


Chapter 13

Legal and Ethical Challenges on Drone Technology: Learnings From Indian Skies

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ABSTRACT

Drone technology is a mixed blessing in the modern tech era. While it offers advantages across various societal sectors, the downsides of unmonitored usage must not be ignored. This paper explores the challenges and opportunities of drone technology and evaluates its use in Indian skies, balancing concerns related to public safety, privacy, criminal justice, and surveillance. The study fills a gap by combining technological and legal perspectives. It critically examines how drones have enhanced existing practices in remote sensing, surveillance, crime scene documentation, search and rescue operations, aerial photography, and agriculture. At the same time, it addresses issues such as threats to individual privacy, unauthorized usage, and the risk of hacking and security breaches. The findings highlight that drones bring significant benefits but also pose societal risks, emphasizing the need for stringent regulations on drone operations in Indian airspace. This research relies on qualitative analysis of secondary data.

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1. INTRODUCTION

Drone is an informal term for any remotely operated autonomous vehicle, including aerial, ground, or underwater systems. It is an uncrewed aircraft and does not have an onboard human pilot. Drones are increasingly used by state and non-state actors (A. Kumar & Vishwanathan, 2025) and have applications spanning several industries. They are used in military surveillance and strikes (Jackman, 2023), aerial photography and videography (such as buildings and construction sites) (Li & Wu, 2024), delivery services, and other commercial applications (De Oliveira et al., 2024), agriculture (precision farming, crop monitoring, spraying pesticides) (A. P. M. Kumar et al., 2025), and search and rescue operations (Gautam & Johari, 2023). This can be seen in the evolution of drones as a sector. It all began with kites and balloons in the early 20th century. However, today, we have reached the stage where drone taxis are not fiction anymore; they have become a reality. Drones are fast becoming an integral part of society and have applications in various sectors.

Technology often moves in building blocks, with each new phase of technological development becoming only a stepping stone for a new evolutionary form to emerge. The rapid integration of drones into sectors like logistics, agriculture, and surveillance underscores the urgent need for robust legal frameworks to address their dual-use potential. Emerging technologies like drones intersect with critical legal questions around privacy, autonomy, and cross-border governance, necessitating interdisciplinary solutions. Within drone technology, advancements are happening on new age control mechanisms, miniaturization, achieving cost-effectiveness, improved sensors with LIDAR and multi-spectral cameras, enhanced autonomy powered by Artificial Intelligence (AI), capability of multiple drones acting in coordination to monitor large-scale areas (Drone Swarms), amongst others will only shift gears in the widespread adoption of drones even in those sectors where their application seems unlikely at present.

Regulators cannot be oblivious to technological development. Drones have certainly proved to be a double-edged sword. They have been used in smuggling drugs across borders, dropping bombs, unauthorized surveillance, infringing personal privacy, espionage, having flights in restricted airspace, and increasing the risk of air accidents, amongst others. These technological and legal challenges of their unmonitored usage need an appropriate regulatory response. The most important one is integrating the thousands and millions of drones into regulated airspace. Though the Indian Government has taken several regulatory steps to prevent the unmonitored and unauthorized usage of drones, there is scope for improvement incorporating the evolving techno-legal landscape and requirements of the nascent drone industry. By qualitatively analyzing secondary data, this study explores the dual-use nature of drone technology. The study looks at the technical and legal

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