
HOVERING HIGH: WHO IS LEADING THE INNOVATION IN DRONE TECHNOLOGY

Author: Vaishali Singh, Assistant Professor, University of Petroleum and Energy Studies

Abstract

While it is a frequently repeated mantra that the law struggles to keep up with technological developments, it can actually serve to foster rather than hinder innovation, UAV drone technology is also constantly evolving as new innovation and big investment are bringing more advanced drones to the market every few months. Drone-technology has invigorated innovation in a number of industries. Agricultural companies have even sought patent protection for UAVs to distribute seeds, tend to crops and monitor livestock through solar powered and voice-controlled drones. This chapter shows that the existing framework of intellectual property rights can do much to protect rights holders from threats created by new technologies. In many cases, these disruptive technologies create opportunities for rights holders and even, as with blockchain, make IPRs easier to record and enforce. Further drone-related innovation shows no sign of slowing, inventors must consider how to improve public perception of a technology with considerable applications for the future. Analysing IP activity around unmanned aerial vehicles, this chapter identified some of the emerging trends for drone technology.

Keywords: Innovation, Drone Technology, Intellectual Property Rights, Blockchain, unmanned aerial vehicles

Introduction

The proliferation of unmanned aerial vehicles (UAVs), commonly referred as “drones” has cluttered not only the airspace but also other areas such as IPR, aviation laws, etc. With the popularity of drones and their easy and cheap availability, their presence and use will significantly increase within the next few years. This raises questions as to what is technologically feasible, what is acceptable from an ethical point of view and what is allowed from a legal point of view.

The term “*drone*” is often used by the media and general public. Drone is originally an English word for a male bee. Clarke (2014) traces the first use of the term to the US Navy in 1935.¹ This military connotation is slowly shifting and drones are being increasingly used for civil purposes. Apart from the term drone, other terms such as *Unmanned Aerial Vehicle* (UAV) and *Unmanned Aerial System* (UAS) are synonymously used. The former focuses on the flying platform and its payload, if any, whereas the latter is a more general term which includes both the flying platform and the ground station that controls the platform.

In October 2014, two Dutch filmmakers in Utrecht used a drone to take pictures of the Dom tower, which was surrounded by mist.² The owner of the drone used by the filmmakers was levied a fine of 350 Euro for using it to photograph the tower. According to Dutch laws, it is illegal to fly a drone without special permission. Also, private drone owners are only allowed to fly drones during the day while the drone is operated in visual line of sight at all times. Also, drones may not fly above buildings and people.

With this backdrop, the researcher through the research article aims to address the following:

- (a) The opportunities and threats associated with use of drones;
- (b) Ethical and legal issues concerning the use of drones; and
- (c) Future scenario of drone technology.

History of Drone Technology

A drone is an aircraft that does not have an on-board human pilot. Most drones have some degree of autonomous operation, and some of their aspect is controlled internally. This requires an on-board computer and software. However, most drones use a mixture of autonomous and human control while few drones are completely autonomous.³

The recent attention of drones suggests that civil drones are a new phenomenon. But drones have existed for almost a century, and there are several examples of aircraft without persons on-board

¹ RICHARD CLARKE, *STING OF THE DRONE* 4 (1st ed. 2014)

² The Dom Tower in Utrecht by Drone, DutchNews (November 19, 2014), available at: <https://www.dutchnews.nl/features/2014/11/the-dom-tower-in-utrecht-by-drone/>

³ ATIP Law, *DroneTechnology*, ATIPLaw 1, 2-3 (2014)

during the American Civil War. However, what is new is that today drones are small, relatively inexpensive and easily available.

The earliest unmanned aircraft were probably hot air balloons. However, they are not considered drones because their flight cannot be controlled. During World War I, radio control techniques were used to build unmanned aircraft. The first flight of such aircraft was in 1917 by the Hewitt-Sperry Automatic Airplane.⁴ It was developed as an aerial torpedo, for military purposes, and is considered to be a flying bomb and precursor of the cruise missile.⁵

During World War II, the Radio plane Company manufactured nearly 15,000 drones for the US Army.⁶ It was launched with a catapult and recovered by parachute.

After World War II, drones were also used for purposes other than being or dropping bombs. The first drone for aerial reconnaissance was the MQM-57 Falconer in 1955. It could carry cameras and illumination flares for night reconnaissance.

During the Vietnam War, the US used Ryan Firebee drones,⁷ which were developed in 1951. They were launched from Hercules transport aircraft, which could carry four Firebee drones in total, two attached under each wing.

Since 1995, the US Air Force and the CIA have used the MQ-1 Predator drone for military reconnaissance and combat.⁸ Thus, from the above it is clear that initially drones were developed in a military context and is still very common.

To understand the drone technology clearly, it is important to understand their different technical characteristics.

⁴Available at:https://en.wikipedia.org/wiki/Hewitt-Sperry_Automatic_Airplane

⁵ KENNETH P WERRELL & DONALD D STEVENS, THE EVOLUTION OF THE CRUISE MISSILE 45

⁶Available at:https://en.wikipedia.org/wiki/Radioplane_OQ-2

⁷Available at:https://en.wikipedia.org/wiki/Ryan_Firebee

⁸ RICHARD WHITTLE, PREDATOR- THE SECRET ORIGINS OF THE DRONE REVOLUTION 35 (1st ed 2014)

Types of Drones

The main drone types are as follows:

(a) Fixed-Wing Systems

They are mainly used in the aviation industry to define aircraft that use fixed, static wings in combination with forward airspeed to generate lift.

(b) Multirotor Systems

They are a subset of rotorcraft. The term rotorcraft is used in aviation to define aircraft that use rotary wings to generate lift.

IP Issues in Drone Technology

Based on new, inventive and useful aspects of drones, multiple patents can be filed to protect the corresponding innovative features. As per patent laws, such aspects of the invention should be novel, non-obvious to a person of ordinary skill in the art, and capable of industrial application. Drone related inventions find applications in consumer and commercial market along with military.

Components of drones and drone manufacturing methods can form the subject matter of one or more patents. Other examples of drone patents include applications of quadcopters (drones) for aerial photography, delivery of goods, agriculture, inspection, refueling, surveillance, integration of drones with smartphones (tablets), airframes, structure construction, propulsion systems, power systems, stealth launch and recovery, communication systems, control systems, collision avoidance systems, navigation systems, data systems, sensors systems, transportation and storage systems, testing systems, support systems, and the like.

For claiming patents for drone inventions, the innovative features of the new drone technology are to be reviewed and these features should be divided into one or more categories, such as, for example, drone apparatus comprising one or more hardware components, process (or method) of

using the drone for performing certain tasks across one or more application areas, and interaction (combination) of drone hardware and software components.⁹

Provisions in Current Aviation Laws

Majority of international treaties do not appropriately regulate drone activities. The European Union (EU) is actively amending and creating new laws and national law has been left to fill the gaps. The key legal issues such as sovereignty, safety, liability, insurance and criminal law raised during the Legal Workshop of the United Nations International Civil Aviation Organization are addressed through the Convention on International Civil Aviation, 1944.

The foremost issue is with the terminology and definition of “drone”. Although the term drone has been widely used in the past, it is now becoming increasingly unpopular and is not used by any of the key aviation entities such as ICAO, EU and the United States (US) Federal Aviation Administration (FAA). Other terms such as ‘remotely operated aircraft’ (ROA) and ‘unmanned aerial vehicle’ (UAV) have also been used to describe just the aircraft, but have not been adopted by any of the key aviation entities.

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Chicago Convention 1944

As per Article 96(b), the Convention regulates aviation activities which operate between the airspace of more than one contracting State.

Therefore, domestic flights do not fall under the scope of the Convention. However, majority of the civil drone activities involves small drones which do not have the capacity to fly long distances.

As per the definition of ‘aircraft’ under the Convention, it means any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth’s surface. Therefore, for the Convention to apply to drones, it must be an aircraft.

⁹Available at:<https://advocaterahuldev.com/npatents-for-unmanned-aerial-vehicles-uav-and-drones-25fee43a779a>

Article 8 deals with ‘Pilotless Aircraft’ and requires special authorization by a State. Thus, the obligation set forth in Article 8 is clear. But its scope is limited to ‘pilotless aircraft’ which refers to aircraft ‘capable of being flown without a pilot’. The term ‘pilotless’ could indicate the absence of a pilot on board and outside of the aircraft which would then only include ‘unmanned drones’.

Similarly, Article 26 of the Convention is relevant. It deals with Investigation of Accidents. The relevant Annexes such as ‘it is generally accepted that the existing noise and emissions standards for manned aircraft should be applied to UAS’.

Sabotage Convention 1971

The Sabotage Convention, 1971 criminalizes acts against the aircraft as opposed to acts carried out on board of an aircraft.

Article 1 declares that a person commits an offence if that person unlawfully and intentionally:

- (i) Destroys an aircraft, causes it to be incapable of flight or endangers the safety of the aircraft;
- (ii) Places or attempts to place a device or substance which could destroy, damage or compromise the safety of the aircraft;
- (iii) Destroys or damages air navigation facilities or interferes with their operation which could endanger the safety of the aircraft;
- (iv) Provides false information which could endanger the safety of the aircraft.

However, while applying the Sabotage Convention to drones, the same limitations are relevant for manned aviation, such as it is limited to international flights as prescribed in Article 4. Thus, the Sabotage Convention has limited application.

The Beijing Convention 2010 modernizes and consolidates the Sabotage Convention 1971 and the Montreal Convention 1988. Also the Beijing Protocol 2010 supplements the Hijacking Convention 1971 and criminalizes certain acts pursuant to Article 1:

- (1) The act of using civil aircraft as a weapon;

- (2) Cyber-attacks on air navigation facilities;
- (3) The use of dangerous materials to attack aircraft or targets on the ground;
- (4) The transport of biological, chemical and nuclear weapons and their related material;
- (5) Threats against civil aviation;
- (6) Leading attacks against will also have no safe haven from criminal prosecution;
- (7) Cyber-attacks on aviation such as jamming and spoofing will be criminalized.

The above acts widens the scope of criminal air law so as to encompass drone activities, either by prohibiting activities carried out by drones or by prohibiting activities against drones. However, to come into force it requires ratification of 22 States after which it will be applicable for drones as well as for manned aviation.

Conclusion

Despite that the drone technology represents a new technology; an international and nation-by-nation evaluation of drone laws and regulations reveals conservatism among lawmakers. In Japan, for instance, the technology has been in use since the 1980- chiefly for agricultural purposes. Moreover, in 2015 a committee has been appointed to review the existing radio and civil aeronautics laws. However, a specified set of rules and regulations covering drones are still not framed. Also, Cambodia has prohibited civil drones to safeguard privacy and to protect against terrorist attacks. Although Mumbai became the first city in which a pizza was delivered by drone,¹⁰ the civil operation of UAV is barred until the civil aviation authority revises existing policies. Other countries such as Sri Lanka and Vietnam allow drone operations, subject to government approval.

Thus, from the above it is clear that a majority of international treaties do not appropriately regulate drone activities. The existing rules and agreements widely cover only the manned aviation. At present, the inclusion of drone technology into the policy framework is not given importance but should be widely recognized at the international level, for safety purposes. Also, there exists a difference of opinion amongst nations regarding drone technology as some

¹⁰<https://www.ndtv.com/mumbai-news/mumbai-restaurant-uses-drone-to-deliver-pizza-563164>

countries have given legal recognition while some have not. But in the future, it is bound to be accepted by all. Thus, the regulators at the international level must adopt a proactive approach and frame new or amend the existing laws so that this emerging technology can be appropriately regulated.

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