Drones Could be Violating Your Privacy and Security

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Unmanned Aerial Vehicles, or drones, have been rapidly developed and integrated into civilian life, from media production and photography to commercial delivery and recreational use. While drones offer convenience and efficiency for such uses, they also introduce significant privacy and security risks. Individuals may be surveilled without their knowledge, sensitive personal or organizational data can be exposed, and in some cases, drones can be exploited to carry out malicious activities. Current legal frameworks and regulatory policies are insufficient to address these emerging challenges, leaving gaps in both accountability and ethical guidance. This paper highlights the severity of these issues and provides realistic solutions and how policy makers can apply and establish ethical standards for drone use. Addressing these risks is essential to ensure that technological innovation enhances society without compromising individual rights or public trust.

**Additional Keywords and Phrases:** Drones, Privacy, Security, Policy, Surveillance

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Technological advancement is constantly pursued to improve efficiency and convenience, but not all innovations come without repercussions. One such technology at the forefront of rapid development is the creation and improvement of drones. Drones are classified today to be “also known as unmanned aerial vehicles (UAVs) or remotely piloted aircraft systems (RPAS)” [6]. While drones have a wide range of applications, from commercial delivery to media production, their increasing presence in everyday spaces raises pressing concerns about privacy. This paper argues that drones in the application of non-military purposes pose an unprecedented threat to individual privacy and autonomy, surpassing the risks of previous surveillance technologies.

Over recent years, drones have become increasingly integrated into civilian life. “Although originally designed as weapons, drone technology has found its way into civilian use for purposes such as product deliveries, and within the media and information space.” [6]. These, among many other applications, are what researchers strive to improve and apply to drone technology. Some of the uses of drones that are being refined and worked on include, “agriculture, geological surveying, archeology, and other industries” [7]. While these advancements can be life changing for the future, they also raise concerns about the ability to regulate a technology that is rapidly expanding. As drones become more advanced and widespread, however, their rapid integration into civilian life has outpaced public awareness of the risks they introduce.

For most people, the concerns around drone technology are not top of mind, as they tend to harbor an 'out of sight, out of mind' mentality regarding its implications. However, the primary issue is not merely the risk of being watched without consent, but the very fact that we are being observed at all in spaces where we have a reasonable expectation of privacy. An experiment demonstrated the ability of drone operators to infringe on an individual’s privacy where a reporter “simulated ordinary activities both downstairs and upstairs in a typical house. A drone was able to monitor him on both floors while hovering out of sight” [2]. Drones, with their ability to fly over private airspace and observe from above, directly challenge this notion of privacy. As drone usage expands in non-military contexts the ethical implications of such surveillance become ever more pronounced. It is crucial to address this concern now, as it undermines our sense of autonomy and security in what should be private spheres.

What makes drone surveillance uniquely harmful is not just that it allows for non-consensual observation, but the specific technological features that give it unprecedented reach and efficiency. “UAVs are now available in a variety of sizes, ranging from extremely small Nano drones to the considerably large aircraft sized drones” [5]. These variable sizes allow drones to easily access remote and private locations, including areas like backyards or even the interior of windows, where people expect confidentiality. Traditional surveillance, such as that from security cameras or store personnel, is limited in scope and often requires direct interaction or a predefined agreement of space. People reasonably expect surveillance cameras in stores, where monitoring is limited to designated areas. Drones, however, can hover undetected, covering large areas from above with the ability to track movement and capture high-resolution images or videos. “Most drones are sold with integrated cameras, and it is not known what the cameras are used for. This possesses a significant threat to privacy and security regarding the audio-visual information collected from other people” [3]. The data these drones collect can include sensitive details, such as the location of valuables inside a home or the habits and routines of its residents that people on a sidewalk would never be able to see. This makes drone technology a gateway to privacy violations and the potential theft of personal belongings, including both physical items and sensitive information. As drones become more advanced and accessible, their unchecked presence threatens privacy by exposing details of private homes that should remain unseen to the outside.

Unfortunately, this main concern regarding drones truly becomes a reality not just in their newly introduced applications, but in the astonishing distribution of this technology. “As of early 2020, the Federal Aviation Administration (FAA) recorded more than one and a half million drone registrations” and “The FAA projects continuous growth of drone use with potentially 4.5 million users by 2021" [8]. The threat to privacy and personal information of an individual is not just a potential problem, but an inevitable one. With millions of drones already in operation and even more expected soon, the ability to monitor and control their use is increasingly difficult. Without immediate action, privacy violations and intrusions will not be exceptions but an embedded reality of modern life, fundamentally altering our expectations of our own personal sphere of privacy.

For many years, the law and regulations regarding airspace have remained unchanged within the United States of America. One of the most prominent cases regarding this issue arrived in 1946, where the “Supreme Court declared in *United States v. Causby* that ‘airspace is a public high’ and carved out a common area in the atmosphere known as ‘navigable airspace’ through which aircraft can fly without interfering with the rights of landowners below” [4]. The court recognized that, as aviation became more abundant and widespread, a crucial distinction should be established between private and public airspace. The decision made by the Supreme Court established the firm principle of a dedicated zone for which aviation could be conducted above a certain level from the ground and above the homes of individuals. While this airspace was established as public, landowners were still permitted exclusive control over the immediate space above the premises of their given property. This ruling by the court reflected a general and simple agreement regarding aviation and the rights of private property. “At the same time, the Court provided landowners with a right to exclude low-flying aircraft from their property, stating ‘if the landowner is to have full enjoyment of the land, he must have exclusive control of the immediate reaches of the enveloping atmosphere.’” [4]. This decision laid the foundation for understanding airspace rights and the balance between private property and public navigation. This framework for airspace control remains relevant to drone regulation today, as it underscores the concept of private landowners' rights to exclude unwanted aircraft, a principle that applies to drones flying at low altitudes over private property.

With a definition of legal airspace, the next key issue concerns how individual privacy is legally defined in US law. One of the most critical rulings made by the Supreme Court regarding privacy occurred in 1967 where in “Katz v. United States, the Court outlined the parameters of an unreasonable search” [5]. Furthermore, “The court reasoned that because the Fourth Amendment protects people and not property, and Charles Katz expected his phone booth conversation to be private, the police had performed a search of Katz’s conversation in violation of his Fourth Amendment right to privacy” [5]. The Court ruled that a violation of an individual’s privacy occurs when the individual has a reasonable expectation of privacy. “Katz introduced the formulation for what would become known as the ‘reasonable expectation of privacy’ test (Katz test)” [1]. As a result of this specific case, the Supreme Court followed in accordance with the fourth amendment and developed what they would refer to moving forward as the Katz Test regarding future cases of privacy violation. While this ruling by the Court was focused on wiretapping, its core principle—the reasonable expectation of privacy—has been critical in evaluating the privacy violations caused by new technologies, including drones. The Katz Test, as it is applied to aerial surveillance, establishes boundaries for what constitutes as reasonable, providing an important legal lens through which the privacy concerns associated with drone technology can be addressed

The Katz Test would then widely be used moving forward, especially in aerial surveillance cases. Later, “The Supreme Court evaluated the first aerial surveillance case in *California v. Ciarolo*” which resulted where “The Supreme Court held the warrantless aerial observation of a fenced-in backyard with curtilage of the home was a reasonable search under the Fourth Amendment” [5]. In this pivotal case regarding aerial surveillance, the Court applied the Katz Test to determine that, although the contents of the homeowner’s backyard were fenced in and out of general sight from the ground, they remained visible from above the property. The Court reasoned that because the space could be seen from public airspace, it did not meet the threshold for privacy protection set by the Katz Test. Additionally, another privacy-related case involving aerial surveillance: “In *Dow Chemical v. United States*, the Supreme Court extended authority to law enforcement officers flying over private commercial areas. The Court held that the EPA had statutory authority to use aerial photography to perform 'site inspections' under the Clean Air Act” [5]. In this case, the Environmental Protection Agency (EPA) was authorized by the Supreme Court under the Clean Air Act and the Fourth Amendment to take aerial photographs of private commercial property. Despite the presence of barriers, like walls, that obstructed line of sight from the ground, the Katz Test and the Fourth Amendment were not violated. These rulings on aerial surveillance set precedents for understanding what is considered public versus private airspace in terms of aerial observation. As drones share many characteristics with aircraft in terms of surveillance capabilities, these rulings are directly applicable to how current laws are being interpreted in relation to drone use for aerial surveillance, particularly in private spaces.

Although these Supreme Court rulings have laid the foundation for discussions of aerial surveillance, they are insufficient in addressing the complexities of modern drone technology. All previous rulings concerned privacy violations by manned aerial vehicles. But would unmanned aerial vehicles, such as drones, present the same or different concerns? “Imagine a helicopter capable of hovering just above an enclosed courtyard or patio without generating any noise, wind, or dust at all—and, for good measure, without posing any threat of injury” [4]. This hypothetical scenario, though imagined, is exactly what we face with today’s drone technology. “Suppose, finally, that the FAA regulations remained unchanged, so that the police were undeniably ‘where they had a right to be.’ Would today’s plurality continue to assert that ‘the right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures’ was not infringed by such surveillance?” [4]. This scenario, made possible by drone technology, exposes the inadequacy of current laws when applied to unmanned aerial vehicles. The power of drones, with their ability to silently observe private spaces, has made it impractical to claim that they are automatically within legal rights for surveillance. The very laws that once applied to manned aircraft are now unclear when applied to drones.

Moreover, the notion of a predefined ‘legal airspace’ is insufficient in addressing the challenges posed by drones. “First, there is little clarity regarding where low-altitude aerial surveillance by the government would violate the Fourth Amendment. Is it at 500 feet if by a fixed-wing aircraft or 100 feet? Is it 400 feet if by a helicopter? … What about 200 feet or the eighty-three feet from Causby?” [4]. These inquiring questions reveal significant gaps in the law, particularly regarding the nuances of drone flight at varying altitudes. While it would make sense for the courts to apply pre-existing policies in these kinds of situations, this approach fails to address the distinct nature of what drones are capable of and unveils where the true vacuum resides. “The Supreme Court’s jurisprudence tells us to look at whether the observation took place from ‘navigable airspace’ – a vantage point from which any member of the public could make an observation” [4]. The rise of drones, with their unprecedented capabilities, calls this outdated method of jurisdiction into question. As drones are now capable of more than what manned aerial vehicles were, current methods of ruling do not restrain or mitigate the risk of unauthorized surveillance in private spaces, leaving individuals vulnerable to privacy violations in areas once thought to be protected.

Given the complexities that drones introduce in the modern era and the limitations of pre-existing law, it is evident that current legal frameworks are inadequate in fully protecting an individual’s right to privacy on their property and the airspace above it. To effectively address these concerns, new policies must be implemented by the FAA, and existing ones must be strengthened. “It could, for example, implement a blanket prohibition against low altitude ‘aerial surveillance’ of private property without consent” [2]. This sort of policy would be effective as it would establish a universal understanding that all drones must adhere to, creating clear boundaries around privacy. Such limitations would define the angles and boundaries of drone surveillance, ensuring that property owners are protected from unauthorized observation, even from within their homes. “It could also ban unauthorized flight over private property at low altitudes without consent and prohibit drone users from ‘following an individual’s movements with a drone’” [4]. These additions would prevent more invasive practices, such as tracking individuals, which could otherwise go unchecked under the current regulatory system. Together, these policies would establish clear boundaries for drone operators, ensuring that all flights over private property are explicitly authorized by the property owner.

Furthermore, it is crucial to develop a deeper understanding of the concept of permission mentioned earlier. As it stands, permission can serve as a vital asset in the implementation of newly proposed policies, and it should be explored and defined in detail. “A solution to the overall privacy concerns raised by drones would be to develop a baseline consumer protection law that details permissible uses of drones in domestic airspace by both law enforcement agencies and private parties” [5]. With a clear understanding of proposed airspace policies, we are now better positioned to solidify the concept of permission. “A baseline consumer protection law would need to address drone surveillance, data collection, and the various drone technological capabilities” [5]. Drones have evolved to the point where they warrant their own distinct regulatory category. As a result, we have the opportunity to craft specific and foundational policies tailored to drones, addressing the pressing concerns regarding personal privacy and individual rights to finally solve these issues.

As drone technology continues to evolve, so must the laws that protect personal privacy. The current legal framework does not fully address the unique challenges drones present, making it necessary to implement stronger policies. By setting clear boundaries on drone use and establishing firm rules about privacy and permission, we can create a legal system that balances innovation with individual rights. Moving forward, it is crucial to refine and enforce these protections to ensure that drones serve society without compromising personal freedoms.

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