

Advanced Judicial Technology, E-Courts, and Artificial Intelligence: Reimagining the Architecture of Justice Delivery

Ms. Harmandeep Kaur

Assistant Professor, University School of Law, Guru Kashi University, Talwandi Sabo, Bathinda

DOI: <https://doi.org/10.51584/IJRIAS.2026.11060196>

Received: 21 June 2026; Accepted: 26 June 2026; Published: 08 July 2026

ABSTRACT

The global judicial system is undergoing a profound paradigm shift driven by the transition from mechanical digitalization to algorithmic automation. This article analyzes the integration of advanced judicial technology, e-Courts framework, and Artificial Intelligence (AI) within the justice delivery system, with a primary empirical focus on the Indian legal ecosystem. Charting the progression from basic computerization under early Information and Communication Technology (ICT) protocols to the newly deployed e-Courts Mission Mode Project Phase III, this study examines the deployment of specialized Natural Language Processing (NLP) and Machine Learning (ML) tools. It assesses algorithmic assets such as SUPACE (Supreme Court Portal for Assistance in Court's Efficiency) and SUVAS (Supreme Court Vidhik Anuvaad Software) alongside newly integrated transcription systems like ASR-SHRUTI and PANINI.

By evaluating regulatory responses—including the Supreme Court's *2025 White Paper on Judicial AI*, the *Digital Personal Data Protection (DPDP) Act, 2023*, and the landmark *2026 state-level judicial AI policies*—this paper highlights the constitutional tensions between algorithmic efficiency and procedural due process. The findings argue that while AI and e-Court architectures are indispensable for reducing massive case backlogs and systemic administrative delays, their deployment must be strictly bound by a "responsible AI" framework. This model requires that technology act strictly as an assistive tool to preserve human oversight, cognitive independence, and the rule of law.

Keywords- e-Courts Phase III, Artificial Intelligence in Judiciary, SUPACE & SUVAS, Algorithmic Due Process, Judicial Automation, Responsible AI Framework

INTRODUCTION

The rule of law in a constitutional democracy depends heavily on the temporal efficiency and systemic accessibility of its judicial institutions. When justice is delayed by procedural friction, bureaucratic obstacles, or institutional backlogs, fundamental rights risk becoming transactional privileges rather than constitutional guarantees. For decades, traditional judiciaries worldwide have grappled with massive scale challenges. In India, for instance, judicial backlogs exceeded **50 million cases**, creating severe structural stress on litigants and state machinery alike.

To address this challenge, the intersection of law and technology has evolved beyond a mere logistical support mechanism into a foundational pillar of modern court architecture. This evolution is represented by the **e-Courts Mission Mode Project**. This pan-India initiative, guided by the e-Committee of the Supreme Court of India and supported by the Department of Justice, has structurally altered the administration of justice.

The trajectory of this digital transformation is best understood as a continuum, moving through three distinct eras:

[Phase I: Hardware Centralization] → [Phase II: Interoperable Networks] → [Phase III: Intelligent Automation]

Basic infrastructural computerization, Virtual courts, cloud e-filing, and Generative AI, dynamic scheduling, NLP

digital case information systems, the National Judicial Data Grid, research assistants, automated scrutiny.

The system is transitioning into **Phase III (2023–2027)**, backed by a significant capital allocation of over ₹7,210 crore. This marks a shift from passive digital record-keeping to proactive, intelligent judicial automation.

At the center of this transformation is the integration of **Artificial Intelligence (AI)**, **Natural Language Processing (NLP)**, and **Predictive Analytics** directly into court workflows. However, this shift raises critical jurisprudential questions. As algorithmic tools assist with case scheduling, petition vetting, legal research, and judgment drafting, the boundaries between human judicial reasoning and machine calculation are blurring.

This research paper provides a comprehensive legal and technical analysis of advanced judicial technology. It examines its modern applications, evaluates the constitutional risks of algorithmic bias, and outlines the emerging regulatory frameworks needed to govern AI within the judiciary.

The Architectural Trajectory of e-Courts: From Digitization to Intelligence

The transformation of the Indian judiciary from a paper-bound ecosystem to a cloud-native, data-driven architecture required a deliberate, phased execution. Understanding this structural evolution is essential to evaluate the current capabilities of Phase III.

Chronological Evolution of India's e-Courts Project

Phase I: Foundation & Core Infrastructure

2007 – 2015

Focused on basic computerization of the country's district and subordinate court complexes. It established WAN connectivity, installed hardware, and launched the initial versions of the Case Information System (CIS) software to record basic filing and cause list data.

Phase II: Interoperability & Citizen-Centric Services

2015 – 2023

Enacted a widespread migration to open-source cloud architectures, creating centralized data repositories. Key milestones included the National Judicial Data Grid (NJDG), the rollout of the e-Filing 3.0 portal, online payment of court fees, and the widespread deployment of the National Service and Tracking of Electronic Processes (NSTEP) mobile application for digital summons delivery.

Phase III: Intelligent & Ubiquitous Digital Justice

2023 – 2027

Funded with ₹7,210 crore to transition the judiciary into a paperless, cloud-native paradigm. This phase introduces open APIs, secure cloud systems, e-Sewa Kendras in underserved regions, and AI-driven automated tools for smart scheduling, e-filing defect detection, and advanced legal research.

Systemic Pillars of the Modern Digital Judiciary

The operational infrastructure of modern judicial technology relies on several interconnected national systems:

- **The National Judicial Data Grid (NJDG):** A real-time national database that tracks pendency, disposal rates, and daily case statuses across thousands of district courts and High Courts. It acts as an open data instrument for public accountability and judicial planning.
- **Case Information System (CIS 4.0):** The primary operating engine of localized court registries. It handles automated case registration, tracking, allocation, and algorithmic cause-list generation.
- **Virtual Courts:** Under specialized procedural rules, virtual courts automate the disposal of minor offenses (such as traffic citations). Litigants can view violations, pay fines online, and close cases without a physical court appearance.

The Deployment of Artificial Intelligence in Judicial Processes

Rather than a single, monolithic technology, AI within the e-Courts framework consists of specialized machine learning models, optical character recognition (OCR), and language architectures. These tools are designed to streamline administrative and analytical tasks.

Substantive AI Implementations in India's Supreme Court and High Courts

AI Platform / Subsystem	Primary Technical Mechanics	Functional Application in Judiciary	Operational Impact & Metric
SUPACE (<i>Supreme Court Portal for Assistance in Court's Efficiency</i>)	Natural Language Processing (NLP), Semantic Vector Clustering, Contextual Summarization.	Parses large volumes of case documents, extracts key factual data, and identifies relevant legal precedents.	Reduces time spent on primary legal research by bench clerks and judicial officers.
SUVAS (<i>Supreme Court Vidhik Anuvaad Software</i>)	Neural Machine Language Translation (NMT), Deep Learning Linguistic Architectures.	Translates judgments and orders into regional scheduled languages to improve accessibility.	Has translated over 36,000 Supreme Court judgments into regional languages.
ASR-SHRUTI	Automatic Speech Recognition (ASR), Real-Time Voice-to-Text Processing.	Captures oral arguments and converts them into text records for the official file.	Used for real-time transcription during Constitution Bench proceedings.
PANINI	Morphological Language Synthesizers, Deep Textual Structuring Models.	Works alongside translation engines to preserve semantic meaning across different languages.	Ensures localized translations retain precise legal terminology.
LegRAA (<i>Legal Research Analysis Assistant</i>)	Machine Learning Precedent Mining, Regulatory Extractors.	Automatically scans case briefs to surface relevant statutory rules and past decisions.	Used within High Court registries to streamline pre-hearing research.

The Automation of Registry and Administrative Workflows

Beyond helping judges with research, AI has transformed the administrative functions of court registries through **Automated Scrutiny and Smart Scheduling Tools**.

When a case is filed via an e-filing portal, an AI scanning engine evaluates the petition against formatting guidelines, structural templates, and jurisdiction rules. The system checks file metadata, highlights missing documents, and flags potential defects. This automates routine checks so registry staff can focus on evaluating complex legal elements.

Furthermore, smart scheduling algorithms predict the time required for specific types of hearings, optimizing daily cause lists to prevent court over-crowding and minimize unnecessary delays.

Constitutional, Ethical, and Regulatory Challenges

The integration of advanced automated systems into the judicial domain introduces significant ethical, constitutional, and data security concerns. These issues demand careful regulation.

The Algorithmic Bias and Hallucination Vector

A major risk of using large language models (LLMs) and generative AI in legal work is their tendency to "hallucinate"—generating fake case citations and fabricated legal rules.

Judicial Warning: In February 2026, the Supreme Court of India flagged a series of AI-drafted petitions containing fabricated citations of non-existent judgments. Chief Justice Surya Kant termed this development "alarming" and warned against relying blindly on unverified algorithmic outputs.

Beyond hallucinations, AI systems trained on historical data risk perpetuating systemic biases hidden within those datasets. If an algorithm is trained on past sentencing or bail decisions that reflect societal prejudices against marginalized communities, the model's outputs may replicate those inequalities under a false veneer of technological neutrality.

Constitutional Due Process and the "Black Box" Problem

Under **Article 14 (Equality Before Law)** and **Article 21 (Right to Life and Liberty)** of the Indian Constitution, citizens are guaranteed a fair trial and a reasoned judicial order. Traditional judicial decisions require deep cognitive reasoning, empathy, and clear justification.

In contrast, proprietary machine learning models often function as a "black box," where the internal processes converting data inputs into recommendations remain obscured. If a court relies on an unexplainable algorithmic model to evaluate bail parameters, determine recidivism risks, or assess evidence, the affected individual is denied their right to understand and challenge the basis of that decision.

Consequently, using AI for core judicial functions like fact-finding, bail assessment, or sentencing presents a structural conflict with due process requirements.

[THE CORE JUDICIAL BOUNDARY]

Permissible: ASSISTIVE AI	Impermissible: DECISIONAL AI
• Document Summarization	• Evaluating Witness Credibility
• Precedent Sorting & Indexing	• Determination of Bail/Sentencing
• Automated Rule Compliance	• Finding of Fact/Fault Liability
• Multilingual Translation	• Generating Final Orders

Data Privacy, Confidentiality, and the DPDP Act, 2023

Court records often contain highly sensitive personal information, including medical histories, financial data, and trade secrets. Deploying AI systems within court infrastructure requires strict compliance with the **Digital Personal Data Protection (DPDP) Act, 2023**, and the subsequent *DPDP Rules*.

Under Section 4 of the DPDP Act, processing personal data must be confined to specified, lawful purposes. Feeding un-anonymized litigation documents into commercial, public AI models violates basic data security principles and waives attorney-client privilege. This exposes courts to severe regulatory penalties (up to ₹250 crore for major data breaches under the Act).

Therefore, judicial AI systems must be hosted on secure, self-contained sovereign cloud architectures with built-in data masking and strict access controls.

Emerging Legal Frameworks and Policy Governance (The 2025–2026 Shift)

To prevent technology from overriding human judgment, Indian judicial institutions have enacted explicit regulatory safeguards.

State-Level Judicial AI Policies (2025–2026)

In mid-2025, the **Bombay Bar Association** and the **Kerala High Court** issued foundational frameworks to govern the use of AI in legal proceedings:

- **The Bombay Bar Association Guidelines (July 2025):** Imposed an explicit obligation on practitioners to independently verify every output generated by an AI tool before presenting it to a court or client. It prohibited entering confidential client data into public generative platforms without express written consent.
- **The Kerala High Court Policy on AI in District Judiciary (July 2025):** The first formal state-level administrative policy governing subordinate courts. It banned the indiscriminate use of AI, warning against data leaks and eroded trust in judicial decision-making. The policy stated that AI must be used solely as an assistive tool under strict human supervision, and mandated keeping a detailed audit log of all AI interactions.

High Court of Gujarat AI Policy (2026)

The **High Court of Gujarat's 2026 AI Policy** represents an evolutionary leap in formal judicial technology governance. While recognizing the value of advanced digital tools for techno-savvy judicial officers, the policy establishes strict boundaries for the technology:

- **The Prohibited Domain:** The policy explicitly bars AI from being used in any part of judicial reasoning, evidence evaluation, credibility assessment, bail determination, sentencing calculations, or the generation of interim and final orders.
- **The Permitted Lanes:** AI deployment is limited to anonymized case scheduling, automated registry compliance checks, and legal precedent indexing.

However, legal scholars note that while this restrictive firewall model prevents algorithmic errors from compromising judgments, it may limit the helpful efficiency gains that well-governed, specialized legal AI models could offer.

Technical Framework for a Judicial Resource Allocation Engine

To illustrate how advanced technology can safely optimize court administration without interfering with judicial decision-making, we can evaluate a data-driven **Judicial Resource Allocation and Case-Load Calculator**.

This interactive model simulates how adjustments in case filing velocity, judicial workforce levels, and AI-driven administrative efficiency scores change the projected time required to clear a court's backlog. By optimizing scheduling and reducing manual administrative tasks, the engine demonstrates how technology can cut systemic delays while leaving substantive adjudication entirely to human judges.

Comparative Perspectives: Global Models of Digital Justice

To better context-map the Indian approach, we can compare its legal and operational attributes with dominant international frameworks:

[GLOBAL JUDICIAL TECHNOLOGY CONTINUUM]

US Federal Model	European Union (EU)	Indian Hybrid Model
Decentralized usage; discretionary reliance on commercial analytics (e.g., COMPAS tool).	Governed by AI Act high-risk category; strict transparency, prohibiting bias.	Centralized strategy led by SC e-Committee; sovereign open-source assistive infrastructure.

While certain jurisdictions in the United States have integrated controversial automated scoring tools like COMPAS for risk assessment and sentencing recommendations (which face criticism for opacity and systemic bias), the European Union has taken a more protective approach. Under the EU AI Act, artificial intelligence systems deployed in the administration of justice are explicitly classified as **High-Risk Systems**. This classification requires formal conformity assessments, mandatory logging, strict transparency documentation, and continuous human oversight.

India's emerging model forms a unique hybrid framework: it pursues rapid digital scale-up through central platforms like the National Judicial Data Grid, yet blocks commercial algorithmic influence over core judicial functions to protect constitutional rights.

CONCLUSION AND POLICY RECOMMENDATIONS

The integration of advanced technology, e-Courts systems, and artificial intelligence represents an institutional turning point for justice delivery. The evolution from early computerized records to the advanced capabilities of e-Courts Phase III shows that technology is no longer merely optional—it is a vital structural asset for managing large-scale caseloads. Platforms like SUPACE, SUVAS, and automated e-filing systems demonstrate how technology can streamline administrative work, automate routine tasks, and improve language accessibility across a diverse nation.

However, the legal and institutional challenges of this transition are clear. As highlighted by recent Supreme Court warnings and state-level policies, the risks of algorithmic hallucinations, encoded bias, and the "black box" problem present real threats to constitutional due process. To harness the benefits of technology while protecting fundamental rights, the evolution of digital courts should follow three core policy recommendations:

- **Establishment of a National Judicial AI Governance Commission:** A specialized, independent statutory commission should be formed jointly under the Supreme Court's e-Committee and the Ministry of Law and Justice. This body would mandate independent bias audits, evaluate algorithmic fairness, and certify AI applications before deployment in court infrastructure.
- **Adoption of a Mandatory Disclosure and Verification Model:** Rather than relying on simple, unenforceable bans on AI use, the legal framework should require formal disclosure. Any legal brief, registry note, or administrative report that relies significantly on AI assistance should carry a standard

disclosure tag. This tag would detail the specific application used, the prompt inputs provided, and the human verification steps taken.

- **Development of Sovereign, Closed-Loop Legal Models:** To protect citizen privacy under the DPDP Act, 2023, the state must avoid third-party commercial platforms for sensitive litigation data. Instead, development should focus on secure, open-source legal language models trained exclusively on verified, anonymized Indian case laws, hosted entirely on public secure cloud servers.

Ultimately, code must remain an enabler of justice, never a replacement for it. By reinforcing the rule that AI acts strictly as an assistive tool, the legal system can harness advanced technology to build a more responsive, transparent, and equitable framework—ensuring that the core human elements of empathy and legal reasoning remain at the heart of the law.

REFERENCES

1. Bombay Bar Association v. State of Maharashtra, Guidelines on Ethical and Practical Use of Artificial Intelligence in the Judicial Process (Issued July 2025).
2. Darshan Singh v. State of Punjab, (2010) 2 SCC 333.
3. From Digitisation to Intelligence: How AI is Enhancing Access to Justice in India. (2026). Press Information Bureau (PIB), Union Ministry of Law and Justice, Government of India. Retrieved February 2026.
4. Gabor, T. (2016). Confronting gun violence in America: Characteristics of gun deaths and solutions. Palgrave Macmillan.
5. Hegde, P. R., Malik, Y., Kumar, C. N., & Math, S. B. (2024). The Bharatiya Nyaya Sanhita Act (BNSA) 2023: Implications for forensic psychiatry in India. *Indian Journal of Psychological Medicine*, 46(4), 312–318. <https://doi.org/10.1177/02537176241281465>
6. High Court of Gujarat. (2026). Policy Framework and Operational Rules on the Integration of Artificial Intelligence Systems in the Administration of Subordinate Courts. Gujarat Law Journal Press.
7. High Court of Kerala. (2025). Policy Regarding Use of Artificial Intelligence Tools in District Judiciary. Rules Committee Publication, July 2025.
8. India | Increasing use of AI across the justice system. (2026). Oxford Technology and Justice Analytics Project, Blavatnik School of Government, Oxford University.
9. McWilliam, J. G. (2025). Second Amendment principles. *William & Mary Bill of Rights Journal*, 33(4), 1127–1182.
10. Nath, P. (2026). Significance of new criminal laws in today's India – An analysis. *Journal of Legal Research and Polity*, 3(1), 20–28.
11. National Judicial Data Grid (NJDG). (2025). Annual Caseload and Pendency Real-Time Analytics Report. e-Committee, Supreme Court of India.
12. Roy, T. (2024). NAMS task force report on gunshot and blast injuries. *Annals of the National Academy of Medical Sciences (India)*, 60(4), 299–323.
13. Supreme Court of India. (2025). White Paper on the Responsible Integration of Artificial Intelligence and Machine Learning in Judicial Decision-Making Support Frameworks. e-Committee Publication.
14. Supreme Court of India. (2026). Newsletter of the e-Committee, Supreme Court of India, Vol. XI(3), published March 2026.
15. Yazgi, S., & Donati, M. (2021). The arms-related risk analysis toolkit. United Nations Institute for Disarmament Research (UNIDIR).