Abhinav Balakrishnan

+91 9677107474 — abhikrish734@gmail.com — github.com/Abhinav7473 —
linkedin.com/in/abhinav-balki — Chennai, Tamil Nadu, India

Research Interests: Human-Centered AI, Explainable Machine Learning, User-Centered System Design

Education

Vellore Institute of Technology, Chennai **Sep 2022 – Jul 2026 (Expected)**
B.Tech. in Computer Science and Engineering CGPA: **8.43/10**

- Relevant Coursework: Machine Learning, Deep Learning, Computer Vision, Data Structures & Algorithms, Probability & Statistics, Linear Algebra.

Human-Centered Systems & Research

RT-MTCP: Real-Time Multi-Target Traffic Crash Prediction **First Author, Under Review**

- Reoriented urban crash-severity models toward minority-class reliability under extreme imbalance, improving rare-class recall by 22–37% through stress-focused evaluation and Bayesian-smoothed gradient boosting.
- Addressed severe class imbalance (405:1) that skewed crash prediction in vulnerable neighborhoods by selecting gradient-boosting and Bayesian smoothing to retain rare, high-risk patterns.

Hybrid Deep Learning for Molecular Property Prediction **Co-Author, Under Review**

- Designed multimodal prediction system that allowed chemists to inspect and validate model reasoning against domain knowledge, improving confidence in downstream drug discovery decisions; combined transformer and graph neural network architectures to achieve 6–14% accuracy improvement while preserving interpretability through attention patterns.

Experience

Softeon, Chennai **May 2024 – Present**
Data Scientist Intern

- Built and iteratively refined AI support platform used in daily enterprise workflows by 50+ users, working closely with support engineers and executives to adapt system behavior and interface design across three major versions based on observed usage patterns and stakeholder feedback.
- Identified usability breakdowns caused by latency and information overload in early deployments; redesigned interaction flow using progressive disclosure to stream knowledge base outputs before historical ticket retrieval.
- Designed role-specific dashboards that surfaced different explanations and metrics for technical and executive stakeholders after observing misinterpretation of uniform outputs; translated complex ticket lifecycle logic into actionable visualizations that addressed gaps in existing enterprise reporting tools.
- Implemented peer-reviewed feedback mechanism enabling continuous knowledge base refinement, achieving sustained quality improvements (88% to 98.6% user ratings) as the system learned from domain expert validation.
- Improved retrieval pipeline and built real-time configuration interfaces that allowed stakeholders to adjust system behavior without engineering intervention.

Projects

Warehouse Management System with 3D Visualization **PERN Stack + Computer Vision**

- Built 3D digital twin interface for warehouse management that enabled intuitive spatial navigation without layer-switching across floor plans; integrated real-time ArUco marker tracking for physical-digital synchronization, reducing cognitive load for operators managing high-density storage layouts.
- Implemented path optimization algorithms reducing picker travel distance by 12–18%; designed REST API architecture allowing real-time updates between physical warehouse state and interactive visualization to support dynamic decision-making during active operations.

CAN Intrusion Detection for Automotive Cybersecurity **LSTM + Time-Series Modeling**

- Developed threat detection system for automotive networks that prioritized rare but critical attack patterns, enabling security analysts to focus monitoring resources on high-severity threats; achieved 94% F1-macro across 5 attack types with sub-8ms inference suitable for real-time embedded deployment.
- Applied focal loss to address class imbalance in attack pattern distribution; evaluated robustness under adversarial conditions to inform deployment tradeoffs between detection sensitivity and operational false positive tolerance.

Technical Skills

Programming: Python, JavaScript, TypeScript, C, SQL
Frontend & Interaction: React (production experience), Three.js, Component-based UI design, Responsive layouts
ML/AI: PyTorch, TensorFlow, Scikit-learn, RAG Systems, Vector Databases (ChromaDB)
Data & Systems: PostgreSQL, MongoDB, FastAPI, Azure AD
Visualization & Design: Data visualization libraries, Figma (prototyping)
Tools: Git, CI/CD

Leadership & Recognition

- **World Cleanup Day Volunteer Coordinator** (2025) – Organized 50+ volunteers, Marina Beach Chennai.
- **CodeVolt EV Ideathon Finalist** (2025) – Top 10 nationally for ML-based cybersecurity system.