

S. MAHESH

Embedded Systems Engineer | C/C++ | IoT | RTOS | ML on Edge
+91 7995367273 | mahesh.official368@gmail.com | [GitHub](#) | [LinkedIn](#) | [LeetCode](#)

EXPERIENCE

Embedded Systems Developer | Inncircles

Mar 2025 – Present

Hyderabad, Telangana

- Enterprise clients needed a reliable gate entry system with no existing C++ infrastructure. Designed and shipped GateLogs: a real-time entry registration engine in C++ handling face scan, punch card, and biometric inputs from industrial hardware, updating employee presence and absence records on every event with zero data loss.
- Payroll depended on accurate timestamps but overtime and shift-boundary edge cases caused incorrect pay. Implemented time-boundary logic in C++ to compute regular hours, overtime, and holiday pay from raw entry/exit events, following MISRA-aligned standards with defensive null checks and deterministic state machines.
- Concurrent hardware events caused race conditions in presence state and peripheral devices required sub-200 ms response. Resolved with mutex-guarded shared state and an event-queue architecture for concurrent input serialisation, plus interrupt-driven serial and GPIO handlers keeping entry-to-record latency under 200 ms across all three input modes.

Stack: C++ C MISRA Multithreading Mutex Event Queues Serial GPIO Biometrics Linux

Full Stack Developer | Inncircles

Mar 2025 – Present

Hyderabad, Telangana

- Owned a P6 XML import/export pipeline ingesting ~600K MongoDB documents across 8 modules. Diagnosed SAX stream limitations causing connection pool exhaustion, re-architected with async promise-sets (max-8 concurrent writes) and sort-based integrity sequencing, eliminating 100% of pipeline failures and cutting run time by 45%.
- Spotted a UX blocker where large exports froze the browser. Engineered a distributed Download Center (BullMQ, Redis, worker threads, Socket.io) to offload processing to background workers with real-time progress broadcast, reducing UI blocking to 0 ms and driving a 3x lift in enterprise export adoption.
- Replaced third-party identity providers with a dynamic RBAC engine (18+ modules, runtime role creation) and custom SSO: auth-key generator, leaky-bucket rate limiting, cross-app session propagation. Cut auth latency by 35%, closed 3 new enterprise accounts, and removed all third-party auth costs.
- Profiled production queries across ~20M records and 24 models. Rewrote MongoDB aggregation pipelines with high-cardinality indexes, cutting p95 API latency by 40% and dropping dashboard loads from 4-6 s to under 1 s at peak.

Stack: NestJS Node.js TypeScript React Angular React Native MongoDB Redis BullMQ NATS gRPC Socket.io AWS Lambda Docker ECharts

Software Development Engineer Intern | Inncircles

Aug 2024 – Feb 2025

Hyderabad, Telangana

- Delivered MERN/MEAN features across Agile sprints, extracted reusable UI components adopted across 5+ modules (30% faster feature delivery), and introduced a pre-merge validation process adopted team-wide, cutting recurring integration issues by 50%.

Stack: React Angular Node.js Express MongoDB React Native

PROJECTS

Gesture-Driven Touchless Smartboard Smart India Hackathon — National Finalist

- Existing smartboards cost \$3,000+ putting them out of reach for most schools. Built a low-cost alternative on Raspberry Pi: a camera module captures hand gestures in real time, a trained ML model interprets gesture commands, and the result triggers smartboard features (pointer, draw, slide control) with sub-100 ms response time.
- Output is broadcast over local LAN using a lightweight socket server, pushing live screen state to all connected mobile devices on the same router, eliminating the need for any display hardware beyond a projector.

ESP32 Industrial IoT Sensor Node Real-Time Sensor Monitoring with RTOS and MQTT

- Industrial sensor data is typically siloed on local hardware with no remote visibility. Built a multi-sensor node on ESP32 with FreeRTOS: dedicated tasks for temperature, humidity, and vibration sensors run at fixed tick rates, publishing structured JSON payloads over MQTT to a broker, with a Node-RED dashboard for real-time visualisation and threshold alerting.
- Unreliable Wi-Fi caused dropped sensor readings in factory-floor conditions. Implemented persistent MQTT sessions with QoS 1 delivery, local ring-buffer caching on flash during disconnections, and automatic reconnect logic, achieving zero data loss across 72-hour stress tests with simulated network drops.

RESEARCH PUBLICATION

Gesture-Driven Touchless Interface for Contactless Smartboard

2024 International Conference on Smart Systems for applications in Electrical Sciences (ICSSSES) IEEE, May 2024 [DOI: 10.1109/ICSSSES62373.2024.10561283](#)

Proposed a Raspberry Pi device using a camera module and ML model to interpret hand gestures and trigger smartboard features, delivering touchless interactivity as a low-cost alternative to touch-display hardware.

SKILLS

- Embedded** C C++ MISRA C Bare-Metal RTOS (FreeRTOS) Interrupt Handling GPIO UART SPI I2C PWM
- IoT** ESP32 Raspberry Pi MQTT Node-RED Wi-Fi BLE Sensor Integration Edge ML
- ML / Vision** OpenCV MediaPipe TensorFlow Lite Gesture Recognition Real-Time Inference
- Systems** Multithreading Mutex Event Queues Serial Comms Linux Makefile GDB
- Web** Node.js React MongoDB REST APIs Socket.io
- Languages** C C++ Python TypeScript JavaScript

EDUCATION

B.Tech, Electronics & Communication Engineering

Graduated Aug 2024

Sree Vidyanikethan Engineering College | GPA: 8.1 / 10.0

ACHIEVEMENTS

- Smart India Hackathon, National Finalist (Dec 2023):** Built a real-time gesture-driven smartboard system using Raspberry Pi, ML, and IoT broadcast. Top team nationally across all participating colleges.