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DRONE TECHNOLOGY-EMERGING LEGAL ISSUES IN INDIA

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INTRODUCTION

Humans are the most curious and smartest living organisms on the planet and hence innovative innovations are taking place. This is how the history has taught the humans of cave bashing a rock on the ground to make the first sharp-edged tool, to the development of electricity and internet which are revolutionary in scientific and technological developments. Thus human curiosity never fails to seek out new advancement and technologies like the Cloud Computing,[1] Face-Book, Apple iPod, Virtual Keyboard, Flower Sound,[2] the Oculus Rift, Apple iPhone, the Invisible Skyscraper, Google Glass, Plus Pool,[3] Birth Control Patch, Hybrid Vehicles, Sixth Sense,[4] Artificial Memories, Amazon Kindle, You Tube, Teleportation, Bionic Contact Lens, Tooth Sensor, Cameral Pill, Bio-artificial Lever Device, Billboard that produces clean water, Rewalk[5], The Artificial Pancreas, Retinal Implants and many more like that of the "Drones".

The initiation of the concept of Liberalization, Privatization and Globalization (LPG) has led the world to witness the much advanced technological developments[6] whereby the end result from the decades of research and development has had paved way for a wide range of technologies

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1. The practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.
2. A gadget that consists of a doughnut-shaped magnet and coil at the base of a vase. It hooks up to a CD player, TV, or stereo and relays sounds through a flower's stem out through its petals (Japan).
3. Designed in New York to filter the very river that it floats in through the walls of the pool, making it possible for New Yorkers and its visitors to swim in clean river water
4. A wearable gestural interface that augment the physical world around us with digital information and lets us use natural hand gestures to interact with that information.
5. A revolutionary wearable robotic exoskeleton that provides powered hip and knee motion to enable individuals with spinal cord injury (SCI) to stand upright and walk.
6. Drones can be expected to become more sophisticated and available in more compact form, and also to become less expensive and therefore more accessible. They are likely to form part of the arsenals of an increasing number of States that may be able to deploy such force across international borders in relatively non-intrusive and sometimes non-attributable ways, on the battlefield and to pursue targets far removed from what would traditionally be seen as zones of armed conflict.

which is now being used and which can augment or replace human physical and intellectual capabilities known as 'Unmanned Aerial Vehicles' or'Pilotless Aircraft' or 'Drones'. These drones are aircraft either controlled by 'pilots' from the ground or increasingly, autonomously following a pre-programmed mission.

This paper at first focuses the concept of drones; its use and functioning of drones. Later it continues with legal framework at the international and national level. This paper highlights the emerging legal issues emanating out of the drone technology and also tries to resolve the technology based mitigation measures. The author tries to brief up the present position regarding the drones in India and finally draws up with a conclusion.

Concept of Drones

The *Drones* are the subject matter of aviation law in particular and international air law in general. They can operate on surfaces or in the air without a person on board to control it; and that can vary in size, shape, form, speed, and a whole host of other attributes.[7] The different forms of drones are; large fixed-wing aircraft; small fixed-wing aircraft; micro-UAVs; Biomimetic UAVs and Blimps or balloons.[8] Hence, a drone can be a model aircraft someone purchases in a store, a mini helicopter used by some police forces, or a large plane-sized aircraft sent to a war zone.

In the industry, and across different regions, drones are also called Unmanned Air Vehicle (UAV); Unmanned Air System (UAS); Remote Piloted Aircraft System (RPAS); Model Aircraft (MA); Unmanned Aerial Vehicles (UAV); Pilotless Aircraft etc. Before UAVs became RPASs pilotless aircraft were known as an *Unmanned Aircraft System* (RPAS) is an aircraft and its associated elements which are operated with no pilot on board. PRAS was an overarching term for the entire system comprising an *Unmanned Aerial Vehicle* (UAV) which is applied to describe a self-piloted or remotely piloted aircraft that can carry cameras, sensors, communications equipment or other payloads, as well those which support unmanned flights

7. Greg McNeal. "A Primer on Domestic Drones: Legal, Policy, and Privacy Implications," *Forbes*, April 10, 2012.
8. Stanley, J. And Crump, C., *Protecting Privacy from Aerial Surveillance: Recommendations for government use of drone aircraft* - American Civil Liberties Union (ACLU), 2011, p 4.

such as air traffic management and remote controllers of such aircraft. The following are the definitions associated with the various *drone* terminology:

i) *Unmanned Air Vehicle* (UAV) is a *"power driven aircraft, other than a model aircraft, that is designed without a human operator on board."*[9]*;*

ii) *Unmanned Air System* (UAS) is *"an unmanned aircraft (UA) and all of the associated support equipment, control station, data links, telemetry, communications and navigation equipment, etc., necessary to operate the unmanned aircraft."*[10]*;*

iii) *Remote Piloted Aircraft Systems (*RPAS) – a newly emerging definition coming from the International Civil Aviation Organization that intends to highlight the fact that the systems involved are not fully automatic but always have a pilot in command responsible for the flight.[11] RPAS describes a remotely piloted aircraft, its associated remote pilot station(s), the required command and control likns and any other components as specified in the design.[12]

iv) *Model Aircraft* is an aircraft; the total weight of which does not exceed 35 Kg (77.2 pounds) that is mechanically driven or launched into flight for recreational purposes and that is not designed to carry persons or other living creatures.[13]

v) *Pilotless aircraft;* [14] *as – "No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each Contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft".*

vi) The*Global Air Traffic Management Operational Concept* (Doc 9854) states *"An unmanned aerial vehicle is a pilotless aircraft, in the sense of Article 8 of the Convention on International Civil Aviation, which is flown without a pilot-in-command on-board and is either remotely and fully controlled from another place (ground, another aircraft, space) or programmed and fully autonomous."* This understanding of UAVs was endorsed by the 35th Session of ICAO Assembly.

9. *Canadian Aviation Regulations* (CARs), s. 102.01.
10. Federal Aviation Administration (FAA) Definition of "unmanned aircraft system" http://www.faa.gov/about/initiatives/uas/uas_faq?#On1 visited on 28-12-2014
11. Council of the European Union. *Towards a European Strategy for the development of civil applications of Remotely Piloted Aircraft Systems (RPAS),* Working Paper (13438/12), September 6, 2012.
12. UVS International Glossary of Terms http://www.uvs-international.org visited on 28-12-2014. CARs s. 101.01 http://laws-lois.justice.gc.ca/PDF/SOR-96-433.pdf
14. Article 8 of the Convention on International Civil Aviation signed at Chicago on 7th December, 1944 (The Chicago Convention, 1944).

Use of Drones

The technology based drones can be used for commercial purposes,[15]or by the State for its good governance and public purposes,[16]or in wars[17] and in targeted killings[18]like that of the imminent threat from the so called terrorists at global level.

Functioning of Drones

The functioning of drones is based on associated support equipment, control station, data links, telemetry, communications and navigation and related equipment necessary to operate the

15. Advertisements and deliveries; aerial photography; agricultural spraying; commercial and motion picture filmmaking; companies use to monitor their infrastructure such as pipelines, buildings etc.; farmers using to monitor livestock on vast spreads of land; journalism and photography; inspections and marketing materials to assist the selling process; journalism and photography; medical industry for blood delivery; organ transportation; photo-grammetry service; promotion and advertising; realtors, developers and builders in real estate and construction activity using drones for surveying land; recreational use; sample water from lakes, ponds and streams that people can't easily reach etc.[15]; used for sports (i.e. not only it is an entertainment to watch games from above, it also gives coaches a unique and valuable perspective of performance by players).
16. Aerial photography; archeology; atmospheric (including weather and atmospheric gas sampling); and oceanographic research; scientific research; cartography and mapping; commercial aerial surveillance (i.e., fire departments use to track and map wild fires); disaster aid and relief (i.e. searching for survivors in cases of flooding, wildfires, or nuclear fallout, used to help locate and save life in the midst of natural disasters); emergency and disaster monitoring; flight research; firefighting monitoring and management ; first aid kit delivery for providing food packets during disaster management; flight research; gather and deliver medical samples; geophysical research; guarding the border by defence personnel; historical monuments; sites topography etc.; imaging spectrometry; medical industry for blood delivery; mineral exploration monitoring wild life; museography ; national heritage sites in danger; oil, gas, mineral exploration; on-line archeology; organ transportation; photo-grammetry service; police using drones to fight crimes; police surveillance; putting out wildfire; remote sensing (i.e., geological surveying, agriculture, and archeology); sample water from lakes, ponds and streams that people can't easily reach etc. scientific research; sites topography; search, rescue and recovery; supplies and medicine to remote or otherwise unreachable areas in a disaster zone etc.; telecommunications relay platforms; tracking of illegal hunting of wild animals; tracking the environmental violations; used for sports (i.e. not only it is an entertainment to watch games from above, it also gives coaches a unique and valuable perspective of performance by players); used to inspect power lines, towers, tall structures like chimneys and roofs which reduce liability exposure; and weather and pollution reconnaissance. However, the subject drones, is one of the fastest-growing and, yet, controversial sectors of aerospace, but 'safety' is the principal concern.
17. Use of drones in warsto target persons located in another State is subject to and in compliance of rules of on the use of inter-State force.
18. According to the UN Special Rapporteur on extrajudicial, summary or arbitrary executions, a targeted killing is "the intentional, premeditated and deliberate use of lethal force, by States or their agents acting under colour of law, or by an organized armed group in armed conflict, against a specific individual who is not in the physical custody of the perpetrator". This definition comprises all key legal elements: intention to kill; preplanning; identification of specific targets who are not detained; and, fundamentally, the "accordance with law" requirement (actual or purported); Philip Alston (footnote 14), p. 3, paragraph 1.

unmanned aircraft.[19] Drones are remarkable devices. Finally drones are no longer exclusively for military use but have been evolving into a more accessible tool that could eventually be put to various tasks domestically across the States. The drones may be used positively for commercial purposes or negatively for wars or by terrorists. This subject *Drones,* is one of the fastest-growing and, yet, controversial sectors of aerospace, but 'safety, security and privacy' is the principal concern.

The World War II had witnessed the use of drones as a means of warfare and beyond, becoming increasingly significant in the course of second half of the 20th century.[20] While initial generations of military drones were used primarily for aerial surveillance, their functions gradually expanded to areas such as search and rescue, communications systems relay, suppression of hostile air defence, and direct attacks against selected targets.[21] In the course of the last decade, the use of armed drones has increased exponentially, beginning with the Second Intifada in the Israeli-occupied areas (since 2000), continuing in the Second Gulf War (2003-2011), and reaching its current peak in the course of the United States' confrontation with Al-Qaeda and affiliate groups in Afghanistan, Pakistan, Yemen and Somalia (since 2001). What is new today is the systematic use of armed drones for the targeted killing of pre-selected individuals in the territory of other States.

As per the statistics of the Federal Aviation Administration (2017), people have registered over 670,000 drones and the number reflects the rapid adoption of drones by hobbyists and a parallel effort by regulators to them to register those aircrafts. The US Department of Defence (till 2012) was said to dispose of some 7,000 drones[22] flying roughly 20,000 raids per year, with a total of 1 million "combat hours" achieved already in 2010.[23] It is further estimated that, between 2004 and 2012, drones operated by the CIA have carried out

19. UNMANNED AIRCRAFT SYSTEMS: UNITED STATES & CANADIAN REGULATORY APPROACHES, ICAO/CERG Warsaw Air Law Conference, 5 September 2012 by Paul Stephen Dempsey, Tomlinson Professor of Law, Director, Institute of Air & Space Law, McGill University.
20. States having employed drones for military purposes during that period include, for example, the United States in the Vietnam War (1965-1975), the First Gulf War (1991) and the wars in Bosnia (1995) and Kosovo (1999), Israel in the Lebanon War (1982) and Iran in its war with Iraq (1980-88).
21. US Department of Defense, "Unmanned Systems Integrated Roadmap FY2011-2036", p 21.
22. Stanford/NYU, *"Living under Drones"*, p. 8, with reference
23. US Department of Defense, "Unmanned Systems Integrated Roadmap FY2011-2036", p 22.

approximately 350 attacks in Pakistan alone, killing between 2000 and 3000 individuals.[24] Although the accuracy of some of these numbers remains uncertain, they provide an approximate picture as to the importance which armed drones have attained in operational practice. Hence, the current operational drones are an unmatched unmanned military jets, but the growing asymmetry of conflicts mean that armed drones are becoming the weapon of choice, particularly in permissive airspace outside the territorial control of the operating State.

Regulatory Framework

International:

On 13th June 1960,the International Civil Aviation Organization (ICAO) Council, at the sixth meeting of its fortieth session adoption a Resolution whereby the Council declared that the flight of uncontrolled balloons[25] not released under appropriate safeguards and conditions may constitute a definite hazard to the safety of air navigation.[26] The Council, while drawing attention to ICAO member States to Article 8[27], urged States to take whatever action they deemed appropriate or necessary to ensure the safety of flight.[28]

In modern parlance the most contentious pilotless aircraft is the drone, more technically referred to as Remotely Piloted Aircraft System (RPAS). Originally called An Unmanned Aerial Vehicle (UAV)[29] it is a self-piloted or remotely piloted aircraft[30] that can carry cameras, sensors,

24. New America Foundation, *The Year of the Drone*. See also: The Bureau of Investigative Journalism, *Pakistan drone statistics visualized*.
25. A balloon falls within the definition of an aircraft as defined in Annex 7 to the Chicago Convention. See CANSO is the global voice of the air traffic management profession. Its members comprise over 50 air navigation service providers who control more than 85% of global air traffic movements.
26. Doc 8097-C/926 at p.9.
27. *"No aircraft capable of being flown without pilot shall be flown without pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft."*
28. Ruwantisssa Abeyratne Convention on International Civil Aviation – A Commentary Springer, p.117
29. For more details of UAV operations and their nature visit www.uvs-info.com.
30. An aircraft is defined as "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. This definition appears in Annexes 1, 2, 3, 7, 8, 11, 13, 16 and 17 to the Convention on International Civil Aviation, signed at Chicago on 7 December 1944.

communications equipment or other payloads. They have been used to conduct reconnaissance and intelligence-gathering for nearly sixty years (since the 1950s).

The Chicago Convention is focused on civil aviation, and applied to civil aircraft. The Convention does not apply to State aircraft, which are identified as aircraft engaged in police, military and customs services.[31] Therefore, principles of the Convention will apply only to RPAS not engaged in such activities as are excluded. One of the provisions which may have a bearing on RPAS in the Convention is Article 8 which stipulates that no aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a Contracting State without special authorization by that State.

The Standards and Recommended Practices (SARP) for the issuance of airworthiness certificate are laid down in Annex 8[32] to the Chicago Convention, Annex 8 (in its 9th Editions) only addresses aero planes[33] over 5700 kg certificated take-off mass and helicopters[34]"without a limitation on mass of an aircraft which is intended for the carriage of passengers or cargo or mail international air navigation.[35] This might provoke the argument that Annex 8 would not usually apply to RPAS since only large RPAS exceed the wright of 5700 kg. The lack of internationally recommended and accepted standards and practices for smaller aeroplanes is a challenge for the operation of RPAS as well as for aeroplanes with a pilot on board.

Annex 2 to the Chicago Convention, detailing the rules of the air referred to in Article 12 of the Convention, states *inter alia* that the rules of the air shall apply to aircraft bearing the nationality and registration marks of a Contracting State.[36] These rules applicable to RPAS as well. Two main categories of rules of the air exist: visual flight rules and instrument flight rules. Annex 2 states *inter alia* that a pilot may elect to fly in accordance with instrument flight rules in

31. Chicago Convention, Preamble (*supra* note 1), at Article 3.
32. Annex 8 to the Convention on International Civil Aviation, "Airworthiness of Aircraft", 10th edition, April 2005.
33. "A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight."
34. "A heavier-than-air aircraft, supported in flight chiefly by the reactions of theair on one or more power driven rotors on substantially vertical axes.
35. See Shawcross and Beaumont (1977) Para. 207-209.
36. *Resolutions and Recommendations of the Assembly 1-9th Sessions* (1947-1055) Part II, Doc 7670 at 78, Article 2.1.1.

visual meteorological conditions. The rules of the air adhered to are thus distinct and separate from the metrological conditions, requiring instrument flight rules to be applied. Chapter 3.1 of Annex 2, contains an article on unmanned free balloons, stating that they shall be operated in such a manner as to minimize hazards to persons, property or other aircraft and in accordance with the conditions specified in Appendix 4. Appendix 4 states *inter alia* that heavy balloons[37] need to comply with similar provisions like normal aeroplanes, *inter alia* minimum height over "congested areas of cities, towns or settlements or an open-air assembly of persons not associated with the operation. Secondary Surveillance Radar (SSR)[38] equipment and lightening. Article 3.3 of Appendix 4 to the Annex 2to the Chicago Convention contains a remarkable requirement to unmanned balloons. Such vehicles shall be equipped with atleast two payload flight termination devices or systems. It may well be argued that such devises or systems are required for RPAS as well. An analogy to the operation of RPAS exists in Annex 2 which requires obliges pilots-in-command to take action as will best avert collision. The Annex also requires that vigilance for the purpose of detecting potential collisions be exercised on board an aircraft, operating. Therefore, it can be concluded that pilots flying according instrument flight rules are required to scan the environment visually in order to detect potentially conflicting traffic. This task may prove difficult in the case of RPAS in that although many RPAS are equipped with video cameras, it would be difficult for RPAS operator to detect vehicles nearby, to assess the potential for conflict and to initiate appropriate actions. This inability might result in infringement of article 3.2.1. of Annex 2, which provides that an aircraft shall not be operated in such proximity to other aircraft as to create a collision hazard?A potential solution to this similar to parking assistant for cars, are built into RPAS. The drawback of such a measure would be the cost involved and the additional weight that has to be carried by the RPAS.

The ICAO has released a circular entitled Unmanned Aircraft Systems (RPAS),[39] the purposes of which was to apprise States of the emerging ICAO perspective on the integration of RPAS into non-segregated airspace and at aerodromes; consider the fundamental differences

37. ICAO *Doc 4510, AI-EC/72*, May 1947, 35, Appendix 4, article 1 (c).
38. A radar system used in air traffic control (ATC), that not only detects and measures the position of aircraft i.e. bearing, but also requests additional information from the aircraft itself such as its identity and altitude
39. *Unmanned Aircraft Systems* (RPAS) Cir 328-AN/190

from manned aviation that such integration will involve; and encourage States to help with the development of ICAO policy on RPAS by providing information on their own experiences associated with RPAS. The fundamental premise that ICAO follows in this regard is that, since unmanned aircraft fall within the definition of "aircraft" all SARPs of the Annexes to the Chicago Convention applicable to aircraft would apply to RPAS as well.[40]

National (India)

In India, presently there are no rules governing the unmanned aircraft or the drones. However, the Directorate General Civil Aviation has come out with a draft proposal on guidelines for obtaining Unique Identification Number (UIN) and Operation of Civil Unmanned Aircraft System (UAS) in 2016 seeking inputs from various regulators and also comments from the public.

Under the proposed rules, the regulator has classified drones in five categories based on their weight i.e. nano drones less than 250 g and are capable of flying not more than 50 feet from the ground level will not need permission; secondly, drones above 250g and up to 2 kg and can fly no higher than 200ft will need police permission; thirdly, those weighing more than 2 kg will need to apply for permissions, including one from the police, as also a licence and a flight plan etc. However, restrictions are laid down on flying drones in sensitive areas including around India Gate, International borders, within 500m from strategic locations, from mobile platforms such as car, ship or aircraft, over eco-sensitive zones like national parks and wildlife sanctuaries. Regarding the use of drones for commercial purposes, it is not clear how it will be implemented.

Emerging Legal Issues

40. Model aircraft, which are outside the purview of the Chicago Convention, are not included in within the principle. It must be noted that a number of Civil Aviation Administrations (CAAs) have adopted the policy that RPAS must meet the equivalent levels of safety a manned aircraft RPAS operations must be safe as manned aircraft insofar as they must not present a hazard to persons or property on the ground or in the air that is any greater than that attributable to the operation of manned aircraft of equivalent class or category. In general, RPAS should be operated in accordance with the rules governing the flight of manned aircraft and meet equipment requirements applicable to the class of airspace within which they intend to operate RPAS must be able to comply with ATC instructions.

The decade's research which led to the advanced technology of "Unmanned Aerial Systems" or the "Drones" is not a foolproof in its application in the modern society. However, the issues and challenges that RPAS bring to civil aviation are asfollows:

i) *Focusing on RPAS and Safety;* the said RPAS are to be equated with manned aircrafts which concerns airworthiness regulations which are required to ensure that a RPAS is built, maintained and operated at high standards that ensure the safety of all involved including crew and passengers of manned civilian and military aircraft with which RPASs will share de-segregated airspace as well as persons and property on the ground.[41] There is currently no international Standards and Recommended Practices (SARPs) adopted under the auspices of the ICAO applicable to the RPAS and the Unmanned Aircraft Systems (RPAS) although RPASs are increasingly requiring access to all categories of airspace including non-segregated airspace.

ii) The second concern is the encroachment on air traffic control functionson air traffic control (ATC) functions in non-segregated air space. In doing so, RPASs should not place an added burden and demands on airspace management and the flow of general air traffic within the en-route air space structure which must not be impeded by the presence of RPASs. In this context, the priority would lie in collision avoidance, primarily through effective separation of aircraft by which aircraft could be kept apart by the application of appropriate separation minima. The two key players in this exercise would be the pilot of the manned aircraft involved and the air navigation service provider who would be jointly or severally liable if a separation minimum were compromised.

iii) The other emerging legal issues pertains to surveillance and privacy issues; potential abuse of DNA database and digital medical records; leakage of personal information; privacy of civil liberties; privacy and data protection[42];interference with Right to Private and Family Life.

41. The main concern of the ICAO in its role as regulator in this context is with international civil RPAS operations and those standards that affect such operations. ICAO should therefore, not be expected to take on a leading role in the development of aircraft performance specifications.

42. Data Protection refers to the set of privacy laws, policies and procedures that aim to minimize intrusion into one's privacy caused by the collection, storage and dissemination of personal data. Personal data generally

iv) Finally, due to lack of rules and regulations in India, UAS poses threat for air collisions and accidents. The civil operation of UAS will require approval from the Air Navigation Service provider, Defence, Ministry of Home Affairs and other concerned security agencies besides the Directorate General of India. Presently, DGCA is in the process of formulating the regulators.

Technology based Mitigation Measures

The concept of globalization gave an opportunity to explore the various technologies in the world but it has also led to misuse which we witness today i.e. the use of drones where there is an understandable concern focusing the privacy of people. Measures were initiated to curb the misuse technologically, as well as by the laws of the State. Keeping in view of the privacy of the people, anti-drone techniques[43] were initiated like the Anti-Drone Drone;[44] Anti-Drone Birds;[45] Anti-Drone Jammers;[46] Drone-Blinding Lasers;[47] Drone-Detection Systems;[48] Drone-Hijacks;[49] No Drone Zone;[50] and Drone Surveillance Laws.[51]

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refers to the information or data which relate to a person who can be identified from that information or data whether collected by any Government or any private organization or an agency.

43. http://www.makeuseof.com/tag/8-ways-prevent-drones-infringing-privacy/ (visited on 08-04-2016).
44. In 2015, Malou Tech gave their first demonstration of an anti-drone drone: a bigger, worst drone equipped with a huge net meant for capturing and disabling smaller drones. It could be an effective method, but in a lot of cases, something more subtle is needed.
45. In this type of technique, eagles (bird) are trained to tackle drones out of the sky.
46. When physical interception is not possible the next technique is the application of the frequency jamming by using the Anti-UAV Defense System (AUDS). It scans the skies for drones and jams their control signals using its own high-powered radio signal.
47. Anti-drone lasers are kind of like anti-drone jammers, except instead of interfering with a drone's control signals, they interfere with its camera. Digital cameras use a light sensor to pick up visual information, so if you overload that sensor with too much light, you can blind it.
48. Back in 2013, a group of engineers and computer scientists started a crowd-funding campaign for a device called Drone Shield. Powered by a Raspberry Pi core, it was able to detect the presence of drones with a microphone that could pick up frequencies that humans can't hear. Once processed, the signal would been compared against a database to separate it from everyday noises and to confirm that it was actually a drone, and if so, the device would shoot a notification your way to let you know that a drone was nearby.
49. One important thing to know about drones is that they'll never be 100% impervious to hacks, much in the same way that computers and mobile devices will never be completely protected. Keep that in mind if we ever plan on buying a drone of our own, then the thing is, this kind of weakness can always be exploited, which was proved when a security researcher demonstrated the hijacking of a $35,000 police drone from up to one mile away. If a government drone can be disabled like that, it's reasonable to assume that most consumer-grade drones won't stand a chance either. Not to say that you should go around hijacking drones,

Present Position in India

It is evident that in India the use of drones are at a rampant stage. Taking into cognizance a few factual situation of using drones in India, (i) the Tamil Nadu police are believed to be the first force in the country to use an unmanned aerial vehicle in a murder investigation of Uma Maheswar a techie from TCS facility;[52] (ii) the Andhra Pradesh Government has sanctioned the use of drones equipped with high resolution cameras to keep watch in the forests against illegal felling of Red Sanders trees;[53] (iii) a 29-year-old businessman married his college sweetheart in a typical big fat wedding at a plush farmhouse close to the IGI airport and his photographer took aerial shots of the function with an unmanned aerial vehicle (UAV) or drone;[54](iv)the rape of a 27-year-old finance company executive by an Uber cab driver brought the spotlight back on women security in the city, and the force has decided to patrol dark stretches and crime prone areas with the help of drones which will be fitted with night vision thermal imaging cameras;[55] and "With this project, North Delhi will become the first district with complete camera surveillance in Delhi".

The ICAO expects to issue its initial SARPs[56] by 2018, with the overall process taking up to 2025 or beyond. Today, it is still possible to import, buy, build or fly small drones in India, despite the DGCA's ban. This means that drone-users in India currently exist in an illicit and unregulated economy, which is far more of a threat to the nation than regulated drone use could

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but in the future we may see disruption devices that utilize these kinds of vulnerabilities to knock drones out the sky and maintain the peace.

50. When a drone peeps into a window or ominously hovering over home; in that case, one should support the growing movement for "no drone zones" that prevent drones from flying through certain airspaces. A few drone manufacturers have even come together to create No Fly Zone. If a person adds his address to their database, any drones created by these manufacturers will be unable to fly over a person's property which is a built-in GPS-based restriction.
51. If all else fails, the last thing to do is to push for laws that protect the privacy of citizens against drones. Bills have been popping up ever since the drone craze really took off back in 2013, and some of them have even been passed into law, but India is still have a long way to go.
52. PP (ed.), "TCS Techie Murder Case: Tamil Nadu Police Use UAV in Investigation" *One India* February 25, 2014
53. SJ, "AP Acquires Drones with HD Cameras to Keep Watch on Red Sanders Smuggling" *The Indian EXPRESS* (August 17, 2015)
54. SS, "Drone Used for Photography in Big Fat Indian Wedding" *Main Today* (December, 2015)
55. http://www.dnaindia.com/india/report-police-to-deploy-drones-to-patrol-delhi-streets-post-uber-rape-2043171 (Visited on April 17, 2016)
56. Standards and Recommended Practices (SARPs)

ever become.[57] After Mumbai, the Pune city police have now banned the use of Unmanned Aerial Vehicles (UAVs) and Unmanned Aircraft Systems (UASs); drones for the layman without seeking prior permission from the local police station. Cops fear that the unmanned aircraft could turn into weapons in the hands of terrorists.[58]The alarming rate of rapes in India – including one allegedly by an Uber cab driver that sparked much debate has prompted an unprecedented security move in New Delhi which has led to the use of drones.[59]

In India, taking the present situation pertaining to regulatory framework, the answer is negative although a public notice issued by the DGCA and the Press Note[60] clearly limits the production and use of drones. Though surveillance not authorized by the government is illegal, drones might continue to pose a threat to privacy.

Conclusion

The initiation of the concept of liberalization, privatization and globalization has led to the economic progress of the States with the innovative ideas of technological development. In this regard the "Unmanned Aerial Systems (UAV)" or the so called "Drones" play a vital role in commercial as well as non-commercial activities across the globe. In this regard, the security of the States is pivotal for its good functioning. The author tries to equate the UAV at par with manned aircraft and thereby suggests for an application of various provisions enshrined under Articles 3 *bis*,[61] 8,[62] 12,[63] 15,[64] 29,[65] 31,[66] 32,[67] 33[68] of the Chicago Convention, 1944. When

57. SS, "Let's Open up the Skies for Drones" *The Hindu, Business Line* (Chennai)
58. MA, "POLICE DON'T WANT UNIDENTIFIED OBJECTS FLYING IN CITY SKIES" *Pune Mirror* (Pune June 17, 2015)
59. AS (ed.), "Will Drones Keep India's Women Safe from Rape?" *The Christian Science Monitor* (December 11, 2014)
60. Press Note No. 3 (2014 Series) released by the Department of Industry Policy & Promotion, Ministry of Commerce and Industry
61. Landing at a designated airport
62. Pilotless Aircraft
63. Rules of the Air
64. Airport and Similar Charges
65. Documents carried in Aircraft
66. Certificate of Airworthiness
67. Licences of Personnel
68. Recognition of Certificates and Licences

once these provisions are made applicable to the UAVs, automatically international conventions[69] will be applied.

The author anticipates that in the near future in India, UAV technologies will be considered in many instances to be effective; low-cost alternatives to manned aircraft. While these developments may be extremely invasive, the safety framework for such usage must be dictated by the Directorate General of Civil Aviation (DGCA) with stringent provisions pertaining to its misuse. At this juncture it is to be noted that the DGCA has issued a public notice[70] and the DGCA waits for comments from the public on its draft guidelines for UAVs released in 2016. As per the Aerial Surveillance, India tops list of drone importing countries and had bought 22.5% of the world's Unmanned Aerial Vehicle between 1985 and 2014.[71]The States should minimize the proliferation of the most capable and lethal drones to countries that are conflict prone. This will reduce the potential for militarized disputes between States that could lead to an escalation of armed conflict in unstable regions. Drones should be treated as a distinct class of weapons. They have unique properties that led them to be used, and defended against, in ways that are destabilizing.

A comprehensive law on drones is the need of the hour for a better way of controlling commercial use of drones in India paving way in granting protection to the privacy rights Constitutional rights and individual rightswill need to be addressed and balanced with technological advancements. However, drones will continue to challenge lawyers and legal policy makers in the semi-foreseeable future. India must bring out a law in general focusing and

69. The Warsaw Convention 1929, The Hague Protocol 1955, The Guatemala City Protocol 1971, The Guadalajara Convention 1961, The Geneva Convention 1948, The Rome Convention,1 952, The Tokyo Convention 1963, The Hague Convention 1970, The Montreal Convention 1999, The Cape Town Convention 2001

70. File No. 05-13/2014-AED, Dt. 7th October, 2014 on Use of Unmanned Aerial Vehicle (UAV) /Unmanned Aircraft Systems (UAS) for Civil Applications. The said public notice states that *"due to lack of regulation, operating procedures/ standards and uncertainty of the technology, UAS poses threat for air collisions and accidents. The civil operation of UAS will require approval from the Air Navigation Service provider, defence, Ministry of Home Affairs, and other concerned security agencies, besides the DGCA. DGCA is in the process of formulating the regulations (and globally harmonize those) for certification & operation for use of UAS in the Indian Civil Airspace. Till such regulations are issued, no non-government agency, organization, or an individual will launch a UAS in Indian Civil Airspace for any purpose whatsoever."*

71. Scroll.in Thursday, April 14th 2016.

balancing the issues pertaining to legal, moral, ethical, social, political and economic in general and privacy issues in particular. As the lawmakers could not have anticipated the rapid and innovative advances in UAV technology, and while technology has catalyzed the aircraft industry allowing UAVs to be developed into operable machines, it will be human ingenuity and determination from regulatory authorities, primarily the DGCA, which will ultimately facilitate UAV integration into India's navigable airspace.

Lastly, the drone industry cannot be ignored considering its various uses and benefits in various fields; a lot of start-up companies are possibly looking at Drone technology as a way to pierce through traffic, which would drastically improve their logistics based on the campaign 'Make in India' as was announced by our Hon'ble Prime Minister Narendra Modi. Hence, this drone technology be used for the economic development rather than the economic destruction of the States.