Aravind Karthik R

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EDUCATION

Vellore Institute of Technology — Chennai, India
B. Tech - Electronics and Computer Engineering with Minor in Management — *July 2021 - Sept 2025*
Courses: Data Structures, Embedded C, Artificial Intelligence, Machine Learning, Computer Networks, Embedded System Design

Vellore Institute of Technology — Chennai, India
M. Tech - Embedded Systems — *July 2025 - Present*
Courses: Real-time Operating Systems, In-Vehicle Networking, Micro-controller Architecture, Embedded Programming, ML&DL, IoT

SKILLS SUMMARY

- **Programming**: Embedded C, C++, Python, ARM Assembly
- **Embedded Systems**: RTOS, Peripheral Drivers, Kernel Device Drivers, Embedded Linux, Firmware Development
- **Protocols**: SPI, I2C, UART, BLE, LoRa, CAN, MQTT
- **AI & Edge**: TensorFlow, PyTorch, Scikit-learn, OpenCV
- **Hardware Platforms**: STM32, ESP32, Raspberry Pi, PSoC, NVIDIA Jetson
- **Tools**: QNX, Git, MATLAB, Quartus Prime, Jupyter

PROFESSIONAL EXPERIENCE

Indian Institute of Science (IISc) — Bangalore, India
Project Associate Intern — *Jun 2024 – Jun 2025*
- Built and deployed real-time edge AI pipelines for medical inference on Raspberry Pi, optimizing models for latency and memory constraints.
- Engineered complete workflow from biomedical data acquisition to model training, deployment, and live system demonstration.
- Engineered and validated large-scale biomedical datasets (150+ participants) to improve model robustness and deployment stability.

Stemtec AI & Robotics Pvt. Ltd. (V-NEST, VIT Chennai) — Chennai, India
Embedded Systems & IoT Intern — *Mar 2024 – Jun 2024*
- Developed and tested C/C++ firmware for embedded measurement and control modules.
- Performed PCB schematic validation, hardware bring-up, and SMD soldering for prototype boards.
- Integrated BLE and LoRa modules for low-power IoT communication systems.

Highbrow Diligence Services Pvt. Ltd. — Chennai, India
Embedded Systems Intern — *Aug 2023 – Dec 2023*
- Developed an embedded automation prototype for medical EBOO therapy device with sensor integration and safety-triggered control logic.
- Implemented SPI and I2C multi-sensor acquisition and real-time actuator control on Arduino-based platforms for the prototype.

PROJECTS

- **fNIRS-Based Stroke Prediction System (Edge AI + Embedded Systems)**: Implemented dual-wavelength optical sensing using photodiodes with ESP32-based ADC sampling and digital filtering. Streamed processed signals via TCP to Raspberry Pi for ML inference, achieving end-to-end response time of ∼250 ms. **Tech:** Python, ESP32, Scikit-Learn, XGBoost, Raspberry Pi. (2024)
- **Remote IV Fluid Monitoring & Safety System (Medical Embedded Systems)**: Developed medical safety prototype using capacitive sensing (PSoC4 CapSense) and reverse blood-flow detection (AS7341). Implemented embedded control logic and alert mechanisms for remote monitoring. **Tech:** Embedded C, PSoC4, Sensors. (2025)
- **Near-Infrared Vein Visualization System (Edge Computer Vision)**: Developed NIR-based vein segmentation system using DeepLabV3+ (MobileNet backbone). Engineered distributed IP-based streaming pipeline where Raspberry Pi transmitted IR frames to a GPU-enabled host (RTX 3050) for deep learning inference and received segmented output for real-time visualization at ∼23 FPS. **Tech:** Python, TensorFlow, OpenCV, Edge AI. (2025)
- **Decentralized MQTT-Based Autonomous Resource Negotiation System (Internet of Things)**: Implemented multi-node ESP32 system using MQTT publish–subscribe architecture with upto 3 nodes with dynamic priority-based arbitration logic for decentralized resource coordination. **Tech:** ESP32, MQTT, Embedded C. (2026)

LEADERSHIP & VOLUNTEERING

- **Programme Representative – MTech Embedded Systems, VIT Chennai**: Elected student representative responsible for academic coordination, communication between faculty and students, and program-level support activities.
- **Research Demonstration – IISc Open Day 2025**: Represented the lab by demonstrating AI/ML-based healthcare and embedded systems projects to academic and public audiences.
- **Technical & Community Engagement**: Served as a member of Rotaract Club and Microsoft Innovation Club at VIT Chennai, contributing to technical workshops, outreach programs, and community initiatives.