into my private property with infrared cameras,' quipped Oakland resident Mary Madden, before she went on to assert, '[i]t's an invasion of my privacy!'<sup>70</sup> While privacy is an amorphous and deeply personal concept, it's noteworthy that Madden's comment captures the idea that there are certain areas of private or personal sanctity within which people have the right to be shielded from view. The idea of privacy as the right of the individual to place limits on the place, or zone, in which others can access information about them, has long served as a legal basis for privacy.<sup>71</sup> It dates back to 1890 when Warren and Brandeis famously wrote

---

<sup>66</sup> US Government Accountability Office, *Efforts Made Toward Integration* (n 40) 3.

<sup>67</sup> *Ibid.*

<sup>68</sup> Kreps (n 7) 131.

<sup>69</sup> Stohl (n 63) 21-2.

<sup>70</sup> *Ibid.*

<sup>71</sup> Similar conceptions of privacy have been adopted by the Supreme Court of Canada (*R v Plant* [1993] 3 SCR 281) as well as the US Supreme Court since *Katz v United States* 389 US 347 (1967).

that privacy is based on the 'right to be left alone'.<sup>72</sup> This concept of privacy has deeply political and normative dimensions because it reflects the underlying ideals enshrined in the *United States Constitution*. These values are also shared by many other Western democracies, particularly when it comes to intrusions by the state.<sup>73</sup> Thus, privacy, in this sense, is both an individual and societal interest, deserving of legal protection against intrusion by private and public actors. These issues are discussed further below.

Other complaints received by the FAA centered on the requirement to get a private pilot's license to fly commercial UAVs. While, intuitively, this seems like a sensible idea, drone manufacturers and those within industries seeking to rely on drones objected. Commercial operators would have been required to complete dozens of hours of work with a costly flight instructor, and countless hours of classroom time. Ultimately, the FAA agreed that the 40 required flight hours, and roughly \$10,000 cost, set the bar too high and threatened to constrain the commercial drone workforce.<sup>74</sup>

Other stakeholders complained that the condition that UAV operators fly only within their visual line of sight would prohibit many important commercial operations, such as those relating to large-scale agriculture.<sup>75</sup> The 400-foot height restrictions and line-of-sight requirements would clearly be appropriate in densely populated urban areas; however, farmers using drones to survey crops on their own rural property would not pose anywhere near the same risks to public safety and security of the NAS.<sup>76</sup> Context would suggest that these blanket restrictions were too heavy-handed, and that an approach which takes into account the nature of the commercial activity and the risks created is more appropriate.

The FAA attributed its lengthy delays in developing new rules and responding to the inflow of Section 333 petitions to the extremely large amount of comments and applications it received.<sup>77</sup> The FAA then established yet another interim policy to speed up authorisations for certain commercial UAV operators who obtain Section 333 exemptions. Under the interim policy, the FAA granted a COA for flights at or below 200 feet to any UAV operator with a Section 333 exemption for aircraft that weighed less than 55 pounds, operated during daytime, within

---

<sup>72</sup> Samuel D Warren and Louis D Brandeis, 'The Right to Privacy' (1890) 4 *Harvard Law Review* 193.

<sup>73</sup> Helen Nissenbaum, *Privacy in Context – Technology, Policy and the Integrity of Social Life* (Stanford University Press, 2009) 76. For example, Nissenbaum discusses the Third and Fourth Amendments of the Bill of Rights: at 95.

<sup>74</sup> Kreps (n 7) 133.

<sup>75</sup> US Government Accountability Office, *Efforts Made Toward Integration* (n 40) 6.

<sup>76</sup> Kreps (n 7) 132.

<sup>77</sup> Stohl (n 63).

visual line of sight of the pilot, and kept away from airports or heliports.<sup>78</sup> The FAA also reversed its position requiring the operator to hold a private pilot's license (i.e. an operator could hold a recreational or sport pilot license, which is easier to obtain but still requires training and flight tests in manned aircraft) and it eliminated the requirement for a medical certificate, requiring only that the operator hold a valid driver's license which is all that is necessary for a sport pilot to fly manned aircraft.<sup>79</sup>

On 21 June 2016, the FAA released its first (finalised) operational rules for routine commercial use of small unmanned aircraft (i.e. UAVs or drones), also known as Part 107.<sup>80</sup> Under the new operational rules, which took effect in late August 2016, the drone operator must be at least 16 years old and have a 'remote pilot certificate with a small UAV rating' or be directly supervised by someone with such a certificate. This standard lowers the bar considerably from the FAA's initial decision to require commercial drone pilots to hold a private pilot's license. To qualify for a remote pilot certificate, a person is required to pass an 'aeronautical knowledge test' at an FAA-approved testing centre, or have completed a flight review in the previous two years, and have completed an online training course on UAVs through the FAA.<sup>81</sup> Operators are also responsible for ensuring their drone is safe before flying and they must perform a pre-flight visual and operational test, which includes checking the communications link between the control station and the UAV.

The new rule also provides that commercial UAVs must weigh less than 50 pounds, remain within the visual line of sight of their operator at all times, fly during daylight hours only (although this has been broadened to include 30 minutes before sunrise and after sunset) and remain below 400 feet or within 400 feet of a structure. These restrictions mean that drone-delivery schemes, like the one envisioned by Amazon through its Prime Air program, might never get off the ground.<sup>82</sup>

---

<sup>78</sup> United States Department of Transportation, 'FAA Streamlines UAS COAs for Section 333', *Federal Aviation Administration* (24 March 2015) <<https://www.faa.gov/news/updates/?newsId=82245>>.

<sup>79</sup> UAV Coach, 'Drone Certification: A Step-by-Step Guide to FAA Part 107 for U.S. Commercial Drone Pilots' (2017) <<http://uavcoach.com/drone-certification/>>.

<sup>80</sup> Federal Aviation Administration, 'Summary of Small Unmanned Aircraft Rule (Part 107)' (online) <<https://www.documentcloud.org/documents/2891049-FAA-Drone-Rules.html>>.

<sup>81</sup> Federal Aviation Administration 'DOT and FAA Finalize Rules for Small Unmanned Aircraft Systems' (Press Release, 21 June 2016) <[https://www.faa.gov/news/press\\_releases/news\\_story.cfm?newsId=20515](https://www.faa.gov/news/press_releases/news_story.cfm?newsId=20515)>.

<sup>82</sup> Matt Schiavenza, 'FAA Drone Regulations Deal Blow to Amazon', *The Atlantic* (online, 15 February 2015) <<https://www.theatlantic.com/business/archive/2015/02/faa-drone-regulations-deal-blow-to-amazon/385529/>>.

Amazon reportedly spent upwards of \$6.63 billion on shipping in 2013, and it estimates that drones could save it as much as \$2 per delivery.<sup>83</sup> So it is not surprising that Amazon lobbied hard for US drone approval, pumping nearly \$10 million into lobbying efforts on Capitol Hill in 2015 alone.<sup>84</sup> At the same time, the company tested its delivery system in other jurisdictions, including Canada, the UK, and the Netherlands; and it remained outspoken about moving its drone program overseas if the FAA did not allow operations at home.<sup>85</sup>

Now with the issuing of the final rule, things are not looking up for Amazon. The FAA concluded that although 'transportation of property for compensation or hire' is permitted, the drone and its cargo cannot weigh more than 55 pounds total. Even more troublesome is the fact that flights can only be conducted within the visual line of sight of the drone pilot (and not from a moving vehicle or secondary aircraft), and the flight must occur wholly within the bounds of one state (excluding Washington DC and territories of the US, which are off limits entirely).

What this denotes for the future of Amazon's Prime Air program is anybody's guess; although, it almost certainly means that Amazon customers will not get their packages delivered by drone anytime soon. The reason is that Amazon or anyone else would find it very difficult to use a UAV to deliver a package from a warehouse to someone's home while keeping their eyes on it for the entire duration of the flight. Of course, drone deliveries could occur between a warehouse and, say, a neighbouring farm – but this is hardly going to be commercially viable in the long term.

On that note, Amazon, Google and other companies that want to start air-lifting products to customers' homes should be aware that the FAA has already come down hard against those who violate the law in the prosperous commercial drone industry.<sup>86</sup> In October 2015, the FAA fined SkyPan International, a Chicago-based drone company, \$1.9 million for 65 unauthorised flights in New York City and Chicago before they were issued a Section 333 exemption.<sup>87</sup> To date, this represents the largest civil penalty ever imposed against a drone company.

---

<sup>83</sup> Ibid.

<sup>84</sup> Hilary Brueck, 'Here's How Amazon is Fighting for US Drone Deliveries', *Fortune* (online, 21 March 2016) < <http://fortune.com/2016/03/21/amazon-drone-lobbying/>>.

<sup>85</sup> Ibid.

<sup>86</sup> Brendan Sasso, 'Drone Company Faces \$1.9 Million Fine for Unsanctioned Flights', *The Atlantic* (online, 6 October 2015) <<https://www.theatlantic.com/politics/archive/2015/10/drone-company-faces-19-million-fine-for-unsanctioned-flights/457464/>>.

<sup>87</sup> Bourree Lam, '65 Unauthorized Flights Could Cost a Drone Company Nearly \$2 Million', *The Atlantic* (online), 6 October 2015 <<https://www.theatlantic.com/business/archive/2015/10/faa-drone-fine-skypan/409249/>>.



Unfortunately, the line of sight requirement will also affect other promising applications of drones, such as inspections along power lines, gas pipelines and railway lines to check for damage or obstacles. It may similarly impair the future use and development of UAVs for agriculture. Of course, it remains to be seen what other restrictions are brought to bear on the future developments of this new technology because of these new regulations.

#### 4.5 Model (Recreational/Hobby)

UAVs flown for recreational use are typically known as ‘model aircraft’, and these include small unmanned drones, such as ‘quadcopters’ flown for recreational or hobby purposes. Officially, the term model aircraft means, ‘an unmanned aircraft that is (1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes.’<sup>88</sup> Those who fly model aircraft for personal interest and enjoyment, not for business purposes, or compensation/hire, are commonly referred to as ‘hobbyists’.<sup>89</sup>

The statutory restrictions placed on model aircraft operators are outlined in s 336 of the *FMRA*. The UAV must be limited to no more than 55 pounds, must not interfere with and must give way to manned aircraft and, if flown within 5 miles of an airport, the operator of the UAV must provide the airport operator and the airport air traffic control tower (if applicable) with prior notice of the operation and follow a mutually agreed upon operating procedure.<sup>90</sup> Individuals who fly within the scope of these parameters do not need permission to operate their UAV; however, any flight outside these requirements needs FAA authorisation, as discussed below.

As of 21 December 2015, the FAA also requires all owners (aged 13 years and older) of model aircraft weighing between 0.55–55 pounds to register online before flying outdoors.<sup>91</sup> They must also pay a small fee of \$5 and obtain a unique identification number that they must affix to any UAV they own and operate exclusively for recreation.<sup>92</sup> Registration is valid for three years. Failure to register a UAV can result in civil penalties up to \$27,500 and criminal penalties including fines of up to \$250,000 and/or imprisonment for up to three years.<sup>93</sup> The FAA has

---

<sup>88</sup> *FAA Modernization and Reform Act of 2012*, Pub L No 112-95, s 336(c).

<sup>89</sup> Small UAV Coalition, ‘Current Rules’ (2016) <<http://www.smalluavcoalition.org/current-rules/>>.

<sup>90</sup> *FAA Modernization and Reform Act of 2012*, Pub L No 112-95, s 336.

<sup>91</sup> Know Before You Fly, ‘Recreational Users’ (2015) <<http://knowbeforeyoufly.org/recreational-users/>>.

<sup>92</sup> Know Before You Fly, ‘Drone Registration’ (2015) <<http://knowbeforeyoufly.org/register-your-drone/>>.

<sup>93</sup> 18 USC § 3571 (1987).

reported that more than 45,000 drone users registered their aircraft within the first two days of this registry being open.<sup>94</sup>

The FAA has also partnered with several industry associations to promote *Know Before You Fly*, a campaign to educate the public about using UAV safely and responsibly. Hobbyists are strongly encouraged to abide by these safety guidelines, which include the following:

- Fly below 400 feet and remain clear of surrounding obstacles;
- Keep the UAV within visual line of sight at all times;
- Do not fly near or over sensitive infrastructure or property such as power stations, water treatment facilities, correctional facilities, heavily travelled roadways, government facilities, etc.;
- Remain well clear of and do not interfere with manned aircraft operations;
- Do not fly within five miles of an airport unless contact is made with the airport and control tower before flying;
- Do not intentionally fly over unprotected persons or moving vehicles, and remain at least 25 feet away from individuals and vulnerable property;
- Do not fly in adverse weather conditions such as in high winds or reduced visibility;
- Do not fly under the influence of alcohol or drugs;
- Ensure the operating environment is safe and that the operator is competent and proficient in the operation of the UAV; and
- Do not be careless or reckless with a UAV.

It is also noteworthy that FAA can fine a person for operating a UAV in a careless or reckless manner or in a manner contrary to the same rules that apply to manned aircraft, as it did in *Huerta v Pirker*.<sup>95</sup> In that case, Raphael Pirker created and posted a video of himself on YouTube flying a drone so low that it came within 25 feet of busy streets, and within 50 feet of individuals – forcing pedestrians to cower and run for safety below. The FAA maintained that his flight violated federal aviation rules by flying close to people and structures at such a low altitude that it was dangerous; and, they fined him \$10,000. In November

---

<sup>94</sup> Keith Wagstaff, 'FAA Says More Than 45K People Register Drones in First Two Days', *NBC News* (online, 23 December 2015) <<http://www.nbcnews.com/tech/tech-news/faa-says-more-45k-people-register-drones-first-two-days-n485201>>.

<sup>95</sup> *Huerta v Pirker*, No CP-217, 2014 WL 3388631 (NTSB 6 March 2014).

2014, the National Transportation and Safety Board, which heard the case, concluded that drones are 'aircraft', as that word is defined under the *Code of Federal Regulations* ("CFR"); and, thus, federal legislation prohibiting careless or reckless aircraft operations applies to drones.<sup>96</sup>

However, notwithstanding the protection against those who operate hobby drones in a careless or reckless manner, hobbyists who fly their drones below 400 feet (Class G airspace) need no approval from air traffic control, an airport, or the FAA.<sup>97</sup> Therefore, the only recourse landowners have for intrusions into the low-altitude space above their property is a civil action in tort law. This leaves a yawning gap in the safe integration of UAVs into the domestic airspace which the law has not yet addressed. Moreover, assigning liability through tort law leaves victims with the burden and expense of claiming compensation for trespass, privacy, or nuisance violations against them.

#### 4.6 State Regulatory Frameworks

Many states have passed or are considering legal limits on UAVs. As of 16 May 2017, 37 states have passed laws addressing UAV issues and an additional four states have adopted resolutions.<sup>98</sup> Frequent issues addressed in the legislation include: defining what a UAV is; how they can be used by law enforcement or other state agencies; how they can be used by the public; and regulations for their use in hunting game. Given the public and media pressure surrounding the perceived threats that drones pose to safety, privacy and property, it's not surprising that state governments have enacted a range of new laws.<sup>99</sup> However, in light of the federal government's preeminent jurisdiction over the NAS, questions have been raised about whether state laws that govern the operation of drones are constitutionally, and thus legally, sound.<sup>100</sup>

Since the beginning of the 2013 legislative sessions, state lawmakers have considered many different types of laws addressing UAVs. But it was not until 3 April 2013 that Virginia enacted the first state drone law in the country.<sup>101</sup> In a bold reactionary approach, both houses of the Virginia legislature approved a

---

<sup>96</sup> 14 CFR § 91.13 (2014) ('No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.').

<sup>97</sup> Assuming they register their UAVs with the FAA, keep away from manned aircraft, and stay beyond five miles' reach of any airport.

<sup>98</sup> National Conference of State Legislatures, 'Current Unmanned Aircraft State Landscape' (2017) <<http://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx>>.

<sup>99</sup> Robert A Heverly, 'The State of Drones: State Authority to Regulate Drones' (2015) 8 *Albany Government Law Review* 29, 30.

<sup>100</sup> *Ibid* 33.

<sup>101</sup> For discussion of this bill and other state drone laws enacted from 2013–16, see Appendix A.

strict 2-year moratorium on law enforcement's use of drones within the state.<sup>102</sup> That same year, Florida passed the *Freedom from Unwarranted Surveillance Act*, which openly declares the state's opposition to the use of drones for state surveillance. It protects citizens from 'privacy-invasive technology' by requiring a judicial warrant supported by probable cause before law enforcement can use a UAV.<sup>103</sup> These examples illustrate the inconsistencies between state drone laws, which reflect cultural and political differences, and emphasise that only federal law can provide adequate protection to Americans when it comes to the use of UAVs for surveillance.

Recall, as well, that the United States government has 'exclusive sovereignty of airspace of the United States'.<sup>104</sup> Congress expressly charged the FAA with ensuring the safe and efficient use of the NAS, and it instructed it to develop rules to safely integrate UAVs into the NAS.<sup>105</sup> If one or more state or local (municipal) government attempts to regulate in this space, this would undermine the FAA's authority in this area.<sup>106</sup> This risk was identified by the Sixth Circuit Court of Appeals, when it noted that:

Air traffic must be regulated at the national level ... [w]ithout uniform equipment specifications, takeoff and landing rules, and safety standards, it would be impossible to operate a national air transportation system.<sup>107</sup>

Moreover, the Supremacy Clause of the *United States Constitution* provides that, 'the laws of the United States ... shall be the supreme law of the land.'<sup>108</sup> Thus, if a court finds that federal law has pre-empted state law, the court can declare the state law null and void. In other cases, Congress expressly excludes state law in a statute, which is known as express pre-emption. For example, Congress asserted express control over the airspace of the United States, as well as

---

<sup>102</sup> HB2012 and SB1331 prohibit drone use by any state agencies 'having jurisdiction over criminal law enforcement or regulatory violations' or units of local law enforcement until 1 July 2015. Numerous exceptions to the ban are enumerated including enabling officials to deploy drones for Amber Alerts, Blue Alerts and use by the National Guard, by higher education institutions and search and rescue operations. Note also that when the 2-year ban expired, the state allowed drones for law enforcement after police have obtained a warrant.

<sup>103</sup> 2013 Fla Laws 2013-0092 c1.

<sup>104</sup> 49 USC § 40103 (1994).

<sup>105</sup> *FAA Modernization and Reform Act of 2012*, Pub L No 112-95, s 332(a)(1).

<sup>106</sup> *Montalvo v Spirit Airlines*, 508 F 3d 464 (9<sup>th</sup> Cir, 2007); *French v Pan Am Express, Inc*, 869 F 2d 1 (1<sup>st</sup> Cir, 1989); see also *Arizona v US*, 567 US 387, 401 (2012) ('Where Congress occupies an entire field . . . even complimentary state regulation is impermissible. Field pre-emption reflects a congressional decision to foreclose any state regulation in the area, even if it is parallel to federal standards.'), and *Morales v Trans World Airlines, Inc*, 504 US 374, 386-7 (1992).

<sup>107</sup> *Gustafson v City of Lake Angeles*, 76 F 3d 778, 792-3 (6<sup>th</sup> Cir, 1996) (Jones, N, concurring).

<sup>108</sup> *United States Constitution* art VI, cl 2.

exclusive authority to regulate virtually all aspects of airlines and aircraft.<sup>109</sup> Thus, states may not regulate in the exclusively federal areas of the use of navigable airspace, which includes pathways to takeoff and landing,<sup>110</sup> and the operation of an aircraft, including flight paths, hours, or altitudes.<sup>111</sup>

Absent express pre-emption, the court must determine whether the state law is pre-empted due to either direct conflict with federal law (i.e. conflict pre-emption), or by finding that the pre-eminence of federal regulation leaves no room for state regulation (i.e. field pre-emption).<sup>112</sup> In other words, in the absence of express federal language on the matter, the court may infer pre-emption by finding that the federal law supersedes a state's statute on the basis that either: (a) the state law conflicts with an existing federal law in a manner that makes compliance impossible; or (b) the federal law is so pervasive that it is reasonable to infer that Congress left no room for the state to legislate in that area.<sup>113</sup>

When it comes to the regulation of drones, this means that states may not legislate on any of the criteria already covered by the FAA, including its recent 2016 rule, discussed above.<sup>114</sup> In this manner, in January 2014, the FAA issued the following statement:

By law, the FAA is charged with ensuring the safe and efficient use of US airspace. This authority generally pre-empts any state or local government from enacting a statute or regulation concerning matters – such as airspace regulation – that are reserved exclusively to the US Government. For example, a state law or regulation that prohibits or limits the operation of an aircraft, sets standards for airworthiness, or establishes pilot requirements generally would be pre-empted. But state and local governments do retain authority to limit the aeronautical activities of their own departments and institutions. Under most circumstances, it would be within state or local government power to restrict the use of certain aircraft, including a UAV, by the state or local police or by a state department or university.<sup>115</sup>

---

<sup>109</sup> 49 USC § 41713 (1994).

<sup>110</sup> 49 USC § 40102(a)(32) (1994).

<sup>111</sup> *Skysign International, Inc v City of Honolulu*, 276 F 3d 1109, 1117 (9<sup>th</sup> Cir, 2002).

<sup>112</sup> Henry H Perritt Jr. and Albert J Plawinski, 'One Centimetre over My Backyard: Where Does Federal Pre-emption of State Drone Regulation Start?' (2015) 17(2) *North Carolina Journal of Law & Technology* 307, 329.

<sup>113</sup> *City of Burbank v Lockheed Air Terminal, Inc*, 411 US 624, 632–3 (1973). See also *Montalvo v Spirit Airlines*, 508 F 3d 464 (9<sup>th</sup> Cir, 2007) 473–4; *Abdullah v American Airlines, Inc*, 181 F 3d 363 (3d Cir, 1999).

<sup>114</sup> Perritt and Plawinski (n 112) 351–2.

<sup>115</sup> United States Department of Transportation (n 44).

Accordingly, a trespass case involving a drone might involve questions about how high above the ground a property owner's rights extend; and, above a certain height, the law of trespass might be pre-empted by FAA regulation.<sup>116</sup>

Along these lines, the common law traditionally allocated airspace rights according to the '*ad coelum* doctrine' which stated that, '[t]o whomever the soil belongs, he also owns the sky'.<sup>117</sup> This phrase was taken to mean that landowners had airspace rights above their land reaching endlessly up into the skies.<sup>118</sup> But subsequent case law has recognised that this approach conflicts with the realities of modern aviation.

In *United States v Causby*,<sup>119</sup> the question was whether the flight of US military planes over the plaintiffs' property, at a height of 83 feet in the air, which was 63 feet over their barn and a mere 18 feet above the highest tree on the property, amounted to a 'taking' under the Fifth Amendment of the *US Constitution*. The US Supreme Court held that since Congress had jurisdiction over the navigable airspace for aviation, a landowner could not exclude aircraft from that space. Yet, the landowner did have jurisdiction over 'at least as much of the space above the ground as he can occupy or use in connection with the land.'<sup>120</sup>

Subsequently, in *Griggs v County of Allegheny*, the US Supreme Court found that flights above 500 feet occurred in navigable airspace and were not compensable.<sup>121</sup> The Court observed:

Following the decision in the *Causby* case, Congress redefined 'navigable airspace' to mean 'airspace above the minimum altitudes of flight prescribed by the regulations issued under the chapter, and shall include airspace needed to ensure safety in take-off and landing of aircraft.' By the present regulations the 'minimum safe altitudes' within the meaning of the statute defined, so far as relevant here, as heights of 500 feet or 1000 feet, '[e]xcept as necessary for takeoff or landing.'<sup>122</sup>

Following *Griggs*, the principles articulated in *Causby* were codified into the *Restatement (Second) of Torts*, as follows:

---

<sup>116</sup> Perritt and Plawinski (n 112) 346-42, 354.

<sup>117</sup> Troy A Rule, 'Airspace in an Age of Drones' (2015) 95 *Boston University Law Review* 155, 166. The *ad coelum* doctrine emanates from the famous phrase articulated by Cino da Pistoia.

<sup>118</sup> *Ibid.*

<sup>119</sup> 328 US 256, 264 (1946).

<sup>120</sup> *Ibid* 260-1.

<sup>121</sup> 369 US 84 (1962).

<sup>122</sup> *Ibid* 88.

Flight by aircraft in the space above the land of another is a trespass if, but only if, (a) it enters into the immediate reaches of the airspace next to the land, and (b) it interferes substantially with the other's use and enjoyment of his land.<sup>123</sup>

Thus, intrusions into low-altitude airspace directly above a surface owner's land, which is generally regarded as within 500 to 1,000 feet above ground level, can trigger a compensable claim for aerial trespass.<sup>124</sup> In this sense, low-altitude airspace is treated in much the same way as surface land, using common law exclusion-based rules to protect owners' property rights.<sup>125</sup>

On the other hand, individuals operating drones in this Class G airspace need no approval from air traffic control, an airport, or the FAA (if they register their UAVs with the FAA, keep away from manned aircraft, and stay at least five miles away from any airport). The state of Oregon has created a law that provides that, under certain conditions, a landowner can bring an action against someone flying a drone lower than 400 feet over their property.<sup>126</sup> Beyond that limited exception in one state, the only recourse landowners maintain for intrusions into the low-altitude space above their property is a civil action in tort law, for which they need to establish the elements of a privacy infringement, nuisance or trespass.

Yet, even a toy drone with a camera confuses the notion of trespass and privacy rights, and without laws addressing these novel situations, new legal questions have surfaced. For example, is someone who (without permission) flies a tiny unobtrusive drone 100 feet above their neighbour's property, which is not equipped with cameras or recording devices, committing a trespass? What if they do this every day for a year? Does the result change if the operator is a commercial entity, which happens to pass over the neighbour's land to deliver a package by drone? What if someone flies a drone 500 feet over their neighbour's property to spy on them? Or, suppose someone flies a video-equipped drone 50 feet above their *own* property, and they also capture footage of their neighbour's land? The question of whether a trespass occurred in each of these cases would likely turn on whether the defendants penetrated the 'immediate reaches' of the plaintiff's airspace and interfered with their use and enjoyment of their land. However, given the murky nature of aerial trespass laws and the vague state of landowner's airspace rights, it is unclear how a court might find in each of these scenarios.<sup>127</sup>

---

<sup>123</sup> American Law Institute, *Restatement (Second) of Torts* (1965) § 159.

<sup>124</sup> *Persyn v United States*, 34 Fed Cl 187, 195 (1995), *aff'd* 106 F 3d 424 (Fed Cir, 1996) ('Airspace above 1,000 feet in the congested areas of cities, towns or villages, and 500 feet in uncongested areas, is navigable, or public, airspace, see 14 CFR § 91.79 (1982), and the owner of subadjacent lands has no claim for compensation for its use.').

<sup>125</sup> *Ibid* 182–3.

<sup>126</sup> Or HR, HB2710 (2013).

<sup>127</sup> 369 US 84 (1962) 171. Note, though, that Rule points out at 176–7 that 'intentional trespassers on surface land can be liable at common law even when their intrusions

To provide guidance, state legislators could enact laws giving landowners unambiguous rights to exclude drones from entering the low-altitude airspace above their property, at least up to 400 feet above the parcel, as the state of Oregon has already done. Thus, landowners would be able to bring trespass claims against those who intentionally fly a drone into this area, below navigable airspace.<sup>128</sup> This would allow the FAA to maintain regulatory authority over flights above the 500-foot navigable airspace threshold, as discussed above.

States can also play a role in other aspects of drone regulation, but they must be mindful of the restrictions imposed by the federal regime. Laws traditionally related to state and local power, including land use, zoning, hunting, invasions of privacy, negligence, and local law enforcement are not generally subject to federal regulation. Thus, if a state narrowly proscribes an area of highly localised drone activity, and relates it primarily to matters of state concern, federal pre-emption is considerably less likely to occur.<sup>129</sup>

#### 4.7 Property Damage and Personal Injury

While federal regulations have already proven useful in dealing with situations involving drone mishaps and misuse, the states also have an important role to play in dealing with resulting property damage and personal injury claims. For example, states have the authority to preserve public order, so they should have the power to establish tort liability or criminalise reckless conduct.<sup>130</sup> For instance, Oregon created the offense of reckless interference with an aircraft<sup>131</sup> and it also establishes crimes and civil penalties for mounting weapons on drones and interfering with or gaining unauthorised access to public drones, such as by hacking into their systems.<sup>132</sup> The state of Louisiana has established the broad criminal offence of the 'unlawful use of an unmanned aircraft system.'<sup>133</sup> States

---

result in no provable damages ... [and] ... no measurable injuries to the plaintiffs or their property.' See *Jacque v Steenberg Homes, Inc*, 563 NW 2d 154 (Wis, 1997).

<sup>128</sup> Ibid 187.

<sup>129</sup> Along these lines, the state drone laws enumerated in the Appendix are generally focused around the following 'safe' issues: procedures and standards for law enforcement's use of UAV, including warrant requirements; the collection and retention of information by UAV for law enforcement (i.e. how law enforcement can obtain and use the information gathered); the private use of UAV to commit voyeurism, harassment, and stalking offences and the unlawful use and distribution of images obtained by UAV; hunting, molesting or locating game animals/birds with UAV; low-level landowner/privacy rights; and general rules for the safe operation of UAV, including criminalising the reckless operation of UAV and operation that interferes with first responders.

<sup>130</sup> Perritt and Plawinski (n 112) 353.

<sup>131</sup> Or HR, HB4066 (2016).

<sup>132</sup> Or Rev Stat § 837.380 (2013). See also Appendix A.

<sup>133</sup> See Appendix A.



should also be able to require liability insurance because there is no FAA law on that subject, and states have reserved their statutory authority over this area.<sup>134</sup>

#### 4.8 Stalking, Harassment and Criminal Trespass

There are also opportunities in most states to use the criminal law when it comes to stalking and criminal trespass. Indeed, stalking and harassment statutes can be found in all 50 states and the District of Columbia. Many are broadly worded so as to encompass spying on someone using a UAV, particularly if the perpetrator causes the victim to fear for their safety, and is involved in other behaviours consistent with stalking and harassment.<sup>135</sup> In some states, such as Arizona, trespass statutes are worded in such a manner as to encompass the trespassory use of a UAV.<sup>136</sup> For example, when it comes to criminal trespass, the word 'entry' is defined as 'the intrusion of any *instrument* or any part of a person's body inside the external boundaries of a structure or unit of real property.'<sup>137</sup>

#### 4.9 Private Nuisance

Like claims of trespass, there are private nuisance actions that protect a person's private use and enjoyment of the land.<sup>138</sup>

To be actionable, the invasion underpinning the private nuisance claim must be intentional, unreasonable, or 'unintentional and otherwise actionable under the rules controlling liability for negligent or reckless conduct, or for abnormally dangerous conditions and activities.'<sup>139</sup> Thus, a person who flies a drone across a neighbour's fence intentionally could be liable under a state-based nuisance claim, particularly if they did so recklessly and/or repeatedly.

As noted above, UAVs with surveillance capabilities are now readily affordable, which means that increasing numbers of people will find innovative ways to commit trespass and infringe upon the privacy of others, whether they be paparazzi, peeping toms, jealous ex-lovers, or whomever else. If someone has a small UAV equipped with a camera, it would be easy to position it near another person's private residence, and aim it directly into the home, while not actually trespassing onto private property. While statutory and common law rules now limit the ability of drone operators to violate privacy and property rights in this

---

<sup>134</sup> Ibid; 15 USC §§ 1011-15 (1945) (preserving state insurance regulation from federal pre-emption).

<sup>135</sup> John Villasenor, 'Observations from Above: Unmanned Aircraft Systems and Privacy' (2013) 36(2) *Harvard Journal of Law and Public Policy* 457, 505

<sup>136</sup> Ariz Rev Stat § 13-1501 (2012).

<sup>137</sup> Ibid (emphasis added).

<sup>138</sup> American Law Institute, *Restatement (Second) of Torts* (1965) § 159.

<sup>139</sup> Ibid.

manner, gaps continue to exist and it is unclear how the law will deal with these stealthy uses of UAVs on the domestic front.

#### 4.10 Invasion of Privacy

Information technologies, like drones, have long been considered a significant threat to privacy because they facilitate surveillance, data collection and aggregation, as well as raising the spectre of 'privacy erosion' that is deeply troubling for many.<sup>140</sup> These notions of privacy are both individual and collective in the sense that they refer to individual safety, security and comfort as well as deeply entrenched societal norms about the importance of protecting the private sphere against surveillance and intrusion by public and private actors. Autonomy, liberty, and freedom of speech and association are also engaged as cardinal privacy-oriented values underpinning the modern liberal democratic state. Some states already have civil or criminal statutes, or both, in relation to the invasion of privacy.<sup>141</sup> A small number of states have also taken the initiative to develop laws around privacy intrusions specifically relating to drones, and they too enable either civil or criminal liability to be imposed. Idaho limits UAV use by both law enforcement and private citizens 'to photograph or otherwise record an individual, without such individual's written consent, for publishing or otherwise publicly disseminating such photograph or recording.'<sup>142</sup> Yet, if Idaho resident Jane Doe's neighbour uses a drone to secretly record her while she is undressing, this affront is not proscribed by the statute unless he shows it to others.

Other state drone laws focus on the public distribution of the images. For example, North Carolina prohibits 'any entity from conducting UAV surveillance of a person or private property and also prohibits taking a photo of a person without their consent for the purpose of distributing it.'<sup>143</sup> That law further creates a civil cause of action for those whose privacy is violated and it establishes a criminal offence for the unlawful distribution of images obtained with a UAV.<sup>144</sup> Similarly, Tennessee makes it a crime for a person to use a UAV to 'intentionally conduct surveillance of an individual or their property'; and also to possess, distribute or otherwise use those images.<sup>145</sup>

In contrast, other states have chosen to prohibit the recording of images by drone, without consent, regardless of whether they are shown to others. For example, California prohibits 'entering the airspace of an individual in order to capture an

---

<sup>140</sup> Nissenbaum (n 73) 1.

<sup>141</sup> See, eg, Cal Civ Code § 1780.8 (2011).

<sup>142</sup> See Appendix A.

<sup>143</sup> *Ibid.*

<sup>144</sup> *Ibid.*

<sup>145</sup> *Ibid.*

image or recording of that individual engaging in a private, personal, or familial activity without permission.<sup>146</sup> Florida prohibits the use of a drone 'to capture an image of privately owned property or the owner, tenant, or occupant of such property without consent if a reasonable expectation of privacy exists.'<sup>147</sup> Presumably, 'permission' could entail the provision of a search warrant, allowing law enforcement officials to conduct lawful surveillance by drone, even in situations when the suspect has a reasonable expectation of privacy.

Courts in most jurisdictions also recognise the tort of invasion of privacy.<sup>148</sup> As discussed, the *United States Constitution* provides protection for individuals against intrusion into various zones of privacy by the state. Yet, consistent with the view held by Warren and Brandies, discussed above, the common law also shields individuals from intrusions upon their personal privacy by others.

The misuse of a drone by a private individual is most likely to give rise to a tort claim of 'intrusion upon seclusion' whereby the defendant intrudes upon a personal sphere of privacy that is normatively rather than materially demarcated.<sup>149</sup> It provides that:

One who intentionally intrudes, physically or otherwise, upon the solitude or seclusion of another or his private affairs or concerns, is subject to liability to the other for invasion of his privacy, if the intrusion would be highly offensive to a reasonable person.<sup>150</sup>

In other words, the personal sphere into which the offender intrudes must be one that a reasonable person would be prepared to recognise as private. A plaintiff who is unknowingly filmed or photographed in their own home by a UAV would thus have a strong claim for compensation.

## 5 Conclusion

As drone technologies continue to mature and become more affordable to the average consumer, they will find their way into an increasing number of hands. Recent data revealing a growing number of 'close call' incidents between drones and manned aircraft, including commercial airliners, has only added to the urgency for lawmakers to deal with this threat. The FAA recently ruled that commercial operators should not be allowed to fly their unmanned aircraft farther than line of sight would permit. Of course, the FAA is accustomed to overseeing an extremely safe commercial airline industry via a rigorous process for qualifying aircraft and enforcing safety procedures. Yet, even sophisticated

---

<sup>146</sup> Cal Legis Assemb, AB856 (2015).

<sup>147</sup> See Appendix A.

<sup>148</sup> Villasenor (n 135) 500-5.

<sup>149</sup> Nissenbaum (n 73) 96.

<sup>150</sup> American Law Institute, *Restatement (Second) of Torts* (1965) § 159.

military drones are not yet this safe. What is needed going forward is a robust regulatory framework that imposes workable restrictions on domestic drone operations while harnessing innovation, spurring job growth, and advancing scientific research.

**APPENDIX A**<sup>151</sup>**CURRENT UNMANNED AIRCRAFT STATE LAWS**

State	Year	Law	Description
Alaska	2016	HB 266	Requests the Department of Fish & Game evaluate the use of UAS for aerial survey work and report findings related to safety and cost-savings compared to manned aircraft.
	2014	HB 255	Creates procedures and standards for law enforcement's use of unmanned aircraft, as well as regulations for the retention of information collected with UAVs. It requires law enforcement agencies to adopt procedures that ensure: the appropriate Federal Aviation Administration flight authorisation is obtained; UAV operators are trained and certified; records of all flights are kept and there is an opportunity for community involvement in the development of the agencies' procedures. Under the law, police may use UAVs pursuant to a search warrant, pursuant to a judicially recognised exception to the warrant requirement and in situations not involving a criminal investigation. Images captured with UAVs may be retained by police under the law for training purposes or if it is required as part of an investigation or prosecution. The law also authorises the University of Alaska to develop a training program for operating UAVs.
	2013	HCR 15	Resolution to extend the operating time and expand the duties of the state UAV task force.
		HCR 6	Resolution creating a legislative Task Force on UAVs. The task force is charged with creating written recommendations and legislation that allows for UAVs to be used in a way that protects privacy. In addition to members of the legislature, the task force will be comprised of representatives from state agencies, aviation organisations and academia. The task force must provide an initial report of its findings by 15 January 2014, and a final report by 1 July 2014.
Arizona	2016	SB 1449	Prohibits certain operation of UAVs, including operation in violation of FAA regulations and operation that interferes with first responders. The law prohibits operating near, or using

<sup>151</sup> As of 6/9/2016.

			UAVs to take images of, a critical facility. It also pre-empts any locality from regulating UAVs.
<b>Arkansas</b>	2015	HB 1349  HB 1770	Prohibits the use of UAVs to commit voyeurism.  Prohibits the use of UAVs to collect information about or photographically or electronically record information about critical infrastructure without consent.
<b>California</b>	2016   2015	SB 807  AB 1680  AB 856	Provides immunity for first responders who damage a UAS that was interfering with the first responder while he or she was providing emergency services.  Makes it a misdemeanor to interfere with the activities of first responders during an emergency.  Prohibits entering the airspace of an individual to capture an image or recording of that individual engaging in a private, personal, or familial activity without permission. This legislation is a response to the use of UAVs by the paparazzi.
<b>Delaware</b>	2016	HB 195	Creates the crime of unlawful use of an UAS and prohibits operation over any event with more than 1,500 attendees, over critical infrastructure and over an incident where first responders are actively engaged in response or transport. The law also specifies that only the state may enact a law or regulation, pre-empting the authority of counties and municipalities.
<b>Florida</b>	2015  2013	SB 766  SB 92	Prohibits the use of a drone to capture an image of privately owned property or the owner, tenant, or occupant of such property without consent if a reasonable expectation of privacy exists.  Defines what a drone is and limits their use by law enforcement. Under this legislation, law enforcement may use a drone if they obtain a warrant, there is a terrorist threat, or 'swift action' is needed to prevent loss of life or to search for a missing person. The law also enables someone harmed by an inappropriate use of drones to pursue civil remedies and prevents evidence gathered in violation of this code from being admitted in any Florida court.

<b>Hawaii</b>	<b>2015</b>	SB 661	Creates a chief operating officer position for the Hawaii unmanned aerial systems test site. It also establishes an unmanned aerial systems test site advisory board to plan and oversee test site development and appropriates funds to establish the test site.
	<b>2013</b>	SB 1221	Appropriates \$100,000 in funds for two staff positions, contracted through the University of Hawaii, to plan for the creation of three degree and training programs on advanced aviation. One of the programs is a professional unmanned aircraft systems pilot program administered through Hawaii Community College.
<b>Idaho</b>	<b>2016</b>	SB 1213	Prohibits the use of UAVs for hunting, molesting or locating game animals, game birds and furbearing animals.
	<b>2013</b>	SB 1134	Defines an ‘Unmanned Aircraft System’, requires warrants for their use by law enforcement, establishes guidelines for their use by private citizens and provides civil penalties for damages caused by improper use.
<b>Illinois</b>	<b>2015</b>	SB 44	Creates a UAV Oversight Task Force which is tasked with considering commercial and private use of UAVs, landowner and privacy rights and general rules and regulations for the safe operation of UAVs. The task force will prepare recommendations for the use of UAVs in the state.
	<b>2014</b>	SB 2937	Creates regulations for how law enforcement can obtain and use information gathered from a private party’s use of UAVs. The law requires police to follow warrant protocols to compel third parties to share information, and if the information is voluntarily given to police, authorities are required to follow the state’s law governing UAV data retention and disclosure. The law also loosens regulations around law enforcement’s use of UAVs during a disaster or public health emergency.
	<b>2013</b>	HB 1652 SB 1587	Prohibits anyone from using a drone to interfere with hunters or fisherman.  Allows drones to be used by law enforcement with a warrant, to counter a terrorist attack, to prevent harm to life or to prevent the imminent escape of a suspect among other situations. If a law enforcement agency uses a drone, the agency must destroy all information gathered by the drone within 30 days, except that a

			<p>supervisor at the law enforcement agency may retain particular information if there is reasonable suspicion it contains evidence of criminal activity.</p> <p>The law also requires the Illinois Criminal Justice Information Authority ("CJIA") to report on its website every law enforcement agency that owns a drone and the number they own. Each law enforcement agency is responsible for giving this information to the Illinois CJIA.</p>
<b>Indiana</b>	<b>2016</b>	HB 1013	Allows the use of UAVs to photograph or take video of a traffic crash site.
		HB 1246	Prohibits the use of UAVs to scout game during hunting season.
	<b>2014</b>	HB 1009	Creates warrant requirements and exceptions for the police use of unmanned aircraft and real time geo-location tracking devices. It also prohibits law enforcement from compelling individuals to reveal passwords for electronic devices without a warrant. If law enforcement obtains information from an electronic service provider pursuant to a warrant, the provider is immune from criminal or civil liability. The law provides that if police seek a warrant to compel information from media entities and personnel, then those individuals must be notified and given the opportunity to be heard by the court concerning issuance of the warrant. The new law also creates the crime of 'Unlawful Photography and Surveillance on Private Property', making it a Class A misdemeanour. This crime is committed by a person who knowingly and intentionally electronically surveys the private property of another without permission. The law also requests that the state's legislative council study digital privacy during the 2014 interim.
	<b>2013</b>	SR27	Resolution urging their legislative council to study UAV issues.
<b>Iowa</b>	<b>2014</b>	HF 2289	Makes it illegal for a state agency to use UAVs to enforce traffic laws. The new law requires a warrant, or other lawful means, to use information obtained with UAVs in a civil or criminal court proceeding. It also requires the department of public safety to develop guidelines for the use of UAVs and to determine whether changes to the criminal code are necessary. The department must report on their findings to the general assembly by 31 December 2014.



<b>Kansas</b>	<b>2016</b>	SB 319	Expands the definition of harassment in the <i>Protection from Stalking Act</i> to include certain uses of UAVs.
<b>Louisiana</b>	<b>2016</b>	SB 73	Adds intentionally crossing a police cordon using a drone to the crime of obstructing an officer. Allows law enforcement or fire department personnel to disable the UAV if it endangers the public or an officer's safety.
		HB 19	Prohibits using a drone to conduct surveillance of, gather evidence or collect information about, or take photo or video of a school, school premises, or correctional facilities. Establishes a penalty of a fine of up to \$2,000 and up to six months in jail.
		HB 335	Authorises the establishment of registration and licensing fees for UAS, with a limit of \$100.
	<b>2015</b>	HB 635	Adds the use of UAS to the crimes of voyeurism, video voyeurism and peeping tom.
		SB 141	Specifies that surveillance by an unmanned aircraft constitutes criminal trespass under certain circumstances.
		SB 183	Regulates the use of UAVs in agricultural commercial operations.
<b>2014</b>	HB 1029	Creates the crime of unlawful use of an unmanned aircraft system. The new law defines the unlawful use of an unmanned aircraft system as the intentional use of UAVs to conduct surveillance of a targeted facility without the owner's prior written consent. The crime is punishable by a fine of up to \$500 and imprisonment for six months. A second offense can be punished by a fine up to \$1,000 and one-year imprisonment.	
<b>Maine</b>	<b>2015</b>	LD 25	Requires law enforcement agencies to receive approval before acquiring UAVs. The bill also specifies that the use of UAVs by law enforcement complies with all FAA requirements and guidelines. Requires a warrant to use UAVs for criminal investigations except in certain circumstances and sets out standards for the operation of UAVs by law enforcement.
<b>Maryland</b>	<b>2015</b>	SB 370	Specifies that only the state can enact laws to prohibit, restrict, or regulate the testing or operation of unmanned aircraft systems. This

	2013	HB 100	pre-empts county and municipal authority. The bill also requires a study on specified benefits.  Appropriated \$500,000 for the state's unmanned aerial system test site.
Michigan	2016	SB 992	Prohibits localities from regulating UAS, except when the drone belongs to the locality. It permits commercial operation in the state if the operator is authorised by the FAA to operate commercially and permits hobby operation so long as the operator complies with federal law. The law prohibits using a drone in a way that interferes with emergency personnel and it also prohibits the use of a drone to harass an individual, to violate a restraining order, or to capture images in a way that invades an individual's reasonable expectation of privacy. The law also prohibits sex offenders from using a drone to follow, contact or photograph a person that they are prohibited from contacting. Anyone who uses a drone in a prohibited way is guilty of a misdemeanor.
	2015	SB 54 SB 55	Prohibits using UAVs to interfere with or harass an individual who is hunting.  Prohibits using UAVs to take game.
Mississippi	2015	SB 2022	Specifies that using a drone to commit 'peeping tom' activities is a felony.
Montana	2013	SB 196	Limits when information gained from the use of unmanned aerial vehicles may be admitted as evidence in any prosecution or proceeding within the state. The information can be used when it was obtained pursuant to a search warrant, or through a judicially recognised exception to search warrants. The new law defines 'unmanned aerial vehicle' as 'an aircraft that is operated without direct human intervention from on or within the aircraft,' not including satellites.
Nevada	2015	AB 239	Includes UAV in the definition of aircraft and regulates the operators of UAVs. It also prohibits the weaponisation of UAVs and prohibits the use of UAVs within a certain distance of critical facilities and airports without permission. The bill specifies certain restrictions on the use of UAVs by law enforcement and public agencies and requires the creation of a

	2013	AB 507	<p>registry of all UAVs operated by public agencies in the state.</p> <p>Appropriated \$4 million to the interim Finance Committee for allocation to the Governor's Office of Economic Development for the Unmanned Aerial Vehicle (UAV) program. The funds can only be appropriated if Nevada is selected as a Federal Aviation Administration test site.</p>
New Hampshire	2015	SB 222	Prohibits the use of UAVs for hunting, fishing, or trapping.
North Carolina	2015	SB 446	Expands the authority of the state's Chief Information Officer to approve the purchase and operation of UAVs by the state and modifies the state regulation of UAVs to conform to FAA guidelines.
	2014	SB 744	<p>Creates regulations for the public, private and commercial use of UAVs. The new law prohibits any entity from conducting UAV surveillance of a person or private property and also prohibits taking a photo of a person without their consent for the purpose of distributing it. The law creates a civil cause of action for those whose privacy is violated. In addition, the law authorises different types of infrared and thermal imaging technology for certain commercial and private purposes including the evaluation of crops, mapping, scientific research and forest management. Under the law, the state Division of Aviation is required to create a knowledge and skills test for operating unmanned aircraft. All agents of the state who operate UAVs must pass the Division's knowledge and skills test. The law enables law enforcement to use UAVs pursuant to a warrant, to counter an act of terrorism, to oversee public gatherings, or gather information in a public space. The bill creates several new crimes: using UAVs to interfere with manned aircraft, a class H felony; possessing an unmanned aircraft with an attached weapon, a class E felony; the unlawful fishing or hunting with UAVs, a class 1 misdemeanor; harassing hunters or fisherman with UAVs, a class 1 misdemeanor; unlawful distribution of images obtained with UAVs, a class 1 misdemeanor for; and operating UAVs commercially without a license, a class 1 misdemeanor. The law addresses launch and recovery sites of UAVs, prohibiting their launch or recovery from any State or private property</p>

	2013	SB 402	<p>without consent. In addition, the law extends the state's current regulatory framework, administered by the chief information officer, for state use of UAVs from July to 31 December 2015.</p> <p>Places a moratorium on UAV use by state and local personnel unless the use is approved by the Chief Information Officer for the Department of Transportation (CIO). Any CIO granted exception has to be reported immediately to the Joint Legislative Oversight Committee on Information Technology and the Fiscal Research Division. The CIO may determine that there is a need to develop a UAV program within the State of North Carolina. This effort must include the CIO and the Department of Transportation Aviation Division Director.</p>
North Dakota	2015	HB 1328	Provides limitations for the use of UAVs for surveillance.
	2013	SB 2018	Grants \$1 million from the state general fund to pursue designation as a Federal Aviation Administration unmanned aircraft systems test site. If selected, the law would grant an additional \$4 million to operate the site.
Ohio	2014	HB 292	Creates the Aerospace and Aviation Technology Committee. One of the Committee's duties is to research and develop aviation technology including unmanned aerial vehicles.
Oklahoma	2016	HB 2599	Prohibits the operation of UAVs within 400 feet of a critical infrastructure facility, as defined in the law.
Oregon	2016	HB 4066	Modifies definitions related UAVs and makes it a class A misdemeanour to operate weaponised UAVs. It also creates the offense of reckless interference with an aircraft through certain uses of UAVs. The law regulates the use of drones by public bodies, including requiring policies and procedures for the retention of data. It also prohibits the use of UAVs near critical infrastructure, including correctional facilities.
		SB 5702	Specifies the fees for registration of public UAVs.
	2015	HB 2534	Requires the development of rules prohibiting the use of UAVs for angling, hunting, trapping,

		<p>HB 2354</p> <p>Changes the term 'drone' to 'unmanned aircraft system' in statute.</p>	<p>or interfering with a person who is lawfully angling, trapping, or hunting.</p>
	2013	<p>HB 2710</p> <p>Defines a drone as an unmanned flying machine, not including model aircraft. The law allows a law enforcement agency to operate a drone if it has a warrant and for enumerated exceptions including for training purposes. It also requires that a drone operated by a public body be registered with the Oregon Department of Aviation (DOA), which shall keep a registry of drones operated by public bodies. The law grants the DOA rulemaking authority to implement these provisions. It also creates new crimes and civil penalties for mounting weapons on drones and interfering with or gaining unauthorised access to public drones. Under certain conditions a landowner can bring an action against someone flying a drone lower than 400 feet over their property. The law also requires that the DOA must report to legislative committees on the status of federal regulations and whether UAV's operated by private parties should be registered in a manner similar to the requirement for other aircraft.</p>	
Rhode Island	2016	<p>HB 7511/SB 3099</p>	<p>Gives exclusive regulatory authority over UAS to the state of Rhode Island and the Rhode Island Airport Corporation, subject to federal law.</p>
Tennessee	2016	<p>SB 2106</p>	<p>Creates the crime of using a drone to fly within 250 feet of a critical infrastructure facility for the purpose of conducting surveillance or gathering information about the facility.</p>
		<p>HB 2376</p>	<p>Clarifies that it is permissible for a person to use UAVs on behalf of either a public or private institution of higher education, rather than just public institutions.</p>
	2015	<p>HB 153</p>	<p>Prohibits using a drone to capture an image over certain open-air events and fireworks displays. It also prohibits the use of UAVs over the grounds of a correctional facility.</p>
	2014	<p>SB 1777</p>	<p>Makes it a class C misdemeanor for any private entity to use a drone to conduct video surveillance of a person who is hunting or fishing without their consent.</p>
		<p>SB 1892</p>	<p>Makes it a Class C misdemeanor for a person to use UAVs to intentionally conduct</p>

	2013	SB 796	<p>surveillance of an individual or their property. It also makes it a crime to possess those images (Class C Misdemeanour) or distribute and otherwise use them (Class B Misdemeanour). The law also identifies 18 lawful uses of UAVs, including the commercial use of UAVs under FAA regulations, professional or scholarly research and for use in oil pipeline and well safety.</p> <p>Addresses the use of drones by law enforcement. The new law enables law enforcement to use drones in compliance with a search warrant, to counter a high-risk terrorist attack and if swift action is needed to prevent imminent danger to life. Evidence obtained in violation of this law is not admissible in state criminal prosecutions. Additionally, those wronged by such evidence can seek civil remedy.</p>
Texas	2015	HB 3628	Permits the creation of rules governing the use of UAVs in the Capitol Complex and provides that a violation of those rules is a Class B misdemeanor.
		HB 2167	Permits individuals in certain professions to capture images used in those professions using UAVs as long as no individual is identifiable in the image.
		HB 1481	Makes it a Class B misdemeanor to operate UAVs over a critical infrastructure facility if the UAVs are not more than 400 feet off the ground.
	2013	HB 912	<p>Enumerates 19 lawful uses for unmanned aircraft, including their use in airspace designated as an FAA test site, their use in connection with a valid search warrant and their use in oil pipeline safety and rig protection. The law creates two new crimes, the illegal use of an unmanned aircraft to capture images and the offense of possessing or distributing the image; both offenses are Class C misdemeanours. 'Image' is defined in the law as any sound wave, thermal, ultraviolet, visible light or other electromagnetic waves, odour, or other conditions existing on property or an individual located on the property. Additionally, the measure requires the Department of Public Safety to adopt rules for use of UAVs by law enforcement and mandates that law enforcement agencies in communities of over 150,000 people make annual reports on their use.</p>

		HR 3035; SR 1084	Resolutions addressing legislative procedure needed to enact their new drone law.
<b>Utah</b>	2016	HB 126	Makes it a Class B misdemeanour to operate UAVs within a certain distance of a wildfire. It becomes a class A misdemeanour if UAVs cause an aircraft fighting the wildfire to drop a payload in the wrong location or to land without dropping the payload. It is a third degree felony if UAVs crash into a manned aircraft and a second degree if that causes the manned aircraft to crash.
	2015	HB 296	Allows a law enforcement agency to use an unmanned aircraft system to collect data at a testing site and to locate a lost or missing person in an area in which a person has no reasonable expectation of privacy. It also institutes testing requirements for a law enforcement agency's use of an unmanned aircraft system.
	2014	SB 167	Regulates the use of UAVs by state government entities. A warrant is now required for a law enforcement agency to 'obtain, receive or use data' derived from the use of UAVs. The law also establishes standards for when it is acceptable for an individual or other non-governmental entity to submit data to law enforcement. The new law provides standards for law enforcement's collection, use, storage, deletion and maintenance of data. If a law enforcement agency uses UAVs, the measure requires that agency submit an annual report on their use to the Department of Public Safety and also to publish the report on the individual agency's website. The new law notes that it is not intended to 'prohibit or impede the public and private research, development or manufacture of unmanned aerial vehicles.'
<b>Vermont</b>	2016	SB 155	Regulates the use of drones by law enforcement and requires law enforcement to annually report on the use of drones by the department. It also prohibits the weaponisation of drones.
<b>Virginia</b>	2016	HB 412	Prohibits the regulation of UAVs by localities.
	2015	HB 2125; SB 1301	Requires that a law enforcement agency obtain a warrant before using a drone for any purpose, except in limited circumstances. Virginia's governor also issued an executive order establishing a commission on unmanned systems.

	<b>2013</b>	HB 2012; SB 1331	The first state drone laws in the US. Prohibits drone use by any state agencies 'having jurisdiction over criminal law enforcement or regulatory violations' or units of local law enforcement until 1 July 2015. Numerous exceptions to the ban are enumerated including enabling officials to deploy drones for Amber Alerts, Blue Alerts and use by the National Guard, by higher education institutions and search and rescue operations. The enacted bills also require the Virginia Department of Criminal Justice Services and other state agencies to research and develop model protocols for drone use by law enforcement in the state. They are required to report their findings to the General Assembly and governor by 1 November 2013.
<b>West Virginia</b>	<b>2015</b>	HB 2515	Prohibits hunting with UAVs.
<b>Wisconsin</b>	<b>2016</b>	SB 338	Prohibits using a drone to interfere with hunting, fishing or trapping.
		AB 670	Prohibits the operation of UAVs over correctional facilities.
	<b>2014</b>	SB 196	Requires law enforcement to obtain a warrant before using drones in a place where an individual has a reasonable expectation of privacy. The law also creates two new crimes: 'possession of a weaponised drone' and 'use of a drone.' Use of a drone creates a Class A misdemeanour for a person who, with intent, observes another individual in a place where they have a reasonable expectation of privacy. Possession of a weaponised drone is a Class H felony.