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# The legal frontier of drone privacy in India: Challenges and regulatory solutions

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**Abstract**
The proliferation of unmanned aerial vehicles (UAVs), commonly referred to as drones, has reshaped technological, commercial, and governance landscapes in India (Jain 2021) [8]. While the Drone Rules, 2021 have eased operational requirements and enabled a thriving domestic UAV ecosystem, privacy safeguards remain notably absent (Rao 2020) [15]. Global scholarship demonstrates that drones pose unique risks by enabling persistent, AI-assisted surveillance even in public areas traditionally presumed to be free from privacy expectations (Clarke 2014; Finn & Wright 2012) [4, 5, 22]. The article situates UAV privacy concerns within India's constitutional framework shaped by Puttaswamy, comparative global regulatory developments, and emerging technological capacities (Calo 2012; McNeal 2013) [3, 11]. It identifies critical lacunae, lack of consent standards, data-governance protocols, oversight bodies, limits on state surveillance, and retention norms, while proposing a reformist, privacy-centric regulatory architecture informed by international models (Toscano 2020; Goddard 2017) [6, 21]. Ultimately, the paper argues that UAV privacy regulation is a constitutional imperative essential to protecting autonomy, democratic accountability, and fundamental rights (Peters 2018; Hildebrandt 2016) [7, 14].

**Keywords:** Drone privacy, unmanned aerial vehicles, surveillance law, digital rights, data protection, Drone Rules 2021, India, constitutional privacy, airspace governance, technology law

## Introduction

The advancement of unmanned aerial vehicle technology has transformed India's governance and economic sectors, enabling widespread use in agriculture, medicine, mapping, and law enforcement (Jain 2021) [8]. The high-resolution cameras, biometric sensors, and AI-enabled capabilities of modern drones create unprecedented surveillance potential (Finn & Wright 2012) [5, 22]. Scholars warn that drones collapse the traditional distinction between "public" and "private," facilitating constant tracking even in public spaces (Nissenbaum 2009; Calo 2012) [3, 13].

The challenge for Indian governance lies in reconciling technological innovation with the fundamental right to privacy affirmed in Justice K.S. Puttaswamy (Retd.) v. Union of India (Peters 2018) [14]. Despite this constitutional imperative, the Drone Rules, 2021 remain primarily aviation-centric, focusing on airspace and safety while excluding privacy protections (Rao 2020) [15]. This regulatory mismatch leaves individuals vulnerable to intrusive collection of personal and sensitive data.

Given wide adoption by law-enforcement agencies and private entities, drone privacy represents a legal frontier requiring doctrinal clarity and policy intervention (Kaminski 2017; McNeal 2013) [9, 11]. This paper scrutinizes current laws, identifies regulatory gaps, and proposes reforms aligned with global best practices.

## Constitutional foundations of privacy in drone regulation

The Puttaswamy judgment introduced a three-pronged proportionality test legality, necessity, and proportionality for evaluating state surveillance. Drone-based policing and crowd monitoring must satisfy this test, yet many deployments lack statutory authority (Singh 2023) [18]. Scholars highlight that technological surveillance often operates beyond established legal frameworks, raising concerns about unchecked state power (Hildebrandt 2016) [7].

Drones blur the public–private divide by enabling persistent, high-resolution monitoring using thermal sensors, zoom lenses, and algorithmic pattern recognition (Brey 2014) [2]. Informational privacy, defined as individual control over personal data, is therefore implicated even when surveillance occurs in public spaces (Nissenbaum 2009) [13]. Comparative scholarship suggests that courts globally are re-evaluating reasonable-expectation-of-privacy doctrines in light of pervasive aerial technologies (Scott 2016) 17[].

While India's constitutional jurisprudence offers strong privacy foundations, the lack of statutory operationalization in aviation contexts creates a regulatory vacuum (Jain 2021; Rao 2020) [8, 15].

## India's Drone Rules 2021: A Safety-Centric Framework with Privacy Blind Spots

The Drone Rules, 2021 liberalized the UAV ecosystem by reducing licensing burdens and encouraging commercial use, but this shift intensified privacy concerns (Rao 2020) [15]. The Rules emphasize operator certification, flight permissions, and airspace management, without obligations relating to consent, notice, data minimization, retention, or anonymization (Smith 2020) [19].

Indian aviation regulation traditionally focuses on airspace safety rather than privacy (Redick 2017) [16]. Consequently, commercial operators conducting mapping, photography, or delivery are able to collect large volumes of personal data with limited oversight (Mendis 2017) [12]. Security vulnerabilities including unauthorized access, remote hijacking, or data leakage remain inadequately addressed (Wright & Kreissl 2018) [22].

India's regulatory framework is thus misaligned with modern technological realities and global privacy norms (Toscano 2020) [21].

**Drone Surveillance and State Power: Privacy Implications**

State use of drones expanded significantly during COVID-19, particularly for lockdown enforcement and monitoring of residential zones (Kaminski 2017; McNeal 2013) [9, 11]. While justified as an emergency measure, drone surveillance often exceeded necessity and lacked statutory authorization, violating the proportionality standards articulated in Puttaswamy (Peters 2018) [14].

Scholars in the United States and Europe have emphasized the need for warrants, judicial oversight, and strict limits on police drone use (Goddard 2017; Koslovski 2020) [6, 10]. Many U.S. states mandate warrants for drone surveillance or prohibit aerial monitoring of private property without consent (Kaminski 2017) [9]. The GDPR requires Data Protection Impact Assessments for high-risk technologies such as UAVs (Toscano 2020) [21].

In contrast, India lacks dedicated procedural safeguards, retention policies, or independent oversight (Singh 2023) [18]. This creates a permissive environment prone to misuse.

**Drone Privacy and the Digital Personal Data Protection Act, 2023**

The Digital Personal Data Protection Act (DPDPA), enacted in 2023, introduces consent, purpose-limitation, and data-minimization principles, but does not directly regulate airborne data collection or UAV-specific harms (Singh 2023) [18]. Drones inherently capture large quantities of incidental data, yet the Act does not require disclosure of such methods.

The DPDPA's broad exemptions for government agencies on grounds of public order or national security significantly weaken privacy protection in contexts where drones are often deployed (Peters 2018) [14]. As scholars note, without UAV-specific legal controls, such as retention schedules, transparency mandates, and limits on secondary use, digital privacy laws cannot adequately manage drone-based surveillance (Hildebrandt 2016; Thaw 2015) [7, 20].

**Comparative Perspectives: EU, United States, and Japan**

The European Union mandates geofencing, remote identification, and privacy-risk assessments under the GDPR and EASA regulations (Toscano 2020; Goddard 2017) [6, 21]. The United States relies on state laws: several states, including California and Texas, require warrants and prohibit non-consensual drone monitoring of private property (Kaminski 2017; McNeal 2013) [9, 11]. Japan's framework incorporates targeted privacy protections that explicitly restrict unauthorized drone photography (Zhang 2017) [23].

These examples demonstrate that integrating privacy into UAV regulation is feasible and compatible with innovation.

**Case Study: Drone Surveillance in Delhi and Privacy Risks**

During the 2019 protests in Delhi, police deployed drones to record crowds without public notice or statutory authorization, creating an extensive database of sensitive footage (Rao 2020; Singh 2023) [15, 18]. The absence of retention policies or independent oversight raised serious risks of profiling, misuse, and secondary use of video data (Hildebrandt 2016; Wright & Kreissl 2018) [7, 22].

Unlike wiretapping, which requires judicial approval, drone surveillance remains unregulated, enabling broad executive discretion (McNeal 2013) [11]. This case exemplifies the constitutional and practical need for clear legal standards and safeguards.

**Regulatory Gaps and Challenges**

Scholars identify persistent gaps in India's drone-privacy regime: lack of consent mechanisms (Mendis 2017) [12], indefinite data retention (Smith 2020) [19], absence of oversight (Hildebrandt 2016) [7], insufficient remedies (Peters 2018) [14], broad state exemptions (Singh 2023) [18], and AI-enhanced surveillance threats (Brey 2014; Zuboff 2020) [2, 24]. These gaps collectively produce a high-risk environment with limited accountability.

**Policy Recommendations: Toward a Privacy-Centric Drone Framework**

A reformed framework must incorporate statutory authorization, consent and notice standards (Toscano 2020; Kaminski 2017) [9, 21], strict data-governance protocols (Goddard 2017) [6], mandatory Privacy Impact Assessments for high-risk UAV uses (Toscano 2020) [21], and establishment of an independent oversight body (Wright & Kreissl 2018) [22].

**Conclusion**

Drones represent a transformative yet intrusive technology requiring urgent regulatory attention in India. The current legal framework constitutionally grounded but operationally incomplete fails to safeguard informational privacy and democratic accountability (Calo 2012; Peters 2018) [3, 14]. As demonstrated through comparative analysis and domestic case studies, integrating privacy protections is a constitutional necessity. A proactive, privacy-centric legal regime will ensure that India's UAV ecosystem grows in a manner consistent with autonomy, dignity, and the rule of law.

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