Chapter 4
Community-Based Crime Surveillance Network:
Empowering Citizens With NavIC-Integrated Drones and Blockchain

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ABSTRACT

This chapter presents a novel, interdisciplinary framework that reimagines public safety through a decentralized, community-driven crime surveillance network. By integrating citizen-operated drones, blockchain infrastructure, and decentralized data storage, the model empowers communities to actively contribute to crime prevention while ensuring transparency, accountability, and legal admissibility of surveillance data. The objective is to design and analyze a layered, ethically grounded architecture that shifts the locus of control from state-centric to participatory governance, where citizens, law enforcement, and technology interact in a verifiable and privacy-conscious ecosystem. The chapter analyses key architectural, operational, and ethical requirements and suggests a technically feasible model for deploying a scalable and legally compliant surveillance system that fosters trust in real-world setups.

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1. INTRODUCTION

There has been rapid development in crime surveillance technologies, giving rise to a paradigmatic shift from traditional surveillance approaches dominated by CCTV camera installations and police patrolling to drone-based, dynamic, and real-time participatory surveillance. Drones act as a transformative tool in this change by offering coverage of large areas, superior aerial views, rapid deployment, and access to difficult terrains. It provides cost-effective and efficient monitoring with better situational awareness. These capabilities of drones significantly enhance both preventive and reactive strategies in surveillance, particularly when integrated into community-driven systems (Royo et al., 2022; Huanfa et al., 2024).

Combined with technological advancements, the increasing recognition of citizen participation in public safety initiatives has led to participatory surveillance models. By engaging local people in monitoring and reporting crime incidents, these models foster accountability, trust, and stronger social cohesion. It has been reported that citizen involvement in crime reporting and information sharing improves the granularity of local intelligence and crime deterrence, particularly in high-risk neighborhoods and under-policed areas (Lau and Ali, 2019; Nubani et al., 2023). However, such participatory systems also create legal and ethical challenges of data authenticity, misuse of surveillance privileges, and protection of individual privacy (Mukherjee, 2025).

Blockchain technology offers a promising solution to address such challenges. The fundamental characteristics of blockchain, such as decentralized architecture, cryptographic immutability, and smart contracts, enable data sharing securely, transparently, and verifiably. These aspects of blockchain make it highly appropriate for participatory surveillance systems where reliable, verifiable, and tamper-proof evidence is paramount (Chen et al., 2021; Wang and Liu, 2023).

This chapter proposes a novel Community-Based Crime Surveillance Network, which describes how the data capture by citizen-operated drones and evidence handling by law enforcement authorities are seamlessly integrated through blockchain's data governance and decentralized storage. A layered system architecture with smart contracts and role-based access control to support verifiable data submission and retrieval processes has been conceptualized. Further, the geospatial metadata gathering has been proposed using the Indian Regional Navigation Satellite System (NavIC, 2023), in place of the USA's GPS, to enhance data sovereignty and accuracy in surveillance. The model shifts the locus of surveillance control from centralized authorities to distributed communities while preserving auditability and legal robustness.

The model has been positioned within the broader perspective of decentralized surveillance paradigms with the following research questions:

a) How can blockchain and smart contracts be leveraged to govern and secure citizen-generated surveillance data?
b) What architectural considerations are necessary to balance community empowerment with privacy preservation and legal compliance?
c) What are the practical, ethical, and regulatory implications of deploying drones for community-led surveillance?

Through a structured analysis of system design, operational flow, and implementation issues, the chapter outlines a technically viable, socially accountable, and ethically responsible framework for next-generation surveillance systems for crime control.