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Drone Technology: Benefits, Risks, and Legal Considerations

Kurt W. Smith[†]

The ability for drones to do beneficial and cost-effective environmental work is widely understood and being applied both nationally and internationally. Less well understood are the types of laws that are needed to protect the public amid rising concerns about privacy for citizens, interference with commercial aircraft, and the potential risk to homeland security. Achieving a reasonable balance between the risks and benefits of this technology is critical as the widespread use of drones continues to grow.

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I. INTRODUCTION

As a professor at a small southern university, I have a great deal of freedom to explore and learn about new ideas and new technologies. I recently had an experience that called into question my freedom to explore new technologies; specifically, the use of drones. My department recently bought a drone, which we have been using to assess the health of streams

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and rivers as well as perform a host of other environmental work. Conducting research proved to be fairly simple and productive, so I used the drone to help my son perform water quality sampling for a science fair project. He did a paired study of an urban and rural watershed as it relates to turbidity. Water was collected from the middle of central North Carolina's Cape Fear River and the Potomac River in downtown Washington, DC. As I watched my son whirl the drone around the Potomac, I realized we were flying it within a half mile of the White House, not to mention the other hallowed structures in the area. We were never stopped, and we were never questioned. This experience led me to wonder about the body of law that needs to be developed soon to protect national security, individual privacy rights, and to still allow beneficial uses of this amazing, cost-effective technology.

A drone can be simply defined as an aircraft with the capacity to fly autonomously due to the support of on board computers and sensors.¹ For many, drones are the stuff of action movies and nightly magazine shows, featuring the hunting down of terrorists and providing breathtaking views of countries hostile to the United States. The US military has poured billions of dollars of research into these high-tech tools, which now provide a low-cost option to the commercial market.² With high-quality models available for as little as two thousand dollars, drones can now be a part of nearly any enterprise that can use them. While drone technology is best known for its use in gathering military intelligence, the modern applications now extend to performing environmental work and a library of permanent baseline data at a fraction of the cost.³ Drones used for these purposes are known as eco-drones, or conservation drones.⁴ Their agility and low-cost quality imaging make them the ideal tool for environmental monitoring.⁵

There are four main issues that will need to be resolved in the near future with regard to the use of drones:

1. How will the privacy issue be addressed when these flying cameras have the capacity to invade your backyard and take photographs at will? Some states have already begun to attempt to

1. UNEP GLOBAL ENVIRONMENTAL ALERT SERVICE, A NEW EYE IN THE SKY: ECO-DRONES (May 2013), available at http://na.unep.net/geas/archive/pdfs/GEAS_May2013_EcoDrones.pdf.

2. *Id.*

3. *Id.*

4. *Id.*

5. *Id.*

deal with this in an uncoordinated way, while other states remain silent on the subject.

2. There is the potential for mischief using these devices. With the rise of domestic terrorism, some method of device registration and monitoring usage will need to be undertaken. It does not take much imagination to realize what one of these devices might do if weaponized and flown into any vulnerable infrastructure.
3. The Federal Aviation Administration has expressed concern about near misses with aircraft, and believes they should be the lead agency of regulation.
4. Drone technology has the potential to be a powerful and cost-effective tool for the government, private sector, and society as a whole. The result has been increased interest in using them, over all of the aforementioned objections.

II. GOOD AND INNOVATIVE USES OF DRONE TECHNOLOGY

Beneficially envisioned and applied applications of drones include forest health monitoring, fire mapping applications, forest inventory, wildlife surveys, avalanche patrols, air quality monitoring, plume tracking, groundwater discharge monitoring, mine surveys, and precision agriculture for things like the monitoring of crop health and precision application of chemicals.⁶

The use of drones for monitoring destructive activities, such as poaching and illegal logging, have been notably applied in Africa, Asia, and South America. The World Wildlife Fund (WWF) has been using drones to monitor illicit trade in Africa by tracking poachers and the wildlife they are pursuing in real time.⁷ In South America, Brazil has purchased fourteen drones for \$350 million for the São Paulo Environmental Police to monitor deforestation in the Amazon, track poachers, and seek out illegal mining operations.⁸ International efforts in

6. Adam C. Watts et al., *Unmanned Aircraft Systems in Remote Sensing and Scientific Research: Classification and Considerations of Use*, 4 REMOTE SENSING no. 6, at 1671-1692 (2012), available at <http://www.mdpi.com/2072-4292/4/6/1671/htm>.

7. *Google Helps WWF Stop Wildlife Crime*, WORLD WILDLIFE FUND (Dec. 4, 2012), available at http://www.worldwildlife.org/stories/google-helps-wwf-stop-wildlife-crime?utm_source=twitter.com&utm_medium=social&utm_campaign=wildlife-crime&utm_content=december2012-4-1110.

8. Michael J. Coren, *Brazilian Eyes in the Sky Focus on the Disappearing Rainforest*, FAST COMPANY (Oct. 26, 2011, 01:15 AM), available at <http://www.fastcompany.com/1790901/brazilian-eyes-sky-focus-disappearing-rainforest>.

drone technology could be used to expand efforts to monitor, assess, and calculate deforestation and carbon sequestration benefits and needs globally. The option of a low-cost drone would be extremely beneficial to governments and NGOs operating with small budgets and seeking to better monitor natural assets with improved data collection efforts globally.

Beyond the use of monitoring for illegal activity, drones can monitor highways vulnerable to landslides using high resolution cameras to detect cracks that may indicate the onset of a landslide, and sensors to detect changes in stress. Once detected, data collected from the drone can be used by authorities to initiate an early warning allowing people currently in the area to escape and those travelling to the area to avoid the disaster event before it occurs.

The use of drones for early warning of forest fires has been tested by several federal agencies, including the US Forest Service. By collecting data on forest fires, firefighters can better plan and manage fires. While manned helicopters and planes could collect similar information when considering flight costs, contract requirements, and regulations and risks, there is no doubt a great use for drones in the future.⁹

Spatially Integrated Small-Format Aerial Photography (SFAP), a newly developed low-cost technology, is proposed for supplementing current bridge inspection techniques.¹⁰ Using top-down views, drones flying at about one thousand feet can allow visualization of sub-inch (large) cracks and joint openings on bridge decks or highway pavements.¹¹ With nightly news stories informing us about the poor state of our bridge infrastructure in the United States, this new technology can help us keep better assessment of our bridge and highway system at a much lower cost.

Drones have also been used in fisheries management. Natural resource agencies in both Texas and Nebraska have used fixed-wing drones to conduct in-channel habitat mapping during low water in the Guadalupe (Texas) and Niobrara (Nebraska) Rivers. Texas has also used this technology to locate isolated pools on the Blanco River during low flow conditions. The State used the information to dispatch teams to remove non-native smallmouth bass via electrofishing and seining, contributing toward efforts to repatriate Guadalupe bass—the native form

9. Everett Alan Hinkley & Thomas Zajkowski, *USDA forest service-NASA: unmanned aerial systems demonstrations – pushing the leading edge in fire mapping*, 26 *GEOCARTO INT'L* no. 2, at 103-111 (2011) (discussing the benefits and burdens to the US Forest Services' use of drones).

10. U.S. Patent No. 20,130,216,089 (filed Apr. 22, 2011).

11. *Id.*

that had been extirpated from the system following the introduction and concomitant hybridization with smallmouth bass.¹²

The University of Nebraska, Lincoln and the University of California, Berkeley were jointly awarded a nearly \$1 million grant from the US Department of Agriculture for developing drones that can take water quality samples from lakes, rivers, and streams.¹³ The project is still in the development stage, but the helicopter-type drones can already be deployed to collect small volume water samples from remote areas, and return the samples to people on the ground.

Drones can be outfitted to detect differences in water temperature, which would allow them to identify and track illegal and unwanted discharges into our streams and rivers.¹⁴ Research has introduced the use of a range of aerial platforms and an innovative application of thermography which can observe, document, and assist authorities in detecting illegal activities, such as, illegal sanitary sewer and storm drain connections, illicit discharges into rivers and streams, and other “peculiarities” occurring on surface waters can be easily seen and documented using the thermal infrared technologies.¹⁵

III. PUBLIC CONCERNS AND STATE LEGISLATIVE REMEDIES

The public has weighed in against the use of drones. In a recent survey about drone use, 63 percent of Americans indicated a belief that uninhibited personal and commercial drone use would represent a change for the worse.¹⁶ Politicians tend to follow public sentiment; thus, increased awareness of drones has resulted in numerous bills being introduced in various state legislatures seeking to limit their use. Between the 2013 and 2014 state legislative sessions, over forty states introduced bills addressing drones.¹⁷ States continue to struggle with legislation while federal regulations are in place, with more under review.

12. Tim Birdsong, Presenter, *Briefing: Application of Unmanned Aerial Systems Technology in Support of TPWD Fish and Wildlife Conservation Goals*, TEXAS PARKS & WILDLIFE (Aug. 22, 2013).

13. Kevin Abourezk, *UNL researchers developing water-collecting copter*, JOURNAL STAR (Sept. 6, 2013), available at http://journalstar.com/news/local/education/unl-researchers-developing-water-collecting-copter/article_74cc9981-f8d8-5a63-93ff-75fe9474c846.html.

14. M. Lega et al., Presenters, *Thermal Pattern and Thermal Tracking: fingerprints of an environmental illicit*, DEPT. OF ENVTL. SCL., UNIV. OF NAPLES., & DEPT. OF MECH. AND AEROSPACE ENG'G., UNIV. OF CAL., SAN DIEGO (June 11-14, 2012) available at <http://www.ndt.net/article/qirt/2012/papers/QIRT-2012-326.pdf>.

15. *See id.*

16. Aaron Smith, *Views of Science and the Future*, THE PEW RESEARCH CENTER, (Apr. 21, 2014), available at <http://www.pewinternet.org/2014/04/21/views-of-science-and-the-future/>.

17. Allie Bohm, *Status of Domestic Drone Legislation in the States*, ACLU (Feb. 15, 2013), available at <https://www.aclu.org/blog/status-domestic-drone-legislation-states>.

Many state and federal fish and wildlife agencies include a law enforcement arm. Some proposed legislation is loosely written, and severely limits the use of drones by law enforcement agencies.¹⁸ Two states have sought to regulate private use of drones by addressing where they can fly.¹⁹ Last year, Oregon enacted a law that allows property owners to sue a drone operator if a drone has flown less than four hundred feet above the owner's property at least once without consent.²⁰ Tennessee has attempted to restrict drones from flying over private property, but has sought to do it by making it a criminal trespass for a drone to fly over and access images of private property below.²¹

Texas has enacted a law with a great deal of detail on acceptable use and misuse of drones. The Texas Privacy Act authorizes a drone to secure images in very specific ways.²² For example, it allows pipeline companies to use drones for inspecting infrastructure. It also has an exemption which allows university research using drones to be conducted. Texas also allows drones to capture images of people on public property as long as they have the consent of the individual who owns the property captured in the image.²³ In addition, Texas law gives individuals who own or rent private property the ability to file a suit for violation of criminal law, as well as seek civil penalties with the court system. In order to recover damages under the Texas law, one would have to show there was malice in the distribution of the drone images made public.

Aside from Texas, several states provide exceptions or remedies to privacy concerns. For example, Idaho's legislation sweeps more broadly. The statute in Idaho bars people from using drones "to photograph or otherwise record an individual, without such individual's written consent, for the purpose of publishing or otherwise publicly disseminating such photograph or recording."²⁴ Similarly, North Carolina does not allow a drone to use or disseminate an image taken without first getting consent.²⁵ This would pertain to any image used in a publication or any other venue where public viewing is possible. But, unlike Idaho, North Carolina has an exception for public gatherings, news events, festivals, or any gathering

18. Smith, *supra* note 16.

19. Michael Berry & Nabiha Syed, *State legislation governing private drone use*, WASH. POST, (Sep. 25, 2014), available at <http://www.washingtonpost.com/news/volokh-conspiracy/wp/2014/09/25/state-legislation-governing-private-drone-use/>.

20. *Id.*

21. *Id.*

22. *Id.*

23. *Id.*

24. *Id.*

25. *Id.*

where the public at large is invited to attend.²⁶ Finally, Wisconsin has passed a criminal law to address the private use of drones.²⁷ The law punishes anyone who uses their drone to intentionally observe, capture images, or make a record of any individual where they would have a reasonable expectation of privacy. While very broad in its protection, it remains a misdemeanor, which may well limit its ability to protect the privacy of the individual.²⁸

In short, the law surrounding the use of drones for private and commercial use is like the “wild west”: fast moving and ever changing. How did we get to this point? Certainly, credit needs to be given to the military industry for billions of dollars in investment, without which we would not have this sophisticated technology available so inexpensively.

IV. FEDERAL AVIATION ADMINISTRATION ISSUES

Pilots around the United States have reported a surge in near-collisions and other dangerous encounters with small drones in the past six months.²⁹ Commercial airlines, private pilots, and air-traffic controllers have alerted the FAA of twenty-five episodes in which small drones came within a few seconds or a few feet of crashing into much larger aircraft, the records show.³⁰ The advent of reports like this give legitimacy to FAA claims for the need to regulate this new technology. Drones used for hobbies or bad intentions create a very real potential for a catastrophic accident.

The FAA has not had favorable results controlling commercial drone usage. In March of 2014, the FAA attempted to fine Raphael Pirker \$10,000 after he used a drone to film a commercial at the University of Virginia. Pirker fought the case, arguing that the FAA has never regulated model aircraft before and that the basis for making such use illegal is only a policy notice from 2007 that does not have the force of law. Patrick Geraghty, a judge with the National Transportation Safety Board (NTSB), agreed, and offered his ruling, which stated that no laws exist that prohibit

26. *Id.*

27. *Id.*

28. *Id.*

29. Craig Whitlock, *Near-collisions between drones, airliners surge, new FAA reports show*, WASH. POST, (Nov. 26, 2014), available at http://www.washingtonpost.com/world/national-security/near-collisions-between-drones-airliners-surge-new-faa-reports-how/2014/11/26/9a8c1716-758c-11e4-bd1b-03009bd3e984_story.html.

30. *Id.*

a drone from flying commercially.³¹ He then dismissed the FAA's case against Raphael Pirker, which, until recently, had been the only attempt by the FAA to issue a fine for flying a drone commercially.

Subsequently, the NTSB has made a ruling, which concluded that drones are, in fact, aircraft and as such they fall under the FAA's authority to regulate. This has served to affirm that the FAA has regulatory control over the quickly developing drone industry. Additionally, the National Transportation Safety Board members overturned an earlier ruling that had thrown out the case against Raphael Pirker for the operation of a drone while recklessly filming for the University of Virginia. The ruling by the NTSB is a clear but temporary victory for the FAA. The agency continues to struggle to find a way to regulate the tremendous rise in the use of drones over FAA regulated airspace in the United States. Technology adapted from the military has served to make drones compact, inexpensive, and simple to fly, with ever growing capacities on the horizon. The FAA will likely propose new rules for drones by the end of this year, but with an extensive comment period, it may take several years for this to become codified in the law.³²

One of the proposed drone regulations would include a private pilot licensing mandate, along with limiting flights to four hundred feet and only in daylight.³³ Most experts in the industry recognize that being able to physically pilot a plane has little or no connection to operating a drone. Tim Adelman, a partner in the New York law firm LeClairRyan that specializes in aviation law, offers that the FAA understands there is no connection, but it is a tool to buy time for the agency to get a handle on regulation. The FAA offered no elaboration on its small drone rules, which are still being prepared, spokesman Les Dorr said.³⁴ The proposed rules should be released by the end of the year, which must be followed by an extensive comment period.³⁵ It is expected that the comment period is when the provision to require a private pilots license will be opposed and replaced with something much less stringent and costly.³⁶ Continued rule

31. Jason Koebler, *Commercial Drones Are Completely Legal, a Federal Judge Ruled*, VICE (Mar. 6, 2014), available at <http://motherboard.vice.com/read/commercial-drones-are-completely-legal-a-federal-judge-ruled>.

32. Jack Nicas, *NTSB Rules Drones Are Aircraft, Subject to FAA Rules*, WALL ST. J., (Nov. 18, 2014, 1:36 PM), available at <http://www.wsj.com/articles/ntsb-rules-drones-are-aircraft-and-subject-to-faa-rules-1416326767>.

33. Justin Bachman, *Not an Airplane Pilot? You Won't Be Flying Commercial Drones*, BLOOMBERG BUSINESS REPORT (Nov. 28, 2014), available at <http://www.bloomberg.com/bw/articles/2014-11-28/faa-drone-rules-not-an-airplane-pilot-you-wont-be-flying-drones>.

34. *Id.*

35. *Id.*

36. *Id.*

writing and regulating is likely to continue from the FAA, and more legal challenges to the FAA's authority in the matter will also be brought forward for years to come.

V. HOMELAND SECURITY CONCERNS

While drone technology provides peaceful applications, it also contains insidious applications that could create harm on a global scale. One example occurred when Israel shot down a Hamas-operated drone in southern Israel.³⁷ Even more alarming, Hamas has also shown video footage of their drones weaponized, and says it has plans for some drones that may operate like a cruise missile. Even more alarming for middle eastern peace interests is the release of video by ISIS showing a simple and inexpensive drone that took surveillance of a Syrian military base that it later attacked. It appeared that the video is from a drone model that can be purchased for less than \$500.³⁸ While ISIS and other terrorist organizations don't possess a traditional air force, the caption on the video was titled "From the drone of the army of the Islamic State." With a low cost, limited technical abilities required to operate, and huge potential benefits, it seems only a matter of months until organizations like ISIS are buying and using these new technologies.³⁹

With the advance of technology and the mass production of these low-cost devices, what would stop terrorists from acquiring and using them? Drones are appealing to the extremist mind. They're small, hard to detect, can fly low or high, can be controlled from across the world or within eyesight, and can fly into the busiest city or into the most wild and remote of places. As such, they could fly into a crowded football stadium, or descend into the cooling tower of a nuclear power plant from miles away. They can be outfitted with explosives, chemical agents, or anything the mind can conceive of, all while drinking a cup of coffee at a local restaurant. In short, the terrorist pays no personal price to complete the mission. Drones provide the stealth of a suicide bomber with the range of an aircraft.

A specific example of a potential extremist use occurred in 2012, when a graduate student from Massachusetts was exposed while trying to affix explosives to a drone for the purpose of flying it into the Pentagon and Capitol in Washington DC. While the plot was thwarted, it does

37. David Cardinal, *Drones provide terrorists with a DIY air force*, EXTREME TECH (Aug. 29, 2014), available at <http://www.extremetech.com/extreme/188941-drones-provide-terrorists-with-a-diy-air-force>.

38. *Id.*

39. *Id.*

demonstrate how vulnerable the use of drones could make us to similar occurrences.⁴⁰ Other potentially unnerving uses include crop-dusting drones modified to disperse deadly chemicals, unmanned planes used as assassins, and drones meant to attack critical infrastructure.⁴¹

By 2030, it is estimated that we may have as many as thirty thousand unmanned planes hovering over us in the United States. While most are deployed for worthy endeavors such as emergency response, fighting forest fires, and finding illicit discharges, one can't help but be concerned about the potential misuse of drones.⁴² With this many aircraft unregistered, shouldn't we all be concerned about who has these devices and what their intentions are?

VI. CONCLUSION

The potential of privacy intrusion by drones is real and should be addressed at the federal level with a broad approach that would restrict drones from using gathered images of people without written permission. States could then implement more restrictive rules based on local and regional preferences. But all fifty states should provide some relief from the potential of privacy intrusion, and to increase confidence in the use of drones for public good and commercial enterprise. This would, in effect, create a kind of cooperative federalism with the federal government, providing a baseline of protection against privacy intrusion and interference with commercial aviation, and states providing nuance that would reflect local and regional preferences.

Regarding the issue of national security, a drone registry should be created that would allow manufacturers to keep record of every drone's ownership and location. It may be possible to sell these devices with tracking technology installed similar to that of our cell phones. It may also be possible to install a kill switch in them, should one be identified in the wrong place or engaged in a wrong activity.

Registration of drones and even permitting of drone use under four hundred feet should be undertaken by individual states, relieving the FAA of exhaustive and often regressive rulemaking on this promising technology. Registry and permitting information should be shared seamlessly with both the FAA and Homeland Security.

40. When Terrorists Have Drones, BLOOMBERG VIEW (Jul. 22, 2014), *available at* <http://www.bloombergvew.com/articles/2014-07-22/when-terrorists-have-drones>.

41. *Id.*

42. *Id.*

Finally, for all of the detrimental potentials for the misuse of drones, there are a myriad of beneficial uses already outlined in this paper, and a vast array of uses yet to come. We should embrace this technology and control its use. It is likely we have entered an era of a new highway between one hundred and four hundred feet above our heads, which will deliver packages, assess our property from the sky, help us in natural disasters, and make us a safer and more efficient society. As with most new technology, once it is developed and used, it cannot be undone, and becomes a matter for society to exercise prudence and apply good management.

