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Game of Drones: Defending Against Drone Terrorism

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GAME OF DRONES: DEFENDING AGAINST DRONE TERRORISM

By: Tung Yin*

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I. INTRODUCTION

The era of weaponized drone warfare began in the deserts of Yemen on November 3, 2002, when an American unmanned aerial vehicle (“UAV”),¹ otherwise known as a drone, blasted a car with a Hellfire missile, killing all six occupants.² The target of the attack was suspected al Qaeda member Qaed Salim Sinan al-Harethi, who was believed to have been behind the 2000 attack on the *U.S.S. Cole* while it was docked in Yemen.³ Some critics were appalled at the attack,

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1. European authorities prefer the term “remotely-piloted aircraft.”

2. See, e.g., James Risen, *Eyes (and Arms) in the Sky*, N.Y. TIMES, Nov. 10, 2002, at C5.

3. See, e.g., Seymour M. Hersh, *Manhunt: The Bush Administration’s new strategy in the war on terrorism*, NEW YORKER, Dec. 23, 2002, at 66.

calling it an “extra-judicial assassination,”⁴ particularly given that the drone strike took place almost 1,700 miles away from the battlefield of Afghanistan.⁵ Supporters of the attack, however, argued that it was a precision strike undertaken with nobody else around, which eliminated the chance of bystander casualties, that al-Harethi was allegedly on his way to another terrorist strike, and that past efforts to capture him alive had failed.⁶

Given the covert nature of the Central Intelligence Agency’s drone program, available data on the number of drone strikes is unlikely to be completely accurate. It appears, however, that the al-Harethi attack was the lone Yemen strike during the Bush Administration, whereas the Obama Administration has since sent the number of drone strikes in that country skyrocketing.⁷

Having opened Pandora’s Box, however, the United States may soon find itself on the wrong end of a weaponized drone. Drone technology has spread like wildfire not just to other countries, such as Iran,⁸ but also to local agencies,⁹ private corporations,¹⁰ and even private citizens.¹¹ In late 2014, the Federal Aviation Administration approved the first set of permits for private commercial drone flights for

4. See Mary Ellen O’Connell, *To Kill or Capture Suspects in the Global War on Terror*, 35 CASE W. RES. J. INT’L L. 326, 331 (2003) (quoting critics such as Amnesty International and the U.N. Special Rapporteur on extrajudicial killing).

5. See, e.g., ERIC LICHTBLAU, *BUSH’S LAW: THE REMAKING OF AMERICAN JUSTICE* 146 (2008) (criticizing the Bush Administration’s claim of executive authority “that would allow the CIA to use an unmanned predator drone to fire a Hellfire antitank missile in 2002 at a car in a remote part of Yemen, far from the Afghan battlefield, killing six suspected al Qaeda operatives.”).

6. See Hersh, *supra* note 3, at 66.

7. See, e.g., *Drone Wars Yemen: Analysis*, NEW AM., <http://securitydata.newamerica.net/drones/yemen/analysis> (last visited Feb. 21, 2015).

8. See P.W. Singer, *Defending Against Drones: How Our New Favorite Weapon in the War on Terror Could Soon Be Turned Against Us*, NEWSWEEK, Mar. 8, 2010, at 38. CNN’s terrorism expert, Peter Bergen, has written that “82 countries now own some type of drone . . . includ[ing] traditional American adversaries such as China, Russia, and Iran.” Peter Bergen & Jennifer Rowland, *Nine facts about armed drones*, CNN OPINION, May 13, 2014, available at <http://www.cnn.com/2014/05/13/opinion/bergen-nine-facts-spread-of-armed-drones/>.

9. See, e.g., Sabrian Eaton, *Ohio Agencies, School Defend Use of Drone Technology*, CLEVELAND PLAIN DEALER, Feb. 13, 2013, at A1.

10. Social media giant Facebook announced plans to build a fleet of drones that would stay aloft indefinitely and provide wi-fi service to impoverished areas of the world. See, e.g., Brian Fung, *Everything You Need to Know About Facebook’s Drones, Lasers and Satellites*, WASH. POST (Mar. 28, 2014), <http://www.washingtonpost.com/blogs/the-switch/wp/2014/03/28/everything-you-need-to-know-about-facebooks-drones-lasers-and-satellites>; Hayley Tsukayama, *Facebook May Look to Drones to Connect World to the Web*, WASH. POST (Mar. 4, 2014), <http://www.washingtonpost.com/blogs/the-switch/wp/2014/03/04/facebook-may-look-to-drones-to-connect-world-to-the-web/>. Internet retailer Amazon similarly disclosed that it was looking into deploying drones to deliver packages to customers. See *Keep the Tip, It’s Drone Delivery: Editorial*, OREGONIAN, Dec. 4, 2013, at B6, available at http://www.oregonlive.com/opinion/index.ssf/2013/12/keep_the_tip_its_drone_deliver.html.

11. See Singer, *supra* note 8, at 39.

Hollywood movie studios.¹² With the cost of some commercial drones at or below \$1,000 in 2014,¹³ drone technology may well fall into the hands of terrorists.¹⁴ Consider this scenario:

It is Opening Day of the baseball stadium and a sell-out crowd has packed into Dodger Stadium in Los Angeles, California. The sky is blue and clear. The temperature is mild, and the air is calm and still. Five miles away, an unmanned aerial drone cruises toward the baseball stadium, directed by remote control by a pilot in a sport utility vehicle on a California highway. As the drone is about to cross over the baseball stadium, the pilot presses a button on his remote-control unit, and a flap in the rear of the drone opens. The drone begins to circle around the stadium, and a fine mist of white powder disperses over the crowd. Because of the calm air, the powder doesn't blow away; it just descends gently, blanketing the stadium. The crowd panics...

Does it matter if the white powder is weaponized anthrax, or sugar? From the standpoint of terrorism, it is probably a difference in degree, not kind. That many people trying to escape such a tightly packed venue could likely result in a dozens of injuries, if not deaths, from trampling and stampeding.¹⁵ The realization that next time a drone could be carrying something worse than sugar—ricin, radioactive cesium, or asbestos—could frighten the public into avoiding mass outdoor venues; densely populated buildings like shopping malls might fare equally badly. A good indication that drone attacks may well be on the minds of terrorists and other wrongdoers is the fact that, as of 2014, terrorist attacks involving drones have started to show up as plot engines in popular culture.¹⁶ Before dismissing such novels and TV shows as mere fiction, one might keep in mind that in 1994 not one,

12. Brooks Barnes, *Drone Exemptions for Hollywood Pave the Way for Wide-spread Use*, N.Y. TIMES, Sept. 26, 2014, at B1, available at http://www.nytimes.com/2014/09/26/business/media/drone-exemptions-for-hollywood-pave-the-way-for-wide-spread-use.html?_r=0.

13. See, e.g., Bill Turque, *Montgomery County Studies Drone Applications*, WASH. POST (Sept. 11, 2014), http://www.washingtonpost.com/local/montgomery-county-studies-drone-applications/2014/09/11/cec59038-39ec-11e4-bdfb-de4104544a37_story.html.

14. See John Villasenor, *Here Come the Drones: These popular, unmanned aircraft will eventually fall into the hands of hostile nations and terrorists*, SCI. AM., Jan. 2011, at 16, available at <http://www.scientificamerican.com/article/here-come-the-drones/> (“As they continue to become smaller, cheaper[,] and more numerous, drones will become easier for hostile nations, and perhaps even terrorists, to get their hands on.”).

15. Cf. Scott Stewart, *The Biggest Threat Dirty Bombs Pose is Panic*, FORBES (Sept. 11, 2014, 2:40 PM), <http://www.forbes.com/sites/stratfor/2014/09/11/the-biggest-threat-dirty-bombs-pose-is-panic/> (suggesting that “it is possible the panic created by a dirty bomb attack could well kill more people than the device itself.”).

16. See, e.g., RICHARD A. CLARKE, *STING OF THE DRONE* 81 (2014) (depicting fictional terrorist plot to use remote-controlled aircraft replica to attack targets in the continental U.S.); *Hawaii 5-O: A'ohe Kahe e Pe'e Ai* (CBS television broadcast Sept. 26, 2014) (depicting terrorist attack in Honolulu using a gun-armed drone); *24 Live*

but two novelists foreshadowed the 9/11 attacks, thrillers in which suicide terrorists crashed planes into U.S. buildings.¹⁷

This Article considers the threat posed by drone terrorism and the technological and legal issues involved in setting up defensive responses. First, the Article provides an overview of current drone technology, legal views on weaponized military drones, and a discussion of the potential appeal of drones as vehicles for terrorism. Next, it discusses the current laws and regulations pertaining to private drones. The Article then lays out the three challenges to defending against drone terrorism: detecting potentially hostile drones, identifying them, and destroying or neutralizing them. Finally, it closes with some proposals to begin to develop the legal and technological architecture to defend against drone terrorism.

II. THE THREAT FROM DRONES

To begin with, this Article should distinguish the reality of drones from the specter of them. By “specter,” I mean that drones are sometimes used as shorthand for ideological or legal or policy disagreements with a particular tactical or strategic course of action.¹⁸ For example, the increasingly used tactic of targeting specific high-level al Qaeda members for killing has led to a sharp debate, with opponents decrying it as assassination and proponents arguing that such killings comport with the law of war.¹⁹ But as Operation Neptune Spear—the successful raid in Abbottabad, Pakistan, that ultimately killed al Qaeda leader Osama bin Laden—demonstrated, targeted killing need not be accomplished by way of drone.²⁰

A. *Brief Primer on UAVs*

Basically, UAVs are bigger, potentially more advanced versions of the remote-controlled planes or helicopters sold in hobby stores, mall kiosks, and Amazon.com as children’s toys. The principles of flight are the same as for manned aircraft or helicopters: The machine gen-

Another Day: 5:00 p.m. – 6:00 p.m. (Fox television broadcast June 9, 2014) (depicting terrorist hijacking of armed U.S. drones and subsequent missile attack in London).

17. See TOM CLANCY, *DEBT OF HONOR* 762 (1994) (depicting a Japanese terrorist crashing a hijacked jetliner into U.S. Capitol building); DALE BROWN, *STORMING HEAVEN* 186–87 (1994) (depicting a terrorist crashing a plane into Memphis airport).

18. In this way, “drone” may be this decade’s version of the USA PATRIOT Act, which Bush Administration critics frequently—and wrongly—identified as the source of the Bush Administration’s claimed authority to detain combatants at Guantanamo Bay or to engage in coercive interrogation. See Tung Yin, *A Government’s Trustworthiness: Beyond the USA PATRIOT Act*, 8 CHI. POL’Y REV. 1 (2004).

19. See *infra* Part I.B.

20. See generally MARK BOWDEN, *THE FINISH: THE KILLING OF OSAMA BIN LADEN* (2012) (reporting that a team of U.S. Navy special forces soldiers infiltrated bin Laden’s house and killed him in a close-quarters firefight); MARK OWEN, *NO EASY DAY: THE FIRSTHAND ACCOUNT OF THE MISSION THAT KILLED OSAMA BIN LADEN* 274 (2012).

erates enough lift to overcome its weight through either the interaction of airflow across a curved wingfoil or tilted rotary blade.

Today's drones come in a variety of sizes, ranging from ones that fit in a person's hand to ones as large as commercial jetliners.²¹ Not all drones are operated by the military, and not all military drones are combat aircraft. In fact, most military drones are flown for surveillance, an ideal purpose given their extended flight time, as some UAVs can stay aloft for twenty-four hours or more. Once the military can refuel drones in midair—a development already on the horizon²²—they should be able to stay aloft indefinitely, reducing if not eliminating temporal gaps in surveillance coverage.²³

Military UAVs offer a number of other advantages over manned aircraft: Pilot combat risk is eliminated. In a traditional piloted mission, if the aircraft is destroyed, the crew may be killed or captured.²⁴ On the other hand, if a drone is shot down, the operator remains safe at the base, which may be thousands of miles away.²⁵

The purchase price of a combat UAV is a fraction of that of a fighter plane or bomber. The most expensive armed U.S. drone is the MQ-9 Reaper, which cost about \$12.5 million apiece in 2012.²⁶ By comparison, the F-22 Raptor, a stealth fighter, cost more than \$145 million

21. See Chris Jenks, *Law from Above: Unmanned Aerial Systems, Use of Force, and the Law of Armed Conflict*, 85 N.D. L. REV. 649, 653 (2009); Lucy Kinder, *US Navy to Get a Drone the Size of a Boeing 757 Plane*, TELEGRAPH (Jan. 8, 2014, 11:30 AM), <http://www.telegraph.co.uk/news/worldnews/northamerica/usa/10558105/US-Navy-to-get-a-drone-the-size-of-a-Boeing-757-plane.html>.

22. See, e.g., David Axe, *Refueling Gear Makes Navy's Next Drone Even Deadlier*, WIRED MAG. (Nov. 4, 2011, 2:00 PM), <http://www.wired.com/2011/11/navy-killer-drone-refuel/> (discussing the Navy's planned development of an aircraft carrier-launched drone with midair refueling capability); *Unstaffed drone refueling test "successful,"* BBC NEWS (Oct. 8, 2012), <http://www.bbc.com/news/technology-19871063>.

23. UAVs have already solved the other limiting factor (pilot fatigue) with regard to the duration of flight missions, since the remote pilot can step away from the controls and be relieved by a fresh pilot.

24. FRANCIS GARY POWERS WITH CRAIG GENTRY, OPERATION OVERFLIGHT: THE U-2 SPY PILOT TELLS HIS STORY FOR THE FIRST TIME 78–84 (1970) (describing the story of Gary Powers, one of the more famous American pilots who have been captured after their planes were shot down, who flew the famous U-2 spy plane over the Soviet Union in 1960; see also MICHAEL R. BESCHLOSS, MAY-DAY: EISENHOWER, KHRUSHCHEV AND THE U-2 AFFAIR 25 (1986); JOHN MCCAIN & MARK SALTER, FAITH OF MY FATHERS (1999) (detailing the six years that Senator McCain spent as a prisoner of war during the Vietnam War); Thom Shanker, *U.S. Pilot's Remains Found in Iraq After 18 Years*, N.Y. TIMES, Aug. 3, 2009, at A10, available at http://www.nytimes.com/2009/08/03/world/middleeast/03speicher.html?_r=0 (reporting on Michael Scott Speicher, a naval pilot shot down at the beginning of the First Gulf War and who was missing in action until his remains were found eighteen years later); SCOTT O'GRADY & MICHAEL FRENCH, BASHER FIVE-TWO: THE TRUE STORY OF F-16 FIGHTER PILOT SCOTT O'GRADY (1997) (writing about Scott O'Grady, who was shot down over Bosnia but escaped capture).

25. See Elisabeth Bumiller, *A Day Job Waiting for a Kill Shot a World Away*, N.Y. TIMES, July 30, 2012, at A1.

26. See *Drones*, TIME MAG. (Nov. 6, 2012), available at <http://nation.time.com/2012/11/06/12548710-60>.

each in 2010.²⁷ This is not to say that the Reaper and the Raptor are directly interchangeable in terms of combat functions but merely to illustrate the vast difference in acquisition cost.

Finally, in theory, an armed drone should be able to carry out attacks in ways that further the two key principles of the laws of war: distinction and proportionality. Distinction is the obligation of a military belligerent to attack legitimate *military* targets.²⁸ An intentional attack against a nonmilitary target, such as a group of civilians, a hospital, or a historic building, may constitute a war crime.²⁹ Note that a lawful attack may well result in expected civilian casualties (euphemistically known as “collateral damage”), so long as the intent of the attack was to strike a military target. Proportionality is the doctrine that limits attacks to ones where the expected military advantage is reasonable in relation to the expected nonmilitary harm.³⁰ As we shall see, none of these advantages is unique to American military use of drones.

B. *Legal Views on the Use of Weaponized Drones*

Since the 2002 Yemen strike, drones have drawn considerable attention from government leaders, policymakers, and academics (mostly critical),³¹ almost entirely focusing on American use of drones against suspected terrorists and militants. Early on, many international law advocates and human rights lawyers argued that such drone strikes were unlawful assassinations.³² International law expert Mary Ellen O’Connell offered a more measured criticism, agreeing that battlefield use of drone strikes did not *per se* violate the law of war but contending that the Yemen strike was unlawful because it supplanted the role of law enforcement.³³ Later, former Yale Law School Dean Harold Koh, an international law expert then serving as the legal adviser to the State Department, gave a speech before the American Society of International Law in which he stated:

27. U.S. AIR FORCE, FY 2011 BUDGET ESTIMATES (Feb. 2010), available at <http://www.saffm.hq.af.mil/shared/media/document/AFD-100128-072.pdf>.

28. See, e.g., Jordan J. Paust, *Propriety of Self-Defense Targetings of Members of al Qaeda and Applicable Principles of Distinction and Proportionality*, 18 ILSA J. INT’L & COMP. L. 565, 577–79 (2012).

29. See *id.* at 577.

30. *Id.* at 578.

31. *Contra* see Kenneth Anderson, *The Case for Drones*, COMMENT. MAG., at 14 (June 2013); Jenks, *supra* note 21, at 665–70.

32. See David Kretzmer, *Targeted Killing of Suspected Terrorists: Extra-Judicial Executions or Legitimate Means of Defence?*, 16 EUR. J. INT’L L. 171, 173 (2005) (collecting sources).

33. See *Rise of the Drones II: Examining the Legality of Unmanned Targeting: Hearing Before the H. Subcomm. on Nat’l Sec. and Foreign Affairs, Comm. on Oversight and Gov’t Reform*, 111th Cong. 18 (2010) (testimony of Mary Ellen O’Connell), <http://www.gpo.gov/fdsys/pkg/CHRG-111hhr64922/pdf/CHRG-111hhr64922.pdf>.

[S]ome have challenged the very use of advanced weapons systems, such as unmanned aerial vehicles, for lethal operations. But the rules that govern targeting do not turn on the type of weapon system used, and there is no prohibition under the laws of war on the use of technologically advanced weapons systems in armed conflict—such as pilotless aircraft or so-called smart bombs—so long as they are employed in conformity with applicable laws of war. Indeed, using such advanced technologies can ensure both that the best intelligence is available for planning operations, and that civilian casualties are minimized in carrying out such operations.³⁴

Prior to serving in the Obama Administration, Koh had been a vocal critic of the Bush Administration's counterterrorism policies, once calling the so-called torture memo "a stain on our national reputation."³⁵ Therefore, Koh's defense of military drone strikes was an important step toward wearing away opposition to drone strikes.

By 2013, the United Nations Special Rapporteur on extrajudicial, summary, or arbitrary executions (Christof Heyns) conceded that drones "are not illegal weapons" but did express concern that they made it easier for nations to use lethal force.³⁶ A year later, the U.N. Special Rapporteur on the promotion and protection of human rights and fundamental freedoms while countering terrorism (Ben Emmerson), however, produced a report that seemingly accepted the legality of UAVs as a matter of principle, instead urging nations using them to comply with international law (particularly the law of war requirements of distinction and proportionality) and to investigate thoroughly the causes and circumstances of civilian casualties inflicted in UAV strikes.³⁷ International and human rights lawyers have thus seemingly shifted toward the predominant American view that an armed drone is simply another weapons platform, the legality of which is determined by the manner of its use.³⁸

34. Harold Hongju Koh, Legal Adviser, U.S. Dep't of State, Speech at the Annual Meeting of the American Society of International Law (Mar. 25, 2010).

35. Paul Richter, *Human Rights Advocate Named State Department's Top Lawyer*, L.A. TIMES (Mar. 25, 2009), available at <http://articles.latimes.com/2009/mar/25/nation/na-justice-koh25>. The "torture memo" was a legal opinion produced by the Office of Legal Counsel that provided a controversial interpretation of the legal elements of "torture" as prohibited by 18 U.S.C. § 2340 (2012). See Office of Legal Counsel, Memorandum for Alberto R. Gonzales, Counsel to the President, *Re: Standards of Conduct for Interrogation under 18 U.S.C. §§ 2340-2340A* (Aug. 1, 2002), <http://www.justice.gov/sites/default/files/olc/legacy/2010/08/05/memo-gonzales-aug2002.pdf>.

36. U.N. G.A. Rep. of the Special Rapporteur on extrajudicial, summary, or arbitrary executions, U.N. Doc. A/68/382 (Sept. 13, 2013).

37. U.N. G.A. Rep. of the Special Rapporteur on the promotion and protection of human rights and fundamental freedoms while countering terrorism, U.N. Doc. A/HRC/25/29 (Mar. 11, 2014).

38. See Harold Hongju Koh, Legal Adviser, U.S. Dep't of State, Speech at the Annual Meeting of the American Society of International Law (Mar. 25, 2010) ("the rules that govern targeting do not turn on the type of weapon system used, and there is no prohibition under the laws of war on the use of technologically advanced weap-

Another popular area of legal analysis of the military use of drones concerns the standards and oversight over the placement of targets on what might best be described as the “kill list.”³⁹ Just as the focus on UAVs as technological weapons is effectively a challenge to a more precise and efficient form of attack compared to a manned aircraft, the focus on the kill list is less about drones and more about targeted killing (though, of course, drone attacks are a primary method for killing a specified target).

Notwithstanding the emphasis on attack drones and targeted killing, there have also been articles examining potential tort and civil liability issues arising out of drone crashes, accidents, trespass, and other mishaps.⁴⁰ Finally, with the likelihood of local governments using drones for surveillance and other public functions, including law enforcement, a spate of scholarship has focused on the privacy issues public drones raise.⁴¹

C. *Game of Drones: Terrorism Advantages of Drones*

Just as American military use of weaponized UAVs is a difference in degree, rather than kind, from the use of manned attack planes, terrorist use of drones is simply the next step in the use of aerial vehicles. Put another way, drones may offer some advantages over

ons systems in armed conflict . . . so long as they are employed in conformity with applicable laws of war.”).

39. See, e.g., Letter from Anthony Romero, Exec. Director, Am. Civil Liberties Union, to President Barack Obama, Apr. 28, 2010, at 2 (expressing concern over, among other things, “kill lists” containing targets designated for killing); *Rise of the Drones II: Examining the Legality of Unmanned Targeting: Hearing Before the Subcomm. on the Nat’l Sec. & Foreign Affairs of the H. Comm. on Oversight & Gov’t Reform*, 111th Cong. 43 (2010) (testimony of William C. Banks urging Congress to “revisit the AUMF . . . and provide a more fine-grained authorization for the use of military force against terrorists”); Jo Becker & Scott Shane, *Secret “Kill List” Proves a Test of Obama’s Principles and Will*, N.Y. TIMES, May 29, 2012, at A1, available at http://www.nytimes.com/2012/05/29/world/obamas-leadership-in-war-on-al-qaeda.html?pagewanted=all&_r=0; Afsheen John Radsan & Richard W. Murphy, *Due Process and Targeted Killing of Terrorists*, 31 CARDOZO L. REV. 405, 411 (2009) (arguing for independent Executive Branch review of every targeted killing carried out by the CIA); William Funk, *Deadly Drones*, *Due Process, and the Fourth Amendment*, 22 WM. & MARY BILL RTS. J. 311, 312 (2013).

40. See Geoffrey Christopher Rapp, *Unmanned Aerial Exposure: Civil Liability Concerns Arising from Domestic Law Enforcement Employment of Unmanned Aerial Systems*, 85 N.D. L. REV. 623 (2009) (discussing “worst-case scenarios” involving police drones).

41. See Joseph J. Vacek, *Big Brother Will Soon Be Watching—or Will He? Constitutional, Regulatory, and Operational Issues Surrounding the Use of Unmanned Aerial Vehicles in Law Enforcement*, 85 N.D. L. REV. 673, 679–84 (2009); John Villasenor, *Observations from Above: Unmanned Aircraft Systems and Privacy*, 36 HARV. J.L. & PUB. POL’Y 457, 475–98 (2013); Brandon Nagy, *Why They Can Watch You: Assessing the Constitutionality of Warrantless Unmanned Aerial Surveillance by Law Enforcement*, 29 BERKELEY TECH. L.J. 135 (2014); Robert Molko, *The Drones Are Coming!: Will the Fourth Amendment Stop Their Threat to Our Privacy?*, 78 BROOK. L. REV. 1279 (2013).

manned aircraft, but there is little that terrorists would be able to achieve using drones that they would not be able to achieve using regular planes. Indeed, in 2010, a man named Joseph Stack deliberately crashed his single-engine small plane into a building housing his target, the Austin, Texas, office of the Internal Revenue Service, killing himself and an IRS agent; thirteen other people were injured.⁴² There were also unconfirmed reports that some of the 9/11 hijackers had looked into the possibility of using small planes such as crop dusters to serve as the delivery vehicle for chemical or biological weapons.⁴³

Nevertheless, just as the U.S. military has been deliberately shifting toward increased use of UAVs compared to manned aircraft,⁴⁴ due to the advantages drones offer, we might reasonably expect terrorists contemplating aerial vehicle-based attacks to gravitate toward drones as well.

1. *Delivering Terror-Inducing Payloads*—Recent literature on terrorist plots within the United States has often focused on the so-called weapons of mass destruction (nuclear, chemical, biological, or radiological attacks),⁴⁵ but terror attacks, successful or not, in the last two decades or so have tended to involve bombs, most often delivered by trucks.⁴⁶ The devastation inflicted by the 9/11 attacks highlighted the

42. Michael Brick, *Man Crashes Plane Into Texas I.R.S. Office*, N.Y. TIMES, Feb. 19, 2010, at A14, available at <http://www.nytimes.com/2010/02/19/us/19crash.html>.

43. See, e.g., *Hijacker Visited Crop-Duster Airfield*, ABC NEWS (Sept. 24, 2001), <http://abcnews.go.com/US/story?id=92436>; Richard A. Muller, *Cropduster Terrorism: What Terrorist Weapon is More Destructive than TNT and More Available than Nukes? It's Gasoline*, MIT TECH. REV. (Mar. 11, 2002), <http://www.technologyreview.com/news/401388/cropduster-terrorism/> (“An Air Tractor 502 Crop Duster airplane is far smaller than a 767, but it is also a flying tanker. . . . Fill ‘er up with 1,700 liters of gasoline, and you are carrying roughly 2.1 to 2.4 tons, the energy equivalent of 32 to 36 tons of TNT.”). But see Edward Jay Epstein, *Fictoid #11: The Terror Crop Dusters*, NETHERWORLD, http://www.edwardjayeepstein.com/nether_fictoid11.htm (last visited Dec. 24, 2015) (noting that the crop duster story relied on two eyewitnesses, each of whom claimed to have met 9/11 hijackers at times when they were demonstrably known to have been outside the U.S.).

44. A few years ago, the Air Force began to recruit more pilots for UAVs than for manned aircraft. See Michael Evans, *Drones to Eclipse Crewed Aircraft*, AUSTRALIAN, Aug. 3, 2012, at 10; see also *Drone Pilots: Dilbert at War*, ECONOMIST, June 21, 2014, at 68, available at <http://www.economist.com/news/united-states/21604608-stressful-lives-chair-force-dilbert-war> (noting “that the air force is training more drone pilots than fighter and bomber pilots combined”). In that same year, UAVs flew more combat hours than manned aircraft did. See Jim Michaels, *Drones change “Top Gun” Culture of Air Force*, USA TODAY (Dec. 1, 2012, 9:00 AM), <http://www.usatoday.com/story/news/world/2012/11/30/drone-wars/1737991/>.

45. See, e.g., RICHARD A. FALKENRATH ET AL., AMERICA’S ACHILLES’ HEEL: NUCLEAR, BIOLOGICAL, AND CHEMICAL TERRORISM AND COVERT ATTACK (1998). But see JOHN MUELLER, ATOMIC OBSESSION: NUCLEAR ALARMISM FROM HIROSHIMA TO AL-QAEDA (2009) (arguing that nuclear weapons are too unwieldy to serve as an effective instrument of terror, compared to the ease with which fanatics can kill using conventional explosives).

46. See, e.g., *United States v. Yousef*, 327 F.3d 56, 79 (2d Cir. 2003) (deciding the case of one of the most violent truck bomb attacks in the United States, the 1993 World Trade Center bombing, which killed six people and injured over a thousand);

tactical value of aircraft as instruments of terror and not just targets, a trend which continued afterward.⁴⁷ Most recently, in 2011, a twenty-six-year-old man named Rezwan Ferdaus pleaded guilty to trying to attack the Pentagon and the U.S. Capitol building with remote-controlled planes filled with explosives; he was caught as a result of a sting operation where undercover Federal Bureau of Investigation agents fooled him into believing that they were al Qaeda members.⁴⁸

Truck or car bombs will probably continue to fascinate would-be terrorists as vehicles for destruction, but they have their limitations when it comes to attacking hardened targets. Following the Oklahoma City bombing, many federal courthouses and buildings placed heavy concrete barriers to keep cars and other vehicles a certain distance away. Still, a large enough truck bomb can cause damage to buildings several blocks away,⁴⁹ so physical barriers cannot ensure the safety of the target;⁵⁰ and of course there are many more

see also United States v. McVeigh, 153 F.3d 1166, 1177 (10th Cir. 1998) (deciding a case of the truck bomb attack on Murrah Federal Building in Oklahoma City, which killed 168 people). Similar attacks against American targets in foreign countries include the simultaneous bombings of U.S. Embassies in Kenya and Tanzania in 1998, the destruction of the Khobar Towers residential complex in Riyadh, Saudi Arabia, in 1996, and the suicide bombing of the U.S. Marine barracks in Lebanon in 1983. *See* STEVE COLL, *GHOST WARS: THE SECRET HISTORY OF THE CIA, AFGHANISTAN, AND BIN LADEN, FROM THE SOVIET INVASION TO SEPTEMBER 10, 2001* 138, 403–04 (2004); GARRETT M. GRAFF, *THE THREAT MATRIX: THE FBI AT WAR IN THE AGE OF GLOBAL TERROR* 201–02 (2011). Truck bombs continue to fascinate those who entertain drams of terrorism against American targets, as demonstrated by a number of successful post-9/11 undercover sting operations that have resulted in convictions for attempted truck bomb attacks. For a discussion of some of these stings and a highly critical review of government tactics involved, *see* TREVOR AARONSON, *THE TERROR FACTORY: INSIDE THE FBI'S MANUFACTURED WAR ON TERRORISM* (2013).

47. In 2006, London authorities foiled a plot by homegrown British terrorists to smuggle improvised liquid explosives on to trans-Atlantic passenger jetliners. *See* Don Van Natta, Jr., et al., *Details Emerge in British Terror Case*, N.Y. TIMES (Aug. 28, 2006), <http://www.nytimes.com/2006/08/28/world/europe/28plot.html?pagewanted=all>.

48. *See* Jess Bidgood, *Massachusetts Man Gets 17 Years in Terrorist Plot*, N.Y. TIMES, Nov. 2, 2012, at A17, available at <http://www.nytimes.com/2012/11/02/us/rezwan-ferdaus-of-massachusetts-gets-17-years-in-terrorist-plot.html>.

49. LOU MICHEL & DAN HERBECK, *AMERICAN TERRORIST: TIMOTHY McVEIGH AND THE OKLAHOMA CITY BOMBING* 231 (2001) (reporting that the truck bomb that Timothy McVeigh set off in Oklahoma City damaged “[e]very one of the structures in a sixteen-block area . . . some of which so badly they would have to be demolished.” Four of the 167 blast victims were elsewhere than the doomed federal building. *Id.* at 233–34.

50. Note that after the truck bombing attacks against the World Trade Center in 1993 and the Murrah Federal Building in Oklahoma City in 1995, security personnel at likely terrorism targets should be attuned to the possible dangers posed by large trucks. Even vigilant security personnel would have difficulty thwarting a suicide attack. Consider, as an example, the devastating 1983 truck bombing attack against the U.S. Marine barracks in Lebanon. Despite the presence of armed guards, barbed wiring, and concrete barriers, the driver was able to plow his explosive-filled vehicle into the barracks, killing 241 people. *See* PETER HUCHTHAUSEN, *AMERICA'S SPLENDID LITTLE WARS: A SHORT HISTORY OF U.S. MILITARY ENGAGEMENTS: 1975–2000* 59 (2001).

soft targets such as shopping malls, skyscrapers, schools, and other such locations that remain vulnerable to ground vehicle-based attacks.⁵¹ For some attractive terrorism targets, drones will offer an avenue of attack that ground vehicles cannot.

2. *Minimizing the Risk of Capture*—A second important advantage of drones compared to manned aircraft is the reduction if not elimination of risk to pilots. As noted above, piloted aircraft are capable of carrying out the same kinds of attacks that drones can. However, the pilot faces a substantial risk of being shot down or captured, possible outcomes that may deter a would-be terrorist (assuming that the pilot is not embarking on a suicide mission). A drone operator, on the other hand, stands a much better chance of evading capture even if the UAV is shot down for the obvious reason that the operator is physically located somewhere other than in the aircraft.

The maximum distance that a drone operator can maintain control over a UAV depends on the method of communication between drone and controller and the controller's power output. Commercially available drones in the United States have operating ranges of anywhere from 300 to 900 feet or more.⁵² For terrorism purposes, 900 feet is probably not sufficient range because it is less than a single lap around a standard track. On the other hand, over a decade ago, a retired engineer and “pioneer in developing unmanned aerial vehicles . . . for the military” built a small remote-controlled plane weighing less than eleven pounds that flew across the Atlantic Ocean; the flight lasted almost thirty-nine hours and yet used less than a gallon of gasoline⁵³—proving that longer range control of non-military drones is possible.

Moreover, this question of control range is relevant only if the operator wants to maintain active control over the drone. If the pilot has instead designed the drone to be controlled by a preinstalled flight program, then once the drone has been launched it no longer needs to be within any means of communication with the would-be terrorist.⁵⁴ Used in such a manner, a programmed drone would be the functional equivalent of a guided missile.

51. See, e.g., Tom LaTourrette et al., *Reducing Terrorism Risk at Shopping Centers: An Analysis of Potential Security Options*, RAND CORP., http://www.rand.org/content/dam/rand/pubs/technical_reports/2006/RAND_TR401.pdf.

52. *Phantom 2 Vision*, DJI, <http://www.dji.com/product/phantom-2-vision/spec> (informing that with its optional range extender, DJI's popular “Phantom 2 Vision” can be controlled via wifi at a distance up to 900 feet).

53. See Emma Brown, *Maynard Hill; Built Model Airplane That Flew Across Atlantic*, WASH. POST (June 11, 2011), http://www.washingtonpost.com/local/obituaries/model-airplane-history-maker-maynard-hill-dies-at-the-age-of-85/2011/06/08/AGcnyQNH_story.html; see also *Model Plane Goes Transatlantic*, BBC NEWS (Aug. 12, 2003), available at <http://news.bbc.co.uk/2/hi/europe/3145577.stm>.

54. One software company is already selling an open source package for an “autopilot platform” for drones. See *Home Page*, OPEN PILOT, <https://www.openpilot.org/> (last visited Mar. 25, 2015).

3. *Reducing the Cost of Terror Attacks*—A final advantage of drones over manned aircraft is a much lower cost: A small drone can be purchased or built for a fraction of the \$1 million or more that a small manned plane would cost. Even for a multinational terrorist group such as al Qaeda, which provided the estimated \$400,000–\$500,000 for the 9/11 operation,⁵⁵ finances are a relevant consideration; by 2005, al Qaeda was already reportedly running short on donations.⁵⁶ One reason may be the success of U.S. efforts to restrict money flows to terrorist groups through material-support-prohibition statutes, which make it federal crimes to provide, among other things, money to assist an act of terrorism or to a designated foreign terrorist organization.⁵⁷

The cheaper cost of an aerial attack using a drone as compared to a manned aircraft is likely to be an even more important consideration for individuals or small groups. Recent concerns about domestic terrorism attempts have included significant focus on lone wolves or isolated groups,⁵⁸ as demonstrated by the number of undercover sting operations since 9/11 in which the federal government has arrested, prosecuted, and convicted individuals for attempted terrorist attacks.⁵⁹

55. See 9/11 COMM'N REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON TERRORIST ATTACKS UPON THE UNITED STATES, 9/11 COMM'N 169 (2004) [hereinafter 9/11 COMM'N REPORT].

56. See, e.g., Rajeh Said, *Al Qaeda's funding sources drying up*, AL-SHORFA (Jan. 23, 2012), http://al-shorfa.com/en_GB/articles/meii/features/main/2012/01/23/feature-01.

57. 18 U.S.C. §§ 2339A–2339B (2012).

58. See, e.g., JEFFREY D. SIMON, *LONE WOLF TERRORISM: UNDERSTANDING THE GROWING THREAT* 23 (2013); Joint Intelligence Bulletin, *Use of Small Arms: Examining Lone Shooters and Small-Unit Tactics*, HOMELAND SEC. & FED. BUREAU OF INVESTIGATION, Aug. 16, 2011, at 2 (2013), <https://info.publicintelligence.net/DHS-FBI-WestgateMallAttack.pdf> (“Attacks by lone offenders—which by definition lack co-conspirators, and therefore provide fewer opportunities for detection—may be more difficult for law enforcement and homeland security authorities to disrupt.”).

59. Civil libertarian critics have disputed the true extent of the threat posed by such persons, arguing that the FBI has either entrapped gullible defendants or otherwise manufactured fantastical plots that were far beyond the capabilities of the targets. See, e.g., AARONSON, *supra* note 46; Glenn Greenwald, *The FBI Again Thwarts Its Own Terror Plot: Are There so Few Actual Terrorists That the FBI Has to Recruit Them into Manufactured Attacks?*, SALON (Sept. 29, 2011, 1:30 PM), available at http://www.salon.com/2011/09/29/fbi_terror/. However, while many of the defendants in these sting cases have raised entrapment, either formally as a legal defense in court or informally as a talking point in the press, as of late 2014, not a single defendant has prevailed. See Karen Greenberg, *How Terrorist ‘Entrapment’ Ensnarers us All*, GUARDIAN (Dec. 12, 2011, 12:45 PM), <http://www.theguardian.com/commentisfree/cifamerica/2011/dec/12/how-terrorist-entrapment-ensnares-us-all>; see also Thomas Watkins, *FBI Director Defends Sting Operations*, VICTORIA ADVOC. (Jan. 6, 2011, 7:05 PM), https://www.google.com/search?q=thomas+watkins%2C+fbi+director+defends+sting+operations&oq=Thomas+Watkins%2C+fbi+director+defends+sting+operations&aqs=chrome..69i57.301j0j4&sourceid=chrome&es_sm=93&ie=UTF-8 (quoting FBI Director Mueller as saying, “There has not been yet to my knowledge a defendant who has been acquitted in asserting the entrapment defense”). Since 2011,

4. *Potential Advances in Drone Technology*—Even if drone terrorism does not pose a significant threat today, drone technology will improve along predictable dimensions: greater carrying capacity, increased duration of flight time, and more precise flying. The development of autonomous control over a drone—or even a swarm of drones⁶⁰—will be as much of a boon for would-be terrorists as for legitimate drone operators. One small drone may be difficult enough to stop; stopping every single one of a dozen or more will be a Herculean task.

III. REGULATION OF DRONES

Congress began setting the framework for regulating large-scale use of private drones in U.S. airspace when it passed the FAA Modernization and Reform Act of 2012, Title III, Subtitle B of which addressed “Unmanned Aircraft Systems.”⁶¹ Given the novelty of UAVs, this law unsurprisingly took a cautious approach. Rather than lay down specific rules, Congress delegated to the Transportation Secretary and the FAA the task of creating appropriate regulations to integrate drones into the national airspace by 2015.

As a stopgap measure, the FAA continues to rely on Advisory Circular 91-57 (“AC 91-57”), a 1981 document setting general standards for model aircraft,⁶² which are remotely piloted, noncommercial aircraft weighing fifty-five pounds or less and operated within the pilot’s line of sight.⁶³ However, AC 91-57 provides only general guidance such as to avoid flying over parks, churches, schools, and hospitals, and to fly no higher than 400 feet above the ground.⁶⁴

State laws can also regulate UAVs, either directly or indirectly. A number of states have enacted drone-specific legislation, typically banning the arming of drones or using private drones to spy on other individuals.⁶⁵ Such state laws supplement, rather than replace, federal laws and regulations; they can restrict legal drone operation more se-

one high-profile case in Portland, Oregon, resulted in a trial verdict of guilty, rejecting the defendant’s entrapment defense. See Bryan Denson, *Mohamed Mohamud Found Guilty in Portland Terrorism Trial*, OREGONIAN (Jan. 31, 2013, 6:14 PM), http://www.oregonlive.com/portland/index.ssf/2013/01/mohamed_mohamud_found_guilty_i.html.

60. Jenks, *supra* note 21, at 653.

61. FAA Modernization and Reform Act of 2012, Pub. L. 112-95, 126 Stat. 13 (2012).

62. MODEL AIRCRAFT OPERATING STANDARDS, DEP’T OF TRANSP. FED. AVIATION ADMIN. (June 9, 1981), https://www.faa.gov/documentLibrary/media/Advisory_Circular/91-57.pdf.

63. See INTERPRETATION OF SPECIAL RULE FOR MODERN AIRCRAFT, DEP’T OF TRANSP. FED. AVIATION ADMIN. No. FAA-2014-0396, at 6 (June 18, 2014), available at https://www.faa.gov/uas/media/model_aircraft_spec_rule.pdf.

64. MODEL AIRCRAFT OPERATING STANDARDS, *supra* note 62, § 3.a, c.

65. See A. Michael Froomkin & Zak Colangelo, *Self-Defense Against Robots and Drones*, 48 CONN. L. REV. 1, § III.B (2015).

verely than what the FAA does but cannot authorize what the FAA forbids.⁶⁶ In addition, even non-drone-specific state laws can regulate the conduct of drone operators indirectly. Examples include torts such as trespass, invasion of privacy, and nuisance.⁶⁷ Similarly, there need not be a specific drone-related criminal statute on the books in order to prosecute a drone operator who commits a crime using a drone, any more than there needs to be a terrorism-specific statute to punish a perpetrator for an act that could be described as terrorism.⁶⁸

Given the potential for drones to carry out acts of terror within the United States, one might wonder whether Congress or the states should simply enact legislation to prohibit private or commercial ownership or use of drones. This would be a reversal of the direction of the FAA Modernization and Reform Act and perhaps therefore quite unlikely to occur,⁶⁹ although individual jurisdictions have exhibited varying degrees of skepticism toward local use of drones.⁷⁰

There would be clear antiterrorism benefits from such a ban. First, there would be many fewer drones in the skies to worry about. Even though nearly all (or all) of the reduction in drone traffic would be expected to come from law-abiding persons, the net result would be fewer potential unidentified aerial targets. Government officials charged with defending against drone attacks therefore would have more time to analyze any potential threat that happened to be detected. Second, drones in the air not under government control would draw quick suspicion, as would any person seemingly operating a

66. Congress could preempt state laws on drones, even ones that do not expressly conflict with federal laws, through so-called field preemption, which occurs where the federal regulatory scheme is so pervasive as to “occupy the field.” See *Maryland v. Louisiana*, 451 U.S. 725, 746 (1981); *Loge*, 76, *Int’l Ass’n of Machinists & Aerospace Eng’rs v. Wis. Emp’t Relations Comm’n*, 427 U.S. 132, 140–48 (1976).

67. See Froomkin & Coangelo, *supra* note 65, § II.

68. See, e.g., Tung Yin, *Were Timothy McVeigh and the Unabomber the Only White Terrorists? Race, Religion, and the Perception of Terrorism*, 4 ALA. C.R. & C.L. L. REV. 33, 45–46, 53–54 (2013) (discussing how Oregon, lacking a terrorism statute, convicted a father-son duo of aggravated murder for placing a bomb that eventually killed two police officers).

69. Indeed, it is also worth asking whether a potentially useful technology should be banned merely because it could be misused to perpetuate a terrorism incident. Trucks and fertilizer, for example, are societally useful objects that nevertheless can be turned into truck bombs, yet it would be difficult to imagine that the government would respond to the threat of another Oklahoma City-style attack by banning either. The benefits of such a ban—a minute reduction in the expected damage from the next truck bomb attack—would be vastly outweighed by the costs—(significant reduction in agricultural yield and/or a massive drag on the national economy due to the slowdown in transportation of goods). Admittedly, the utility of private drones is at present largely confined to entertainment and hobbies, and a detailed accounting of the potential utilities is beyond the scope of this Article.

70. For example, the city of Seattle shelved plans to use drones for law enforcement purposes after significant opposition from local residents. See Christine Claridge, *Seattle Grounds Police Drone Program*, SEATTLE TIMES (Feb. 8, 2013, 9:34 PM), available at http://seattletimes.com/html/localnews/2020312864_spddrones.xml.html.

drone remotely. The likelihood of a false positive (i.e., misidentifying an innocuous drone as a hostile one) versus a false negative (i.e., misidentifying a hostile drone as an innocuous one) would shift heavily toward the latter, which would probably lead to more decisive anti-drone action.

On the other hand, a ban on private or commercial drones would only simplify the problems of identification. It would not make it easier to detect potentially hostile drones. A legal prohibition on a dual-use item such as a drone will not eliminate the actual possession of private drones within the United States. Consider handguns and nuclear weapons. Federal law bars convicted felons from possessing firearms,⁷¹ while nuclear weapons are, of course, off-limits to all individuals. Yet, the federal prohibition of possession of firearms by convicted felons does not physically prevent a felon from getting a hold of guns.⁷² The reason terrorists and criminals do not have ready access to nuclear weapons is that they are incredibly difficult to manufacture, particularly the necessary fissile material,⁷³ which represents a physical restriction.

There would be fewer drones available to be commandeered for criminal purposes, but even without commercial manufacturing of drones within the United States, a would-be terrorist could still acquire a drone in various ways:

1. *Stealing one from a public agency*—It seems surprisingly easy to steal police vehicles and equipment.⁷⁴ Presumably, a police UAV would be secured better (as many of the stolen police car incidents involve vehicles left with the keys in the ignition), but it would be a tempting target. Extending a prohibition on UAVs to public agencies to avoid this problem would further reduce the supply available to be stolen, but it would also deprive society of the public benefits of search and rescue, firefighting, or law enforcement drones.

71. 18 U.S.C. § 922(g) (2012).

72. One need only peruse the number of Section 922(g) convictions to see that numerous felons are indeed able to get their hands on guns. In 2012, there were 4,190 convictions for violating Section 922(g). See U.S. Sentencing Comm'n, Overview of Federal Criminal Cases: Fiscal Year 2012, 9, http://www.ussc.gov/sites/default/files/pdf/research-and-publications/research-publications/2013/FY12_Overview_Federal_Criminal_Cases.pdf.

73. See, e.g., MUELLER, *supra* note 45, at 169–72.

74. See, e.g., *Five charged With Breaking Into Dothan Police Vehicle*, DOTHANEAGLE (Jan. 24, 2013, 10:13 AM), http://www.dothaneagle.com/news/crime_court/article_027a3950-6641-11e2-9103-001a4bcf6878.html (reporting theft of tactical police equipment from police car); Wendy Lin, *Highway Robbery: Police Car Stolen*, NEWSDAY, Nov. 13, 1993, at 16 (“A police car was stolen yesterday from two police officers who were investigating a report of a stolen car in Brooklyn”); *Teen arrested for stealing police chief’s car*, ASSOCIATED PRESS, May 10, 2005 (reporting that a teenager stole the Conover Police Chief’s “unmarked patrol car”).

2. *Smuggling it from outside the country*—UAVs could be brought across the U.S.-Canada or U.S.-Mexico borders in regular vehicles;⁷⁵ interdiction would possibly require searching every vehicle at a border stop.

3. *Building one*—Building one's own drone is already a popular hobby; as one example, see *DIY Drones*, a community website devoted to helping amateurs build their own drones for under \$1,000.⁷⁶ Once the drone has been built, weaponizing it is not challenging.⁷⁷

In short, while small UAVs are nowhere (yet) as ubiquitous in the United States as handguns are, we would still have to prepare ourselves to detect, identify, and destroy any potentially hostile drones, even if the federal or state governments were to ban private use of them. At most, such bans would simplify the challenges involved at the identification stage but not at the detection or destruction stages.

IV. DEFENDING AGAINST DRONE ATTACKS: THREE CHALLENGES

Aerial drones offer an attractive vehicle for terrorism because they can be smuggled into the country, assembled, and deployed without having to fly *into* the country. Unless we can interdict the drone before it is smuggled in, we will need a way of detecting it in the air, identifying it as potentially threatening, and taking action to stop it.

A. *Detection*

The initial step in responding to any potential terrorism threat posed by a drone is to be able to detect it early enough to mount an effective response. Consider that a drone capable of carrying a small package flying at an altitude of 400 feet with an air speed of thirty to forty miles per hour will look “like a tiny dot moving in the sky” and will be quiet enough that it cannot be heard.⁷⁸ Of course, at some

75. See Villasenor, *supra* note 14, at 16 (noting that drones “can be transported in the trunk of a car or in a backpack”).

76. See *DIYDRONES*, <http://www.diydrones.com> (last visited Feb. 21, 2015).

77. See, e.g., Adam Piore, *How I Tried Turning My Off-The-Shelf Drone into a Weapon: The Unregulated, Slightly Terrifying Frontier of Personal Flight*, *POPULAR SCI.* (July 11 2013), <http://www.popsci.com/technology/article/2013-06/flight-fringe> (describing the author's experiment of packing his small commercial drone with model rocket explosives).

78. See Alexis C. Madrigal, *A Drone-Delivery Expert Answers the Big Questions About Amazon's Plans*, *ATLANTIC* (Dec. 2, 2013), <http://www.theatlantic.com/technology/archive/2013/12/a-drone-delivery-expert-answers-the-big-questions-about-amazons-plans/281980/> (interview with founder of drone delivery company). There are private companies developing devices that they claim can detect drones—even ones that are virtually invisible to radar. Washington, D.C.-based DroneShield claims to be able to detect small drones by their “acoustic signature.” See *DRONESHIELD*, <http://www.droneshield.org/products/> (last visited Feb. 21, 2015). This particular product/service appears primarily aimed at detecting and interdicting surveillance and spy drones from getting close enough to invade personal or corporate privacy. The expected close proximity allows the detection of acoustic signatures.

point unaided human senses can detect even small UAVs, but depending on the size of the vehicle, any intended attack may be mere minutes away.

As far as civilian air traffic control goes, the modern world relies not on human spotters, but rather radar systems,⁷⁹ after radar demonstrated its usefulness in World War II. A radar detector works by sending a beam of energy outward in the direction it is searching. If the beam intersects an object, some of it will be absorbed, but the remaining energy will scatter, including some back toward the radar. Because the velocity (speed and direction) of the beam is a known quantity, the distance from the detector to the object can be determined based on time elapsed from when the beam is emitted to when the bounce-back energy is detected.⁸⁰ The height of the detected object can also be calculated through simple trigonometry, given the distance to the object and the angle between the ground and the energy beam.⁸¹ Finally, the radar system can determine the radial velocity (i.e., the speed of the object along the direct line to the radar) by analyzing the Doppler shift in the return signal.⁸²

The key challenge for the radar system is to determine whether any detected bounce-back energy came from an actual target or from interference (i.e., noise). As one technical book explains, “[false alarm] errors are minimized if the target spikes stand out strongly from the background interference, i.e., if the SIR [signal-to-interference ratio] is as large as possible.”⁸³ The larger the target, the more radar energy is reflected back and hence the stronger the target spike. Due to their size, small drones reflect less radar energy and present smaller signatures; moreover, they can be constructed using composite materials that absorb radar energy without reflecting it back toward the detector. As a result, they can be virtually invisible to radar.⁸⁴ The upshot is that the problem of detecting potentially hostile drones is not likely to be solved by building more active radar systems within the United States.

79. Radar is an acronym for “radio detection and ranging.” See NAVAL AIR TECHNICAL TRAINING CENTER, FUNDAMENTALS OF RADAR 1 (1943); MARK A. RICHARDS, FUNDAMENTALS OF RADAR SIGNAL PROCESSING 1 (2005).

80. Madrigal, *supra* note 78, at 1; RICHARDS, *supra* note 79, at 3. For example, suppose that the beam travels at 600 miles per hour (approximately the speed of sound at sea level), or 10 miles per minute. If the bounce back energy is detected after two minutes, then the object is 10 miles away; the radar beam took one minute to reach the object, and then one minute to return to the detector.

81. RICHARDS, *supra* note 79, at 3.

82. *Id.* The Doppler shift refers to the change in the frequency of an electromagnetic wave due to the change in position between the source (i.e., the target of the radar) and the observer (i.e., the radar). The waves become more compressed as the source moves toward the observer, and less compressed as the source moves away from the observer.

83. *Id.* at 48.

84. See Villasenor, *supra* note 14, at 16.

This type of radar system is sometimes referred to as primary radar but in fact has assumed a backup role in domestic air traffic control. So-called secondary surveillance, relying on transponders located on the aircraft to broadcast flight-related information, has become the main method of detecting *and* identifying airplanes in the air.⁸⁵ The weakness of transponders, at least on manned aircraft, is that those intent on causing mischief or worse can refuse to comply. For example, after successfully taking control of the four doomed airplanes on 9/11, the al Qaeda hijackers turned the transponders off,⁸⁶ making tracking the aircraft a considerably more difficult task. And of course there is the problem of forcing the drone operators to install transponders.

Another potential detection method is to keep surveillance UAVs in the air on a continuous basis as spotters. As noted earlier, one of the major advantages that UAVs offer compared to manned flights is vastly extended flight time. But given the current technological difficulties in detecting small drones via radar or other methods, it would require multiple surveillance UAVs in all but the geographically smallest metropolitan areas. If a small drone at a distance of 400 feet looks like a tiny dot in the sky, then the same drone would also look like a tiny dot to a surveillance UAV flying at 800 feet. One solution would be to fly the surveillance UAV at a lower altitude, except that doing so would limit the scope of coverage provided by the UAV, which might require the operation of additional surveillance UAVs in the area. Additionally, UAV surveillance is far from costless; the Department of Homeland Security's inspector general estimated that each hour of drone surveillance by U.S. Customs and Border Protection cost over \$12,000, due in part to the fact that the planes were frequently grounded due to maintenance issues or absence of pilots.⁸⁷

Even if surveillance UAVs prove to be technologically capable of detecting potentially hostile drones, the government's widespread use of such spotting aircraft may raise Fourth Amendment issues. Under basic search and seizure doctrine, the government conducts a search when it infringes upon an individual's reasonable expectation of privacy.⁸⁸ In *California v. Ciraolo*, the U.S. Supreme Court held that local law enforcement officers did not engage in a search by flying a police plane at 1,000 feet in the air to see into the defendant's backyard full of marijuana plants because there could have been private and commercial planes at that altitude and, hence, any expectation of pri-

85. See *infra* Part IV.B.

86. 9/11 COMM'N REPORT, *supra* note 55, at 16.

87. See Craig Whitlock, *U.S. Surveillance Drones Largely Ineffective Along Border*, Report Says, WASH. POST (Jan. 6, 2015), http://www.washingtonpost.com/world/national-security/us-surveillance-drones-largely-ineffective-along-border-report-says/2015/01/06/5243abea-95bc-11e4-aabd-d0b93ff613d5_story.html.

88. See *Katz v. United States*, 389 U.S. 347, 361–62 (1967) (Harlan, J., concurring).

vacy from overhead surveillance was unreasonable.⁸⁹ *Florida v. Riley* followed a few years later, upholding police discovery of marijuana plants in a mostly covered greenhouse spotted only through the use of a helicopter hovering at 400 feet.⁹⁰ These cases would suggest strongly that high-altitude aerial surveillance by government drones would not violate any reasonable expectations of privacy.

Nonetheless, recent decisions from the Supreme Court hint at discomfort with the implications of the *Katz* doctrine in today's technological society. In another line of cases that evolved from *Katz*, the Court ruled that the use of devices to duplicate what police could have gleaned through human observation did not constitute a search so long as the human observations would have been valid. Thus, the use of a beeper to enable police to track the location of the device—and hence the suspect—did not violate the Fourth Amendment.⁹¹ Under these precedents, one would not have expected any Fourth Amendment problems with the use of a global-positioning-satellite device to follow the movements of a suspect's vehicle. Yet, in *United States v. Jones*, all nine members of the Court agreed with the target of the GPS surveillance that a search had occurred.⁹² As to why it was a search, though, the Court split 5–4, with the slim majority ruling that the FBI had committed a physical trespass by placing the GPS device on Jones's car without consent and without a valid warrant and that the *Katz* reasonable expectation of privacy test was an overlay on top of the prior understanding that any physical intrusion constituted a search.⁹³ This trespass rationale enabled the majority to avoid deciding whether there was a reasonable expectation of privacy in one's public locations and movements. The Justices in the minority would have held that there is a reasonable expectation of privacy against “longer term GPS monitoring.”⁹⁴

Jones suggests that the Court is not prepared just yet to reject the long-accepted doctrinal view that whatever one knowingly and voluntarily exposes to the public is bereft of Fourth Amendment protection

89. *California v. Ciraolo*, 476 U.S. 207, 213–14 (1967) (Harlan, J., concurring). The Court acknowledged that the defendant had taken steps to protect his privacy by setting up tall fences, which blocked the view of the backyard from the street. *Id.* at 216. But as *Katz* explained, a reasonable expectation of privacy in one way is not necessarily a reasonable expectation of privacy in another way. *Id.* at 211–12 (citing *Katz v. United States*, 389 U.S. 347 (1967)).

90. *Florida v. Riley*, 488 U.S. 445, 445 (1989).

91. *United States v. Knotts*, 460 U.S. 276, 281–82 (1983); *see also* *United States v. Karo*, 468 U.S. 705, 719–21 (1984) (finding that the beeper placed inside a container of ether did provide police with information they could not have obtained through mere visual observation because the vehicle carrying the container drove into the garage of a home and later left; without the beeper, the police would not have known whether the container remained with the vehicle or had been unloaded in the building).

92. *United States v. Jones*, 132 S. Ct. 945, 945 (2012).

93. *Id.* at 950 (discussing *Olmstead v. United States*, 277 U.S. 438 (1928)).

94. *Id.* at 961 (Alito, J., concurring).

no matter what technology the government uses to ease its means of observation.⁹⁵ Otherwise, Justice Alito's concurrence would have been the majority opinion. But at the same time, the Court did not blindly apply the voluntary exposure doctrine; had it done so, it would have upheld the GPS tracking in *Jones* as a more technologically advanced version of the beeper tracker used in *United States v. Knotts*. The trespass formulation of the search in essence allowed the Court to put off deciding the more difficult question of when government use of technology to follow public movements cross the line from being merely helpful to being unduly oppressive.⁹⁶

B. Identification

As explained above, active (or primary) radar systems can provide the location and velocity of an object in the sky but typically cannot identify the object.⁹⁷ Thus, an increase in the effective radar coverage or surveillance of urban regions will not be enough to address drone terrorism without a corresponding increase in the ability to ascertain the nature of those detected objects. The need for identification will only intensify in the next few years as American airspace becomes more and more crowded with non-military drones.

Identification of any specific aircraft, at present, relies upon an on-board transponder that broadcasts a coded signal, which in turn is received and decoded by air traffic control towers. This is equivalent to the "identification of friend or foe" ("IFF") codes used by U.S. military aircraft to avoid targeting friendly aircraft. The transponder broadcast has a number of advantages over active radar. It contains much more information than the radar can provide, including the identity of the aircraft and more accurate altitude, bearing, and positional information.

95. The Court used a similar rationale in *Florida v. Jardines*, 133 S. Ct. 1409 (2013), to hold that police officers engaged in a search when they brought a drug-sniffing dog on to the porch of a suspect's home. As with *Jones*, the majority did not rely on *Katz* and the reasonable expectation of privacy test, but rather the trespass theory of the Fourth Amendment. *Id.* at 1416 ("But introducing a trained police dog to explore the area around the home in hopes of discovering incriminating evidence is something else. There is no customary invitation to do that.").

96. *See, e.g.*, Orin S. Kerr, *The Curious History of Fourth Amendment Searches*, 2012 SUP. CT. REV. 67 (2012) (contending that the Court revived a test that never existed); Jim Harper, *Escaping Fourth Amendment Doctrine After Jones: Physics, Law, and Privacy Protection*, 2012 CATO SUP. CT. REV. 219, 219 (2011-12) ("*Jones* . . . has put Fourth Amendment law into a state of flux"). *Cf.* Jack Gillum et al., *FBI flying spy aircraft over cities*, OREGONIAN (AP), June 3, 2015, at A14 (revealing the existence of manned aerial surveillance flights by the FBI and other federal law enforcement agencies).

97. RICHARDS, *supra* note 79, at 45-47 (explaining that through the use of sophisticated "synthetic aperture radar technique[s]," some modern radar systems are able to generate visual images; however, these are "most commonly associated with moving airborne or space-based radars, rather than with fixed ground-based radars.").

As a result, Congress directed the FAA to issue, by the end of 1990, regulations requiring the installation of transponders in all aircraft in domestic airspace “where radar service is provided for separation of aircraft.”⁹⁸ The FAA did so, imposing a requirement of working transponders in any aircraft flying above 18,000 feet, anywhere from surface level to 10,000 feet near major airports, or anywhere from surface level to 4,000 feet near smaller airports.⁹⁹

C. Destruction or Disablement

Once a UAV has been detected and identified as potentially hostile, all that remains is to neutralize it. Drones can be shot down, they can have their guidance systems damaged, or their control signals can be jammed or interfered with. Various drones across the world, American or foreign, have already been attacked, sometimes successfully:

- December 2002: An Iraqi fighter plane engaged an armed Predator drone in an aerial dogfight; the drone launched its anti-air missile but missed, while the jet fighter’s missile destroyed the drone.¹⁰⁰
- April 2008: A fighter plane (suspected of being Russian) shot down a Georgian drone in 2008 using an air-to-air missile.¹⁰¹
- September 2009: U.S. military pilots shot down an unresponsive American combat drone in Afghanistan.¹⁰²
- December 2011: Iranian officials claimed to have been responsible for shooting down a U.S. surveillance drone that crashed.¹⁰³
- November 2012: Two Iranian fighter planes fired at an American drone with thirty-millimeter cannons but failed to shoot it down.¹⁰⁴

98. 49 U.S.C. § 44716(f) (2012).

99. See 14 C.F.R. § 91.215(b) (2014). For definitions of Class A, B, and C airspace, see INSTRUMENT FLYING HANDBOOK, DEP’T OF TRANSP., FED. AVIATION ADMIN. 1–2 (2012), http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/FAA-H-8083-15B.pdf.

100. See RICHARD WHITTLE, *PREDATOR: THE SECRET ORIGINS OF THE DRONE REVOLUTION* 308 (2014); David Axe, *Predator Drones Once Shot Back at Jets . . . But Sucked at It*, WIRED MAG. (Nov. 9, 2012, 10:07 AM), <http://www.wired.com/2012/11/predator-defenseless/>. At one point, the video footage from the Predator drone was available on YouTube, but it has since been designated “private.”

101. *Russia “Shot Down Georgia Drone,”* BBC NEWS (Apr. 21, 2008, 7:51 PM), <http://news.bbc.co.uk/2/hi/europe/7358761.stm> (providing a video footage from the drone).

102. Jeremy Hsu, *Air Force Shoots Down Runaway Drone Over Afghanistan*, POP. SCIENCE (Sept. 14, 2009), <http://www.popsi.com/military-aviation-amp-space/article/2009-09/when-drones-go-wild-air-force-shoots-them-down>.

103. *Iran Claims it Shot Down U.S. Drone*, McCLATCHY-TRIBUNE NEWS SERV. (Dec. 5, 2011), <http://www.boulderweekly.com/article-7062-iran-claims-it-shot-down-us-drone.html>.

104. Spencer Ackerman, *Iranian Pilots Tried (and Failed) to Shoot Down a U.S. Drone*, WIRED MAG. (Nov. 8, 2012, 4:27 PM), <http://www.wired.com/2012/11/iran-drone/>.

- December 2013: Chinese air force pilots reportedly shot down a private drone that was interfering with commercial planes.¹⁰⁵

Besides air-to-air missiles and gunfire, lasers may be an effective weapon against drones. The U.S. Navy has been developing a ship-based laser cannon for use against drones and other small targets;¹⁰⁶ in test trials in 2010 and 2012, such laser systems successfully shot down several UAVs by setting them on fire.¹⁰⁷ Although the naval laser is still in the test phase, the Navy is moving forward with a similar, portable ground-based laser system.¹⁰⁸

Other forms of electromagnetic attack consist of interfering with the GPS signals that the drone uses to position itself. Successful jamming of GPS signals would leave the drone unable to follow the pilot's navigation commands accurately, while successful "spoofing" could enable an attacker to take control of the drone.¹⁰⁹ Russian and Iranian operators have claimed to have brought down U.S. drones in such a fashion, although the veracity of such claims is questionable.¹¹⁰

1. *Military use*—At present, air-to-air missiles, weaponized lasers, aircraft-mounted thirty-millimeter cannons, and, to some extent, electronic jammers are military equipment that generally would not be found in the armory of local police departments. To the extent that they are the kinds of equipment required to destroy or disable UAVs, the most obvious logistical approach would have the military carry out any necessary anti-drone operations.

105. See *Drone Shot Down in Beijing Suburb, Operators Charged*, CHINA DAILY (Dec. 16, 2014, 4:32 PM), http://www.chinadaily.com.cn/china/2014-12/16/content_19099308.htm.

106. *All Systems Go: Navy's Laser Weapon Ready for Summer Deployment*, U.S. NAVY, OFFICE OF NAVAL RESEARCH (Apr. 7, 2014, 12:02 PM), http://www.navy.mil/submit/display.asp?story_id=80172.

107. See Spencer Ackerman, *Watch the Navy's New Ship-Mounted Laser Cannon Kill a Drone*, WIRED MAG. (Apr. 8, 2013, 1:31 PM), <http://www.wired.com/2013/04/laser-warfare-system/>; Larry Greenemeier, *U.S. Navy Laser Weapon Shoots Down Drones in Test [Video]*, SCIENTIFIC AM. (July 19, 2010), <http://www.scientificamerican.com/article/laser-downs-uavs/> (includes video footage).

108. Rosa Prince, *US Military Announces Laser Weapon to Shoot Down Enemy Drones: Ground-Based Air Defence System Described by US as 'Dad News for the Bad Guys'*, TELEGRAPH (June 16, 2014), <http://www.telegraph.co.uk/news/worldnews/northamerica/usa/10861780/US-military-announces-laser-weapon-to-shoot-down-enemy-drones.html>.

109. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-981, UNMANNED AIRCRAFT SYSTEMS: MEASURING PROGRESS AND ADDRESSING POTENTIAL PRIVACY CONCERNS WOULD FACILITATE INTEGRATION INTO THE NATIONAL AIRSPACE SYSTEM 36–37 (2012). In 2012, scholar Ben Wittes of the Brookings Institute organized a simulated aerial dogfight using small UAVs, in which he prevailed by hacking the other drones to take them over. See Benjamin Wittes, *The Lawfare Drone Smackdown*, BROOKINGS (Sept. 24, 2012, 5:38 PM), <http://www.brookings.edu/blogs/up-front/posts/2012/09/24-drone-smackdown-wittes>.

110. See, e.g., Connor Simpson, *Russia Says It Took Down a U.S. Drone Over Crimea*, WIRE (Mar. 14, 2014, 3:50 PM), <http://www.thewire.com/global/2014/03/russia-claims-it-took-down-us-drone/359197/>.

Use of military forces on domestic soil inevitably raises statutory concerns under the Posse Comitatus Act,¹¹¹ which states:

Whoever, except in cases and under circumstances expressly authorized by the Constitution or Act of Congress, willfully uses any part of the Army or the Air Force as a posse comitatus or otherwise to execute the laws shall be fined under this title or imprisoned not more than two years, or both.¹¹²

Although the text of the statute mentions only the Army and Air Force, the Department of the Navy has consistently considered the Navy and the Marines to be similarly bound by the Posse Comitatus Act.¹¹³ In addition, Title 10 of the United States Code, whose subject matter is the military, includes a provision stating that:

The Secretary of Defense shall prescribe such regulations as may be necessary to ensure that any activity (including the provision of any equipment or facility or the assignment or detail of any personnel) under this chapter does not include or permit direct participation by a member of the Army, Navy, Air Force, or Marine Corps in a search, seizure, arrest, or other similar activity unless participation in such activity by such member is otherwise authorized by law.¹¹⁴

To be sure, these two statutes do not prohibit the U.S. military from taking any combat role on U.S. soil. The key restriction is on having the military engage in law enforcement activities, such as searches, seizures, and arrests.¹¹⁵ Over a number of years, especially since the 9/11 attacks, Congress has enacted provisions suggesting that military combat-related actions do not constitute law enforcement. The Homeland Security Act of 2002, for example, contains sections making clear that the newly created Department of Homeland Security was to have no military role and that nothing about the creation of that department was intended to take away the role of the military in “warfighting, the military defense of the United States, or other mili-

111. See, e.g., Eric Schmitt, *Wider Military Role in U.S. is Urged*, N.Y. TIMES (July 21, 2002), <http://www.nytimes.com/2002/07/21/us/wider-military-role-in-us-is-urged.html> (“Administration lawyers determined that President Bush would violate Posse Comitatus if he called up National Guard troops to help provide security at airports nationwide.”).

112. 18 U.S.C. § 1385 (2012). Enacted after the post-Civil War Reconstruction period, the Posse Comitatus Act was aimed at keeping the federal government from using the military to interfere with or supervise the newly-installed civilian governments in the South. See, e.g., *United States v. Hartley*, 796 F.2d 112, 114 (5th Cir. 1986); NORMAN ABRAMS, *ANTI-TERRORISM AND CRIMINAL ENFORCEMENT* 746 (4th ed. 2012).

113. See ABRAMS, *supra* note 112, at 746–47.

114. 10 U.S.C. § 375 (2012).

115. See, e.g., *Bissonette v. Haig*, 776 F.2d 1384 (8th Cir. 1986) (en banc) (noting that the Posse Comitatus Act reflects “limits established by Congress on the use of the military for civilian law enforcement”).

tary activities.”¹¹⁶ Another section of that act explicitly identifies the scope of the Posse Comitatus Act:

(4) Nevertheless, by its express terms, the Posse Comitatus Act is not a complete barrier to the use of the Armed Forces for a range of domestic purposes, including law enforcement functions, when . . . the President determines that the use of the Armed Forces is required to fulfill the President’s obligations under the Constitution to respond promptly in time of war, insurrection, or other serious emergency.

(5) Existing laws . . . grant the President broad powers that may be invoked in the event of domestic emergencies, including an attack against the Nation using weapons of mass destruction, and these laws specifically authorize the President to use the Armed Forces to help restore public order.¹¹⁷

Thus, when the U.S. naval forces belatedly fired back at the attacking Japanese warplanes over Pearl Harbor on December 7, 1941, the military was neither “execut[ing] the laws” nor “search[ing], seiz[ing], arrest[ing]”; it was repelling an enemy attack.¹¹⁸ This is true even though Congress would not declare war on Japan until the next day.¹¹⁹ Similarly, the U.S. Air Force pilots who were scrambled into the air on September 11, 2001, were authorized to shoot down any additional hijacked aircraft in U.S. airspace,¹²⁰ even though congressional Authorization to Use Military Force (“AUMF”) would not be passed until September 18, 2001.

Whether anti-drone actions by U.S. military forces would violate the Posse Comitatus Act therefore turns on the appropriate legal characterization of such actions. If defending against terrorist use of UAVs is essentially a law enforcement action, then it would appear that the Posse Comitatus Act is indeed triggered by, say, an Air Force pilot’s shooting down a hostile drone. This would be the case even though one could argue that the military’s primary interest was in stopping a terrorist threat, rather than making an arrest as the initial step toward criminal prosecution.¹²¹

116. Homeland Security Act of 2002, § 876, Pub. L. 107-296, 116 Stat. 2135 (2002).

117. *Id.* § 886.

118. *Cf.* The Prize Cases, 67 U.S. (2 Black) 635, 668 (1863) (noting that “If a war be made by invasion of a foreign nation, the President is not only authorized but bound to resist force by force. He does not initiate the war, but is bound to accept the challenge without waiting for any special legislative authority.”).

119. *See* Congressional Declaration of War on Japan, Dec. 8, 1941, *available at* <http://www.law.ou.edu/ushistory/japwar.shtml>.

120. *See* 9/11 COMM’N REPORT, *supra* note 55, at 40–44. Two sets of fighter planes took off from different air bases; the ground control for the first set received the shootdown order but did not pass it along to the pilots. *See id.* at 42–43. However, the second set of pilots did receive the shootdown order. *See id.* at 44.

121. For a related scenario, consider the use of military aircraft in 2002 to assist local law enforcement agencies in capturing the so-called Beltway Sniper (which turned out to be two males). As one commentator explained, “The Army can offer

Of course, just because the Posse Comitatus Act is implicated does not mean that it has been violated. Apart from armed conflict, the military can operate on domestic soil under a number of circumstances: (1) in the face of public insurrection, as provided for in the Insurrection Act;¹²² (2) as an emergency response following a natural disaster, as provided for in the Stafford Act;¹²³ or (3) pursuant to any other direct congressional authorization.

The Insurrection Act provides the President with advance statutory authorization to use the military on domestic soil to respond to “an insurrection in any State against its government,”¹²⁴ to enforce federal law in the face of obstruction or rebellion,¹²⁵ or to break up interference with state or federal law significant enough to deprive citizens of civil rights.¹²⁶ If there were a public uprising significant enough to trigger the Insurrection Act and the uprising were to use weaponized drones, then the Insurrection Act would appear to apply, but in the instance of a single potentially hostile drone, there would not be the circumstances triggering this statute.

The Stafford Act authorizes the President to use the military to assist in responding to emergencies and major disasters. As major disasters involve natural catastrophes, that aspect of the Stafford Act would not apply to drone terrorism.¹²⁷ Emergencies are defined by the Act as:

[A]ny occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.¹²⁸

A successful drone attack using some exotic chemical or radiological agents could conceivably create enough of a hazard zone requiring decontamination or other cleanup, for which federal assistance might be necessary and for which the Stafford Act would be applicable. But that, of course, would be a post-attack use of the military, not defend-

intelligence, transportation, and logistical assistance to cops, but it can't conduct searches or make arrests.” See Philip Carter, *Why Can the Army Help Cops Catch the D.C. Sniper?*, SLATE (Oct. 17, 2002), http://www.slate.com/articles/news_and_politics/explainer/2002/10/why_can_the_army_help_cops_catch_the_dc_sniper.html.

122. 10 U.S.C. §§ 331–334 (2012); see generally Stephen I. Vladeck, *Emergency Power and the Militia Acts*, 114 YALE L.J. 149, 159–64 (2004).

123. 42 U.S.C. §§ 5121–5208 (2012).

124. 10 U.S.C. § 331.

125. *Id.* § 332.

126. *Id.* § 333.

127. See 42 U.S.C. § 5122(2) (2012) (defining major disasters); Ernest B. Abbott, *Representing Local Governments in Catastrophic Events: DHS/FEMA Response and Recovery Issues*, 37 URB. LAW. 467, 471 (2005).

128. 42 U.S.C. § 5122(1) (2012). Notably, the Governor of the State must request that the President declare an emergency in order to trigger the Stafford Act. 42 U.S.C. § 5191 (2012).

ing against a drone attack. The Stafford Act could conceivably come into play ahead of time if the government were to learn of an impending drone attack with enough warning to be able to mobilize military assets to detect, identify, and destroy that drone. But where the threat of a drone attack materializes out of nowhere, the Stafford Act would not be of relevance.

Moreover, neither of those statutory overrides of the Posse Comitatus Act is sufficient to justify *all* uses of the military to defend against drone terrorism where such defense is considered law enforcement. A terrorist group that has been operating stealthily up to the launching of the attack for the first time, or a lone wolf terrorist doing so, will not have provided any evidence of an insurrection. And while a catastrophically successful drone terrorism attack may well throw the region into a state of chaos that would trigger the Stafford Act, this statutory provision too would apply only afterward, not beforehand.

The other analytical fork is to consider that defense against drone terrorism is a military action, as it surely would be if the drone were piloted by an enemy nation's air force during a state of armed conflict, where the Posse Comitatus Act is of no relevance because the military would be neither executing the laws nor searching, seizing, or arresting criminal suspects; it would be defending the nation from an aggressor.¹²⁹

Under this line of analysis, we next need to determine the lawful source of authority for use of military force. The conventional separation of powers view is that the President may use military force only when specifically authorized by Congress or when facing an imminent attack on the nation.¹³⁰

129. In *The Prize Cases*, 67 U.S. 635 (1863), the Court stated that "If a war be made by invasion of a foreign nation, the President is not only authorized but bound to resist force by force. He does not initiate the war, but is bound to accept the challenge without waiting for any special legislative authority." *Id.* at 668. Under this doctrine, the President has the authority to repel imminent attacks even in the absence of congressional authorization—and it goes without saying that the President would be using the military, as it is an exercise of war powers.

130. See Tung Yin, *Structural Objections to the Inherent Commander-in-Chief Powers Thesis*, 16 *TRANSNAT'L L. & CONTEMP. PROBS.* 965, 968–72 (2007) (citing and discussing various sources, including John Hart Ely, Harold Koh, Louis Fisher, *The Steel Seizure Case*, and the War Powers Resolution, on the need for congressional authorization); *The Prize Cases*, 67 U.S. at 668 (noting the President's authority and obligation to repel imminent attacks).

A contrary separation of powers view, most notably associated with John Yoo, argues that the President, as Commander-in-Chief of the military, does not need any congressional authorization to sanction the use of the military; Congress's control over the President in this area is limited to its power to declare war (which brings about a state of perfect, or total war, between the combatants) and to funding—or refusing to fund—the military. See, e.g., JOHN C. YOO, *THE POWERS OF WAR AND PEACE: THE CONSTITUTIONAL AND FOREIGN AFFAIRS AFTER 9/11* (2005); JOHN C. YOO, *The Continuation of Politics by Other Means: The Original Understanding of War Powers*, 84 *CALIF. L. REV.* 167 (1996); JOHN C. YOO, *War, Responsibility, and the Age of Terrorism*, 57 *STAN. L. REV.* 793 (2004); JOHN C. YOO, *War and Constitutional*

As of this writing, the only active congressional authorizations for use of military force are the 2001 authorization against al Qaeda and the 2002 authorization against Iraq.¹³¹ It is possible that any hostile attack by a UAV in U.S. airspace could be carried out by clandestine al Qaeda operatives (much as how the 9/11 attacks were carried out) or Iraqi agents still loyal to the deposed Saddam Hussein regime, in which case one of the active AUMFs would indisputably authorize responsive military action.

In many instances, the identity of the group behind a drone attack will remain unknown to the U.S. government. Perhaps in such instances, at least at the outset, the government should act as if the attack were launched by an entity covered by one of the two AUMFs. At some point, however, the government may become aware that the drone is being piloted by some hostile force that is *not* the subject of a current AUMF. After all, it is far from the case that all terrorism threats faced by the United States come from Islamic fundamentalist groups (and, even there, only a fraction of such groups fall within either AUMF¹³²); ACLU lawyer Mike German, who successfully infiltrated various white supremacist groups as an FBI agent, argues that the government has consistently ignored the serious threat of terrorism from right-wing white supremacist groups.¹³³ And of course, the deadliest terrorist incident on U.S. soil before the 9/11 attacks was the Oklahoma City bombing, carried out by Timothy McVeigh, who shared the anti-U.S. government view held by al Qaeda but little else, his primary motivation apparently having been to avenge what he perceived as the federal government's role in the Waco firestorm that killed Branch Davidian sect leader David Koresh and his followers.¹³⁴

Text, 69 U. CHI. L. REV. 1639 (2002); see also STEPHEN M. GRIFFIN, *LONG WARS AND THE CONSTITUTION* (2013) (disagreeing with Yoo's historical analysis but arguing that the Cold War brought about a constitutional level change in the President's war powers). For more discussion of the inherent Commander-in-Chief powers thesis, see Yin, *Structural Objections, supra*, at 972–76.

131. Authorization for Use of Military Force, Pub. L. No. 107-40, 115 Stat. 224 (2001); Authorization for Use of Military Force Against Iraq Resolution of 2002, Pub. L. No. 107-243, 116 Stat. 1498. The United States has not declared war since World War II, most likely because the United Nations Charter banned war as a matter of international law. See Curtis A. Bradley & Jack L. Goldsmith, *Congressional Authorization and the War on Terrorism*, 118 HARV. L. REV. 2047, 2060–62 (2005).

132. For example, the State Department has considered the Palestinian group Hamas to be a terrorist organization since 1997, see *Foreign Terrorist Organizations*, DEP'T OF STATE, <http://www.state.gov/j/ct/rls/other/des/123085.htm>, but unless there is evidence that Hamas somehow assisted al Qaeda in planning or carrying out the 9/11 attacks, or harbored al Qaeda, it is not a target of the 2001 AUMF. Cf. Jennifer Daskal & Stephen I. Vladeck, *After the AUMF*, 5 HARV. NAT'L SECURITY L.J. 115, 115–16 (2014) (“[D]espite widespread misrepresentations to the contrary, Congress pointedly refused to declare a ‘war on terrorism.’”).

133. See, e.g., MIKE GERMAN, *THINKING LIKE A TERRORIST: INSIGHTS OF A FORMER FBI UNDERCOVER AGENT* 65–66 (2007).

134. See MICHEL & HERBECK, *supra* note 49, at 379–80. Indeed, McVeigh was likely the exact type of terrorist who would find drones to be an attractive weapon for

Therefore, it seems unlikely that the existing AUMFs would authorize any and all military actions to shoot down potentially hostile drones.

Congress could, of course, enact a new AUMF that would provide the President with advanced legal authorization to shoot down any unidentified UAVs in U.S. airspace, but to be effective such an AUMF would have to be written without specifying the identity of the targets, only the particular method of attack. This would be a much broader AUMF than any previous ones, as it really would be tantamount to a “war on terrorism” in a legal sense as opposed to the rhetorical sense in which President Bush often spoke. By contrast, past AUMFs or their functional equivalents, including declarations of war, have identified specific enemies.¹³⁵ Even the controversial 2001 AUMF against al Qaeda, which engendered criticism for elevating a non-state group to the equivalent status of a nation-state,¹³⁶ defined an enemy in terms of group membership, as opposed to a tactic or conduct. The phrase “war on terrorism” (or its variations) was easily derided as being legally meaningless, akin to the “war on drugs” or the “war on poverty.”¹³⁷

Without such a broad AUMF, the President might seem legally helpless to order military action against potentially hostile drones launched by unknown persons because there would not be a specific AUMF in place. However, the *repel* doctrine recognized the President’s authority and obligation to defend the nation against imminent attacks.¹³⁸ If, hypothetically, Iran were to launch a squadron of seemingly hostile UAVs in U.S. airspace toward key government and private buildings, public stadiums, and major amusement parks, the President surely would be entitled to order fighter planes scrambled for air defense without congressional authorization, just as U.S. Forces on Pearl Harbor could have fired defensively against the Japanese planes even before the first bomb or torpedo had been dropped or launched, well before the American declaration of war against Japan and without knowing whether the planes with red circles on the wings were on an official mission or under a rogue command. The key point is that, *ex ante*, the military does not know the source behind a poten-

causing mass panic and perhaps even casualties, while insulating the operator from discovery.

135. See Authorization for Use of Military Force Against Iraq Resolution of 2002, Pub. L. 107-243, 116 Stat. 1498 (2002); Authorization for Use of Military Force Against Iraq Resolution, Pub. L. 102-1.

136. See Tung Yin, *Ending the War on Terrorism One Terrorist At a Time: A Non-criminal Detention Model for Holding and Releasing Guantanamo Bay Detainees*, 29 HARV. J.L. & PUB. POL’Y 149, 153 & n.14 (2005) (citing sources).

137. See, e.g., BRUCE ACKERMAN, *BEFORE THE NEXT ATTACK: PRESERVING CIVIL LIBERTIES IN AN AGE OF TERRORISM* 40 (2006).

138. See *The Prize Cases*, 67 U.S. (2 Black) 635, 668 (1863) (“If a war be made by invasion of a foreign nation, the President is not only authorized but bound to resist force by force. He does not initiate the war, but is bound to accept the challenge without waiting for any special legislative authority.”).

tial drone threat. International law also recognizes this type of preemptive self-defense—attacking suspected hostile forces before actually being fired upon—when the perceived threat is “instant, overwhelming, and leaving no choice of means, and no moment for deliberation.”¹³⁹

To be sure, all of this discussion is likely academic in the sense that it is extremely doubtful that anyone would be able to enforce a restrictive view of the President’s authority to defend the nation. The most likely complainant would be the owner of a (wrongfully) downed UAV, who might conceivably sue under the Federal Tort Claims Act (FTCA), claiming negligence in shooting down a non-hostile aircraft.¹⁴⁰

The FTCA waived the United States’ sovereign immunity over ordinary tort claims “in the same manner and to the same extent as a private individual under like circumstances,”¹⁴¹ so would seem to be an appropriate vehicle for litigating such a negligence-based claim. However, it comes with a number of exceptions, one of which is “[a]ny claim arising out of the combatant activities of the military or naval forces, or the Coast Guard, during time of war.”¹⁴² In a tragic incident roughly analogous, from a legal standpoint, to the hypothetical shoot down of an innocuous drone mistaken for a hostile aircraft, the *U.S.S. Vincennes* shot down an Iranian passenger jet in 1988 out of a mistaken belief that the target was on an attack path; the almost 300 people on the plane all died.¹⁴³ When family members of some of the passengers and crew brought suit against the United States under the FTCA, claiming negligence in the operation of the warship, the United States successfully invoked the combatant activities exception. At the time, there was no declared state of war or armed conflict between the United States and Iran; rather, Iran and Iraq were at war, during which Iran began attacking cargo ships bound for Iraq from Kuwait, leading Kuwait to seek assistance from the United States.¹⁴⁴ U.S. and Iranian warships exchanged fire sporadically for over a year before the passenger jet shoot-down incident; and in fact, just before the passenger jet took off, the *Vincennes* had fired upon Iranian gun-

139. Letter from Daniel Webster to Henry Stephen Fox, in 1 THE PAPERS OF DANIEL WEBSTER: DIPLOMATIC PAPERS, 1841–43, at 62 (Kenneth E. Shewmaker ed., 1983).

140. Another possibility is a *Bivens* claim brought directly under the Fourth Amendment. As Stephen Vladeck persuasively argues, courts *should be*—but typically *are not*—solicitous toward such claims in national security cases. See Stephen I. Vladeck, *National Security and Bivens After Iqbal*, 14 LEWIS & CLARK L. REV. 255, 276 (2010).

141. 28 U.S.C. § 2674 (2012).

142. 28 U.S.C. § 2680(j).

143. *Koohi v. United States*, 976 F.2d 1328, 1330 (9th Cir. 1992).

144. *Id.* at 1330.

boats.¹⁴⁵ In affirming the dismissal of the lawsuit, the Ninth Circuit explained that:

The combatant activities exception applies whether U.S. military forces hit a prescribed or an unintended target, whether those selecting the target act wisely or foolishly, whether the missiles we employ turn out to be “smart” or dumb, whether the target we choose performs the function we believe it does or whether our choice of an object for destruction is a result of error or miscalculation. In other words, it simply does not matter for purposes of the “time of war” exception whether the military makes or executes its decisions carefully or negligently, properly or improperly. It is the nature of the act and not the manner of its performance that counts. Thus, for purposes of liability under the FTCA, it is of no significance whether a plane that is shot down is civilian or military, so long as the person giving the order or firing the weapon does so for the purpose of furthering our military objectives or of defending lives, property, or other interests. To put it in the terms of the statute, the only question that need be answered is whether the challenged action constituted combatant activity during time of war.¹⁴⁶

As to whether the shooting down of the passenger jet constituted combatant activity during war time despite the absence of explicit congressional authorization, the court concluded that “when, as a result of a deliberate decision by the executive branch, United States armed forces engage in an organized series of hostile encounters on a significant scale with the military forces of another nation, the FTCA exception applies.”¹⁴⁷

To be sure, in the drone terrorism hypothetical, the encounter is not clearly against the military force of another nation, although that fact may not be immediately clear at the time that government agents must decide whether to take action against a potentially hostile drone. And a single drone that may or may not be engaged in an act of terrorism would not appear to rise to the level of “hostile encounters on a significant scale.” Yet, it has become commonplace to say that everything changed after 9/11, including concepts of war time and peace time.¹⁴⁸

Federal courts have generally been reluctant to adjudicate issues of whether a state of war exists even when there is no explicit congressional authorization for the use of military force. For example, in the run-up to the First Gulf War, President George H.W. Bush ordered hundreds of thousands of U.S. troops and equipment to the Middle

145. *Id.*

146. *Id.* at 1335–36.

147. *Id.* at 1335.

148. *See, e.g.,* MARY L. DUDZIAK, WAR TIME: AN IDEA, ITS HISTORY, ITS CONSEQUENCES 112–20 (2012). As Dudziak writes, “Post-9/11 scholarship has persisted in the assumption that normality is a state of existence outside times of danger.” *Id.* at 114.

East as part of Operation Desert Shield without an AUMF, leading to multiple lawsuits filed in federal court challenging his authority to do so. In *Dellums v. Bush*, about 10% of the members of Congress sought an injunction to block the President from attacking Iraq before securing Congress's assent.¹⁴⁹ The district judge denied the injunction on the grounds that it was not ripe because a majority of Congress had not voted either way on an AUMF.¹⁵⁰ In *Ange v. Bush*, a U.S. soldier sought a similar injunction so that he could not be ordered overseas.¹⁵¹ A different district judge concluded that the case presented a political question federal courts were institutionally incapable of resolving.¹⁵²

For anyone else, there would seem to be additional justiciability barriers to any judicial check on the President. Unlike the hypothetical drone operator who has suffered a concrete loss of property, anyone else complaining about the use of the military to defend against potential drone terrorism would have a hard time establishing Article III standing, which is the requirement that the plaintiff have suffered a concrete harm caused by the defendant and redressable by court order.¹⁵³ Where a plaintiff has suffered no specific individual harm, courts have generally concluded that the plaintiff is raising a “generalized grievance” and declined to reach the merits of the case.¹⁵⁴

Furthermore, in the calm period before there is any threat of an attack, any lawsuit seeking an injunction against military action absent congressional authorization would fail for lack of ripeness, and once a potential attack has triggered a military response, any lawsuit is unlikely to be resolved before the threat has ended (either because it was a successful attack, it was a false alarm, or the drone was shot down). Analytically, the dilemma is very similar to that faced by the plaintiff in *City of Los Angeles v. Lyons*, where Adolph Lyons, the victim of a police chokehold, brought a civil rights action seeking an injunction against the Los Angeles Police Department's further use of the chokehold. The Supreme Court held that Lyons could not show that he was likely to be subjected to the chokehold again and, hence, lacked standing to pursue his claim for relief.¹⁵⁵ If Lyons were subjected to a chokehold again, presumably he would then have standing

149. *Dellums v. Bush*, 752 F. Supp. 1141 (D.D.C. 1990).

150. *Id.* at 1151 (requiring “that the plaintiffs in an action of this kind be or represent a majority of the Members of the Congress”).

151. *Ange v. Bush*, 752 F. Supp. 509 (D.D.C. 1990).

152. *Id.* at 514 (“Ange asks the court to delve into and evaluate those areas where the court lacks the expertise, resources, and authority to explore. . . . Time and again courts have refused to exercise jurisdiction in such cases and undertake such determinations because courts are ill-equipped to do so.”).

153. *See, e.g., Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560–61 (1992).

154. *See, e.g., United States v. Richardson*, 418 U.S. 166, 174–76 (1974) (holding that taxpayer had no standing to sue Congress for compliance with the Public Accounting clause of the Constitution, in order to obtain the CIA's annual budget).

155. *Los Angeles v. Lyons*, 461 U.S. 95, 105–07 (1983).

to sue, except, of course, he would find it prohibitively difficult at that moment to get into court because he would be passing out...¹⁵⁶

2. *National Guard units*—A second option is for a local National Guard unit to operate anti-drone weaponry. So long as the Guard unit remains under control of the governor of the state in which it is based (as opposed to being called up by the President), it is not considered to be part of the Army or Air Force for the purposes of the Posse Comitatus Act.¹⁵⁷

3. *Civilian law enforcement use*—Another option is to equip local or state law enforcement officials with the requisite military equipment or even indirect support so long as the military is not actually engaged in law enforcement activities. There has been a several-decades-long history of military equipment being loaned to civilian law enforcement, primarily for drug interdiction purposes.¹⁵⁸ Congress further facilitated such loans through the Military Cooperation with Law Enforcement Officials Act,¹⁵⁹ which gave a congressional imprimatur to such cooperation. As the Eighth Circuit has noted, the policy reason favoring such lending is to “improve the efficiency of civilian law enforcement by giving it the benefit of military technologies, equipment, information, and training personnel.”¹⁶⁰

Later, in the National Defense Authorization Act of 1997, Congress amended Title 10 (dealing with the U.S. military) to permit the outright sale or donation to law enforcement agencies of excess military equipment, with preference for transfers to be used for “counter-drug and counter-terrorism activities.”¹⁶¹ In recent years, the face value of annual donations through the so-called 1033 program has been around a half-billion dollars or more, largely in the form of small arms, ammunition, and armored vehicles, all presumably due to the drawdown of U.S. troops in Iraq and Afghanistan.¹⁶²

156. To the extent that *Lyons* sounds like a ridiculous result, one should keep in mind that *Lyons* did not lack standing to pursue damages for the chokehold that he already suffered. The standing problem related only to the claim for injunctive relief. *Id.* at 112–13.

157. See *United States v. Gilbert*, 165 F.3d 470, 473 (6th Cir. 1999); *United States v. Hutchings*, 127 F.3d 1255, 1258 (10th Cir. 1997).

158. See, e.g., Peter M. Sanchez, *The “Drug War”: The U.S. Military and National Security*, 34 A.F. L. REV. 109, 123 (1991); Sean J. Kealy, *Reexamining the Posse Comitatus Act: Toward a Right to Civil Law Enforcement*, 21 YALE L. & POL’Y REV. 383, 408–14 (2003).

159. Pub. L. 97-86, 95 Stat. 1115 (codified as amended at 10 U.S.C. § 372(2012)).

160. *Bissonette v. Haig*, 776 F.2d 1384, 1388 (8th Cir. 1985), *aff’d en banc*, 800 F.2d 812 (8th Cir. 1986) (en banc).

161. Pub. L. 104-201, § 1033, 110 Stat. 2639–40 (codified as amended at 10 U.S.C. § 2576 (2012)).

162. See Niall McCarthy, *Chart: Pentagon Donations to Police Are Skyrocketing*, FORBES (Aug. 15, 2014, 10:21 AM) <http://www.forbes.com/sites/niallmccarthy/2014/08/15/chart-pentagon-donations-to-police-are-skyrocketing/>; Shawn Musgrave et al., *The Pentagon Finally Details its Weapons-for-Cops Giveaway: Belying up to the arsenal*, MUCKROCK NEWS (Dec. 4, 2014), <https://www.muckrock.com/news/archives/2014/>

However, it is unlikely that Section 1033 transfers will involve anti-drone equipment in the near future because the program applies only to excess—i.e., surplus—military equipment. The statutory provision explicitly bars spending Defense Department funds in furtherance of the transfers.¹⁶³ Thus, the Defense Department would not be able to spend federal funds to buy additional anti-drone military equipment to donate or sell to local law enforcement agencies.

V. SOME THOUGHTS ABOUT WHERE TO GO FROM HERE

One terrorism analyst has written that “[i]t is clearly impossible to protect all potential targets from covert [nuclear, biological, and chemical] attacks all the time, and this should not be attempted.”¹⁶⁴ The same reality is true when it comes to protecting the United States from terrorism via small drones. The cost of maintaining real-time surveillance across the entire nation, along with the necessary equipment to disable any potentially hostile drones, would be far higher than we can probably afford realistically, at least given current technologies. Nevertheless, the fact that we are unable to defend every area of the country against potential drone terrorism need not mean that we should take no steps at all, unless even the most basic steps are of little utility relative to cost.

A. *Require FAA Registration and Use of Transponders*

Currently, AC 91-57 sets the threshold for small drones/remote-controlled aircraft at fifty-five pounds, a threshold that the FAA Modernization and Reform Act and subsequent FAA regulations have left intact. Heavier planes require an airworthiness certificate from the FAA, but lighter ones only need to stay below 400 feet and away from parks, churches, and schools. Considering that this regulation is over thirty years old and has not kept up with modern developments, both technological (the availability and utility of small drones) and sociological (the increasing trend toward nihilistic terrorism aimed at mass casualties as opposed to political statements), it would be an appropriate time for the FAA to revisit the regulation of small remote-controlled planes/drones.

This is likely to be an ongoing process because the threshold for which a small drone poses a sufficiently reasonable likelihood of being used as a vehicle for terrorism will change as smaller and smaller drones gain the ability to carry payloads that today would require larger drones. Besides explosives, drone terrorism might employ radioactive material such as cesium-137 as a radiological attack,

dec/04/pentagon-finally-details-its-weapons-cops-giveaway/ (compiling database of all donations/sales received through this program, sorted by law enforcement agency).

163. Nat'l Defense Authorization Act, § 1033(b)(3) (1996).

164. FALKENRATH ET AL., *supra* note 45, at 7.

weaponized anthrax or other biological pathogens,¹⁶⁵ or chemical agents.¹⁶⁶ To be sure, it is far from clear that small drones are an appropriate, or even effective, means of dispersing radiological, chemical, or biological agents to inflict mass casualties.¹⁶⁷ However, as the scenario in the introduction to this Article suggests, even ineffective use of chemical or biological agents could cause panic and resulting deaths.¹⁶⁸

As discussed earlier, transponder-based identification systems offer a number of advantages over primary radar system.¹⁶⁹ The FAA could mandate the use of a transponder in a drone to broadcast positional, directional, and identifying information, including contact information for the operator. That way, if a drone were to wander over a packed stadium or other sensitive location, local authorities could attempt to reach the operator to warn him or her to alter course immediately or else risk offensive action against the drone.¹⁷⁰

Extension of the transponder requirement to smaller UAVs has three drawbacks from the standpoint of the remote pilots: cost, weight, and power draw. By way of example, one aircraft transponder advertised as “the world’s smallest and lightest Mode S certified GA transponder[]” in early 2015 costs at least \$2,345 and weighs almost a pound.¹⁷¹ An extra pound of weight is negligible for a larger aircraft, but perhaps not for a small UAV. The added weight will either reduce the drone’s flight time or will require more power. Since more power

165. In late 2001, after the 9/11 attacks, various designated targets, including television journalists and federal politicians, received letters laced with anthrax spores that were capable of spreading locally in the air. See, e.g., PHILIPP SARASIN, ANTHRAX: BIOTERROR AS FACT AND FANTASY 30–32 (Giselle Weiss trans., 2006); William J. Broad, *Contradicting Some U.S. Officials, 3 Scientists Call Anthrax Powder High-Grade*, N.Y. TIMES, Oct. 25, 2001, at B6. Five people, mostly postal workers, died after contracting inhalation anthrax. See Scott Shane, *FBI, Laying Out Evidence, Closes Anthrax Case*, N.Y. TIMES, Feb. 20, 2010, at A1.

166. In 1995, a Japanese doomsday cult unleashed a terrorist attack in the Tokyo subway system with the nerve gas sarin, killing twelve and injuring about a thousand others. See, e.g., K. Ganesan et al., *Chemical Warfare Agents*, 2 J. PHARM. BIOALLIED SCI. 166 (2010). While chemical weapons are difficult to use and have historically proven less effective than conventional explosives against prepared troops, “they can be devastating against unprotected civilian populations. . . .” Matthew Meselson, *The Myth of Chemical Superweapons*, BULLETIN, Apr. 1991, at 12, 15.

167. A small drone would not be an effective vehicle for launching a chemical weapons attack based on the estimate that “[a]bout one ton of nerve gas . . . is required to produce heavy casualties among unprotected people in an open target one kilometer square.” Meselson, *supra* note 166, at 13.

168. Although not due to terrorism, a New Year’s Eve stampede in Shanghai, China, that left thirty-six people dead and nearly fifty injured provides an example of the tragedy that panic can cause. See David Barboza, *In Moments, New Year’s Revelry Became Fatal Crush in Shanghai*, N.Y. TIMES, Jan. 2, 2015, at A1.

169. See *supra* Part IV.B.

170. This use of transponders reduces the effectiveness of a stolen transponder, as the contact information would be for the rightful owner, not the thief.

171. See TRIG TT21 MODE S TRANSPONDER, AIRCRAFTSPURCE, <http://www.aircraftspruce.com/catalog/avpages/trigt21.php>.

means more batteries or more fuel, the drone will have to add even more of either. As for powering the transponder, one drone expert explains that “almost all transponders use power as if it’s freely available—they don’t have batteries in mind as the sole power source.”¹⁷² Feeding that transponder therefore will require additional batteries or fuel (or result in a reduction in flight time), which, as has been seen, creates a recursive problem of needing to add even more batteries or fuel.

There is reason to believe that technological innovation will address all three concerns. As far as weight is concerned, there already are working prototypes of transponders that weigh less than four ounces.¹⁷³ If demand for light, low-power consumption transponders were to increase due to an FAA mandate for at least some of the drones lighter than fifty-five pounds, then the cost for such transponders would likely begin to drop, especially given the general pattern of price drops for high-tech equipment once adoption has become widespread.¹⁷⁴

Admittedly, one would not expect a would-be terrorist to comply with the transponder requirement or, if he did comply, to respond to any attempts to reach him. But by not complying or not responding, the operator would essentially give the go-ahead to local authorities (or the military) to shoot down the drone. (If the would-be terrorist has stolen or spoofed a transponder from a legitimate drone operator, the local authorities would end up contacting that person, who would presumably deny knowledge of the drone flight in question.)

B. *Restrict Airspace Above High-Value Targets*

If the nation is going to arrange anti-drone defenses, it will need to prioritize the defense of likely, high-value targets over less likely ones. A large, open-air sports stadium filled with fans makes a far more inviting objective for a drone attack than a neighborhood of single-family homes, if nothing else because the latter has a much lower density of persons per square mile of area. Sporting events, music concerts, and other special events at outdoor arenas are not the only potentially desirable targets of drone terrorism. For open-air locations with large crowds (i.e., high population density), it would be

172. See also Eric Greenwell, *A Guide to Transponders in Sailplanes – 2010B*, at 7 (Jan. 2010), <http://www.soaringsafety.org/prevention/Guide-to-transponders-in-sailplanes-2010B.pdf>.

173. See Thomas Black, *Crash-Proofing Drones: The Tech Race is On*, BLOOMBERGBUSINESSWEEK (June 5, 2014), <http://www.businessweek.com/articles/2014-06-05/crash-proofing-is-drone-industrys-big-challenge>.

174. See, e.g., Michael Feroli, *US: is IT over?*, JPMORGAN CHASE BANK NA, ECONOMIC RESEARCH NOTE 13–14 (Jan. 11, 2013) (noting a recent decline in the drop in pricing for IT equipment, following a period when “I.T. prices declined at an extremely rapid pace during the 1990s”).

hard to top popular amusement parks like Disney World and Disneyland.¹⁷⁵

It should be noted that national security policymakers have typically not resorted to this sort of triage, even during the government reorganization leading up to the creation of the Department of Homeland Security, which presented an ideal opportunity for contemplation of the relative risks of terrorism that different areas of the country faced. Thus, *New York Times* columnist Paul Krugman complained bitterly in 2003 that “[t]he federal government spends much more protecting the average resident of Wyoming from terrorists than it spends protecting the average resident of New York City.”¹⁷⁶ And Professors John Mueller and Mark G. Stewart have argued similarly that the federal government has classified too many potential targets as “critical infrastructure,”¹⁷⁷ watering down the term to uselessness (much like highlighting every line on a page of text).

For its part, the FAA has recognized that the airspace above sporting events and other large public gatherings needs to be restricted from private aircraft, issuing “circulars” that prohibit private aircraft from flying over such arenas starting an hour before the event until an hour afterward.¹⁷⁸ The FAA does issue waivers from the restriction; thus, airplanes involved in producing aerial television coverage, for example, receive authorization to fly over stadiums.¹⁷⁹ Not surprisingly, the FAA has issued separate circulars restricting the airspace above both Disney parks indefinitely.¹⁸⁰ Strangely, the two Disney parks are the only large amusement parks that have received such FAA circulars¹⁸¹—a deficiency that the FAA should remedy.

Of course, these circulars are simply administrative orders, and there is no reason to believe that would-be terrorists would even be aware of them, much less obey them. The circulars are analogous to a temporary and geographically limited ban on handguns, such as a

175. Disneyland, for example, had nearly 16 million visitors in 2012, which averages to over 40,000 per day. See Hugo Martin, *Disney Park Crowding Reveals Options: Hike rates or expand*, L.A. TIMES (May 21, 2014), <http://www.latimes.com/business/la-fi-disneyland-passes-20140521-story.html>. Having gone running around the outside of Disneyland and California Adventure numerous times, I can attest that the external perimeter around both parks measures only about three miles total.

176. Paul Krugman, *Dust and Deception*, N.Y. TIMES, Aug. 26, 2003, at A19, available at <http://www.nytimes.com/2003/08/26/opinion/26KRUG.html>.

177. John Mueller & Mark G. Stewart, *Balancing the Risks, Benefits, and Costs of Homeland Security*, 7 HOMELAND SECURITY AFF. 1, 6 (2011).

178. See, e.g., FAA NOTAM FDC 4/2621 (Oct. 27, 2014), http://tfr.faa.gov/save_pages/detail_4_3621.html.

179. *Id.*

180. See FAA NOTAM FDC 4/3634 (Oct. 27, 2014), http://tfr.faa.gov/save_pages/detail_4_3634.html; FAA NOTAM FDC 4/3635 (Oct. 27, 2014), http://tfr.faa.gov/save_pages/detail_4_3635.html.

181. See Barmini Chakraborty, *No Carpet Rides Here: Disney Keeps No-fly Zone Over Parks*, FOX NEWS (Nov. 16, 2014), <http://www.foxnews.com/politics/2014/11/16/no-fly-zone-rules-bent-for-disney/>.

“gun free zone.”¹⁸² While gun free zone designations have not prevented mass shootings,¹⁸³ the logistical difficulties in detecting the presence of guns in such locations are far greater than those involved in detecting drones above restricted airspace. This is true because people carry firearms, and gun free zones do not bar people from entry; absent some way of detecting firearms on people,¹⁸⁴ a person can bring a firearm into a school zone without necessarily arousing suspicion. Under the FAA circular, on the other hand, any unauthorized drone in restricted airspace is presumptively suspicious.

C. *Establish Statutory Authorization and Rules of Engagement for Anti-Drone Responses*

As discussed previously, the current challenges to defending against drone terrorism are most acute with regard to detecting and neutralizing them. Assuming that we have the technological infrastructure in place to detect and neutralize small drones, identification presents less of a challenge because we do not have to be 100% accurate, so long as the mistakes are false positives (i.e., misidentifying an innocuous drone as a hostile one) rather than false negatives.¹⁸⁵ This dynamic points in favor of an “if in doubt, bring it down” strategy, at least in the airspace above high-value targets.

Statutory authorization would resolve the question identified earlier about exactly who is responsible for operating the equipment that would be used to destroy or neutralize renegade drones. Through legislation such as the Stafford Act and the Insurrection Act, Congress has already demonstrated the ability to preauthorize the President to use military troops when calamitous events occur without having to suffer delays occasioned by repeat, subsequent authorization.

To the extent that drone defense would presently require military equipment not generally available to local law enforcement agencies, Congress could remove all doubt as to the lawfulness of such actions

182. See, e.g., 18 U.S.C. § 922(q) (2014).

183. One study by a gun control-favoring group, *Mayors Against Illegal Guns*, concedes that 33% of the mass shootings between 2009 and 2013 occurred in gun free zones. See *Mass Shootings Since January 20, 2009*, MAYORS AGAINST ILLEGAL GUNS, 2, http://www.washingtonpost.com/blogs/wonkblog/files/2013/02/mass_shootings_2009-13_-_jan_29_12pm1.pdf.

184. For example, some schools have placed metal detectors at their schools. See, e.g., Michael Ferraracio, *Metal Detectors in the Public Schools: Fourth Amendment Concerns*, 28 J.L. & EDUC. 209, 216–25 (1999) (discussing cases opining on the use of handheld metal detectors in schools); Robert S. Johnson, *Metal Detector Searches: An Effective Means to Help Keep Weapons Out of Schools*, 29 J.L. & EDUC. 197, 200–01 (2000) (arguing in favor of the use of metal detectors at schools).

185. See, e.g., KENNETH R. FOSTER & PETER W. HUBER, *JUDGING SCIENCE: SCIENTIFIC KNOWLEDGE AND THE FEDERAL COURTS* 75–76 (1999) (describing false positives and false negatives and the trade-off involved in minimizing one at the expense of the other).

by enacting the tactic-based AUMF discussed earlier.¹⁸⁶ While such an AUMF would admittedly be broader than those enacted in the past, it would still be a far cry from the rhetorical “war on terrorism” that has drawn criticism and derision in the past. It would apply to a very specific set of factual circumstances that are easily ascertainable and not particularly susceptible to manipulation or misinterpretation.¹⁸⁷

Even in the absence of such an AUMF, a President intent on shooting down a potentially hostile drone would be expected to do so and claim authority under the Repel Doctrine. On September 11, 2001, for example, after the first three hijacked airplanes had already crashed into their targets, President Bush and Vice President Cheney reportedly agreed that combat aircraft being scrambled should be given permission to shoot down any remaining hijacked airplanes in the Washington, D.C., area.¹⁸⁸ But an AUMF in place would provide a President with a more solid legal basis by placing him or her in the first category of the famous *Steel Seizure* formulation (where the President’s power is at its maximum because it has been augmented by congressional authorization), as opposed to the second category (where the President is acting on his or her own power, in the face of silence from Congress).¹⁸⁹ The difference between the shoot-down order on September 11, 2001, and in the hypothetical involving drone terrorism is that in the former incident three planes had already been used as suicide weapons, demonstrating beyond a doubt that the country was being attacked and making the possibility of imminent further attacks at least plausible, if not likely. In the drone terrorism scenario, the question is whether an unknown drone is in fact hostile, without any other context.

D. *Establish Joint Task Forces*

In further preparation for responding to potential drone terrorism, the federal government should establish joint task forces to coordinate federal and local law enforcement agencies and the military. There already exist such joint task forces between federal and local law enforcement agencies for counterterrorism purposes, which join the federal government’s wider variety of surveillance tools (such as foreign intelligence surveillance warrants) with local police departments’

186. See *supra* Part IV.

187. By contrast, a far more problematic tactic-based AUMF would be one targeting “terrorism.” Although terrorism is in fact a defined term in federal law, see, e.g., 18 U.S.C. § 2331 (2014); 22 U.S.C. § 2656f(d) (2014), those definitions include political motivations, which would require more interpretation and conjecture, compared to the fact of a drone breaching restricted airspace.

188. See 9/11 COMM’N REPORT, *supra* note 55, at 40–42.

189. See *Youngstown Co. v. Sawyer*, 343 U.S. 579, 635–37 (1952) (Jackson, J., concurring).

larger staffing and greater engagement with the community.¹⁹⁰ Joint task forces also promote information sharing, which is a not insignificant consideration when it comes to counterterrorism.¹⁹¹ The 9/11 Commission documented how the lack of information sharing between the CIA and the FBI enabled two of the 9/11 hijackers to operate within the United States despite having been tracked overseas.¹⁹²

Joint task forces may also promote more effective responses to drone terrorism. This is not a novel concept. With regard to exotic forms of terrorism, the Clinton Administration considered forming an elite task force consisting of ten teams of specialists based in ten different states, with each task force being trained to respond to chemical or biological attacks.¹⁹³

VI. CONCLUSION

Drone terrorism probably remains, for now, a very low probability event. But as small private drones become more commonplace and capable of carrying larger payloads, the likelihood of drone terrorism will only increase. Officials will almost certainly be unable to detect and stop every such attempt, just as they are unable to detect and stop every attempt at other forms of terrorism. Officials can, however, take steps to improve our chances of disrupting drone attacks. Some of those steps are technological in nature but some are legal in nature. This Article has suggested some legal steps that could be taken now or in the near future so that doubts about legal authority or other related concerns are not obstacles to effective drone defense.

190. See, e.g., Tung Yin, *Joint Terrorism Task Forces as a Window into the Security vs. Civil Liberties Debate*, 13 FLA. COASTAL L. REV. 1, 3–4 (2011).

191. *Id.* at 6–17.

192. See *id.*

193. Jim Landers, *U.S. Quietly Upgrading Homeland Defense Plan*, DALLAS MORNING NEWS, Feb. 9, 1999, at 1A, available at <http://devvy.net/pdf2/october2012/Dallas.pdf>.

