

Nitesh Saini

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SUMMARY

AI/ML and full-stack engineer specializing in production-grade computer vision, voice AI, geospatial intelligence, and RAG/LLM systems for low-connectivity, resource-constrained field environments. Proven track record building and deploying end-to-end offline-first mobile and cloud platforms (AWS, PostgreSQL/PostGIS) for large-scale forest governance, public policy, and social-impact research programmes, including peer-reviewed publications and a NeurIPS submission.

EXPERIENCE

Lead, Technology and AI | | Bharti Institute of Public Policy (BIPP), Indian School of Business *Oct 2025 – Present*

- Direct technology and AI strategy for BIPP's field-research technology stack under Executive Director Prof. Ashwini Chhatre, spanning computer vision, voice AI, geospatial intelligence, RAG/LLM systems, and offline-first mobile platforms.
- Lead development of the VanSaathi/CommFor platform, including a custom Android GPS boundary-mapping module (Kalman filtering, pause/resume, autocapture) and species distribution mapping for forest department stakeholders.
- Own ODK-based survey infrastructure (XLSForm design, pyxform validation, ODK Central → PostgreSQL → S3 pipelines) supporting large-scale field data collection across multiple state government programmes.
- Built nCount, a forest inventory and analytics platform, including dashboarding and a domain-graph portfolio microsite (Obsidian-style, D3 force-directed graph).

AI Systems Engineer | | Bharti Institute of Public Policy (BIPP), Indian School of Business *Apr 2025 – Oct 2025*

- Built the MonoDBH tree-trunk segmentation pipeline (YOLOv8s-seg, Mask mAP50 = 0.953; Grounding DINO fine-tuning) and published the MonoDBH dataset on Zenodo.
- Co-authored BarkVisionAI, published in Scientific Data (Nature), with Chhatre, Parmar, Rana, and Jain.
- Developed a voice-based Key Informant Interview (KII) chatbot using Sarvam STT/TTS, a Flask proxy layer, and RAG with pgvector.
- Built the CommFor Android field app (ODK Collect fork) with custom login flow and OkHttp/Retrofit API integration.
- Designed a STAC catalog ingestion pipeline (stac.forestgovernance.in) for spatial and non-spatial research datasets.

Full Stack Developer | | Bharti Institute of Public Policy (BIPP), Indian School of Business *Jun 2023 – Apr 2025*

- Built and deployed field-facing web and mobile tools including a bamboo-pilot monitoring dashboard (React, Leaflet, AWS Amplify) for Malkangiri CFR areas and a TBL simulation platform (Firebase Firestore, multi-cohort routing) for ISB cohorts.
- Delivered CFR boundary digitization tooling (OpenCV/Python) and GLC30 land-cover analysis for community forest rights research.
- Managed core AWS infrastructure, including a large-scale ODK Central storage emergency resolved via LVM extension (98 GB → 6.54 TB).

SELECTED PROJECTS & RESEARCH

VanSaathi / CommFor — Forest Governance Field Platform

- Led technology development for a randomised controlled study spanning 548 villages in Gondia, Maharashtra, submitted as a FLARE 2026 abstract.
- Designed and built a custom GPS boundary-mapping module for Android replacing the ODK geoshape widget, with Kalman filtering, pause/resume logic, 20m proximity checks, and autocapture.
- Built an HWC (Human-Wildlife Conflict) incident reporting XLSForm and a speaker-enrollment voice pipeline (pyannote) evaluated across three embedding strategies.
- Delivered the CommFor Android app (ODK Collect fork) end-to-end, including login flow, OkHttp/Retrofit API integration, and a full ODK Central → PostgreSQL → S3 data pipeline with image attachment handling.

nCount-rfm — Canopy Species Classification Research

- Built an image-cleaning pipeline for hyperspectral and RGB canopy imagery to support species distribution classification.

- Designed a benchmark dataset with controlled variant generation and a phase-1 evaluation harness, targeting a NeurIPS 2026 submission.
- Extended the pipeline with hyperspectral imaging research to improve canopy species classification accuracy.

Smartphone GNSS Performance Spread Dataset

- Led data collection for a public dataset of 454 raw GNSS capture sessions spanning 285 Android device models across 15 manufacturers and 53 distinct hardware platforms; published on Zenodo (DOI: 10.5281/zenodo.20092798).
- Analysed chipset-position asymmetry across devices, finding an ICC of 0.96 for PRR versus 0.06 for CEP50, informing GPS-based field data collection methodology; findings prepared for the GPS Solutions journal.

RatiFi Forest Rights Management System

- Built a stress-testing framework for the RatiFi system by systematically deriving test cases from a 148-page user manual.
- Identified system reliability gaps ahead of deployment for forest rights record management.

Cognitive Multi-Agent Swarm

- Designed an LLM-based multi-agent swarm framework for decision-making over specialized knowledge systems, coordinating multiple agents to reason collectively rather than relying on a single model.
- Explored agent specialization and coordination patterns to improve reliability and depth of reasoning on domain-specific knowledge tasks.

Conversational GeoAI

- Built an LLM-driven natural language interface for querying visual map layers and running geospatial analysis conversationally.
- Enabled non-technical users to interact with spatial datasets through natural language rather than traditional GIS tooling.

Blockchain Sellifi

- Built a distributed ledger (blockchain) system for traceability in the forest produce supply chain.
- Designed the system to support sustainability goals and provenance verification from source to market.

AI-Assisted Video Grading Pipeline

- Built a Firestore-backed AI-assisted grading pipeline for an ISB Business & Society course, automating first-pass evaluation of student video submissions.
- Developed a collaborative review web app with side-by-side comparison views and an admin dashboard for grader oversight and calibration.

PUBLICATIONS

- Chhatre, A., Saini, N., Parmar, A.K. et al. "BarkVisionAI: Novel dataset for rapid tree species identification." Scientific Data (Nature) 13, 343 (2026). DOI: 10.1038/s41597-026-06711-8
- BarkVisionAI Dataset — 167,361 tree bark images across 13 species. Zenodo, DOI: 10.5281/zenodo.14650999
- Smartphone GNSS Performance Spread Dataset — 454 device capture sessions, 285 models, 53 platforms. Zenodo, DOI: 10.5281/zenodo.20092798
- MonoDBH Dataset — Zenodo, DOI: 10.5281/zenodo.19412511

EDUCATION

B.Tech, Indian Institute of Technology (IIT) Delhi

Graduated 2023

TECHNICAL SKILLS

AI/ML: Computer Vision, Voice AI, RAG/LLM Systems, Geospatial ML, PyTorch, YOLO, SAM 2, Grounding DINO

Infrastructure: AWS, PostgreSQL/PostGIS, ODK Central, Firebase/Firestore, Docker

Full Stack: React, Vite, Next.js, D3.js, Android (Kotlin/Java), Flask

Domains: Forest governance, community forest rights (FRA 2006), remote sensing (GEE, Sentinel, ISRO Bhuvan), offline-first field research systems