**U.S. Coast Guard Academy; Department of Engineering**

**Electrical Engineering & Cyber Systems Section**

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Autonomous Unmanned Aerial Vehicle: Increased Recreational Drone Usage and its Impacts on Airspace Management and Regulation

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***Abstract – The Autonomous Unmanned Arial Vehicle Capstone project can be created at a very low cost with materials that are readily available. This is the same reason that a lot of American hobbyists are getting into drone flying as well. This is impacting American life in a big way however, as the current laws essentially give drones free range to go wherever they want. Unlike owning land, all airspace is under federal control and therefore property owners have no control over the space directly over their property. The FAA states that the navigable airspace for a drone is anywhere as long as it is outside and that is the only restriction. Drones can fly anywhere, record video, and are protected by law from being shot down. The only restrictions currently in place regard restricted airspace around airports and government property such as military bases. This has sparked a lot of conversation within the United States, and currently it seems as if the best solution is to have the States and local officials deal with low altitude flight and keep everything above 500-feet on the federal level. Still nothing has been done about this officially, but there has been movement in Congress to create a new law that would allow for local law enforcement to create laws regarding low altitude airspace and drones that they seem fit.***

**Keywords:** Drone, UAV, AUAV, Federal Aviation Administration (FAA), Restricted Flight, Airspace, Private Airspace

1. **Introduction**

Unmanned Aerial Vehicles (UAVs), or more commonly referred to as drones, have been a growing field of technology and in the past decade there has been a large push to lower the cost and skill required to create and pilot them. This has resulted in a large increase in the consumer market. One of the major objectives for the Autonomous Unmanned Aerial Vehicle (AUAV) capstone project is to make the drone as cost effective as possible for the Coast Guard. A large byproduct of this is the research into cheap and readily available drone usage that the public can take advantage of. As drones continue to go down in price and up in popularity the number of them in the sky has increased significantly. This has begun to impact the American population by causing regulatory issues regarding airspace management that have never been dealt with before.

1. **Background**

Since the beginning of regulating flight in the United States and the creation of the Federal Aviation Administration (FAA), all airspace in the United States is owned and controlled by the U.S. government and regulated through the FAA. This was mandated by U.S. code passed by congress in 1940 [1]. Congress also mandated that every U.S. Citizen has a right to use this airspace as long as it is considered navigable. With regards to UAVs, the FAA considers everything other than indoors to be considered navigable due to their small and nimble construction and controls [1]. This elimination of private airspace is becoming a much larger problem as drones become more and more available to the public. Under current conditions a drone could fly in another person’s yard, and they would not be able to do anything about it, and a major concern for this is safety and privacy.

1. **Discussion**

The new question is how does the United States move forward with this extremely pressing issue? More recently, there has been discussion of local law enforcement taking over this regulation as they are commonly the ones who are responding to any incidents regarding UAVs and what people claim to be their ‘private airspace’ [1]. In March of 2021 Senator Mike Lee (R-UT) introduced the Drone Integration and Zoning Act (DIZA) in congress and it has begun to catch traction. The point of this bill is to address the issue of regulation and give local law governments the ability to regulate airspace and create laws regarding drone usage on or around private property [2]. If this law were to pass, then local governments could pass their own regulations regarding drones flying at low altitudes above private property and the higher altitudes would remain under federal jurisdiction. This is a very plausible solution as it doesn’t necessarily restrict access to federal airspace, but it would help to limit unwanted flights [3].

The FAA has made progress with regards to regulating flying drones around things like airports and federal property such as military bases but has yet to do the same on private land. This has impacted the citizens mainly through privacy and safety concerns. Under the U.S. Constitution all citizens have the right to property and privacy, but this is being impacted as drones can fly anywhere as long as it is not inside a building under the current statutes [4]. Drones can be equipped with nearly any payload and can theoretically be untraceable back to a specific person. This begins to dive into the impact of liability. If something were to happen is the private property owner liable, or is the drone operator liable? At some point the drone will go from public airspace to private land, but at what point and who is responsible [5]? This is why legislation like the one that Senator Lee is attempting to pass is so important.

Privacy and freedom are founding principles for life in America. When these are infringed upon it often times results in uproar from the American public. Under the current laws, any drone could fly above someone else’s property only a few feet of the ground while recording video and the property owner could do nothing about it without asking for proper authority first [6]. As these hobbyist drones continue to get cheaper and more common this is going to become a more regular issue and will have long term impacts on not only the American public but also the future of drone flight as the regulations may soon flip hard to the other side and be too restrictive.

Another impact of the increasing recreation use of drones is the flight ceiling regulations passed by the FAA. Under current statute, manned aircraft should not fly below 500 feet and hobbyist UAVs should not fly above 400 feet [7]. This forces drones down more onto private property and is worsening the problem. The FAA made this regulation to protect the commercial manned flying industry, but it created a new impact elsewhere. It would make the most sense for state and local law enforcement to create laws and regulate all airspace below the 500-foot mark that would be enforced in conjunction with the current federal ones [1].

1. **Conclusion**

The Unmanned Autonomous Aerial Vehicle is an excellent project that has proven the ability to create a well working product at an inexpensive price point, but this project is not the only drone that is like that. As drones continue to expand throughout the market and subsequently the sky, the American people are going to grow more and more frustrated with the current laws regarding the lack of private airspace. These impacts are not expected, nor are they desired but they are a byproduct of these advances in technology. Legislature is already being created, but more has to be done or else the population is going to grow more and more concerned.

**References**

1. National Association of Mutual Insurance Companies. “Unmanned Aircraft: Defining Private Airspace,” January, 2017. Available: <https://www.namic.org/pdf/drones/1703_privateairspace.pdf>
2. U.S. Senate. 117th Congress, 1st Session. *Drone Integration and Zoning Act.* Available: <https://www.lee.senate.gov/services/files/a5dd4109-0dcf-44be-8489-cf755634a5bd>
3. M. Lee. “Sen. Lee Introduces Drone Integration and Zoning Act,” March, 2021. Available: <https://www.lee.senate.gov/2021/3/sen-lee-introduces-drone-integration-and-zoning-act>
4. C. Rosengaum. “The approach to drone regulation that will change air space management,” *The Center for Growth and Opportunity,* October, 2021. Available: <https://www.thecgo.org/benchmark/the-approach-to-drone-regulation-that-will-change-air-space-management/>
5. B. Rao, A. Gopi, and R. Maione, “The societal impact of commercial drones,” *Technology in Society,* vol. 45, pp. 83-90. 2016. Available: <https://www.researchgate.net/publication/298427201_The_societal_impact_of_commercial_drones>
6. KMGH-TV. “What are your privacy rights when it comes to drones?,” *ABC News,* January, 2020. Available: <https://www.abcactionnews.com/news/national/what-are-your-privacy-rights-when-it-comes-to-drones>
7. Federal Aviation Administration. “FAA Highlights Changes for Recreational Drones,” May 2019. Available: <https://www.faa.gov/newsroom/faa-highlights-changes-recreational-drones>