Isha Bamel

Computer Science Undergraduate — Research & Machine Learning Enthusiast
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Education

Sardar Patel Institute of Technology Mumbai, India
Bachelor of Technology in Computer Engineering *2022 – 2026*

- **CGPA: 9.22/10.0** (Current)
- **Relevant Coursework:** Data Structures & Algorithms, Database Management Systems, Operating Systems, Computer Networks, Linear Algebra, Probability & Statistics

Research Experience

Research Intern Jan 2025 – Present
Indian Institute of Technology Bombay *Mumbai, India*

- Designed and implemented a **Streamlit-based research tool** with SQLite backend for comparative analysis of contactless and contact-based fingerprints using multiple similarity metrics **as part of a research collaboration with UIDAI (Unique Identification Authority of India)**
- Investigating **transformer-based models** for enhanced biometric security, focusing on robustness against spoofing attacks.
- Developed a frequency-domain generative framework integrating wavelet/shearlet transforms with ATME, achieving 89.7% SSIM (49.5% over baseline) for crime-scene fingerprint reconstruction and 100% minutiae preservation in contactless-to-contact conversion.
- Designed BioPix2Pix super-resolution module improving ridge fidelity (SSIM 0.98 on PolyU dataset), demonstrating significant improvements over existing GAN and diffusion-based methods on benchmark datasets.
- This work forms the basis of a manuscript currently under second-round peer review at IEEE Transactions on Information Forensics and Security.

Publications & Research Achievements

Published & Under Review Papers

- **"Authentic Fingerprint Reconstruction via Wavelet-ATME with Super-Resolution Verification"** – Under Review (Submitted to IEEE Transactions on Information Forensics and Security (Top-tier IEEE Journal in Biometrics Security)).
- **"Hybrid Optimization and Explainability-Driven Framework for Creditworthiness Assessment"** – Accepted at ICONAT 2025
- **"Comparative Analysis of Transformer Models for Skin Lesion Detection"** – Accepted at CVMI 2025 (NIT Rourkela)
- **"Comparative Analysis of Optimized ML and Deep Learning Models for Credit Risk Prediction"** – Accepted at ICDSINC 2025 (NIT Raipur)

Teaching Experience

Teaching Assistant — Engineering Mathematics Feb 2025 – Present
Sardar Patel Institute of Technology *Mumbai, India*

- Assisted in teaching **Engineering Calculus, Differential Equations, and Complex Analysis** to first-year undergraduates, covering partial differentiation, maxima–minima, multiple integrals, ordinary differential equations, and complex functions
- Conducted tutorial sessions emphasizing **rigorous problem-solving**, including Euler's theorem, successive differentiation, series solutions, linear differential equations, and Cauchy–Riemann equations
- Provided **one-on-one academic mentoring** to strengthen conceptual clarity in integration techniques, gamma and beta functions, contour integration, and residue theory
- Collaborated with the course instructor to **design and refine lecture slides (PPTs)** and tutorial question set
- Guided students in connecting **mathematical theory with engineering applications**

Industry Experience

Machine Learning Intern Jul 2025 – Aug 2025
Capital Quants Solutions *Remote*

- Fine-tuned **PaddleOCR model** to improve recognition accuracy in financial documents by 15%, enhancing reliability of downstream analytics
- Implemented comprehensive **dataset preprocessing pipeline** and model evaluation framework for production-level OCR systems
- Collaborated with research team on developing novel approaches for document analysis and text extraction

Software Development Intern Jun 2024 – Aug 2024
PiSquared Payments *Mumbai, India*

- Optimized loan approval workflows through **data-driven process analysis** and system design, reducing processing time by 30%
- Implemented robust **REST APIs** and integrated Meta API for WhatsApp, improving operational efficiency
- Collaborated with cross-functional teams to deliver scalable fintech solutions

Projects

Cloud-Based Smart Attendance System | *AWS, Lambda, DynamoDB, API Gateway, React* 2025

- Designed and deployed a **fully serverless attendance system** using AWS Lambda, DynamoDB, and API Gateway
- Developed a **simulated RFID data generator** to test secure event ingestion pipelines and end-to-end serverless workflows
- Built an interactive **React-based dashboard** for real-time device monitoring, student management, and attendance analytics

HackCentral: Intelligent Virtual Hackathon Platform | *MERN Stack, BERT, K-means, Gemini API* 2025

- Built comprehensive virtual hackathon platform with **ML-powered teammate matching** using K-means clustering algorithm
- Integrated **BERT-based natural language processing** for intelligent query answering and automated project evaluation
- Implemented real-time collaboration features and automated Git tracking for seamless project submissions
- Designed scalable architecture supporting multiple user roles (Admin, Participant, Judge, Mentor)

SpectraScan: AI-Powered Medical Diagnostics Platform | *TensorFlow, Flask, VGG19, Firebase* 2024

- Fine-tuned **VGG19 model** achieving 90-95% accuracy in breast cancer classification from mammography images
- Developed **hybrid CNN and ensemble stacking model** achieving 97% accuracy in breast cancer detection and 94% in Parkinson's detection
- Implemented robust data preprocessing pipeline and model interpretability features for clinical deployment

Technical Skills

Programming Languages: Python, Java, C/C++, JavaScript, MySQL, MongoDB, HTML/CSS, PHP
ML/DL Frameworks: TensorFlow, Keras, Scikit-learn, OpenCV
Web Technologies: React.js, Node.js, Express.js, Flask, Spring Boot, REST APIs
Tools/Platforms: Jupyter, Git, Docker, Kubernetes, Streamlit, AWS

Achievements & Open Source

- **Barclays Hack-O-Hire 2024 Finalist** — Top 24/1200+ teams nationally.
- **Hacktoberfest 2025 — Super Contributor**: Contributions to **tldr-pages**, a 60k+ stars project providing simplified CLI documentation; added new pages, standardized command examples, and improved documentation clarity for global developer community.
- **GSSoC'24 Contributor** — Contributed to open-source projects including bug fixes, feature additions, and documentation.
- **GSSoC'25 Mentor** — Guided contributors on PR quality, issue triaging, Git workflows, and open-source best practices.
- **Student Mentor** — Mentored 2nd-year undergraduate students on academics, project planning, and career guidance.