

AKHIL JOSEPH

Senior Embedded Systems & Product Development Engineer · Technical Lead · Hardware Design

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PROFESSIONAL SUMMARY

Hands-on Senior Embedded Systems & Hardware Product Engineer with 10+ years of end-to-end product ownership spanning medical devices, industrial automation, IoT, and smart infrastructure. Expert in Embedded C/C++, ARM Cortex-M (STM32, ESP32), FreeRTOS, multilayer PCB design (DFM/DFA, EMI/EMC), and hardware debugging. Proven track record delivering safety-critical systems for government and medical clients, architecting automated test equipment, leading engineering teams, and coordinating with contract manufacturers to bring products from concept to production. Equally effective as an individual contributor and engineering leader.

TECHNICAL SKILLS

- **Microcontrollers & Platforms:** STM32 (ARM Cortex-M), ESP32, PIC16F, MSP430, XMEGA, Raspberry Pi, Arduino
- **Embedded Software & OS:** Embedded C, Embedded C++, Python, FreeRTOS, Nucleus RTOS, Linux (Debian/RPi OS), Bare-Metal Firmware
- **Hardware & PCB Design:** Schematic Capture, Multilayer PCB Layout, DFM/DFA, EMI/EMC, Component Selection, BOM Optimization, Proteus, FAB3000, Autodesk Inventor
- **Protocols & Connectivity:** Modbus RTU/TCP, RS232, RS485, CAN, MQTT, I²C, SPI, UART, BLE, GPS, GSM/GPRS, TCP/IP
- **Industrial & Medical Systems:** PLC/HMI/VFD (Delta), Relay Logic, Automated Test Equipment (ATE), Medical Device Validation, Radiation Monitoring, Safety-Critical Systems
- **Leadership & Tools:** Technical Leadership, Product Ownership, Design Reviews, Vendor Coordination, Git, Jenkins CI/CD, JIRA, Agile/Scrum, AWS EC2, Firebase, Django REST API, PostgreSQL

PROFESSIONAL EXPERIENCE

Sinnov8 sinnov8.com — *Medical Device Test Automation & Embedded Systems*

Technical Consultant — Embedded Systems & Hardware | Feb 2025 – Present

- Architected and delivered a full Automated Test System for an Electrosurgical Unit (ESU): designed an STM32-based relay switching matrix automating channel routing across cut, coag, bipolar, and monopolar surgical modes; integrated Python OCR/OpenCV pipelines reading Rigel power measurements via RS232+camera, reducing manual test effort by 60%.
- Engineered a pin-level Automated Test System for Phacoemulsification (Phaco) surgical boards — testing ADC, DAC, GPIO, CAN, and RS232 interfaces across LVDT, motor-drive, and diathermy sub-systems; delivered a .NET application generating automated board-level certification reports.
- Designed an STM32-based Distributed Temperature Sensor (DTS) Controller communicating with a Linux IPC over RS232 to trigger zone-specific relay outputs (fiber break, over-temperature, rate-of-rise alarms) with a .NET multi-zone operator dashboard.
- Provided technical leadership across all projects: defined embedded architectures, conducted firmware code reviews, enforced DFM on PCB designs, and coordinated with contract manufacturers for production readiness.

Acex Industries Pvt. Ltd. — *Government Contract — Bhabha Atomic Research Centre (BARC), Mumbai*

Lead Engineer — Radiation Monitoring & Industrial Automation | Aug 2024

- Spearheaded end-to-end design and firmware development of a Gamma Radiation Monitoring System achieving 96% detection accuracy through analog front-end optimization, sensor calibration, and embedded signal processing.
- Engineered a PLC-controlled industrial furnace for crystal development, reducing production cycle time by 20% via automated temperature profiling and closed-loop PID control.
- Designed and commissioned an industrial control panel for a 500 kg drum-lifter machine (Hyderabad Nuclear Fuel Complex, DoAE) with relay logic, overload protection, and safety interlocking for incident-free operations.
- Mentored a junior engineer to independently deliver a PyQt real-time data visualization GUI, improving field-operator accessibility by 30% and eliminating manual data logging.

Triaxia Infotech Pvt Ltd www.triaxia.in — *IoT Products, Home Automation & Digital Platforms*

► **Head of Engineering** | 2022 – 2024

- Directed cross-functional firmware, hardware, and software engineering teams; owned technical roadmap, architecture decisions, design reviews, and product delivery milestones across multiple concurrent embedded products.
- Established Jenkins CI/CD automation for firmware builds, reducing release cycle time by 50%; implemented automated server monitoring maintaining 99.9% uptime for cloud-connected IoT device fleets.
- Spearheaded Kerala's first Kochi Metro Musical Staircase — a Raspberry Pi-based distributed sensor and audio system — delivering a 40% increase in station public engagement.
- Directed hardware bring-up, PCB design reviews, DFM coordination, and contract manufacturer qualification for new product introductions.

► **Project Associate → Technical Consultant** | 2020 – 2022

- Owned hardware and backend development for 5+ IoT home automation products, managing full lifecycle from schematic design through field deployment.
- Evaluated and selected microcontrollers, RF modules, and power management ICs for smart home platforms, reducing BOM cost by 20%; architected scalable APIs supporting 1,000+ concurrent IoT device sessions.

Technorip Innovations Pvt Ltd technorip.com — *Embedded Products — Asset Tracking, Biometrics & Telematics*

► **Lead Embedded Engineer** | 2018 – 2019

- Architected a low-power GSM/GPRS asset tracking solution on Quectel OpenCPU (Nucleus RTOS), engineering aggressive power management to achieve 30-day battery life; passed full pilot validation for commercial deployment.
- Designed multilayer PCBs for commercial tracking devices and fingerprint-based HR terminals adhering to DFM/DFA principles; developed low-level I²C/UART drivers for OLED displays and biometric sensors.

► **Embedded Engineer → Intern (Part-Time)** | 2014 – 2017

- Developed production-grade firmware for Quectel M66 GSM/GPRS modules used in telematics products; performed schematic design, PCB layout, prototype bring-up, and laboratory validation across multiple hardware platforms.
- Joined as a second-year B.Tech part-time intern; transitioned to full-time embedded engineer upon graduation — progressing to Lead Engineer within 2 years.

- Developed AIS140-compliant GPS-GPRS vehicle tracker firmware on PIC16F with M95 GSM modem and Quectel L86 GPS; implemented ignition detection, real-time location reporting, and SOS emergency alerting.

FLAGSHIP PROJECT PORTFOLIO

- **ESU & Phaco Machine Automated Test Equipment:** STM32, Python OCR, RS232, Relay Matrix, CAN, .NET — Class IIb medical device hardware validation system; eliminated 100% of manual measurement errors; generated automated certification reports per board.
- **Distributed Temperature Sensor Controller (DTS):** STM32 + Linux IPC + RS232 + .NET HMI — zone-based optical-fiber temperature monitoring with multi-mode alarms (fiber break, over-temperature, rate-of-rise) for industrial fire detection applications.
- **Gamma Radiation Monitoring System — BARC Mumbai:** Custom sensor front-end + embedded firmware — 96% gamma detection accuracy for nuclear facility safety; delivered under Government of India contract for Bhabha Atomic Research Centre.
- **Kochi Metro Musical Staircase:** Raspberry Pi, capacitive sensing, distributed audio — Kerala's first public smart infrastructure installation; increased station engagement by 40%; featured as flagship IoT product deployment.
- **GSM/GPRS Asset Tracker (30-Day Battery Life):** Quectel OpenCPU, Nucleus RTOS, DFM multilayer PCB — commercial-grade cellular asset tracker for high-value cargo; achieved 30-day battery backup through embedded power optimization and low-power architecture.
- **Industrial Automation Portfolio:** Delta PLC/HMI/VFD — delivered 3 industrial control systems: CNC Pipe Bending Machine (arbitrary-angle bending), Home Lift Safety Controller (obstacle detection, interlocking), and PLC Furnace Controller (PID, 20% cycle reduction).

TECHNICAL LEADERSHIP & COMMUNITY

- Mentored engineers and student teams at 6+ national hackathons (2019–2024) spanning TinyML/IoT, Agri-Tech, and Women-in-Tech domains — events hosted by Thinkerspace Kochi, Christ College Bengaluru, CPCRI (ICAR), and CISCO Thingbator × Amrita University.
- Delivered technical keynote talks at Pi Jam (Raspberry Pi Foundation), Arduino Day (FISAT College), and CISCO Thingbator on Cellular IoT Architecture, GSM/GPRS Firmware Development, and MQTT Protocol Design.
- Presented Entrepreneurial Innovation Talk and launched Student Tech Dashboard at SNMIT (2023).

EDUCATION & CERTIFICATION

Diploma in Digital Fabrication — Fab Academy (MIT-Affiliated) · FABLAB, Kochi · Dec 2019

- Completed MIT's 'How To Make (Almost) Anything' curriculum: CAD/CAM, CNC machining, electronics production, 3D printing, and embedded programming. Capstone: Automated Flute Playing Machine.

B.Tech — Electronics & Communication Engineering · [University Name] · 2016 · Main Project: Industrial-Grade 3D Printer