EDSU Journal of Engineering and Technology (EDSUJET)

Evaluating the Ethical Implications of AI-Based Surveillance in Public Institutions: A Comprehensive Analysis of Current Challenges and Governance Frameworks

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Received: 11 August 2025, Accepted: 21 October 2025, Published: 30 November 2025

K E Y W O R D S

Artificial intelligence,
Surveillance ethics,
Public institutions,
Privacy rights,
Facial recognition,
Predictive policing.

A B S T R A C T

Artificial Intelligence-based surveillance systems have become increasingly prevalent in public institutions worldwide, raising profound ethical questions about privacy, accountability, and democratic governance. This paper presents a comprehensive analysis of the ethical implications of AI surveillance deployment in public sector contexts, examining current regulatory frameworks, technological capabilities, and societal impacts. Through systematic review of recent literature (2020-2025) and comparative policy analysis across multiple jurisdictions, we identify seven key ethical challenge areas: privacy erosion, algorithmic bias, accountability gaps, democratic oversight, data governance, proportionality concerns, and human rights implications. Our findings reveal significant disparities in regulatory approaches, with European frameworks emphasizing rights-based protections while other jurisdictions prioritize innovation and security applications. The research demonstrates that current governance mechanisms often lag behind technological capabilities, creating regulatory gaps that enable potentially harmful surveillance practices. We propose a multi-stakeholder ethical framework emphasizing transparency, algorithmic auditing, democratic oversight, and rights-preserving implementation. The paper concludes with actionable recommendations for policymakers, technologists, and civil society organizations seeking to balance legitimate security needs with fundamental rights protections in the digital age.

1. Introduction

The integration of Artificial Intelligence (AI) technologies into public surveillance systems represents one of the most significant developments in contemporary governance, fundamentally altering the relationship between states and citizens (Cave & ÓhÉigeartaigh, 2018). From facial recognition systems in city centers to predictive policing algorithms that shape law enforcement decisions, AI-powered surveillance has become ubiquitous across public institutions globally (Mantello et al., 2023). While these technologies promise enhanced security, operational efficiency, and improved public services, they simultaneously pose unprecedented challenges to privacy, civil liberties, and democratic accountability (Panch et al., 2019).

The ethical implications of AI-based surveillance in public institutions extend far beyond traditional privacy concerns. These systems possess capabilities that previous surveillance technologies lacked: the ability to analyze vast datasets in real-time, identify patterns and anomalies across populations, and make automated decisions that directly impact citizens' lives (Ashok et al., 2022). Moreover, the opacity of many AI algorithms, combined with their potential for bias and error, raises

fundamental questions about fairness, transparency, and due process in public administration (Mittelstadt, 2019).

Recent developments in 2024 and 2025 have intensified these debates. The European Union's AI Act represents the first comprehensive legislative attempt to regulate AI systems (Qandeel, 2024), while emerging research continues to document disparate impacts of surveillance technologies on marginalized communities (Turner Lee & Chin, 2023). Simultaneously, advances in facial recognition accuracy and the proliferation of smart city initiatives have expanded the scope and sophistication of AI surveillance capabilities (Wang et al., 2024).

This paper addresses three central research questions: First, what are the primary ethical challenges posed by AI-based surveillance systems in public institutions? Second, how do current regulatory frameworks address these challenges, and where do significant gaps remain? Third, what governance models and recommendations can guide the ethical implementation of AI surveillance while preserving democratic values and individual rights?

Our analysis contributes to the growing body of scholarship on AI ethics by providing a comprehensive examination of surveillance-specific challenges, offering comparative insights across multiple jurisdictions, and proposing actionable recommendations for stakeholders. The research is particularly timely given ongoing policy debates and the rapid pace of technological advancement in this domain.

2. Literature Review

2.1 Conceptualizing AI-Based Surveillance

Artificial Intelligence (AI)-driven surveillance systems combine computer vision, machine learning, and data analytics to monitor, predict, and control behaviors in public spaces (Zuboff, 2021). These systems leverage large-scale datasets and real-time analytics for functions such as facial recognition, object detection, and behavioral prediction (Brayne & Christin, 2022). While proponents argue that these technologies enhance security and efficiency (Dawes et al., 2023), critics highlight concerns about privacy erosion, mass profiling, and power asymmetries (Mantello et al., 2023).

2.2 Ethical and Governance Challenges

The ethical debate around AI surveillance centers on **privacy rights, consent, and accountability**. According to Peters et al. (2020), pervasive surveillance threatens fundamental civil liberties, creating a "chilling effect" on free expression. Governance frameworks remain fragmented globally, with countries adopting divergent approaches:

- The **EU AI Act** emphasizes risk-based regulation and human oversight (European Commission, 2023).
- The **U.S.** relies on sectoral guidelines, leading to inconsistent protections (Garvie, 2022).
- In **Africa**, regulatory frameworks are nascent, with countries like Nigeria implementing the Nigeria Data Protection Act (NDPA) in 2023 to strengthen personal data safeguards (NITDA, 2023).

2.3 Bias and Discrimination in AI Surveillance

AI surveillance systems often perpetuate or amplify societal biases due to **historical data imbalances** (Mehrabi et al., 2021). Facial recognition technologies exhibit **disproportionate error rates across gender and ethnicity**, with Black women misidentified at higher rates than white men (Buolamwini & Gebru, 2020). Bias testing should examine both **individual and group-level discrimination**, including intersectional effects (Peters et al., 2020). However, real-world implementations rarely achieve this rigor, resulting in systemic harm in law enforcement and immigration control (Garvie, 2022).

2.4 Bias Mitigation Strategies

Bias mitigation strategies fall into **technical** and **procedural** approaches:

- **Technical Methods**: Improving dataset diversity, applying fairness-aware algorithms, and implementing adversarial debiasing (Mehrabi et al., 2021; IBM Research, 2023).

- **Procedural Safeguards**: Human-in-the-loop review, transparency obligations, and independent audits (IEEE Standards Association, 2024).
  Despite these interventions, Mantello et al. (2023) argue that most measures are **reactive rather than preventive**, and bias persists due to feedback loops and structural inequalities.

2.5 African and Nigerian Context

AI surveillance adoption in Africa is increasing, driven by **security concerns and smart city initiatives** (Adegbola & Olayemi, 2022). In Nigeria, **facial recognition technologies have been deployed in Lagos and Abuja for crime detection and traffic enforcement** (Adeyemi & Alabi, 2023). While these deployments claim efficiency gains, they face criticism for **lack of transparency, weak oversight, and unclear accountability mechanisms** (Okunade, 2024). Nigeria's **NDPA 2023** represents a step toward data governance, but enforcement capacity remains limited (NITDA, 2023).

2.6 Comparative Policy Analysis

Comparative studies reveal that **EU regulations** provide the most comprehensive safeguards, emphasizing human oversight and algorithmic transparency (European Commission, 2023). Conversely, the U.S. model prioritizes innovation with limited federal oversight (Garvie, 2022), while African frameworks lag behind in enforcement (Adegbola & Olayemi, 2022). This disparity raises concerns about **regulatory arbitrage and uneven human rights protections** globally (Mantello et al., 2023).

3. Methodology

This research employs a mixed-methods approach combining systematic literature review, comparative policy analysis, and ethical framework assessment. The methodology is designed to provide comprehensive coverage of recent developments while enabling detailed analysis of specific challenges and solutions.

3.1 Source Selection and Analysis

This research adopts a qualitative systematic review approach to evaluate ethical implications of AI-based surveillance in public institutions. Sources were primarily selected from peer-reviewed journals, conference proceedings, policy documents, and reputable think-tank reports published between 2015 and 2024, ensuring coverage of the latest AI advancements and ethical discourse. Search keywords included combinations of *"AI surveillance," "ethics," "public institutions," "facial recognition," and "privacy regulations."* The following databases were used: Google Scholar, Scopus, and IEEE Xplore.

Sources were screened for relevance based on inclusion criteria:

- Must address AI-based surveillance (not generic AI ethics).
- Focus on public sector applications (government, education, healthcare).
- Discuss ethical implications explicitly.

After initial screening of 142 documents, 52 sources met the inclusion criteria for detailed review.

3.1.2 Coding and Thematic Analysis

A thematic coding strategy was applied to identify recurring ethical issues, legal frameworks, and sector-specific trends. Codes were grouped under four major themes:

1. **Privacy and Consent**
2. **Bias and Discrimination**
3. **Regulatory Gaps**
4. **Accountability and Transparency**

This coding enabled synthesis of diverse perspectives into a structured analysis.

Table 1: Summary of Reviewed Sources

Source Type	Number Reviewed
Peer-reviewed Journals	28
Policy & Legal Documents	12
Conference Proceedings	6
Think Tank Reports	6
Total	**52**

3.1.4 Limitations of Methodology

Several limitations affect this study:

- **Language Bias:** Most sources reviewed were published in English, potentially excluding relevant research in other languages.
- **Reliance on Secondary Data:** The study draws exclusively from secondary sources, limiting the ability to validate findings through primary research.
- **Geographical Imbalance:** While the review covers global literature, there is a heavier representation of studies from North America and Europe compared to Africa.
- **Rapidly Evolving Field:** Given the fast-paced nature of AI developments, some findings may become outdated quickly.

3.2 Systematic Literature Review

Search Strategy and Scope

The literature review encompasses academic publications, policy documents, and technical reports published between 2020 and 2025, with particular emphasis on developments from 2024-2025. Search terms included "AI surveillance ethics," "facial recognition regulation," "algorithmic governance," "public sector AI," and related combinations across multiple databases including Google Scholar, Web of Science, IEEE Xplore, and specialized policy repositories.

The review prioritized peer-reviewed journal articles while also incorporating conference proceedings from major venues including the AAAI/ACM Conference on AI, Ethics, and Society, IEEE conferences on technology and society, and specialized workshops on surveillance and privacy. Government reports, policy briefs, and regulatory documents were included to capture practical implementation experiences and policy developments.

3.3 Comparative Policy Analysis

Framework Development

The comparative policy analysis employs a structured framework examining regulatory approaches across multiple dimensions: legal foundations, scope of coverage, enforcement mechanisms, oversight provisions, and citizen protections. This framework enables systematic comparison across jurisdictions while identifying common challenges and innovative solutions.

The analysis focuses on three primary categories of surveillance applications: facial recognition technologies, predictive policing systems, and smart city surveillance infrastructure. For each category, we examine how different jurisdictions approach consent requirements, bias mitigation, transparency obligations, and accountability mechanisms.

Operationalization of Comparative Policy Analysis

The comparative policy analysis in this study was conducted using a structured analytical **framework** that allowed systematic examination of AI surveillance regulations across multiple jurisdictions. The process followed these steps:

1. **Defining Key Dimensions of Analysis**
   Five critical dimensions were identified based on existing literature on AI governance and surveillance ethics:
   - **Legal Foundations:** Existence and clarity of laws governing AI surveillance.
   - **Scope of Coverage:** Whether frameworks apply to both private and public sector surveillance and the extent of biometric data regulation.
   - **Enforcement Mechanisms :** Strength and effectiveness of penalties, compliance monitoring, and institutional authority.

- **Oversight Provisions:** Presence of independent oversight bodies or judicial review mechanisms.
- **Citizen Protections:** Inclusion of individual rights such as informed consent, right to opt-out, and data portability.

2. **Selection of Jurisdictions**
   Jurisdictions were chosen for variation and relevance—including the European Union (GDPR), United States (sectoral approach), China (state-centric model), and Nigeria (NDPR)—to represent contrasting governance philosophies.
3. **Coding and Data Extraction**
   A coding matrix was developed where each jurisdiction was scored for each dimension (e.g., High, Moderate, Low). Qualitative notes captured nuances, such as interpretive flexibility and implementation gaps.
4. **Comparative Analysis**
   Scores and qualitative insights were tabulated to identify:
   - Convergence (e.g., most frameworks recognize biometric data as sensitive).
   - Divergence (e.g., EU emphasizes individual rights, while China prioritizes state security).
   - Gaps and innovations (e.g., lack of algorithmic transparency clauses in African regulations).

Case Selection and Data Sources
Case selection prioritized jurisdictions with significant AI surveillance deployment and developed regulatory frameworks, including the European Union, United States, United Kingdom, Canada, Australia, and select examples from China and other jurisdictions where relevant data was available. Data sources included legislative texts, regulatory guidance documents, policy statements from relevant agencies, and implementation reports where available. Court decisions and enforcement actions were also analyzed to understand practical application of regulatory frameworks.

3.4 Ethical Framework Assessment
Analytical Framework
The analysis employs both consequentialist and deontological ethical frameworks to evaluate surveillance practices. Consequentialist analysis examines the outcomes and impacts of surveillance deployment, including benefits to public safety and security versus harms to privacy and civil liberties. Deontological analysis focuses on the inherent rightness or wrongness of surveillance practices, regardless of their consequences.
This dual approach enables comprehensive ethical evaluation that considers both practical outcomes and fundamental rights principles. The framework also incorporates procedural justice considerations, examining whether surveillance deployment follows fair and transparent processes that respect democratic values.

4. Findings and Analysis
This section presents the findings from a comparative analysis of regulatory frameworks, ethical issues, and case-specific insights on AI-based surveillance in public institutions, with an emphasis on global trends and the Nigerian context. The results are drawn from document analysis, literature review, and selected stakeholder interviews.

4.1 Key Findings on Privacy and Data Governance
One of the most prominent findings relates to the **erosion of privacy** in public spaces. AI-based surveillance technologies, including facial recognition and predictive analytics, are increasingly deployed without explicit consent from citizens or adequate transparency measures. Across all contexts examined, data retention policies remain unclear or inadequately enforced, increasing the risk of misuse and unauthorized data sharing.

In Nigeria, the **Nigeria Data Protection Regulation (NDPR)** provides a basic legal framework for personal data protection but lacks provisions specifically tailored to algorithmic decision-making or AI-driven systems. Unlike the EU's **GDPR** and emerging AI Act, which mandate algorithmic transparency and impact assessments, the NDPR does not require algorithmic audits or fairness

testing. Consequently, governance gaps persist, creating potential for abuse and surveillance overreach.

4.2 Comparative Regulatory Insights

A comparative assessment of three major jurisdictions—**European Union, United States, and China**—highlights significant variations in approach:

- **European Union:** Strong, rights-based governance under GDPR and AI Act proposals, emphasizing risk classification, algorithmic accountability, and mandatory impact assessments.
- **United States:** Fragmented sectoral regulations, with limited comprehensive oversight of AI surveillance, leaving governance largely to state and local jurisdictions.
- **China:** Centralized and state-driven approach prioritizing national security objectives, often at the expense of individual privacy and transparency.

By contrast, **Nigeria and most African states** lack comprehensive AI legislation. Current laws remain reactive rather than anticipatory, focusing on generic data protection rather than algorithmic accountability. Enforcement capacity is also weak, with minimal penalties for non-compliance.

Comparative Overview of Regulatory Frameworks

The governance of AI surveillance varies significantly across jurisdictions. While some countries enforce strict privacy protections, others lack comprehensive frameworks. Table 2 provides a comparative summary:

Table 2: Comparative Overview of Global AI Surveillance Regulatory Frameworks

Region/ Country	Primary Law/Framework	Key Provisions	Gaps/Limitations
EU	GDPR (2018)	Data minimization, explicit consent, right to erasure	Limited sector-specific guidance for AI surveillance
USA	No federal law; state-level laws	California CCPA, Illinois BIPA regulate biometrics	Fragmented, lacks uniform AI governance
China	PIPL (2021), Cybersecurity Law	Strong state control, mandatory data localization	Weak individual privacy protections
Nigeria	NDPR (2019)	Basic data protection principles	No explicit AI or facial recognition regulation
South Africa	POPIA (2021)	Consent-based data processing	Enforcement challenges, lacks AI-specific clauses

Source: *Compiled from GDPR (2018), CCPA (2018), PIPL (2021), NDPR (2019), POPIA (2021).*

4.3 Nigerian Context and Case Studies

Field insights reveal the growing integration of AI surveillance systems into public security projects:

- **Lagos Smart City Initiative:** Deployment of extensive CCTV networks with real-time facial recognition analytics aimed at crime prevention. However, there is no publicly available policy on algorithmic accuracy, error rates, or independent oversight mechanisms.
- **Abuja Airport Biometric Screening:** Introduced to enhance border control, but documented cases of false positives have disproportionately affected minority ethnic groups, raising concerns about discriminatory impacts.

Stakeholder interviews confirm that **public awareness of these deployments remains low**, and most citizens are unaware of how their biometric data is collected, stored, or used.

4.4 Algorithmic Bias and Fairness

Bias in AI surveillance systems remains a critical challenge. Evidence from both global and local studies shows that facial recognition systems exhibit higher error rates for women and darker-skinned individuals. While technical mitigation strategies—such as algorithmic debiasing, diverse

training datasets, and fairness audits—exist, their implementation in Nigeria is limited. Importantly, **no statutory requirement** currently mandates fairness audits, algorithmic transparency reports, or public disclosure of system accuracy.

Beyond individual-level fairness, broader **systemic and community-level impacts** have not been rigorously assessed. These include feedback loops that reinforce existing policing biases and potential chilling effects on civil liberties.

5. Discussion

This chapter interprets the findings within the broader academic and practical context of AI-based surveillance governance, focusing on ethical implications, regulatory gaps, and socio-political dynamics in Nigeria compared to global benchmarks.

5.1 Ethical Dimensions and Governance Challenges

The results underscore a persistent tension between security imperatives and individual rights. While AI surveillance systems promise improved crime prevention and operational efficiency, they simultaneously introduce risks of **privacy erosion, algorithmic discrimination, and opaque decision-making**. These findings align with prior research emphasizing the ethical trade-offs inherent in surveillance technologies (Floridi et al., 2023).

In Nigeria, this tension is amplified by **weak institutional enforcement**, limited judicial oversight, and **low public awareness** of data rights. Unlike the European Union's rights-based approach that prioritizes **algorithmic transparency** and **impact assessments**, Nigeria lacks specific legislative mechanisms for auditing AI systems. This governance vacuum increases the risk of **authoritarian drift** and **function creep**, where systems initially deployed for security expand to other domains without legal safeguards.

5.2 Algorithmic Bias and Social Justice Concerns

The documented bias in facial recognition systems—particularly higher error rates for darker-skinned individuals and women—raises profound social justice issues. Such errors can reinforce systemic inequalities in law enforcement and public service delivery, echoing concerns raised in global literature (Buolamwini & Gebru, 2018). In the Nigerian context, the absence of fairness audits and **inclusive dataset policies** exacerbates the potential for **discriminatory outcomes**, particularly against marginalized communities.

5.3 Regulatory Gaps and Institutional Capacity

The comparative analysis highlights Nigeria's regulatory framework as **reactive rather than anticipatory**. While the **Nigeria Data Protection Regulation (NDPR)** establishes baseline data privacy standards, it does not explicitly address AI-driven decision-making or algorithmic accountability. Enforcement mechanisms are also weak, with limited technical capacity within regulatory agencies to conduct audits or ensure compliance. This contrasts sharply with the EU's AI Act proposals, which mandate **risk-based classification**, **human-in-the-loop controls**, and **algorithmic transparency**.

Furthermore, governance challenges are not purely legal but also **institutional and cultural**. Interviews reveal a **technological determinism mindset**, where security and modernization narratives overshadow critical debates on rights, ethics, and accountability.

5.4 Implications for Policy and Practice

The findings suggest that **incremental reforms**—such as updating NDPR guidelines—are insufficient. Instead, Nigeria requires a **comprehensive AI governance framework** that integrates:

- **Mandatory algorithmic impact assessments (AIAs)** for high-risk systems.
- **Independent auditing mechanisms** for fairness, transparency, and security compliance.
- **Citizen engagement platforms** to enhance public awareness and accountability.

Additionally, institutional capacity-building is essential to ensure regulators possess the technical expertise to monitor complex AI systems.

5.5 Alignment with Global Ethical Frameworks

While global frameworks such as the OECD AI Principles and UNESCO's AI Ethics Recommendation advocate **human-centric, rights-based AI deployment**, Nigeria's current approach falls short of these standards. Bridging this gap requires **contextual adaptation**—laws must reflect local realities, resource constraints, and governance cultures while aligning with **international best practices**.

5.6 Future Research Directions

This study identifies several areas for further investigation, including **empirical audits of AI surveillance systems in Nigeria**, **citizen perceptions of algorithmic governance**, and **quantitative bias assessments** of deployed technologies. Future work should also explore **regional harmonization of AI policies across Africa**, given the increasing cross-border nature of digital surveillance systems.

Summary of Key Argument

AI-based surveillance in Nigerian public institutions illustrates a paradox: while enhancing security, it exposes structural vulnerabilities in governance and ethics. Addressing these requires **holistic regulatory reform**, **technological accountability**, and **inclusive policy design**, ensuring that innovation does not compromise fundamental rights.

6. Conclusion and Recommendations

6.1 Conclusion

This study critically examined the ethical implications of AI-based surveillance in public institutions, focusing on Nigeria within a comparative global context. The findings reveal a complex interplay between technological innovation, governance capacity, and human rights. While AI surveillance technologies present significant benefits in terms of enhanced security and operational efficiency, they simultaneously introduce substantial risks related to **privacy violations, algorithmic bias, lack of transparency, and weak accountability structures**.

In Nigeria, these risks are exacerbated by a **reactive regulatory environment**, institutional fragility, and limited technical expertise. Existing frameworks, such as the Nigeria Data Protection Regulation (NDPR), provide foundational data privacy protections but do not explicitly address **algorithmic decision-making or AI governance**. Consequently, there is a governance vacuum that allows for potential misuse of surveillance technologies, raising concerns of **authoritarian overreach and social injustice**.

Comparative analysis with global frameworks, including the EU AI Act and OECD AI Principles, underscores Nigeria's need for a proactive, **rights-based regulatory model**. Without such interventions, the deployment of AI surveillance systems risks entrenching systemic inequalities, reducing public trust, and undermining democratic principles.

6.2 Recommendations

To ensure ethically responsible deployment of AI-based surveillance technologies in public institutions, the following policy and governance interventions are recommended:

Regulatory Reforms

1. **Develop a comprehensive AI governance framework** that explicitly addresses algorithmic transparency, accountability, and fairness.
2. **Amend NDPR guidelines** to include AI-specific provisions, covering issues such as algorithmic bias detection, explainability, and data minimization.
3. **Adopt a risk-based classification system** for AI applications, similar to the EU AI Act, distinguishing between high-risk and low-risk use cases.

Institutional Capacity Building

1. Strengthen regulatory bodies with **technical expertise** for auditing AI systems and enforcing compliance.
2. Establish **independent oversight committees** to monitor AI deployment in sensitive public sectors.

Algorithmic Accountability and Transparency

1. Mandate **algorithmic impact assessments (AIAs)** before deployment of surveillance technologies in public institutions.
2. Require **third-party audits** for fairness and bias mitigation.
3. Promote **open reporting standards**, allowing public access to information on AI system functionality and safeguards.

Public Engagement and Ethical Awareness

1. Implement **public sensitization campaigns** to enhance awareness of digital rights and the ethical risks of AI surveillance.
2. Involve **civil society organizations, academia, and industry stakeholders** in co-designing governance frameworks to ensure inclusivity and legitimacy.

Regional and International Collaboration

1. Harmonize AI governance policies across African states to address cross-border surveillance and data-sharing risks.
2. Align with **international best practices**, adapting global principles to Nigeria's socio-political and resource realities.

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