

KARTHIK B

Computer Science Undergraduate — Full-Stack, AI/ML & Embedded Systems Engineer

Chennai, Tamil Nadu, India | bkarthik0404@gmail.com | linkedin.com/in/karthikb-0b8905362 | github.com/KArT4206

SUMMARY

Final-year Computer Science undergraduate at VIT Chennai building production-grade full-stack platforms, applied AI/computer-vision systems, and embedded fog-computing research. Best Paper Award-winning researcher with hands-on experience across React/Next.js, NestJS, PostgreSQL, ESP32 embedded systems, and multi-heuristic cybersecurity detection.

EDUCATION

Vellore Institute of Technology, Chennai | 2023 – 2027

B.Tech, Computer Science & Engineering (SCOPE) — Expected 2027

Relevant Coursework: Data Structures & Algorithms, Operating Systems, Database Systems, Object-Oriented Programming, Computer Networks

TECHNICAL SKILLS

Languages: Python, C, C++, Java, JavaScript, TypeScript, SQL, PHP, R, HTML5/CSS3, Bash

Full-Stack Development: React.js, Next.js, NestJS, Node.js, Flask, REST APIs, WebSockets, Tailwind CSS

AI / ML & Computer Vision: PyTorch, OpenCV, YOLOv8, MobileNetV2, Scikit-learn, Hidden Markov Models, NLP, CLIP-based Similarity, Pandas, NumPy

Cybersecurity: RBAC, JWT & argon2, Multi-Factor Authentication, TLS/WHOIS Analysis, Behavioral Biometrics, Access Control

Embedded Systems & IoT: ESP32, ESP8266, STM32, Arduino, LoRa, NRF24L01, GPS Modules, Sensor Fusion, PCB Design

Data & Infrastructure: PostgreSQL, MySQL, Prisma, Redis, BullMQ, Git, Docker, Prometheus

PROJECTS

Enrollment Governance & Management Platform (EGMP) — In Development

Tech: Next.js 15, React 19, TypeScript, NestJS 11, Prisma, PostgreSQL, Redis, BullMQ, WebSockets

- Independently architected and built the full-stack platform (Next.js/React/NestJS/PostgreSQL/Redis) across 16 engineering milestones — RBAC/JWT auth, BullMQ background jobs, WebSocket realtime layer, analytics/reporting, and GPS geofence tracking.
- Backed the system with evidence-based performance tuning, security hardening, and 276 unit + 146 e2e tests.
- Designed role-based access control (RBAC) with JWT authentication, argon2 password hashing, Redis-cached per-request session validation, and self-service registration/approval workflows enforced on every API route.

Fog-Based Multi-Node Environmental Anomaly Detection on ESP32 — Research Paper

Tech: ESP32, Fog/Edge Computing, Sensor Fusion, MQ-2/PIR/Sound Sensors, C++, HTTP, F1/AUC-ROC/MCC Analysis

- Co-authored a three-tier fog-computing safety system built entirely on commodity ESP32 microcontrollers (total hardware cost ₹2,356) delivering cloud-free, sub-200ms fire and intrusion detection.
- Designed a context-aware dual-modality sensor-fusion algorithm (gas + luminosity for fire; PIR + acoustic for intrusion) that cut the fire false-positive rate by 65% (17% → 6%) while preserving full recall.
- Achieved F1-scores of 95.0% (fire) and 95.2% (intrusion), AUC-ROC of 0.974/0.981, and Matthews correlation coefficients of 0.900/0.903 across 100 controlled trials, with operating thresholds calibrated via an F1-maximizing sweep over 1,500 labeled observations.

Intelligent Traffic Monitoring for Real-Time Vehicle Tracking in Smart Cities — Best Paper Award

Tech: YOLOv8, MobileNetV2, Computer Vision, Embedded Systems | ICDSBS 2026 (IEEE Madras & Singapore Sections)

- Co-authored and presented this research at the 3rd International Conference on Data Science and Business Systems (ICDSBS 2026, IEEE Madras & Singapore Sections, SRM Institute of Science and Technology), receiving the Best Paper Award.
- Applied YOLOv8 and MobileNetV2 for real-time vehicle detection and classification, integrated with embedded systems to drive adaptive, traffic-responsive signal management for smart-city deployment.

Advanced Multi-Heuristic Phishing Detection Platform

Tech: Python, Flask, TLS/WHOIS Analysis, OCR, CLIP Visual Similarity, Decision Tree/Random Forest/XGBoost

- Built a Flask-based multi-heuristic phishing detection platform combining TLS certificate validation, WHOIS domain analysis, OCR, and CLIP-based visual similarity to classify URLs as Safe, Suspicious, or Phishing.
- Presented the accompanying research, "Multi-Heuristic Phishing Detection System Using TLS, WHOIS, and OCR," at the International Conference on AI & Sustainable Development Goals (ICAISDGs 2025).

Multi-Factor Biometric Authentication System

Tech: Python, OpenCV, Facial Recognition, Keystroke Dynamics, Hidden Markov Models

- Designed and built a multi-factor authentication system combining password verification, facial recognition, and keystroke-dynamics analysis to harden login security beyond single-factor credentials.

EXPERIENCE

Team Blitz Racing | Sep 2024 – Present

Electronics & Embedded Systems Division — Chennai, India

- Developed a radio-based pit-to-driver communication system and a wireless telemetry module streaming speed, RPM, battery voltage, and GPS location to the pit station in real time.
- Integrated onboard sensors with Arduino and ESP8266, using LoRa and NRF24L01 for long-range wireless data transmission.

HONORS & RESEARCH

- Best Paper Award — 3rd International Conference on Data Science & Business Systems (ICDSBS 2026, IEEE Madras & Singapore Sections), for "Intelligent Traffic Monitoring and Management for Real-Time Vehicle Tracking in Smart Cities."
- Research Presenter — International Conference on AI & Sustainable Development Goals (ICAISDGs 2025), "Multi-Heuristic Phishing Detection System Using TLS, WHOIS, and OCR."
- Life Member, Chendur Research Foundation (CRF).