Game of Drones: Rolling the Dice with Unmanned Aerial Vehicles and Privacy

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GAME OF DRONES: ROLLING THE DICE WITH UNMANNED AERIAL VEHICLES AND PRIVACY

Rebecca L. Scharf

We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology.

Carl Sagan

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INTRODUCTION

The advent and proliferation of unmanned aerial vehicles, commonly known as drones, present real opportunities for positive societal contributions. Yet, as with many emergent technologies, the challenges are undeniable. Undoubtedly, the breathtaking speed of scientific and technological advances outpaces the ability of government actors to keep stride. That is, to determine the appropriate avenues for regulating them, both in law enforcement and private contexts. And while the potential regulatory issues are numerous given the wide variety of non-military uses alone—no use is more controversial than

1 A variety of terms are used to describe “unmanned” aircraft: Drones, Unmanned Aerial Vehicle (“UAV”), Unmanned Aircraft (“UA”), Unmanned Aerial Systems (“UAS”), which refers either “to the system [or] systems in the aircraft or the aircraft ground station system.” Donna A. Dulo, Aeronautical Foundations of the Unmanned Aircraft, in UNMANNED AIRCRAFT IN THE NATIONAL AIRSPACE 21 n.1 (Donna A. Dulo, ed. 2015). The term “drone” is used throughout this Article for purposes of consistency and gender neutrality.

2 Certainly, one of the main uses for drones is for a wide variety of military engagements. Discussion of military drone use, generally, is beyond the scope of this Article. That said, to the extent that the military is responsible for the creation and unveiling of drones and developing drone technology, there are drones and drone-associated technology currently in use by the military that may be available to the public in the near future. For example, the U.S. Army has created a drone that carries a 1.8-gigapixel color camera called an Aurgus-IS. Press Release, U.S. Army, Warfighters to Get Improved ‘Eyes in the Sky’ (Dec. 17, 2010), http://www.army.mil/article/49594. That camera has a video sensor that can cover nearly twenty-five square miles from 20,000 feet above, tracking sixty-five separate targets at the same time. NOVA, What Drones Can See, PUB. BROAD SERV. (Jan. 17, 2013), http://video.pbs.org/video/232549143.

3 In addition to the hobbyist recreational uses of drones, drones are being used in weather forecasting, topographical mapping, firefighting, cinematography, farming, infrastructure inspection and real estate photography, just to name a few. The variety of uses will continue to increase as the technology advances and the price decreases.
the use of drones by law enforcement and its potential to harm individual privacy.

The amalgamation of surveillance technology already available on drones is vast. In fact, it is most accurate to consider drones as “simply the platform for enabling the surveillance.”4 Drones allow law enforcement to track the movements of large swathes of individuals at once, employing facial recognition software, and recording scores of data to be retained indefinitely. They are equipped with high resolution still and video cameras with increasingly high powered zoom lenses. In essence, they are flying computers with GPS, sensors, thermal imaging devices, license plate readers, wifi-sniffers, and even facial recognition software. Routinely, they are undetectable by design.

Moreover, it is not only the cutting-edge surveillance technology that is at issue, but the pure physics involved. The ability of drones to hover, to fly at varying altitudes and airspace, and, to stay aloft for ever-lengthening time periods creates the ideal surveillance agent. In fact, the time is not far off when drones may be “filling our skies, engaging in myriad video surveillance tasks.”5 As this time draws nearer and police engage in increasingly sophisticated and pervasive surveillance using drones, one question remains: What role does the Fourth Amendment play in balancing privacy and security in this brave new world?6

A single drone could invoke almost all the technological advances that the Supreme Court has previously analyzed in its Fourth Amendment jurisprudence.7 For example, the United States Supreme Court’s most recent forays into Fourth Amendment technological surveillance have involved a singular category of technology, such as a thermal imagery device,8 or Global Positioning System (“GPS”).9 With law enforcement agencies across the

7 See Part III.
country increasingly deploying drones as surveillance agents the potential to use many of the traditional technological surveillance tools simultaneously leaves courts ill prepared to address the level of Fourth Amendment scrutiny to prescribe.

At the present time, there is a dearth of case law explicitly addressing the Fourth Amendment and drones, and Congress has not yet entered the fray in any meaningful way. Many states have attempted to fill the void and have

10 Drones employing cameras could “magnify and video record [a woman strolling down the street’s movements, actions, and the details of her vehicle’s license plate, or the items she is carrying out of a store.” Marc Jonathan Blitz, The Fourth Amendment Future Public Surveillance: Remote Recording and Other Searches in Public Space, 63 AM. U. L. REV. 21, 24 (2013).

11 Notably, “in Jones, Alito stressed what Professor Daniel Solove and others have argued, which is that it would be ideal for legislatures to take a first stab at these complicated questions, after which courts can review whether those solutions meet the constitutional floor.” Stephen E. Henderson, Real-time and Historic Location Surveillance After United States v. Jones: An Administrable, Mildly Mosaic Approach, 103 J. CRIM. L. & CRIMINOLOGY 810 (2013) (referring to Daniel J. Solove, Essay, Fourth Amendment Pragmatism, 51 B.C. L. REV. 1511, 1515, 1535–37 (2010)). The very suggestion that it is primarily the role of the Court, rather than Congress, to address the intersection of evolving technologies and privacy is not without controversy. Compare Orin S. Kerr, The Fourth Amendment and New Technologies: Constitutional Myths and the Case for Caution, 102 MICH. L. REV. 801, 805 (arguing that “statutory rules rather than constitutional rules should provide the primary source of privacy protections regulating law-enforcement use of rapidly developing technologies”), with Marc Jonathan Blitz, The Fourth Amendment Future Public Surveillance: Remote Recording and Other Searches in Public Space, 63 AM. U. L. REV. 21, 22 (2013) (explaining the need for courts to take the lead in developing a “technology-based” or “design-based” approach to defining law enforcement’s use of surveillance under the Fourth Amendment).

12 That said, states do so at their own peril as issues of federal preemption loom large. The Federal Aviation Administration (“FAA”) has acknowledged that state and local law enforcement is in the “best position to deter, detect, immediately investigate, and, as appropriate, pursue enforcement actions to stop unauthorized or unsafe UAS operations.” FED. AVIATION ADMIN., U.S. DEP’T OF TRANSP., LAW ENFORCEMENT GUIDANCE FOR SUSPECTED UNAUTHORIZED UAS OPERATIONS (Aug. 18, 2016), https://www.faa.gov/ufs/resources/law_enforcement/media/faq_uas-po_lea_guidance.pdf.

On the other hand, a UAV is an ‘aircraft’ under the definitions of the FAA’s authorizing statutes and therefore subject to regulation by the FAA. 49 U.S.C. § 40102(a) (6). Moreover, according to the FAA,

[s]ubstantial air safety issues are raised when state or local governments attempt to regulate the operation or flight of aircraft. . . A navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system. See Montalvo v. Spirit Airlines, 508 F.3d 464 (9th Cir. 2007), and French v. Pan Am Express, Inc., 869 F.2d 1 (1st Cir. 1989); see also Arizona v. U.S., 567 U.S. ___ , 132 S.Ct. 2492, 2502 (2012) (“Where Congress occupies an entire field . . . even complimentary state regulation is impermissible. Field preemption reflects a
passed state laws regulating drones. In the meantime, lower courts, which will be the first to address these issues, are left with little guidance as to where to draw the line. Moreover, with the Federal Aviation Administration (“FAA”) finalizing the first round of regulations on drones in the summer of 2016 (albeit only tangentially touching on privacy issues), the use of drones both by private individuals and law enforcement is likely to increase exponentially in the very near future.

Such an increase in the use of drones is likely to put pressure on courts to determine what level of Fourth Amendment scrutiny to apply given that drones do not easily fit into any defined technological category the Supreme Court has previously addressed. And yet, the very nature of the technology that a drone engages in is not simply an issue of first impression for courts; although drones have their own unique characteristics, the technology they employ is largely an amalgamation of technology that the Supreme Court has previously analyzed. Since a drone is basically an instrument that allows other technologies — such as facial recognition, photography, thermal imagining,
etc.—to be used more freely, stealthily, and quickly, the Supreme Court is faced with issues stemming from the use of the countless amalgamations of these ever-developing technologies.

Given the unique surveillance capabilities of the drone, the question becomes how much leeway law enforcement should be given in utilizing drones for surveillance before a search violates an individual’s Fourth Amendment right to privacy. As Marc Jonathan Blitz queries, “as police gain the ability to technologically monitor individuals’ public movement and activities, does the Fourth Amendment’s protection against ‘unreasonable searches’ place any hurdles in their way?”

Since a drone is in fact an “aerial vehicle,” should courts simply treat drones as any other aerial vehicle merely taking photographs—in which case no warrant would be required? Or, given the pervasive technological abilities of drones, as well as their potential to engage in lengthy surveillance, is a drone more like GPS in that warrantless search is at odds with the Fourth Amendment? Drones are simply not like any other technology and their potential for wreaking havoc on the fabric of privacy in our society is too great for their use to continue without additional guidelines.

This Article builds on the work of other scholars who have urged courts to adopt a “technology-based” definition of what constitutes a search. This article proposes the following multifactor test as a way to guide both courts and law enforcement as to how to use drones effectively while still protecting privacy:

17 See infra Part II.A.
19 Other legal scholars have proposed guidelines regarding the proper test for what constitutes a search when police engage in technological surveillance, although not those focused primarily on surveillance by drones. See, e.g., Susan Freiwald, First Principles of Communications Privacy, 2007
(1) What type of technology is the drone employing in the search? Camera, video, facial recognition software, GPS/cell phone tracking?

(2) What is the extent of the surveillance?

(3) What is the extent of the privacy intrusion?

Essentially, courts should apply a presumption that a warrant is necessary absent exigent circumstances in instances where the police are surveying homes or its curtilage when using drones. Drones are simply not like any other technology and their potential for wreaking havoc on the fabric of privacy in our society is too great. Therefore, a presumption that a warrant is required will combat the increased potential of Fourth Amendment violations and provide a framework for law enforcement and courts. The burden would then be on law enforcement to demonstrate why it should not have been required to obtain a warrant given the multifactor test.


20 See Chicago's High-Tech Cameras Spark Privacy Fears, PHYS. ORG (Feb. 8, 2011), http://www.phys.org/news/2011-02-chicago-high-tech-cameras-privacy.html#nRlv ("At least 1,250 of [Chicago’s cameras] are powerful enough to zoom in and read the text of a book." The camera system is also capable of searching for images like an unattended package or a specific license plate.).


22 “As a general rule, we define exigent circumstance as those circumstances that would cause a reasonable person to believe that entry was necessary to prevent physical harm to the officers or other persons, the destruction of relevant evidence, the escape of the suspect, or some other consequence improperly frustrating legitimate law enforcement efforts.” U.S. v. Martinez, 406 F.3d 1160 (2005).
To support this multifactor test, this Article addresses the history of Supreme Court Fourth Amendment jurisprudence to explain how the Court has addressed privacy concerns regarding the use of a singular technology. Understanding the various issues that arise out of law enforcement use of a singular technology strengthens the real danger privacy rights are under when law enforcement employs drones with multiple technologies without a warrant. Part I introduces the vast potential of combining drones and surveillance technology. Part II addresses the current status and connection between technological advancements and their effects on privacy rights. Next, Part III explores the Supreme Court’s Fourth Amendment jurisprudence. This discussion begins with United States v. Katz and the historic reasonable expectation of privacy test, followed by the, commonly referred to as the “Aerial Surveillance Trilogy” cases, California v. Ciraolo, Dow Chemical v. United States, and Florida v. Riley, the advanced technology cases, Kyllo v. United States and United States v. Jones, concluding with a discussion on the several post-Jones decisions. Lastly, Part IV details the multifactor test outlined above in order to provide guidance and reasoning for courts and law enforcement agencies.

I. DRONES AND SURVEILLANCE POTENTIAL

The surveillance capability of drones is infinitely comprehensive and adaptive, able to record not only location information, but photograph (including taking screen shots of computer screens), videotape, audiotape, use thermal imaging, engage facial recognition technology, and intercept cell phone information. These capabilities have greatly expanded with each model and technological advancement23 but also, the sheer number of drones available and in use today has far surpassed predictions.

23 Drone technology has increased dramatically in recent years. Specifically, drones can now travel farther, both in distance and in height, and stay aloft for longer periods of time. S. Alex Spelman, Drones: Updating the Fourth Amendment and the Technological Trespass Doctrine, 16 NEV. L.J. 373, 411–12 (2015) (“[C]urrent drone technology typically operates aloft only for a matter of hours, but certain UAS devices, called high-altitude long-endurance (HALE) UAS, will have the potential to operate in the air for extremely prolonged periods of time (even years), which will enable them to gather long-term information about the ground, including constitutionally protected areas such as our backyards and other parts of the curtilage”); see Shane Crotty, The Aerial Dragnet: A Drone-ing Need for Fourth Amendment Change, 49 VAL. U. L. REV. 219, 227 (2014) (citing the time periods various drones can stay afloat; “Drones are also capable of staying airborne for long periods of time, several in excess of twenty-four hours.”); William C. Marra & Sonia K. McNeil, Understanding “The Loop”: Regulating the Next Generation of War Machines, 36
Technologically, drones continue to break new barriers. Some such “barriers” may have little effect on privacy. For example, one company is in the process of developing a drone to take selfies that a person could wear on his wrist until the time came to use it. Others, particularly those related to duration and longevity, increase greatly the chance of the drone acting as the prototypical surveillance agent. Specifically one drone recently stayed aloft for four days straight without refueling, while Boeing has plans to make a drone that would be capable of staying aloft for ten days. Moreover, development has started on drones able to remain airborne for years.

Sensor platforms on drones also continue to become more sophisticated, increasing their ability to conduct a variety of different types of surveillance. Multispectral sensors are used to capture unseen information. Drones may carry platforms that allow live video feeds, infrared cameras, heat sensors, radar, Wi-Fi crackers, and which can spoof (impersonate) cell phone towers. The Department of Rehabilitation and Corrections in Ohio has started to test the use of balloon drones to provide continuous monitoring of two prisons. The United States Air Force has developed a sensor platform, called

HARV. J.L. & PUB. POLY 1139, 1169 (2013) (citing various military drones and how long each can stay afloat); Melanie Reid, Grounding Drones: Big Brother's Tool Box Needs Regulation Not Elimination, 20 RICH. J.L. & TECH. 9, 8 (2014) (describing various drones and how long they can stay in the air).

29 Wi-fi crackers are devices that can defeat a local Wifi network security system.
Gorgon Stare, which allows monitoring of twenty square miles at a time using “electro-optical and infrared sensors.”

Moreover, the private industry is taking notice and starting to use drones, which will likely lead to even more advances in technology, with concomitant effects on privacy. Industries such as agriculture, construction, energy, mining, and film are showing great interest in drones. The construction industry is keen to use drones on large projects as an extra set of eyes to monitor construction progress and quality. Agriculture in California is determining if cloud seeding (a form of weather modification that attempts to change the amount of precipitation that falls by adding specific chemicals to the clouds) may be done via drone to alleviate drought conditions. Further, energy

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32 David Cenciotti & David Axe, This New Drone Sensor Can Scan a Whole City at Once, MEDIUM: WAR IS BORING (Sept. 10, 2014), https://medium.com/war-is-boring/the-new-sensor-on-this-drone-can-scan-a-whole-city-at-once-33c314d4e763. While not technically a sensor platform, drones may also be used to carry lethal or non-lethal payloads such as missiles, taser, or rubber bullets. ELEC. FRONTIER FOUND., Surveillance Drones, https://www.eff.org/issues/surveillance-drones (last visited Oct. 16, 2015).


companies have already been given permission for commercial drone use in Alaska to survey roads and pipelines in remote locations.  

Some experts opine that “the extent of [UAV’s] potential domestic application is bound only by human ingenuity.” Many predict that drone surveillance will eventually provide law enforcement with astounding information about individuals, simply by drones’ ability to track a large number of people for a significant period of time, employing high definition cameras and facial recognition software. Drones can conduct surveillance far beyond what helicopters and manned aerial vehicles can do. Furthermore, with technological advancements in data retention software, such tracking information can be retained indefinitely, creating the possibility of future privacy issues.

From a law enforcement standpoint, drones have, at a minimum, three distinct advantages: size, cost, and safety. All three can have ramifications on an individual’s privacy. First, the variations in the sizes of drones are enormous. There are drones, for example, that are currently being put to use by the Israeli military, which have a wingspan of over eighty-five feet and weigh four-and-a-half tons. And there are drones the size of a hummingbird equipped with the ability to sound like birds or insects, allowing them to move undetected. It is these smaller drones with the potential to fly undetected and mask their appearance that pose some of the largest threats to individual privacy.

Second, drones are more cost-effective than helicopter or other aerial surveillance, which involve the cost of personnel, maintenance, and fuel at the

38 Hillary B. Farber, Eyes in the Sky: Constitutional and Regulatory Approaches to Domestic Drone Deployment, 64 SYR. L. R. 1, 4 (2014).  
very least. Drones can be purchased commercially, through Amazon.com, for as little as $39.99,\textsuperscript{41} obviously considerably cheaper than any “manned aircraft.” As with most advances in technology, the price of drones should be expected to decrease over time. The extremely low cost to both law enforcement and private individuals is undoubtedly one of the primary catalysts for the huge surge in the number of drones. As drones become ubiquitous there will unquestionably be a loss of privacy.

Third, deploying drones can be helpful in situations where there is risk to human life, such as missing person searches, as well as combatting forest fires and other natural disasters.\textsuperscript{42} For example, the Federal Bureau of Investigation (“FBI”) admits to using drones “in a limited capacity” for surveillance\textsuperscript{43} in instances where it was necessary for “critical information that otherwise would be difficult to obtain without introducing serious risk to law enforcement personnel.”\textsuperscript{44}

In addition to the FBI’s use of drones for safety reasons, multiple other federal, state, and local law enforcement agencies use drones as surveillance tools. For example, the Customs and Border Protection (“CBP”) has used drones for surveillance on behalf of myriad federal, state, and local agencies, including the U.S. Immigration and Law Enforcement, the Federal Emergency Management Agency, the U.S. Secret Service, the Drug Enforcement Agency, U.S. Forest Service, the U.S. Department of Energy, the Minnesota Bureau of Criminal Investigation and the Texas Department of Public Safety, among


\textsuperscript{44} Kevin Johnson, Mueller Tells Lawmakers FBI Has Used Drones in United States: Privacy Issues Raised, Though Use is “Minimal,” USA TODAY, June 20, 2013, at A1.
others. The surveillance has ranged from aerial reconnaissance to missing person searches to drug-related investigations.

In many ways, data collection may be the biggest danger to privacy. So while the non-law enforcement missions involving the surveying of land may appear to be an innocuous use as far as privacy considerations, in conducting the surveys, the drones necessarily collect data on individuals and their privacy. For example, the CBP has announced plans to make the data gathered through its drone surveillance widely available to outside agencies.

Overall, drones bring convenience and adaptability to many physically difficult or unrealistic tasks like never before. However, unfettered use of drones by law enforcement in connection with technology will likely cause a damaging and long-term effect on individual Fourth Amendment privacy rights. Society cannot be blinded by the benefits of drone technology, as privacy rights are essential to our functioning society.

II. Privacy Generally

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45 Jennifer Lynch, *Customs & Border Protection Logged Eight-Fold in Drone Surveillance for Other Agencies*, ELEC. FRONTIER FOUND. (July 3, 2013), https://www.eff.org/deeplinks/2013/07/customs-border-protection-significantly-increases-drone-surveillance-other. This is despite the fact that the CBP's direct mission is to prevent illegal immigrants from crossing the border or smuggling drugs, the CBP allows other law enforcement agencies use its drones for other, unrelated purposes. Kimberly Dvorak, *Homeland Security Increasingly Lending Drones to Local Police*, WASH. TIMES (Dec. 10, 2012).

46 Jennifer Lynch, *Customs & Border Protection Logged Eight-Fold in Drone Surveillance for Other Agencies*, ELEC. FRONTIER FOUND. (July 3, 2013), https://www.eff.org/deeplinks/2013/07/customs-border-protection-significantly-increases-drone-surveillance-other. Moreover, the predator drones used by the CBP have “highly sophisticated, high resolution Synthetic Aperture Radar (“SAR”), color video, and electron optical and infrared cameras and are capable of performing Reconnaissance, Surveillance, Targeting and Acquisition on and tracing of multiple moving and stationary targets of interest.” *Id.* The CBP was also considering equipping its drones with “non-lethal weapons designed to immobilize.” *Id.* The CBP also reports using its predator drones for non-law enforcement missions. It has conducted extensive electro-optical, thermal infrared imagery and synthetic aperture radar of levees along the Mississippi River across several states, along with surveying land for the U.S. Geological Survey, the Bureau of Land Management, and the Department of Natural Resources. *Id.*

Privacy is a commonly held value given that all individuals have some common perceptions about privacy, and value some degree of privacy. And yet privacy is not monolithic. For example, in his seminal law review article titled, *Privacy*, Charles Fried describes privacy as control over knowledge about oneself. But it is not simply control over the quantity of information abroad; there are modulations in the quality of the knowledge as well. We may not mind that a person knows a general fact about us, and yet feel our privacy invaded if he knows the details.

In addition to having individual personal value, privacy is also a public societal value in that it is at the core of securing the promises of a democratic society. That is, it not only protects the individual “but serves as a restraint on the government or on the use of power.”

Undoubtedly, much of the legal discussion around privacy protections revolves around the U.S. Constitution and the Fourth Amendment. But does the Fourth Amendment protect the individual or society? As Anthony Amsterdam provocatively writes

Does [the Fourth Amendment] safeguard my person and your house and her papers and his effects against unreasonable searches and seizures; or is it essentially a regulatory canon requiring government to order its law enforcement procedures in a fashion that keeps us collectively secure in our persons, houses, papers, and effects, against unreasonable searches and seizures?

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51 The text of the Fourth Amendment broadly describes an individual’s “right to privacy”:
   The right of the people to be secure in their persons, houses, papers and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched and the persons or things to be seized.
   U.S. Const. amend IV.
Moreover, the Constitution does “protect us from government fishing expeditions whereby police invade the private realms of our life in search of details that would justify subjecting us to an arrest or other seizure.”

A. Influences of Technological Advancements on Privacy

One of the primary changes around privacy law in the electronic age is how one demonstrates their “reasonable expectation of privacy.” When an individual was attempting primarily to protect physical objects such as diaries, bank statements, or private letters, they could exhibit that expectation of privacy by keeping them in a safe deposit box or a locked drawer or perhaps even putting them under a mattress. If the government wanted to find out about what books you read, your personal hobbies and interests, or whom you corresponded with, they would be required to obtain a search warrant under the Fourth Amendment.

Now, of course, we keep journals and diaries, bank statements, books, Google searches and emails on our telephones, which we carry with us from place to place. The fact that this information is not locked away in a secret place makes it more difficult to establish a privacy interest. These technological advances have influenced privacy law. To claim, however, that there was only one wave of “technology” that influenced privacy law, however, would be overly simplistic. As far back as the Samuel Warren and Louis Brandeis article, *The Right to Privacy*, referred to by some as the most influential law review article ever written, legal scholars and the judiciary have struggled with protecting

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54 DANIEL J. SOLOVE, NOTHING TO HIDE 102 (2011).
privacy from the encroachments of technological advancements. In 1890, Warren and Brandeis bemoaned the invention of cameras with the ability to take “instantaneous photographs” and the ability of those cameras “to invade the sacred precincts of private and domestic life.” Warren and Brandeis concerned themselves with the “numerous mechanical devices [that] threaten to make good the prediction that “what is whispered in the closet shall be proclaimed from the house-tops.”

In his book, Privacy and Freedom, Alan Westin refers to the technological advances of the late nineteenth century, which, in addition to the ability to take “instantaneous pictures,” included telephones, microphones, digital recorders, as well as the ability to tap and record telephone conversations as the “First Era of Technological Challenges.” He posits that the American legal system did not respond to the threats to privacy from these technological advances until the 1950s, some fifty years after their introduction, thus demonstrating the

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56 See Hyman Gross, The Concept of Privacy, 42 N.Y.U. L. REV. 34, 36 (1967) (“The law does not determine what privacy is, but only what situations of privacy will be afforded legal protection.”).
57 The “instantaneous photographs” refers to advances in photography that took place in the 1880’s that allowed for an individual to take snapshots. Prior to this point, it would take several minutes to take a photograph, with the individual sitting still the entire time. Richard C. Turkington & Anita L. Allen, PRIVACY LAW CASES AND MATERIALS 45 (2d ed. 2002); see also ALAN F. WESTIN, PRIVACY AND FREEDOM 336, 338 (1967). The telephone, microphone, and digital recorder, with ability to tap telephone lines were also invented/developed in the later decades of the nineteenth century. Richard C. Turkington & Anita L. Allen, PRIVACY LAW CASES AND MATERIALS 45 (2d ed. 2002).
59 Samuel Warren & Louis Brandeis, The Right to Privacy, 4 HARV. L. REV. 193 (1890). The Warren and Brandeis seminal privacy article was undoubtedly influenced by changes in technology in the late nineteenth century:

Recent inventions and business methods call attention to the next step which must be taken for the protection of the person, and for securing to the individual what Judge Cooley calls the right ‘to be let alone.’ Instantaneous photographs and newspaper enterprise have invaded the sacred precincts of private and domestic life; and numerous mechanical devices threaten to make good prediction that ‘what is whispered in the closet shall be proclaimed from the house-tops.’

60 ALAN F. WESTIN, PRIVACY AND FREEDOM 339 (1967).
difficulty courts may have in catching up with technological advances affecting privacy.

B. Privacy and Video Surveillance

When considering the privacy implications of drones, the potential implications are numerous, but one of the most obvious is video surveillance. Some scholars have opined that there is no difference between government surveillance through undercover agents and electronic surveillance. Anthony Amsterdam, for example, claims to see very little difference in that
[both tend to repress crime in the same way, by making people distrustful and unwilling to talk to one another. The only difference is that under electronic surveillance you are afraid to talk to anybody in your office or over the phone, while under a spy system you are afraid to talk to anybody at all.]

But what are the privacy implications of drones being used by private actors? For example, if a government agency takes a video of you and a court finds that the agency violated your Fourth Amendment right, the exclusionary rule can force the government to exclude evidence derived from that video surveillance (fruit of the poisonous tree doctrine). Private actors, however, are different, in that there are not “punishments” for private actors equivalent to the exclusionary rule. Instead, we have state laws relating to torts and privacy.

We obviously live in a society where people can, and do, use cell phones to take videos all the time. Such cell phone video is largely subject to the state laws governing torts and privacy. In theory, video taken by drones would be subject to the same tort law. Although some scholars have opined that there is no meaningful connection between the right to informational privacy in constitutional law and the privacy torts, Richard C. Turkington posits that

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64 In fact, interestingly, in several recent high profile criminal cases (Baltimore), it is the video of a private citizen that led police to charge an individual police office with a crime. Of course, police can subpoena video and could subpoena video from drones.
65 See J. T. McCarthy, The Rights of Publicity and Privacy, § 5.7(B) 5-54 (Clark Boardman Callaghan, 2d ed. 2001).
[t]he connection . . . between informational privacy rights in constitutional law and torts is in the nature of the injury and not in the character of the actor that causes the injury. It is the loss of the condition of privacy and the intellectual tradition that is the foundation of the privacy rights in tort and constitutional law.  

C. Drones and Privacy

Drones pose complicated questions regarding privacy and security. Moreover, as with the technological advances at issue throughout the history of the United States, drones pose specific questions regarding an individual’s “reasonable expectation of privacy” when a technological advancement is not yet “in the general use of the public.” Such variations show that courts may struggle with what constitutes a search when drones, are involved, particularly given that drones can fly at a much lower altitude than helicopters and planes. The average person may not be able to take actions to protect him or herself or even adequately demonstrate an expectation of privacy precisely because the average person may not know the capabilities of drones.

In 2010, the FAA predicted there would be 15,000 drones purchased annually in the United States alone by 2020. Instead, there were 616,000 drones registered in 2016 and the FAA now predicts seven million drones could be purchased annually by 2020.

Seven million drones. The fact that a federal agency issued a report pointing to this possibility alone should have set off alarms from those concerned with privacy issues, let alone the general public. Yet no alarms have sounded. This is not to say that I am the first scholar to recognize the threat to privacy posed by

68 At least one scholar has predicted that “[e]ventually, the UAV will replace the helicopter as the preferred method for conducting aerial surveillance.” Hillary B. Farber, Eyes in the Sky: Constitutional and Regulatory Approaches to Domestic Drone Deployment, 64 Syr. L. Rev. 1, 4 (2014).
drones. M. Ryan Calo, in his essay, *The Drone as Privacy Catalyst*, accurately predicted over five years ago the threat drones pose to privacy, and the fact that “[e]xisting privacy law will not stand in its way.” Yet, amidst the dark picture Calo paints with references to Orwell’s Oceania, there are hints of optimism in his essay as well. After bemoaning the stagnation of privacy law generally, he turns hopeful that the sheer visibility of drones will serve as a wakeup call to the public. “But unlike the debates [surrounding privacy and technology] of recent decades, I think these arguments [that drones threaten our dwindling individual and collective privacy] will gain serious traction among courts, regulators, and the general public.” That has yet to happen. Instead, Calo’s more ominous prediction where the government takes few efforts to protect privacy while “FAA restrictions relax and private and public drones quickly fill the sky,” has seemingly come true.

At this moment in time when the FAA has just issued regulations involving small unmanned aircraft systems, we stand on the precipice of the unmanned aircrafts going into “the general use of the public.” This first round of FAA regulations, which became effective in August 2016, does not reference privacy. Rather, privacy concerns have been left to legislators.

According to M. Ryan Calo, Director for Privacy and Robotics at Stanford Law School’s Center for Internet & Society, drones could be just “the visceral jolt society needs to drag privacy law into the twenty-first century.” Moreover, Calo states that, “the development of American privacy law has been slow and uneven; the advancement of information technology has not. The result is a widening chasm between our collective and individual capacity to observe one another and the protections available to consumers and citizens under the law.”

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76 In August 2016, the FAA issued regulations governing drones under 55 lbs. 14 C.F.R. pt. 107. They make no reference to privacy, but some of the key points include requiring that drones may not fly directly above an individual who is not operating the drone; the drones may not fly above 500 feet; and requiring that the drones must be within the “line of sight” of the operator. See generally, 14 C.F.R. Part 107 (2017).
These unmanned aircraft systems threaten to perfect the art of surveillance. Drones are capable of finding or following a specific person. They can fly patterns in search of suspicious activities or hover over a location in wait. Some are as small as birds or insects, others as big as blimps. In addition to high-resolution cameras and microphones, drones can be equipped with thermal imaging and the capacity to intercept wireless communications.80

III. FOURTH AMENDMENT SUPREME COURT PRIVACY JURISPRUDENCE

A. The Early Electronic Surveillance Cases

As mentioned above, privacy rights have developed over time, often in response to the government’s use of new technologies. In the late nineteenth century, the United States Supreme Court first began addressing individuals’ privacy rights vis-a-vis their personal writings in the context of the Fourth Amendment. First, in Ex parte Jackson,81 the United States Supreme Court held that when an individual placed a sealed letter in the mail, the contents of that letter were subject to the warrant requirements of the Fourth Amendment.82 A decade later, in Boyd v. United States, the Supreme Court further held that a government’s request to produce and hand over an individual’s private papers violated the Fourth and Fifth Amendments.83 It was not until the advent of the twentieth century, however, that the Supreme Court began addressing privacy rights in light of the great technological advancements made in the late nineteenth century.84

Beginning with the outset of the twentieth century, the Supreme Court has struggled with the parameters of the Fourth Amendment as they apply when technological advancements and individual privacy interests intersect. Beginning with Olmstead v. United States, the Supreme Court addressed numerous

80 M. Ryan Calo, The Drone as Privacy Catalyst at 30.
81 Ex parte Jackson, 96 U.S. 727 (1877).
82 Ex parte Jackson, 96 U.S. 727, 733 (1877) (“The Constitutional guarant[ee] of the right of the people to be secure in their papers against unreasonable searches and seizures extends to their papers, thus closed against inspection, wherever they may be.”).
83 Boyd v. United States, 116 U.S. 616 (1886).
cases involving mechanical wiretapping of telephones. In those cases, the Supreme Court focused primarily on where the wiretap was placed—and the concomitant physical intrusion on to the property—rather than the perceived level of privacy that was invaded, a shift from earlier cases.

In *Olmstead*, for the first time the United States Supreme Court addressed a case involving electronic surveillance. There, the Supreme Court concluded that the Fourth Amendment protections were limited to circumstances where there was a physical trespass, which, it held, did not include a wiretap attached to the outside of an individual’s house. At its essence, the *Olmstead* Court found that the Fourth Amendment was not violated “unless there has been an official search and seizure of [a] person or such a seizure of his papers or his tangible material effects or an actual physical invasion of his house ‘or curtilage’ for the purpose of making a seizure.”

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85 *Olmstead* v. United States, 277 U.S. 438, 475 (1928); *Goldman* v. United States, 316 U.S. 129 (1942) (holding there was no Fourth Amendment violation when police used a device called a “detectaphone” to listen to an individual’s conversation in an adjacent office because there was no physical trespass); *Silverman* v. United States, 365 U.S. 505 (1961) (holding that law enforcement violated the Fourth Amendment when they used “spike mike” inserted into the baseboard of an attached house on the wall adjoining the defendant’s house because it was an “unauthorized physical encroachment” into defendant’s house); *Lopez* v. United States, 373 U.S. 427 (1963) (finding that police recording conversations between agent and defendant on an electronic device did not violated defendant’s Fourth Amendment rights).

86 See *Olmstead* v. United States, 277 U.S. 438, 475 (1928) (Brandeis, J., dissenting) “[E]vil incident to invasion of the privacy of the telephone is far greater than that involved in tampering with the mails.” *Id.* Not surprisingly, Justice Brandeis objected to the majority’s focus on physical trespass, opining that “[i]t is, of course, immaterial where the physical connection with the telephone wires leading into the defendant’s premises was made.” *Id.*

87 *Olmstead*, 277 U.S. at 455.


89 *Olmstead*, 277 U.S. at 466. In his dissenting opinion in *Olmstead*, then-Justice Brandeis continued to forcefully argue—in a vein similar to which he had argued some thirty years prior—that the Supreme Court needed to be forward-thinking in its conceptualization of the Fourth Amendment and technological advancements:

> in the application of a Constitution, our contemplation cannot be only of what has been but of what may be. The progress of science in furnishing the Government with means of espionage is not likely to stop with wire-tapping. Ways may someday be developed by which the Government, without removing papers from secret drawers can reproduce them in court, and by
B. United States v. Katz and the Reasonable Expectation of Privacy Test

The Supreme Court continued to apply the *Olmstead* physical trespass doctrine throughout the twentieth century to cases involving technology such as “detectaphones” and “spike mikes.” In *Katz v. United States*, however, the Court explicitly altered course, rejecting the *Olmstead* reasoning and the bedrock physical intrusion (trespass) theory for finding a search to violate the Fourth Amendment. *Katz* involved wiretapping technology similar to that at issue in *Olmstead*, although the conversations at issue took place in a public telephone booth. In so holding, the Court explicitly overruled its decades-old opinion in *Olmstead*.

The majority held that whether the police action constituted a search in violation of the Fourth Amendment depended on whether the information had been “knowingly expose[d] to the public,” irrespective of the physical location or whether the individual had sought to keep the information private. Under *Katz*, the Court, in rejecting the “physical trespass” property construct, declared that the Fourth Amendment “protects people, not places.” It further limited which it will be enabled to expose to a jury the most intimate occurrences of the home.

*Olmstead*, 277 U.S. at 474 (Brandeis, J. dissenting).

90 See, e.g., Goldman v. United States, 316 U.S. 129 (1942) (holding there was no Fourth Amendment violation when police used a device called a “detectaphone” to listen to an individual’s conversation in an adjacent office because there was no physical trespass); Silverman v. United States, 365 U.S. 505 (1961) (holding that law enforcement violated the Fourth Amendment when they used “spike mike” inserted into the baseboard of an attached house on the wall adjoining the defendant’s house because it was an “unauthorized physical encroachment” into defendant’s house).

91 At issue in *Katz*, however, was law enforcement’s wiretapping of a conversation in a public telephone booth, which would not have constituted a physical trespass or intrusion of Katz’s property, and consequently would not have violated the Fourth Amendment. *Katz*, 389 U.S. at 347.

92 *Katz*, 389 U.S. at 353. (“the underpinnings of Olmstead . . . have been so eroded by our subsequent decisions that the ‘trespass’ doctrine there enunciated can no longer be regarded as controlling.”).

93 *Katz*, 389 U.S. at 351.

94 *Katz*, 389 U.S. at 351.

95 *Katz*, 389 U.S. at 351.
the Fourth Amendment protection by stating that “[w]hat a person knowingly exposes to the public, even in his own home or office, is not a subject of Fourth Amendment protection. But what he seeks to preserve as private, even in an area accessible to the public, may be constitutionally protected.”

The “reasonable expectation of privacy test” became the core of Supreme Court jurisprudence surrounding Fourth Amendment protection after Katz. Justice Harlan constructed a two-part test to determine when a person has a reasonable expectation of privacy. Under this test, (1) the person must “have exhibited an actual (subjective) expectation of privacy”; and (2) the expectation must be “one that society is prepared to recognize as ‘reasonable.’” Justice Harlan’s concurrence is intriguing on several levels. It is known best for the articulation of the “reasonable expectation of privacy” construct. And while it purported to agree with the majority’s opinion that the Fourth Amendment “protects people, not places,” it moved the discussion forward by then saying, “[t]he question, however, is what protection it affords those people. Generally, as here, the answer to that question requires reference to a ‘place.’” So while still rejecting the Olmstead trespass doctrine that looked almost exclusively at whether the government had physically trespassed on an individual’s property, Justice Harlan clarified that the place where the search occurred is still relevant to whether the expectation of privacy is reasonable.

Still, to this day, the Supreme Court’s Fourth Amendment search jurisprudence is strongly aligned with concepts of privacy vis-a-vis property.

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96 Whether Katz was intended to limit the protections of the Fourth Amendment is not without dispute. See Jones, 132 S. Ct. at 951 (“Katz did not narrow the Fourth Amendment’s scope.”).
97 Katz, 389 U.S. at 349.
98 DANIEL J. SOLOVE, NOTHING TO HIDE 114 (2011). Hence, why many commentators were surprised at the majority’s reliance on Olmstead’s seemingly antiquated trespass doctrine in United States v. Jones. See Part III.D.2.
99 Katz, 389 U.S. at 349 (“But the protection of a person’s general right to privacy – his right to be let alone by other people – is like the protection of his property and of his very life, left largely to the law of the individual States.”).
100 Katz, 389 U.S. at 361–62 (Harlan, J., concurring).
101 Katz, 389 U.S. at 361 (Harlan, J., concurring).
102 Katz, 389 U.S. at 361 (Harlan, J., concurring).
103 Katz, 389 U.S. at 361 (Harlan, J., concurring).
104 Stephen E. Henderson, Beyond the (Current) Fourth Amendment: Protecting Third-Party Information, Third Parties, and the Rest of Us Too, 34 PEPP. L. REV., 975, 976 (2007); see also Susan W. Brenner, The Fourth Amendment in an Era of Ubiquitous Technology, 75 MISS. L.J. 31–32, 51 (2005) (arguing that even after the Court’s rejection of the physical trespass of property lens for looking at privacy in Katz, the Supreme Court “has continued to approach Fourth Amendment privacy as
Despite the Katz majority’s insistence that the Fourth Amendment is about protecting people and not places.

Again, the Katz test required both a subjective expectation of privacy and an objective expectation of privacy, or one that society is prepared to recognize as ‘reasonable.’ However, the Supreme Court has since parsed much of Justice Harlan’s language. First, the Court has read the word “reasonable” as being synonymous with “legitimate.”

Therefore, an individual in the midst of committing a crime may in fact have exhibited a subjective expectation of privacy, and that expectation may also be reasonable. For example, the individual committing the crime may know there is no one in the bank and that he has completely and correctly disabled the security systems. It may be reasonable for him to believe he is utterly alone. There is no doubt, however, that such an expectation of privacy is not a legitimate one and not “one that society is prepared to recognize as reasonable.”

Moreover, in Smith v. Maryland, Justice Blackmun, writing for the majority, opined that there are some foreseeable circumstances under which a subjective expectation of privacy would not be required. He put forth the

\[\text{if it is nothing more than a spatial concept; what I seclude from others is private; what I fail to shield is not.}\]

105 The Supreme Court first substituted the word “legitimate” for “reasonable” in its majority opinion. United States v. Miller, 425 U.S. 435 (1976). It did so without explanation, citing only to “Cf. Couch v. United States,” Id. (referencing Couch v. United States, 409 U.S. 322, 335 (1973)); see Rakas v. Illinois, 439 U.S. 128 (1978) (finding that passengers of a vehicle “made no showing that they had any legitimate expectation of privacy in the glove compartment or area under the seat of the car in which they were merely passengers”); Smith v. Maryland, 442 U.S. 735 (1979) (“[T]his Court uniformly has held that the application of the Fourth Amendment depends on whether the person invoking its protection can claim a ‘justifiable,’ a ‘reasonable’ or a ‘legitimate expectation of privacy’ that has been invaded by government action.”); see also Richard Sobel, Barry Horwitz and Gerald Jenkins, The Fourth Amendment Beyond Katz, Kyllo and Jones: Reinstating Justifiable Reliance as a More Secure Constitutional Standard for Privacy, 22 B.U. PUB. INT. L.J. 1, 2 (2013) (arguing for “reinstating the Katz majority holding a justifiable reliance standard reinforcing that the Fourth Amendment protects ‘people not places’—as the better mechanism to secure Fourth Amendment rights”).

106 Katz, 389 U.S. at 361 (Harlan, J., concurring); see also Illinois v. Caballes, 543 U.S. 405 (2005) (“We have held that any interest in possessing contraband cannot be deemed legitimate.”) “The critical question, then, is whether society is prepared to recognize Skinner’s expectation of privacy as legitimate.” United States v. Skinner, 690 F.3d 772, 784 (2012) (Donald, J., concurring) (“[N]umerous courts have held that privacy expectations are not diminished by the criminality of a defendant’s activities.”).

example of an immigrant, from a “totalitarian country,” may not have an understanding of “this Nation’s traditions, erroneously assum[ing] that police were continuously monitoring his telephone conversations, a subjective expectation of privacy regarding the contents of his calls might be lacking as well.”

Under such circumstances, Justice Blackmun advocated for abandoning the subjective expectations requirement since “those subjective expectations obviously could play no meaningful role” in determining the scope of Fourth Amendment protection. Instead, he claimed that a “normative inquiry” should be used, leaving unanswered how such an inquiry should be undertaken. Professor Susan Freiwald criticizes the Court’s decision in *Smith* precisely because it “avoided normative analysis and failed to consider how much privacy the law should actually grant to information.”

C. The Aerial Surveillance Trilogy

In a series of cases involving “aerial surveillance,” the Supreme Court interpreted the expectation of privacy “that society is prepared to recognize as reasonable” narrowly. In fact, in this series of cases, the Court has not found evidence gathered by law enforcement through aerial surveillance constituted a search. That said, in two of the aerial surveillance cases—*California v. Ciraolo*, *Dow Chemical v. United States*—the Court alludes to advances in technology that could lead the Court to find that law enforcement’s use of sophisticated

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108 *Smith*, 442 U.S. 735, n.5. Blackmun gave a second more-chilling example, namely, “if the Government were suddenly to announce on nationwide television that all homes henceforth would be subject to warrantless entry, individuals thereafter might not in fact entertain any actual expectation of privacy regarding their homes, papers, and effects.” *Smith*, 442 U.S. at 735, n.5.

109 *Smith*, 442 U.S. at 735, n.5.

110 *Smith*, 442 U.S. at 735, n.5.


surveillance equipment, which the public may not even be aware exists, could constitute a search requiring a warrant.\textsuperscript{113}

1. \textit{California v. Ciraolo}

In the first case in this trilogy, the Supreme Court held that there was no Fourth Amendment violation when police took photographs of marijuana plants in the defendant’s backyard from a plane 1,000 feet above.\textsuperscript{114} In \textit{California v. Ciraolo}, the police received an anonymous tip that marijuana was growing in the defendant’s backyard.\textsuperscript{115} Unable to see through two fences surrounding the backyard, the police obtained a private airplane and a thirty-five millimeter camera to fly over the backyard and take a photograph of the, as expected, marijuana plants.\textsuperscript{116} The police used their naked-eye observations and photograph of the marijuana to obtain a search warrant.\textsuperscript{117}

In determining this was not a search, the Court acknowledged the validity of Ciraolo’s subjective expectation of privacy by erecting the fences in his backyard, completely obscuring it from public view at ground level.\textsuperscript{118} However, the Court found that society would not accept as reasonable\textsuperscript{119} an expectation of privacy from surveillance that “took place within public navigable airspace . . . [given that] any member of the public flying in this airspace who glanced down could have seen everything these officers observed.”\textsuperscript{120}

\textsuperscript{113} \textit{California v. Ciraolo}, 476 U.S. 207, 215 n.3 (1986) (“\textit{a}erial observation . . . may become invasive, either due to physical intrusiveness or through modern technology which discloses to the senses . . . through modern technology”). Specifically, in \textit{Dow Chemical}, the Court opined that “surveillance of private property by using highly sophisticated surveillance equipment not generally available to the public, such as satellite technology, might be constitutionally proscribed absent a warrant.” \textit{Dow Chem. Co. v. United States}, 476 U.S. 227, 229 (1986). In \textit{Florida v. Riley}, although the alleged search involved pictures taken with a telephoto lens, the Court took pains to articulate that the police officer had identified the marijuana with his “naked eye,” leaving open the possibility of a different result in a case involving more advanced technology. \textit{Florida v. Riley}, 488 U.S. 445, 448–49 (1989).


\textsuperscript{115} \textit{Ciraolo}, 476 U.S. at 209.

\textsuperscript{116} \textit{Ciraolo}, 476 U.S. at 209.

\textsuperscript{117} \textit{Ciraolo}, 476 U.S. at 209–10.

\textsuperscript{118} \textit{Ciraolo}, 476 U.S. at 211.

\textsuperscript{119} \textit{Ciraolo}, 476 U.S. at 214.

\textsuperscript{120} \textit{Ciraolo}, 476 U.S. at 213–14.
Ciraolo could not escape from the routine of flight and use of public airways 1,000 feet above his backyard. However, the Court did note that this type of aerial observation may become invasive by physical intrusiveness or “through modern technology which discloses to the senses those intimate associations, objects or activities otherwise imperceptible to police or fellow citizens.”

2. *Dow Chemical v. United States*

On the same day, the Court held similarly in *Dow Chemical v. United States*, that aerial photographs taken from public navigable airspace was not a Fourth Amendment violation. The Court determined that mere enhancement of the naked eye through the use of an aerial mapping camera did not constitute a search.

In *Dow Chemical*, a chemical manufacturing company, which barred ground level public view of its plant and investigated low-level flights above its plant, denied the EPA’s request for an on-site administrative inspection. In response, the EPA hired a commercial aerial photographer with an aerial mapping camera to take photographs of the plant, which Dow Chemical argued was beyond the EPA’s statutory right of site inspection.

Holding that taking “aerial photographs of an industrial plant complex from navigable airspace is not a search prohibited by the Fourth Amendment,” the Court emphasized that the company had done nothing to shield itself from aerial photography from public airspace. Additionally, the Court looked carefully at the type of camera technology that was used—“a conventional, albeit precise, commercial camera commonly used in mapmaking”—as well as the absence of visible intimate details captured in the picture.

Though the Court did not find it applicable in the present case, it hypothesized that there may be some instances where warrantless government

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121 *Ciraolo*, 476 U.S. at 215 n.3.
124 *Dow Chem.*, 476 U.S. at 229.
126 *Dow Chem.*, 476 U.S. at 239.
surveillance of private property could constitute a search in violation of the Fourth Amendment. Here, though, instead of focusing on physical intrusiveness or technology “which discloses to the senses . . . intimate associations,” as it had in *Ciraolo*, the court focused on the type of technology: “surveillance of private property by using highly sophisticated surveillance equipment not generally available to the public, such as satellite technology . . . [or] an electronic device to penetrate walls or windows as to hear or record confidential discussions” may be unconstitutional without a warrant.

3. *Florida v. Riley*

Concluding the trilogy, in *Florida v. Riley*, the Court held that there was no Fourth Amendment violation when police flew a helicopter over defendant’s backyard at approximately 400 feet and took photographs of the marijuana growing below.

In *Riley*, after the police were unable to observe the defendant’s backyard to confirm an anonymous tip that Riley was growing marijuana, the police used a helicopter to observe the backyard. While 400 feet above the ground, the police observed two open sides of a greenhouse and took photographs using a telephoto lens of the marijuana growing inside. The officers used the photograph to obtain a search warrant, which resulted in Riley’s arrest for possession of marijuana.

The plurality determined that the two exposed sides of the greenhouse subjected Riley to a reasonably objective search from the public airspace above.

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131 Although partially concurring in the majority opinion, Justice Powell wrote a dissent criticizing the analysis of the majority, claiming the majority had abandoned the principles of *Katz* by focusing on the method of the search rather than the scope of the right being protected. *Dow Chem.*, 476 U.S. at 246–47 (Powell, J., concurring in part and dissenting in part).


133 The deputy took photographs from the helicopter, but the trial judge accepted that the deputy could identify the marijuana without the use of the camera. *State v. Riley*, 476 So. 2d 1354, 1355 (Fla. Dist. Ct. App. 1985). The Supreme Court found that the deputy had identified the marijuana with his “naked eye.” *Riley*, 488 U.S. at 448–49.

134 *Riley*, 488 U.S. at 448–49.

135 *Riley*, 476 So. 2d at 1355.
despite his reasonable subjective expectation of privacy. Similar to the fixed-wing planes in *Ciraolo*, helicopters are routinely used in public airways, and the helicopter stayed at an altitude in accordance with laws and regulations. Further, because of the low altitude, as compared to the plane at 1,000 feet in *Ciraolo*, the plurality focused on whether the helicopter interfered with the defendant’s normal use of his property during the flight. The Court held that society would accept the use of a helicopter as reasonable because “no intimate details connected with the use of the home or curtilage were observed, and there was no undue noise, and no wind, dust, or threat of injury.”

4. The Aftermath of the Aerial Surveillance Trilogy

The aerial surveillance trilogy brought new and additional considerations for other courts addressing aerial surveillance issues. The Court in *Ciraolo* focused on whether the surveillance took place within public navigable airspace. *Dow Chemical* took the discussion beyond that, focusing on the type of technology used. And lastly, *Riley* focused on the altitude of the aerial surveillance tool and whether the defendant’s normal use of property was interfered with.

Although the Supreme Court has in no case found that any type of aerial surveillance is a search, lower courts have struggled with applying this precedent, particularly when determining the altitude from which an aircraft is allowed to view private property. For example, the Eighth Circuit has found it was not a search under the Fourth Amendment when the defendant could not prove that flights at 100 feet “are so rare as to make aerial surveillance at that level unreasonable.” The Fourth Circuit similarly found that a helicopter flying as low as 35 feet over a defendant’s property did not constitute a Fourth Amendment search where the prosecution proved that the flights were in compliance with FAA regulations and “such flights were a regular occurrence in the area.” Conversely, the Sixth Circuit affirmed the trial court’s order

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139 See *supra* Part III.C.
141 *United States v. Boyster*, 436 F.3d 986, 992 (8th Cir. 2006).
142 *United States v. Breza*, 308 F.3d 430, 434 (4th Cir. 2002).
suppressing evidence in a per curium opinion, stating that “[i]f, in fact the
officers were flying at an altitude of 125 to 150 feet, their disturbance of the
home would interfere with the defendant’s normal use of his premises.”143

D. The Advanced Technology Cases

In the following cases, in an unexpected divergence from the aerial
surveillance cases,144 the Supreme Court found the use of advanced technology
did constitute a search in violation of an individual’s Fourth Amendment right
to privacy. Specifically raising the additional concerns of whether the
technology used is in general public use, whether the technology is monitoring
the home, and the duration of the surveillance.

1. Kyllo v. United States

Although the aerial surveillance trio suggests that the government has
broad discretion in surveillance of private property, such discretion is not
unfettered, at least when it comes to technology that is not yet commonly used
by the public.145 In Kyllo v. United States,146 the Supreme Court held that police
use of thermal image technology to detect whether marijuana was being grown
inside a home was considered a “search” under the Fourth Amendment and
“presumptively unreasonable without a warrant.”147

In Kyllo, a federal law enforcement agent suspected Kyllo of growing
marijuana in his triplex home.148 Because indoor marijuana ordinarily requires
high-intensity heat lamps to grow, two agents, while sitting in their car across
the street, briefly employed a thermal imager to determine whether the amount
of heat emanating from Kyllo’s home was consistent with high-intensity heat

143 United States v. Saltzman, No. 92-5389, 1993 WL 100082, at *3 (6th Cir. Apr. 5, 1993) (per
curium).
144 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.
145 The real question is whether the Court would look at unmanned aerial systems as it has in
the aerial surveillance cases or whether it will be viewed as “new technology” as in Kyllo.
146 Kyllo, 533 U.S. at 27.
147 Kyllo, 533 U.S. at 40.
148 Kyllo, 533 U.S. 27 at 29.
Based on the readings from the thermal imager, as well as testimony from informants and utility bills, the agents obtained a warrant and searched Kyllo’s home, where they found an “indoor growing operation” with over 100 marijuana plants. Kyllo was charged with manufacturing marijuana and pled guilty after the District Court denied his motion to suppress the evidence seized from his home. Upon appeal, Ninth Circuit Court of Appeals held that Kyllo had made no attempt to conceal the heat escaping from his home and the imager did not expose any intimate details.

In explaining its holding that using a thermal imaging device to scan an individual’s home was presumptively unreasonable without a warrant, the Court declared that “[t]he question we confront today is what limits there are upon this power of technology to shrink the realm of guaranteed privacy.” The majority explained that one of the many reasons that Kyllo had a reasonable expectation of privacy in his home was that the thermal image scanners were not in “general public use.”

Further, the Court emphasized the non-mechanical approach in *Katz*, applying it to the home, stating “[r]eversing that approach would leave the homeowner at the mercy of advancing technology.” Thus, emphasizing the

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149 *Kyllo*, 533 U.S. 27 at 29.
151 *Kyllo* was specifically charged with violating 21 U.S.C. § 841(a)(1).
152 *Kyllo*, 533 U.S. 30.
153 “[N]o subjective expectation of privacy because he had made no attempt to conceal the heat escaping from his home . . . and even if he had, there was no objectively reasonable expectation of privacy because the imager ‘did not expose any intimate details of Kyllo’s life.’ ” *Kyllo*, 533 U.S. at 31 (citing United States v. Kyllo, 190 F.3d 1041, 1047 (9th Cir. 1999)). Scalia takes on this “intimate details” argument by implying that it is not whether the details are intimate or not that matters but instead the fact that *Dow Chemical* involved “aerial photography of an industrial complex, which “does not share the Fourth Amendment sanctity of the home.” *Kyllo*, 533 U.S. at 37.
154 *Kyllo*, 533 U.S. at 34. Although Scalia says this at the beginning of the opinion, he spends most of the opinion elucidating the importance of the “home,” which appears to directly contravene the language in the majority opinion in *Katz*, recognizing that the Fourth Amendment protects “people, not places.” *Kyllo*, 533 U.S. at 49 (citing *Katz*, 389 U.S. at 351).
155 *Kyllo*, 533 U.S. at 40. “While the technology used in the present case was relatively crude, the rule we adopt must take account of more sophisticated systems that are already in use or development.” *Kyllo*, 533 U.S. at 35.
156 *Kyllo*, 533 U.S. at 35.
importance of privacy given to the “sanctity of the home,” as the Fourth Amendment protection of the home has never depended on the “quality or quantity of information obtained.”\textsuperscript{157} Instead, in the home, “all details are intimate details, because the entire area is held safe from prying government eyes.”\textsuperscript{158} However, the Court found that limiting the prohibition of the thermal imaging to “intimate details” is incorrect in principle and in practicality,\textsuperscript{159} and instead should focus on whether a device is within general public use, and used “to explore details of the home that would previously have been unknowable without physical intrusion.”\textsuperscript{160}

Justice Stevens’ scathing dissent recognizes the possible effects of the majority’s decision on the expectation of privacy.\textsuperscript{161} The dissent criticized the expansive treatment of the expectation of privacy afforded to the home and disagreed with hinging the determination as to whether government surveillance constitutes a search on whether or not the device used by the government is “in general public use.”\textsuperscript{162} Specifically, the dissent argued that the thermal imaging technology was readily available for “commercial, personal, or law enforcement purposes, and is just an 800 number away from being rented from ‘half a dozen national companies’ by anyone who wants one.”\textsuperscript{163} Inevitable privacy concerns and intrusive technology becoming more readily available supported the dissent’s position that looking at whether technology is in general public use is unnecessary, unwise, and inconsistent with the Fourth Amendment.\textsuperscript{164}

2. \textit{United States v. Jones}

\hspace{1cm} 157 \textit{Kyllo}, 533 U.S. at 37.
\hspace{1cm} 158 \textit{Kyllo}, 533 U.S. at 37. He compares the physical search of the home in \textit{Arizona v. Hicks}, which involved the “registration number of a phonograph turntable” with the heat emanating from Kyllo’s residence, which seems like a stretch. These were “details of the home, just as was the detail of how warm—or even how relatively warm—Kyllo was heating his residence.” \textit{Kyllo}, 533 U.S. at 38 (citing \textit{Arizona v. Hicks}, 480 U.S. 321(1987)).
\hspace{1cm} 159 \textit{Kyllo}, 533 U.S. at 38.
\hspace{1cm} 160 \textit{Kyllo}, 533 U.S. at 40.
\hspace{1cm} 161 “The supposedly ‘bright-line’ rule the Court has created in response to its concerns about future technological developments is unnecessary, unwise, and inconsistent with the Fourth Amendment.” \textit{Kyllo}, 533 U.S. at 41 (Stevens, J., dissenting). Justice Stevens was joined by then Chief Justice Rehnquist, Justices O’Connor and Kennedy.
\hspace{1cm} 162 \textit{Kyllo}, 533 U.S. at 46–47.
\hspace{1cm} 163 \textit{Kyllo}, 533 U.S. at 47, n.5.
\hspace{1cm} 164 \textit{Kyllo}, 533 U.S. at 47.
In *United States v. Jones*, the Supreme Court held that using and attaching a GPS tracking device to an individual’s vehicle to monitor the vehicle’s movements was a Fourth Amendment search.\(^{165}\)

In *Jones*, the defendant was suspected of drug trafficking and targeted by the FBI and local police.\(^{166}\) The government sought evidence to obtain a search warrant for Jones’s wife’s truck.\(^{167}\) While parked in a public parking lot, the officers installed a GPS tracker on the under carriage of the truck.\(^{168}\) For the following twenty-eight days, the government tracked the vehicle’s movements through satellite signals, resulting in more than 2,000 pages of data.\(^{169}\) After the government obtained an indictment against him for multiple drug-related offenses, Jones moved to suppress the evidence obtained by the government through the GPS device.\(^{170}\)

The District Court granted Jones’s motion to suppress in part concerning the GPS data from when the car was parked in the garage at Jones’s residence, and denied in part for the remaining data.\(^{171}\) In doing so, the Court held that an individual “has no reasonable expectation of privacy in his movements from one place to another.”\(^{172}\) The first trial ended in a hung jury, and after being indicted, charged, and faced with the same GPS data a second time, Jones was sentenced to life in prison.\(^{173}\)

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165 *Jones*, 132 S. Ct. at 948.

166 *Jones*, 132 S. Ct. at 948. In addition to the GPS device, the police employed a plethora of investigative techniques, including visual and camera surveillance of Jones’s place of business and installation of a pen register and wiretap of Jones’s cell phone. *Id.*

167 The warrant that issued from the U.S. District Court for the District of Columbia authorized the government to install the device within ten days and to do so in the District of Columbia. *Jones*, 132 S. Ct. at 948. The fact that the government did not install the device until after the ten days had expired—on the 11th day—and did so in Maryland rather than the District of Columbia, lead the courts to treat this as a warrantless search. *Jones*, 132 S. Ct. at 948, n.1 (citing United States v. Maynard, 615 F.3d 544, 566 (D.C. Cir. 2010) (“In this litigation, the Government has conceded noncompliance with the warrant and has argued only that a warrant was not required.”)).

168 Although the vehicle was registered to Jones’s wife, the government conceded that Jones was “the exclusive driver.” *Maynard*, 615 F.3d at 555. The Court of Appeals reached the conclusion that the fact that the car was registered in his wife’s name did not preclude Jones from bringing a Fourth Amendment claim. *Maynard*, 615 F.3d at 555.

169 *Jones*, 132 S. Ct. at 948.


173 *Jones*, 132 S. Ct. at 948–49.
The D.C. Circuit reversed and found that admitting the data obtained by the government through the warrantless use of GPS system constituted a search and thus violated Jones’s Fourth Amendment rights. The circuit court referenced the use of law enforcement’s “mosaic theory” regarding surveillance, finding that “[w]hat may seem trivial to the uninformed, may appear of great moment to one who has a broad view of the scene.”

The Court returned to the trespass analysis from Olmstead, nothing that “[t]he text of the Fourth Amendment reflects its close connection to property,” and “[c]onsistent with this understanding, our Fourth Amendment jurisprudence was tied to common-law trespass, at least until the latter half of the 20th century.” The Court opined that it need not address the Katz

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174 Maynard, 615 F.3d at 544.
175 Maynard, 615 F.3d at 562 (quoting C.I.A. v. Sims, 471 U.S. 159, 178 (1985) (internal quotations omitted)). Moreover, it distinguished the type of “surveillance” at issue in Knotts v. United States with the month-long constant prolonged surveillance in Maynard:

Prolonged surveillance reveals types of information not revealed by short-term surveillance, such as what a person does repeatedly, what he does not do, and what he does ensemble. These types of information can each reveal more about a person than does any individual trip viewed in isolation. Repeated visits to a church, a gym, a bar, or a bookie tell a story not told by any single visit, as does one’s not visiting any of these places over the course of a month. The sequence of a person’s movements can reveal still more; a single trip to a gynecologist’s office tells little about a woman, but that trip followed a few weeks later by a visit to a baby supply store tells a different story. A person who knows all of another’s travels can deduce whether he is a weekly church goer, a heavy drinker, a regular at the gym, an unfaithful husband, an outpatient receiving medical treatment, an associate of particular individuals or political groups—and not just one such fact about a person, but all such facts.

United States v. Maynard, 615 F.3d 544, 562 (D.C. Cir. 2010). At issue in Knotts was the use of GPS to monitor a “single trip” and the Knotts Court “pointedly acknowledged and reserved for another day the question of whether a Fourth Amendment issue would be posed if “twenty-four hour surveillance of any citizen of this country [were] possible.” In Knotts, the Supreme Court held there was no Fourth Amendment violation where a beeper was placed in a container of chloroform with the permission of the container’s owner before the container came into the defendant’s possession. United States v. Knotts, 460 U.S. 276 (1983); see also Renee McDonald Hutchins, Tied Up in Knotts? GPS Technology and the Fourth Amendment, 419 UCLA L. REV. 409, 457 (2007) (The United States Supreme Court decision in Knotts should not be read to permit warrantless “twenty-four hour surveillance of any citizen of this country.” (quoting Knotts, 460 U.S. at 284)).

176 Jones, 132 S. Ct. at 949.
reasonable expectation of privacy test because “the *Katz* [] test has been added to, not substituted for the common-law trespassory test.” Further, in finding that there was a Fourth Amendment violation, the Supreme Court distinguished the Court’s previous rejection of two Fourth Amendment challenges involving the government’s placing of “electronic tracking devices” or “beepers” into containers, allowing police officers to monitor the location of the containers.  

The Justices note various concerns with the majorities holding, which foreshadow the potential effects on the right to privacy in future cases. Specifically, Justice Alito notes that “longer term GPS monitoring in investigations of most offenses impinges on expectations of privacy” and, as such, likely conflicts with the Fourth Amendment. Along the same lines, Justice Sotomayor posited that the holding in the majority opinion in *Jones* “provides little guidance on ‘cases of electronic or other novel modes of surveillance that do not depend on a physical invasion on property.’” Sotomayor warned of the danger to privacy of long-term surveillance:

> GPS monitoring generates a precise, comprehensive record of a person’s public movements that reflects a wealth of detail about her familial, political, professional, religious, and sexual associations. The Government can store such records and efficiently mine them for information years into the future. And because GPS monitoring is cheap in comparison to conventional surveillance techniques and, by design, proceeds surreptitiously, it evades the ordinary checks that constrain

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177 *Jones*, 132 S. Ct. at 952.

178 *Jones*, 132 S. Ct. at 951.

179 *Jones*, 132 S. Ct. at 964 (Alito, J., concurring) (positing that although “short-term monitoring of a person’s movements on public streets accords with expectations of privacy that our society has recognized as reasonable. . . [b]ut the use of longer term GPS monitoring in investigations of most offenses impinges on expectations of privacy.”).

180 *Jones*, 132 S. Ct. at 964 (Alito, J. concurring).

181 *Skinner*, 690 F.3d at 780 (quoting *Jones*, 132 S. Ct. at 955 (Sotomayor, J., concurring)).

182 *Jones*, 132 S. Ct. at 955 (Sotomayor, J., concurring) (quoting *Weaver*, 12 N.Y.3d at 441–42, (2009) (“Disclosed in [GPS] data . . . will be trips the indisputably private nature of which takes little imagination to conjure: trips to the psychiatrist, the plastic surgeon, the abortion clinic, the AIDS treatment center, the strip club, the criminal defense attorney, the by-the-hour motel, the union meeting, the mosque, synagogue or church, the gay bar and on and on.”)).

183 United States v. Pineda-Moreno, 617 F.3d 1120, 1124 (9th Cir. 2010).
abusive law enforcement practices: ‘limited police resources and community hostility.’

E. Post-Jones Circuit Court Difficulties

1. Seventh Circuit: United States v. Flores-Lopez

Not long after the Supreme Court issued its decision in Jones, the lower courts demonstrated the difficulties they would have in following the reasoning of the majority opinion, despite its supposed “bright-line technological search rule.” For example, in the United States v. Flores-Lopez, the Seventh Circuit issued a decision holding that a warrantless search by the police of a defendant’s cell phone in order to identify his cell phone number did not violate the Fourth Amendment because the search was only “minimally invasive,” a standard the Seventh Circuit created pre-Kyllo and Jones. The standard, however, was at odds with the majority opinion in Kyllo, which stated that Fourth Amendment violations have “never been tied to measurement of the quality or quantity of information obtained.”

Although the Seventh Circuit held in Flores-Lopez that the warrantless search of the cell phone was reasonable, it did acknowledge that “[t]he potential invasion of privacy in a search of a [smart] phone is greater than in a search of a ‘container’ in a conventional sense even when the conventional container is a purse that contains an address book (itself a container) and photos.” Moreover, the court acknowledged that, for purposes of Fourth Amendment searches, smartphones are unlike other personal objects because they “hold so much personal and sensitive information touching on many private aspects of life [and there] is a far greater potential for the ‘inter-mingling’ of documents and consequent invasion of privacy when police execute a search for evidence

184 Jones, 132 S. Ct. at 955 (Sotomayor, J., concurring) (quoting Illinois v. Lidster, 540 U.S. 419, 426 (2004)).
186 United States v. Flores-Lopez, 670 F.3d 803, 806 (7th Cir. 2012)
187 Flores-Lopez, 670 F.3d at 807 (citing United States v. Concepcion, 942 F.2d 1170, 1172–73 (7th Cir. 1991)).
188 Kyllo, 533 U.S. at 37.
189 Flores-Lopez, 670 F.3d at 805.
on a computer” because “[e]ven the dumbest of [smart]phones give the user access to large stores of information.”

Despite recognizing the level of invasiveness related to a search of a cell phone, the Seventh Circuit upheld the validity of the search primarily because the individual had no expectation of privacy in the telephone number since he had already disclosed the information to a third party, his cell phone company. Such a finding brings to the forefront yet another reason that the third party doctrine is “ill-suited to the digital age,” as opined by Justice Sotomayor in Jones. Nonetheless, the court’s reliance on this doctrine in this case was at odds with the Supreme Court’s decisions in Kyllo and Jones.

2. Sixth Circuit: United States v. Skinner

Shortly after Jones, the Sixth Circuit found that there was no Fourth Amendment violation when police used GPS technology to track a defendant’s phone.

In United States v. Skinner, the police used GPS technology to track the “pay-as-you-go” cell phone that defendant Skinner used as part of his drug trafficking courier activities. Law enforcement used the GPS to track the data emanating from Skinner’s phone and tracked him to a motorhome parked at a truck stop. Officers conducted a perimeter dog sniff around the motorhome, which alerted them to possible drugs inside. The officers entered the home.

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190 Flores-Lopez, 670 F.3d at 806 (quoting United States v. Lucas, 640 F.3d 168, 178 (6th Cir. 2011)).
191 Flores-Lopez, 670 F.3d at 806; see also Richard Sobel, Barry Horwitz & Gerald Jenkins, The Fourth Amendment Beyond Katz, Kyllo and Jones: Reinstating Justifiable Reliance as a More Secure Constitutional Standard for Privacy, 22 B.U. PUB. INT. L.J. 37 (2013) (“Since smartphones contain a wealth of intimate information in the form of text messages, e-mails and other personal data, it is highly likely that an average member of the community would be outraged or at least strongly object to the police rifling through one’s smartphone merely as an incident to arrest.”).
192 Flores-Lopez, 670 F.3d at 807.
193 Jones, 132 S. Ct. at 957 (Sotomayor, J., concurring).
194 See Kyllo, 533 U.S. at 34 (warning against leaving citizens “at the mercy of advancing technology”).
196 Skinner, 690 F.3d at 774.
197 The law enforcement “authorities obtained an order from a federal magistrate judge . . . authorizing the phone company to release subscriber information, cell site information, GPS real-time location, and ‘ping’ data” for two pay-as-you-go phones, including the one used by Skinner. Skinner, 690 F.3d at 776.
discovered over 1,100 pounds of marijuana, and arrested Skinner.198 Prior to trial, Skinner moved to suppress the evidence found in the motorhome, alleging that his Fourth Amendment rights were violated by the officers’ use of the GPS data emanating from his cell phone.199 The district court denied the motion to suppress because Skinner did not have a legitimate expectation of privacy in the cell phone or the motorhome because he was traveling on a public thoroughfare.200

On appeal, the Sixth Circuit held similarly that there was no Fourth Amendment violation because Skinner had no “reasonable expectation of privacy in the data given off by his voluntarily procured pay-as-you-go cell phone.”201 Therefore, “[b]ecause authorities tracked a known number that was voluntarily used while traveling on public thoroughfares, Skinner did not have a reasonable expectation of privacy in the GPS data and location of his cell phone.”202

The court noted the differences between Jones in that the majority opinion “explicitly relied in the trespassory nature of the police action”203 and “no such physical intrusion occurred in Skinner’s case.”204 Additionally, the court acknowledged that Skinner was using the cell phone for criminal purposes, stating “[i]f a tool used to transport contraband gives off a signal that can be tracked for location, certainly the police can track the signal.”205 Thus, the type of technology used, the amount of time monitored, and the location of what was being monitored were all-important factors in the court’s decision.

3. Riley v. California

A unanimous Supreme Court, in Riley v. California, held that police should not be permitted to search cell phones without a warrant or exigent circumstances.206 Riley consisted of two cases in which officers seized cell

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198 Skinner, 690 F.3d at 776.
199 Skinner, 690 F.3d at 776.
200 Skinner, 690 F.3d at 776.
201 Skinner, 690 F.3d at 777.
202 Skinner, 690 F.3d at 781.
203 Skinner, 690 F.3d at 777.
204 Skinner, 690 F.3d at 779.
205 Skinner, 690 F.3d at 777.
phones from the defendants, and subsequently searched them in detail.207 The contents on the phone led police to other evidence and ultimately charged both defendants with additional crimes.208 Riley moved to suppress the cell phone evidence, arguing the officers did not have a warrant and there were no exigent circumstances to support the search.209

In finding that a defendant’s Fourth Amendment rights were violated when officers searched their cell phone without a warrant or exigent circumstances, the Court had to decide how the search incident to arrest doctrine applied to cell phones.210 The Court emphasized the pervasiveness of cell phones with their tremendous storage capacity.211 Additionally, the Court held that the “container doctrine,” which established a per se rule that police could seize and open personal objects found on an individual they were arresting,212 did not extend to “opening” cell phones. There was no risk to the officer that there was a weapon inside the phone (so no necessity based on danger) and there was no danger of losing evidence because the police could seize the phone and likely just turn the phone off.

There is an element of pervasiveness that characterizes cell phones but not physical records. Prior to the digital age, people did not typically carry a cache of sensitive personal information with them as they went about their day. Now it is the person who is not carrying a cell phone, with all that it contains, who is the exception.213

Given the amalgamation of technologies at issue with drones, courts need to rethink how to ensure that Fourth Amendment protections are protected in the face of technological advances such as drones.

V. Factors Test to Assist Courts When Faced with a Warrantless Search by Law Enforcement Deploying Drones

207 Riley, 134 S. Ct. at 2480–82.
208 Riley, 134 S. Ct. at 2480–83.
209 Riley, 134 S. Ct. at 2480.
210 Riley, 134 S. Ct. at 2484.
211 Id. at 2490.
212 This doctrine was originally established in United States v. Robinson, 414 U.S. 218 (1973), when the Supreme Court allowed that a cigarette pack an arrestee had on their person could be removed and opened without a warrant.
The question therefore becomes now that police have the ability to extensively technologically monitor individuals’ public movement and activities by using drones, how should courts analyze the Fourth Amendment’s protection against ‘unreasonable searches’ in the context of drones?

Some scholars have argued for a technology-based approach to determining what constitutes a search under the Fourth Amendment. David Gray and Danielle Citron propose that use of any technology, including aerial drones, would be a search if that technology could “facilitate broad programs of indiscriminate surveillance that intrude upon reasonable expectations of quantitative privacy.”214 According to Gray and Citron, the key is that these broad-based modern surveillance technologies “raise the same specter of authoritarianism for modern citizens that ‘broad and indiscriminate use of physically invasive searches and seizures’ did for our predecessors.”215

Similarly, Susan Freiwald proposes a four-factor test that she has synthesized from the Supreme Court and lower courts in addressing video surveillance or wiretapping in the home or private spaces. Under this proposed test, police engagement in public surveillance would be considered a search based on the following factors:216 (1) it is hidden, that is, the surveillance target is not aware of it; (2) it is intrusive, that is, it grants police access to things that individuals would consider private; (3) continuous, that is, it denotes a series of intrusions rather than a single intrusion; 217 (4) indiscriminate, in that it “gathers up more information than necessary to establish guilt.”218 Most GPS surveillance would ordinarily be considered a search under her factors test.

I propose a series of factors for courts to apply to determine whether a warrantless search by a law enforcement deploying drones has crossed the Constitutional line in violation of an individual’s Fourth Amendment right to privacy:

217 This circles back to the Mosaic theory, Kerr’s criticisms of the series idea, and the difference between Knotts and Jones.
1. Type of technology is the drone employing in the search? Camera, video, facial recognition software, GPS/cell phone tracking
2. Extent of the surveillance?
3. What is the extent of the privacy intrusion?

A. What Type of Technology is the Drone Employing in the Search?

A court faced with a drone surveillance issue would first address what type of technology is being used on that specific drone — camera, video, Facial Recognition Software, GPS/Cell Phone tracking—noting that a drone may be fitted with several technologies working in combination. The more precise the technology is, the greater implication of privacy rights.

In the context of law enforcement surveillance tracking, “[w]hat the technology yields and records with breathtaking quality and quantity is a highly detailed profile, not simply of where we go, but by easy reference, of our associations—political, religious, amicable and amorous, to name only a few—and of the pattern of our professional and avocational pursuits.”

In *Kyllo*, the Supreme Court stated that the police using sense enhancement technology would not constitute a search if that technology were “in general public use,” unless the police used it to surveil a home or other “private environment.” This general public use test has been criticized heavily by myriad scholars. As Marc Blitz writes, “critics are right to argue that the Supreme Court would invite chaos and confusion if what counted as a search

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221 *Kyllo*, 533 U.S. at 40.
changed each year as new technologies and cultural practices transformed the way people interact with public space.”

Further, in his concurrence in *Jones*, Justice Alito identified specific problems with *Katz*’s expectation-of-privacy test particularly as they apply to new developments in technology.

[T]he *Katz* test rests on the assumption that this hypothetical reasonable person has a well-developed and stable set of privacy expectations. But technology can change those expectations. Dramatic technological change may lead to periods in which popular expectations are in flux and may ultimately produce significant changes in popular attitudes. New technology may provide increased convenience or security at the expense of privacy, and many people may find the tradeoff worthwhile. And even if the public does not welcome the diminution of privacy that new technology entails, they may eventually reconcile themselves to this development as inevitable.

For a variety of practical reasons, the least of which is, how a court or a magistrate would measure “general public use.” Would it, for example, be locality specific, or a national measure? What of technology that was arguably not commonly in the hands of the public at the time of the alleged search but at the time of the court challenge it was in the public use? We are that the pinnacle of just such a possibility with drones at this very moment. As a result of the FAA regulations, the number of drones within the public use is already skyrocketing, undoubtedly increasing the risks to public privacy. Perversely, [t]hat would mean that, even as enhancements to aerial drones and GPS units make these devices a greater threat to privacy, their use by police would paradoxically become subject to less Fourth Amendment oversight—as long as private citizens are able to purchase and use such surveillance technology for their own purposes.

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224 *Jones*, 132 S. Ct. at 962.
225 *Jones*, 132 S. Ct. at 962–63.
B. What is the Extent of the Surveillance?

“Members of a free society do not expect to be subject to continuous government surveillance, even as they walk or drive on public pathways.”227 The judge would first consider the privacy level of a particular type of information.228 How personal is the information?229 “Moreover, [w]ill its access tend to be embarrassing or stigmatizing? Is the information being accessed by others?”230 Does current law speak to the access of this or similar information?231

The Court in United States v. Knotts and United States v. Jones both looked at the duration of surveillance. However, unlike the GPS surveillance at issue in Knotts and Jones, the surveillance capability of drones is substantially more comprehensive. Although, in Part IV of his concurrence in Jones, Alito may have well been talking about drones rather than GPS devices. Before the advent of GPS devices, it would have been close to impossible from a practical and financial standpoint for the government to track every movement an individual made in his car every minute for four weeks. Devices like the GPS at issue in Jones, or drones, “make long-term monitoring relatively easy and cheap.”232 Therefore, the “best that we can do is to apply existing Fourth Amendment doctrine and to ask whether the use of GPS tracking in a particular case involved a degree of intrusion that a reasonable person would not have anticipated.”233 He concludes that, unlike “relatively short-term monitoring of a person’s movements on public streets”234 the four-week long secret monitoring

228 In 2012, the American Bar Association House of Delegates created an additional volume to its Criminal Justice Standards titled “Law Enforcement Access to Third Party Records.” CRIMINAL JUSTICE STANDARDS ON LAW ENFORCEMENT ACCESS TO THIRD PARTY RECORDS (2012).
229 CJS Sec. 25-4.1(b).
230 CJS Sec. 24-4.1(c).
231 CJS Sec. 24-4.1(d).
232 Jones, 132 S. Ct. at 964. Moreover, “[i]n the pre-computer age, the greatest protections of privacy were neither constitutional nor statutory, but practical.” Id. at 963.
233 Jones, 132 S. Ct. at 964.
234 Jones, 132 S. Ct. at 964.
and cataloging of every single movement of a vehicle is not in accord with “expectations of privacy that our society has recognized as reasonable.”

Marc Jonathan Blitz puts forth the following Constitutional law query: “As police gain the ability to technologically monitor individuals’ public movements and activities, does the Fourth Amendment’s protection against ‘unreasonable searches’ place any hurdles in their way?” Blitz posits that the Supreme Court answered the question affirmatively in Jones in two separate concurring opinions, signed on by five different justices. However, he critiques the suggestion in the concurring opinions on two primary grounds: first, they do not provide guidance on where the line should be drawn regarding when public surveillance “morphs from a means by which police monitor public space into a Fourth Amendment ‘search.’” In other words, the justices did not identify when surveillance becomes so long or so comprehensive that it could be said “to cross the constitutional dividing line.” Second, the concurring opinions fail to address why the Fourth Amendment would cover electronic surveillance like that at issue in Jones, but not apply to around the clock surveillance by the police.

As technology develops allowing law enforcement to continuously follow an individual and track all of his or her movements, the importance of considering the duration of the surveillance becomes even more critical. Doing so, will address two primary concerns involving privacy. It will place limits on the possibility that a drone can monitor an individual’s day-to-day activities.

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235 Jones, 132 S. Ct. at 964. Moreover, if there is uncertainty as to whether the length of time for the surveillance is too long, police can always get a warrant. Id.
239 Maynard discusses why around the clock video surveillance is different. United States v. Maynard, 615 F.3d 544, 566 (D.C. Cir. 2010); supra note 177; see also Jeremy Brown, Pan, Tilt, Zoom: Regulating the Use of Video Surveillance of Public Places, 23 BERKELEY TECH L.J. 755, 761–62 (explaining that law enforcement has increasingly engaged in more sophisticated surveillance and “praised video surveillance as an effective tool”).
Second, the court should consider the location of the technologies, looking to the aerial surveillance trilogy cases for guidance. As at issue in Florida v. Riley, the altitude of the helicopter was greatly considered by the Court. Specifically, in her concurring opinion, Justice O'Connor argued that the defining question was “whether the helicopter was in the public airways at an altitude at which members of the public travel with sufficient regularity that Riley’s expectation of privacy from aerial observation was not ‘one that society was prepared to recognize as reasonable.’”\(^{241}\) Distinguishing Riley from the Court’s opinion in Ciraolo, Justice O’Connor opined

Ciraolo’s expectation of privacy was unreasonable not because the airplane was operating where it had a “right to be,” but because public air travel at 1,000 feet is a sufficiently routine part of modern life that it is unreasonable for persons on the ground to expect that their curtilage will not be observed from the air at that altitude.

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If the public rarely, if ever, travels overhead at such altitudes, the observation cannot be said to be from a vantage point generally used by the public and Riley cannot be said to have “knowingly expose[d]” his greenhouse to public view.\(^{242}\)

While currently, seeing a drone would not be as routine as seeing an airplane or helicopter high above your property. But, in due time, seeing the approximated seven million drones by 2020 will seem as common as seeing a flock of birds.

C. What is the Extent of the Privacy Intrusion?

Finally, the court would look to how pervasive the intrusion is,\(^ {243}\) considering such things as whether the home is involved, whether intimate details of an individual’s life is exposed, and whether access was gained to an item, like a cell phone, that contains a vast amount of information. How personal is the information being collected?

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\(^{241}\) Riley, 488 U.S. at 454 (O’Connor, J., concurring) (quoting Katz, 389 U.S. at 361).

\(^{242}\) Riley, 488 U.S. at 453, 455 (O’Connor, J., concurring) (emphasis added).

\(^{243}\) “Being observed by an insect on the wall is not invasive for privacy; rather, privacy is threatened by being subject to human observation, which involves judgments that can affect one’s life and reputation.” Daniel J. Solove, Privacy and Power: Computer Databases and Metaphors for Information Privacy, 53 STAN. L. REV. 1393, 1418 (2001).
Stephen E. Henderson looks to how personal the information is that is sought after. He posits that where information can routinely be accessed by others, it is typically not considered personal. But there may be instances in which the type of information is personal—it is intimate and social norms typically keep such information within one’s social network—but nonetheless certain such information is not only accessible to but is routinely accessed by persons having no authorization from the person to whom the information relates.

The Mosaic Theory

Because of the many technologies that may be utilized at the same time on a single drone, courts should consider the combined effect of the search to determine whether an individual’s right to privacy has been violated. Looking at both the drone itself—the size, capabilities, and appearance—and the technologies attached to it, is the information collected ----

The mosaic theory was first introduced in United States v. Maynard, the D.C. Circuit opinion that was a precursor to Jones. In Maynard, Jones argued that the government placing a GPS device on his car and tracking his movements for four weeks was an unreasonable search. In holding that the use of a GPS device was a violation of Jones’s Fourth Amendment rights, the court discussed the mosaic theory. This theory is based on the idea that “Prolonged surveillance reveals types of information not revealed by short-term surveillance, such as what a person does repeatedly, what he does not do, and what he does ensemble.”

That is, it is an approach to the Fourth Amendment whereby actions by the police in isolation do not count as a search but do as they are aggregated. “[U]nder the mosaic theory, searches can be analyzed as a collective sequence of steps rather than as individual steps.”

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244 Insert brief definition of the Third Party Doctrine and how this is different.
246 United States v. Maynard, 615 F.3d 544, 555 (D.C. Cir. 2010); see supra Part III.D.2., for a more in-depth factual discussion.
247 United States v. Maynard, 615 F.3d 544, 562 (D.C. Cir. 2010).
248 United States v. Maynard, 615 F.3d 544, 562 (D.C. Cir. 2010).
249 Orin S. Kerr, The Mosaic Theory of the Fourth Amendment, 111 MICH. L. REV. 311, n.5 (citing United States v. Maynard, 615 F.3d 544, 562 n.* (D.C. Cir. 2010)).
In *Jones*, the Supreme Court demonstrated discomfort with applying Katz’s reasonable expectation of privacy standard but also, on the other hand, they failed to adopt the D.C. Circuit Court’s mosaic theory argument. However, while declining to adopt the mosaic theory reasoning in *Jones*, five justices in concurrences (or at least joining concurrences) acknowledged it. The Alito and Sotomayor concurrences mention it but do not go into extensive detail about it. Alito, however, uses the reasoning of the D.C. Circuit in *Maynard* to explain why the long-term surveillance in *Jones* would be a search while short-term search in *Knotts* was not. Sotomayor, on the other hand, was more opaque in her reference to the mosaic theory in positing that when determining whether police behavior constitutes a search, courts consider “whether people reasonably expect that their movements will be recorded and aggregated” in this way.250

Many scholars are critical of the mosaic theory for reasons focusing on administrability, duration, and pervasiveness. Most notably, Orin Kerr, have been critical of the mosaic theory based on what they believe its inherent lack of administrability.251 According to Kerr,

The mosaic theory requires courts to apply the Fourth Amendment search doctrine to government conduct as a collective whole rather than in isolated steps. Instead of asking if a particular act is a search, the mosaic theory asks whether a series of acts that are not searches in isolation amount to a search when considered as a group.252

Moreover, Marc Jonathan Blitz advocates for not including a duration of the search or pervasiveness of the search component to the test because doing so “spares the courts the task of seeking some elusive or arbitrary point in the duration or intensity of a search at which such monitoring morphs from being just another means by which police watch over public space into a possible violation of the Constitution.”253 Under Blitz’s proposed test, duration is, by design, irrelevant. “After police begin recording events outside of their

\begin{notes}
252 Expand with Kerr’s critiques.
\end{notes}
presence, it does not matter whether they do so for two minutes or two
weeks.254

And yet, ignoring both the duration and pervasiveness of the search tips
the scale too far toward administrability in terms of the balance between court
administrability and privacy. Yes, it spares the court the task of determining
where to draw the line, but, at the expense of not taking into consideration that
the invasion of privacy is undoubtedly considerable higher when the
surveillance is longer and more pervasive. Blitz also advocates for avoiding
duration and persistence as part of the test because doing so “parallels the way
that courts typically define Fourth Amendment searches in private spaces.”255
That is, outside of exigent circumstances.256

According to Stephen Henderson, the state took an “egregious
position” when it argued that law enforcement could use GPS to track the
movements of anyone for nearly a month without a warrant.257 On the one
hand, given the state of Fourth Amendment law at the time Jones could have
(and, as some would argue, should have) been seen as merely an extension of
Knotts. One of Henderson’s primary arguments is that by taking such a broad
position with virtually no limiting factors, “it was not difficult for the Justices to
recognize that such tracking could be used against them.”258

Moreover, Henderson opines, that it was not only their ability to see
themselves as potential victims of surveillance, “[i]t was the common sense that
in a free and democratic society, and one in which at least some law
enforcement abuse has been known to occur,” law enforcement should not be

254 Marc Jonathan Blitz, The Fourth Amendment Future Public Surveillance: Remote Recording and Other
255 Marc Jonathan Blitz, The Fourth Amendment Future Public Surveillance: Remote Recording and Other
256 See, e.g., Payton v. New York, 445 U.S. 573, 590 (1980) (With the exception of “exigent
circumstances,” under the Fourth Amendment, the police must acquire a search warrant
whenever they “cross the line that marks the entrance to the house.”)
257 Stephen E. Henderson, Real-time and Historic Location Surveillance After United States v. Jones: An
258 Stephen E. Henderson, Real-time and Historic Location Surveillance After United States v. Jones: An
Administrable, Mildly Mosaic Approach, 103 J. CRIM. L. & CRIMINOLOGY 808 (2013). And, as
Henderson, points out, Justice Robert asked exactly such a question in Oral Argument. Id.
granted unfettered discretion to track whomever they wish for as long as they wish.259

CONCLUSION

The advances in technology that have resulted in the increase in the prediction as to the number of drones that may soon be in our skies – as many as seven million in 2020 alone, serve as a call to action. It serves as a call to action for those concerned with protecting individuals’ privacy without imprudently inhibiting the ability of law enforcement. It also serves as a call to action to those concerned with the Supreme Court’s 4th Amendment jurisprudence focusing on the “reasonable expectation of privacy” standard. If the Federal Aviation Administration itself predicted six years ago that there would be 15,000 drones sold annually and today places that number at seven million, how can law enforcement and the courts determine what the public’s reasonable expectation of privacy should be regarding drones. If the technology advances allow for nearly constant increases in surveillance capabilities of drones from an amalgamation of technologies, it is time for the Court to deconstruct its broad “reasonable expectation of privacy” doctrine.

This Article has proposed three factors that the Court should take into account to determine whether police are required to obtain a warrant based on probable cause. Essentially, courts should first apply a presumption that a warrant is necessary absent exigent circumstances260 in instances where the police are surveying homes or its curtilage when using drones. Given the myriad surveillance technologies potentially contained within a single drone, they are simply not like any other singular technology. The potential for a literal


260 “As a general rule, we define exigent circumstance as those circumstances that would cause a reasonable person to believe that entry was necessary to prevent physical harm to the officers or other persons, the destruction of relevant evidence, the escape of the suspect, or some other consequence improperly frustrating legitimate law enforcement efforts.” U.S. v. Martinez, 406 F.3d 1160 (2005).
“invasion of privacy” is too great. Therefore, a presumption that a warrant is required will combat the increased potential of Fourth Amendment The burden would then be on law enforcement to demonstrate why it should not have been required to obtain a warrant given the multifactor test of viewing the surveillance technology in use, the extent of the surveillance, and the extent of the privacy intrusion.