NAVIGATING THE SKIES-A DEEPER ASPECT AT THE TWO-FOLD NATURE OF UNMANNED AERIAL VEHICLES

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ABSTRACT

People have always been interested in flying, including children and older people in India and everywhere & since the day Wilbur & Oliver Wright completed their first successful flight, this craze has gone to another level. So, drones, also known as Unmanned Aerial Vehicles, started in the United States of Nations due to the commencement of World War II. The drones were used for the first time for military purposes. Still, their use has significantly increased over the years for military purposes and almost every field. It's a very beneficial tool as it can be used in many ways, but as everything has two sides, so do drones. Drones also have various adverse effects & have raised concerns about privacy intrusion, nuisance, trespass, etc. So, in this article, we will highlight the harmful effects of drones & how they can create privacy-related issues.

Keywords: Nuisance, Privacy, Trespass, Unmanned Aerial Vehicle

INTRODUCTION

The article discusses about the development, applications and problems of drones or unmanned aerial vehicles (UAV). Starting, with the historical context of their evolution, the article traces drones from their military origins to their uses in various fields like agriculture, infrastructure, and disaster management. It highlights the optimistic impact of drones on various industries, by giving examples from India and around the world. Despite their extensive use and advantages, the article throws light on the harmful effects of drones, focusing in particular on privacy concerns and potential harms associated with their increased proliferation. Invasion of privacy, security risks, noise disturbance and ecological imbalance are among the challenges discussed, which are forcing careful consideration of the delicate balance between technological innovation and unintended consequences. The international perception is also explored with the regulations of countries such as the United States, Australia, Singapore, etc. This is followed by an analysis of the Indian context and the detailed rules and regulations laid down by the Directorate General of Civil Aviation (DGCA). Essentially, the article aims to provide a comprehensive understanding of drones and acknowledge their important contributions, while raising awareness of the ethical and legal challenges associated with its extensive use. The two-fold nature of drones—bringing both advantages and concerns—is a central theme of the article.

WHAT ARE DRONES

[1]The uncrewed Aerial Vehicle, commonly known as a drone, is an aircraft without any pilot, crew, or passengers. It is an unpiloted aircraft. These were originally developed in the twentieth century for military missions & by the twenty-first century, they become the essential tools used in the military.

As the technology improved, the making charges & all other charges got reduced, which can be used for non-military purposes.

ORIGIN OF DRONES

In 1782, when the Montgolfier brothers first completed their unmanned aerostats afloat in

[1]" *Unmanned Aerial Vehicle ",Wikipedia https://en.wikipedia.org/wiki/Unmanned_aerial_vehicle (accessed 5 October 2023).*

preparation for their crewed flights, they had a little bit of idea about what 'drones' were & thought that they would take flight across the world as a disruptive technology. Various experiments and developments in the nineteenth & twentieth centuries led to the creation of drones in several militaries. The US Navy first used the term 'drone' back in 1935, when they started a program to produce a remotely-controlled target aircraft. As time progressed, they became increasingly used for military activities.

The use of drones in the Iraq War (2003-2011) made it notorious as a modern war machine, the use of which is still a subject of several debates.

In general, a pilotless aircraft, regardless of its function and specification, is referred to informally as a drone or formally as an uncrewed aerial vehicle (UAV). Other terms that can be used, like Remotely Piloted Aircraft (RPA), Remotely Piloted Vehicle (RPV), and Remotely Operated Aircraft (ROA), are the common terminologies that are used in Europe.' Unmanned Aircraft System (UAS) is another term that refers to a system weighing between 1 to 1,500 kilograms. The pilot could be sitting some meters or even a hundred kilometers away, depending on each Drone's technology. The turn of the 21st century saw a significant change in the use of drone technology. Creative and informative thinking has led to the propagation of drone technology in the civilian sphere. This is just the beginning of an era whose future can be equated to how cell phones infuse our everyday lives.

USES OF DRONES IN DIFFERENT SECTORS

The recent spurt in automation techniques combined with advanced design, mapping & visualization techniques makes it possible today that one unimaginable a few years ago is now used for various purposes & in multiple fields. These drones have Wi-Fi communications, rechargeable batteries, high-resolution digital cameras, GPS receiver chips & other functions that can be used in almost all areas. Now, drones are used by hobbyists, which seamlessly give various technologies. Nowadays, drones are frequently used by content creators, mostly Vloggers, which help us see the earth's natural beauty. These technological advances, coupled with innovations in manufacturing like 3D Printing, have led to the enormous expansion of drone markets. These drones have been widely used for counter-terrorism operations, pollination, 3D mapping aerial photography, package delivery to environmental protection, emergency response to law enforcement, and more, In addition to being used as the original

personal recreational aircraft. Several Asian countries have recognized the technology's potential to advance their national interests, benefiting industries ranging from agriculture to surveillance.

In the case of agriculture, several companies & various individual farmers are using it. The affordable quadcopter fitted with a camera helped the farmers conduct effective surveillance of the growth & deterioration of crops & then target the use of water, fertilizers, pesticides, etc, on the specific areas that need attention. This is a better solution than satellite imagery & also cheaper than crop imaging.

In the case of the infrastructure sector, drones are revolutionizing investment monitoring, maintenance & asset inventory, particularly in roads, railways & oil & gas. Drones improve the speed & quality of the design process by giving good quality photos & videos and 3D Modelling, which can create digital terrain models for more accuracy.

In the mining industry, drones can enable digital models of current work & to see the progress & detect the changes in mine structure, which enhances safety & lowers the cost. Advancements in 3D Scanning technology can improve the mapping facilities of drones in underground areas.

As the use of drones is expanding, Goldman Sachs stated in its recent report that the total global spending on drones in the next five years will be around 100 billion dollars, of which 11.2 billion dollars will be in the construction industry & by the year 2020, the jobs created by drone industry is 1.3 billion dollars for construction in the USA.

USES OF DRONES & INDIA & HOW DID IT HELP

- For the Raebari-Allahabad highway, Indian Startups are helping in digital 3D mapping, a part of the road widening project started by the National Highway Authority of India. The information collected by the UAVs has proven to be very useful in calculating compensation for those whose property rights are affected by the project.

- Indian Railways is planning a tender for 3D video mapping of the 3,360 km (about 2,000 miles) freight corridor network using drone technology.

- India's leading transmission companies signed an agreement with a global company to use large-scale, long-distance drone flights to examine fixed assets. As India has a transmission network of more than a million circuits, with Double-digit growth in kilometers per year, drones can help prevent blackouts.

- Coal India has sought permission from the Ministry of Home Affairs and the Ministry of Civil Aviation to use drones for aerial surveys of prospective coal blocks to assess the extent of green space to be restored after coal block closures.

- The National Disaster Management Authority (NDMA) has already relied on drone delivery and surveillance capabilities for India's disaster relief and rescue operations. Similarly, the Central Reserve Police Force used UAVs for round-the-clock patrolling and surveillance in an area of 40,000 square kilometers during the state elections in Chhattisgarh. The Uttar Pradesh government used drones to maintain law and order during the Kumbh Mela festival in Allahabad and by the Mumbai police during the grand Ganpati festival." The drones helped the New Delhi police identify seventy bags of bricks kept for. Use as ammunition.2014 Trilokpur rioters., and they could take preventive measures.

HARMS CAUSED BY DRONES

Drones have brought many changes in various industries, but their increased use has raised concerns about potential drawbacks and challenges. From privacy violations to security concerns to ethical considerations, the growing popularity of drones has sparked debate about the delicate balance between technological innovation and protection against unintended consequences. The primary concern related to using drones is that they are lethal weapons. As an activist on Medea, Benjamin said that on September 11th, the terrorist attacks in the USA played an essential role in the correctness of allied technologies, which made drones function better. It was said that under the Barack Obama administration, drones were used to kill the targeted people.

Intrusion To Privacy- The expansion of drones, predicted by their flexibility and applications, has simultaneously created countless problems, especially in the area of privacy. As they are made with advanced digital cameras and sensors, drones can collect a wide amount of visual data, often without the knowledge or consent of the people being observed. This has created

many problems and encounters in privacy, suggesting the need for watchful consideration and a robust regulatory framework. One of the main problems with the use of drones is extensive and often covert aerial surveillance. With the ability to navigate different environments and fly over specific locations, drones break traditional privacy boundaries. Individuals in their homes or private property can innocently become targets of surveillance, challenging expectations of a safe and personal space. Public events and gatherings previously considered freedoms of open expression are increasingly under the watchful eye of drones. Although the goal is to improve security and audience control, the arbitrary collection of visual data raises ethical questions. Participants in such events may be monitored without express consent, exposing their right to participate in public activities without excessive surveillance. The business sector is not immune to the privacy issues posed by drones. Industries that use drone technology to measure, monitor, and collect data may inadvertently violate people's privacy. High-resolution cameras on police drones can capture detailed images that extend beyond the target, raising concerns about corporate surveillance and protecting sensitive data. Paparazzi drones, designed to capture intimate moments of public figures, have emerged as a particularly troubling appearance of the invasion of privacy. Despite being public figures, celebrities have the right to a reasonable amount of privacy in specific contexts. The use of drones to cross this border raises not only legal but also deep ethical questions about the limits of permissible observation and documentation. Obtaining consent also becomes problematic when drones operate in public spaces. Drone cameras can accidentally capture people going about their daily lives, raising questions about reasonable expectations of privacy in public areas. The lack of clear guidance on collecting and using such information increases the challenges of obtaining informed consent.

The offense of privacy intrusion was first described in the article of Samuel D. Warren and Louis D. Brandeis & they categorized it into four categories & Drone activity would best fit into the category of "invasion of the plaintiff's privacy or solitude & To prove this claim, plaintiffs must show the intent of the drone operators to intrude on their affairs. But damages may also apply to claims involving a non-physical prohibition.

Various judgments show that drones create private intrusion into the lives of people, which are given below-

In the case of [2]United States v. Causby, In 1946, the defendant landowner argued that regular military flights over his land at low sea level constituted a constitutional taking of his property for which he was entitled to compensation. The proximity of the land to the airport and the noise and fury of the planes forced him to abandon his chicken business. At this, The US government argued that the flights take place at the minimum safe altitudes as statutorily prescribed legal minimum safety heights and did not amount to privacy intrusion. The government argued that the landowner did not own any of the above airspace unless he gained control by building structures or other forms of housing."To this, the Supreme Court established a principle of cujus est solum ejus est usque ad coelom, which means he who has the ownership of land also possesses what is above it & this principle doesn't apply in this case & said that there is no physical intrusion by the airplane & neither the owner has any physical occupation of that land.

However, In [3]United States v. Jones(2012), the court said that thermal imaging devices should not be used in general for public use & and the court disallowed unauthorized searches that make use of radio transmitters and receivers, high-quality digital cameras, and location-tracking devices as they create private intrusion in the lives of people

Generating Nuisance-Drones have spread across various industries and brought multiple challenges, the notable aspect of which is their tendency to cause disruption & nuisance. One primary concern is related to noise disturbance. Drone's noisy sound, especially in crowded urban areas, can disturb the peace of people living there. The constant buzzing above can be a source of irritation & annoyance to them, affecting their quality of life. Safety hazards are another dimension of nuisance caused by drones. Not adequately trained or careless users can accidentally cause accidents by flying drones into people, vehicles, or buildings. The risk of injury or property damage, especially in congested areas, raises concerns. This safety measure will become even more critical as drones become more common and the potential for accidents increases. Restricted airspace violations add to the hassle associated with drones. Unauthorized access to restricted areas, especially around airports, poses security risks and triggers security alerts that disrupt normal flight operations. Managing the coexistence of drones and regulated airspace is critical to preventing interference and ensuring the safety of drone operations and regular air traffic. Wildlife disturbance is a problem that goes beyond privacy concerns. Drones

2 U.S. v. Causby [1946] 328 U.S. 256
3 United States v Jones [2012] 565 U.S. 400

flying in natural habitats can disturb the behavior and nesting patterns of birds and other animals.

The intrusion of drones into these environments can cause an ecological imbalance, classifying them as a nuisance in areas where the conservation of wildlife and ecosystems is most important. Public events and gatherings are also affected. Attendees felt that the continuous presence of drones above their heads could be distracting, affecting their overall pleasure of the event. Finding a balance between capturing aerial perspectives to document events and regarding the comfort and experience of attendees is a challenge that event organizers and drone operators must manage. The spread of business premises is a significant concern in business life. Camera-equipped drones can be used to gain unauthorized access to sensitive company data or spy on competitors. This intrusion into commercial environments causes harm by compromising commercial confidentiality and security, highlighting the broader challenges surrounding using drones in retail environments. The lack of clear guidelines and enforcement mechanisms increases uncertainty and allows drone operations to be tampered with. Communities and individuals are grappling with these challenges as lawmakers try to create frameworks that balance promoting innovation and addressing the harms caused by the widespread use of drones.

There are various instances where drones created a nuisance; one example is In 2017 when a drone crashed into a power line in New York. The accident caused a power outage, and the drone operator was charged with negligence. Similarly, in the case of [4]Rivera v. Foley in 2015, the District Court said that the journalists who used drones to click the photographs of a crime scene created a trespass & caused nuisance to the respected authorities.

In addition, the court also said that to succeed in the principle of nuisance, the landowners should have to satisfy the dual test of substantial & unreasonable interference caused by flying drones close to their property.

[4] *Rivera v Foley [2015] US Dist Lexis 101407*

RULES AND REGULATIONS RELATED TO DRONES IN DIFFERENT COUNTRIES

There are currently thirty-one states across the country that have enacted UAV Laws regulating a wide range of issues like privacy, trespass, nuisance, etc.& most of the cases are related to Privacy Intrusion. There are a total of twenty-two states that have passed privacy protection laws, which include that there should be a warrant from the legal enforcement agencies for its use. Activities like 'Peeping Tom' are also punishable if they are done with drones. Also, Nevada and Oregon have established enforcement requirements against UAS operators who will continue to fly below 250 and 400 feet above an owner's property after receiving prior notice from the property's possessor that they are not allowed to do so. Another exciting trend among many of these state-level companies is identifying crucial beneficial uses for drones and balancing privacy and property among those uses. For example, Florida law that forbids the use of drones for photography includes exceptions to that prohibition if the use of Drones is intended to assess property for property tax purposes, operate and maintain municipal utilities, assess vegetation growth, or monitor the environment. Even states that restrict the use of uncrewed aerial vehicles by government agencies provide exemptions, such as for search and rescue missions, especially during disaster relief operations, resulting in inconsistencies in drone regulation.

Apart from this, various countries have issued some regulations related to Drone-

- Singapore-In this, the UAV Guidelines are given under the Unmanned Aircraft(Public Safety & Security)Act, and there is a strict restriction on the movement of drones with heavy permits. However, hobbyists whose drones weigh less than seven kilos do not need any license, whereas all drones weighing above that require three permits. The Civil Aviation Authority of Singapore (CAAS) grants an air operator's license to an applicant who demonstrates the ability to operate a drone safely. An Activity license is granted for the individual operation of an uncrewed aerial vehicle in a specific operating area. Other permits are required for different activities that fall under the jurisdiction of various agencies. Additional permits are required if objects are thrown from an uncrewed aircraft, photographs are taken from a protected area, or if an uncrewed plane is flown in areas of special events declared by the Ministry of the Interior. Although the law does not specify the speed limit and training opportunities, it criminalizes certain

behaviors related to the use of drones, like transporting dangerous goods while flying, which is mentioned in section 9, and photographing a protected area by using photographic equipment on board the uncrewed aircraft is given under Section 8

- United States of America(USA)-The new UAV regulatory rules have fewer restrictions on civilians & give a much faster route for flying drones. The present FAA rules state that all civilian uncrewed aerial vehicles should use automatic permits as contrasting & conflicting to specific approvals on case-by-case permits, must weigh less than twenty-five pounds, should remain within visual range, must not be operated at night, and should not fly more than 400 feet above the ground." The rules appear to limit innovative UAVs like Amazon's delivery drones, which would require operating beyond line of sight. However, UAV operations are permitted within most airspace with air traffic control clearance, and the FAA is also slowly allowing, but cautiously, sight activities.

- Australia-As, Australia has introduced new federal legislation for drones, which classifies & differentiates between low-risk & high-risk drones based on their uses, weight, etc. However, it allows the low-risk RPAS to be permitted without any license & permissions, which provides business opportunities to various enterprises that use drones below two kg.

- Poland- Polish drone law prohibits the registration of drones weighing more than 25 kilograms but requires a license for use if the Drone is heavier. Operating drones for commercial purposes requires the pilot to obtain a certificate of competence, which is valid for both line-of-sight & non-line-of-sight flights. However, the latter is only allowed in a particular airspace.

- In Canada, UAV operators require a special permit, except if the UAV weighs less than 35 kilograms and is used only for recreational purposes. There are some Safety guidelines, which include flying only in daylight and in good weather conditions, keeping the UAV within the operator's line of sight, and flying within a radius of 9 kilometers from the airport; the Drone should be more than 90 meters above the ground, or within 150 meters from people, animals, buildings or vehicles. Applicants must take responsibility for UAVs weighing 25 kilograms or less, which are used for non-

recreational purposes. One should require insurance and should fly only in daylight.

- United Kingdom- In the UK, a person must only fly an aircraft weighing up to 7kg with special permission or at a height of more than 400ft, except in some very specific circumstances. In addition, the operator must be reasonably confident that the flight can be performed such that objects or animals must not fall from the aircraft in a manner that endangers people or property.

INDIAN RULES AND REGULATIONS RELATED TO DRONES

After discussing the rules & regulations of different countries, we should analyze what are rules & regulations that India has-

The rules & regulations related to drones are addressed in the draft guidelines, which the [5]DGCA published in[6] April 2016. According to these, UAVs are classified into four categories according to weight: micro-weight drones, which weigh up to 2 kilograms; mini-weight drones, which weigh more than 2 kilograms but less than 20 kilograms; small-weight drones, which have a weight of more than 20 kilograms and less than 150 kilograms and large weight drones which weight more than 150 kgs. In India, All UAVs require a Unique Identification Number (UIN), which the DGCA issues. A UIN can only be issued to an Indian citizen or a company registered, having its principal place of business in India and sufficiently controlled by Indian citizens. UIN is a positive security measure to track and identify all UAVs operating in India. However, the fact that only Indian citizens get a UIN number would hinder economic growth and technological development. The procedure and documents for getting a UIN Number are quite advanced & elaborative, which requires address and identity proof, information on the purpose of the UAV's work as well as its technical data, flight manual, and manufacturer's maintenance instructions, operator background check by local police; and permission from the Ministry of Telecommunications for the use of radio frequencies necessary for the operation of the UAV.

In addition, all civil UAV flights above 200 feet in uncontrolled airspace for any purpose require a DGCA Unmanned Aircraft Operator Permit (UAOP), while civilian aircraft in

[5] *Directorate General of Civil Aviation (India), 'Home,' http://www.dgca.nic.in/ (accessed 5 October 2023).*
[6] *Federal Aviation Administration, 'Unmanned Aircraft Systems (UAS)' (Federal Aviation Administration, https://www.faa.gov/uas/, Accessed 5 October 2023).*

unchecked airspace are restricted. UAVs can enter controlled airspace only with the prior permission of the air navigation service provider. In addition, all UAV operators must ensure that the UAV is flown within a visual distance of 500 meters. With these precautions, it may be unnecessary and restrictive to prevent foreign players from obtaining a UIN. The UAOP is valid for two years and is non-transferable. UAOP is not required for civilian aircraft in uncontrolled airspace below 200 feet where there are no restrictions, model aircraft flying below 200 feet in uncontrolled airspace or indoor recreational flights. This is a constructive step to liberalize the civilian use of UAVs, especially in educational institutions, where students can play with the technology and innovate more. All UAV flights above 200 feet must be reported by the UAS operator to the local government, air traffic services unit, civil aviation security office, and airport operators, if applicable, both before and after the flight. The operator must also submit flight plans that include information about the flight, UAV performance characteristics, the number and location of remote pilot stations, liability insurance, etc. The guidelines also require UAV operators to conduct safety assessments of the launch site and maintain complete control of the operating area. This is an essential part of airspace security. The guidelines also specify training requirements for remote pilots. They must be over 18 years of age and have extensive training equivalent to that of a piloted aircrew or private pilot license holder. The training must also include preparation for obtaining an aeronautical radio operator's license. In addition, remote pilots must undergo extensive hands-on training to control the UAV in flight, including simulated flight training, to build the ability to control the UAV during actual use and safely recover it on board in an emergency due to a malfunction. These training requirements do not apply to recreational flying and flying of micro-UAVs.

CONCLUSION

To Conclude, The article provides a comprehensive overview of drones, also known as uncrewed aerial vehicles (UAV), development, applications, and challenges. It tells about the historical context of the development of drones; it outlines their transformation from military tools to versatile consumer goods used in various sectors. It looks at the positive impact of drones, such as their contribution to agriculture, infrastructure, and disaster management in India and around the world. However, drones have some adverse effects, with a particular focus on privacy concerns and the harms caused by their widespread use. Drones have often invaded people's privacy and explored potential injuries such as security risks, noise disturbances, and ecological imbalances. This article also discusses international regulations on the use of drones

and gives examples from countries such as the United States, Australia, Singapore, etc. In India, the rules and regulations are drawn up by the DGCA & look into such issues as Unique Identification Numbers (UINs), operator licenses, and safety protocols. Through this article, I wanted to highlight the dual nature of drones, acknowledging their essential contribution while raising awareness of the ethical and legal challenges associated with their proliferation.