

Rohit Kumar Shaw

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PROFILE

Embedded Firmware Engineer specializing in safety-critical systems, deterministic RTOS scheduling, and hardware-constrained environments.

Experienced in configuring custom Buildroot Linux environments, developing character device drivers, and deploying multi-threaded edge applications.

Proven track record of designing fault-tolerant communication protocols and highly available gateway-to-cloud telemetry infrastructure.

TECHNICAL SKILLS

Languages: Embedded C, C++, Python, Shell/Bash, SQL

Embedded & Firmware: ESP-IDF (ESP32), Beken BK7258, FreeRTOS, PIC, PSoC 5LP, STM32, Bare-Metal, Zephyr RTOS, Firmware Architecture

Embedded Linux: Buildroot, Cross-Compilation (aarch64), Kernel Modules, Device Drivers

Interfaces: I2C, SPI, UART, CAN, Modbus, Watchdog Timers, ISR Design, RTC, ADC

IoT & Cloud: MQTT/mTLS, WebRTC (SRTP, TURN), MbedTLS, AWS IoT Core, Azure IoT Hub, Mosquitto, mDNS

Edge AI: TensorFlow Lite, INT8 Inference

Tools: Git, GDB, Logic Analyzer, Oscilloscope, SQLite

EXPERIENCE

Firmware & Product Engineer

Oct 2026 – Present

Anedya Systems (joined as Firmware Developer Intern, Jul 2026)

Ahmedabad, India

- Developing firmware for data loggers headed for mass production at 30,000–40,000 units per month.
- Building an industrial gateway that reads PLC data over Modbus and forwards it to the cloud.
- Developing firmware for a smart RO water purifier.
- Ported the libpeer WebRTC stack to the Beken BK7258 under FreeRTOS, streaming 720p H.264 video and two-way G.711A audio from a camera module directly into a browser, with MQTT signalling and TURN relay fallback.
- Fixed choppy audio, picture-loss storms and a crash after one hour of uptime by reordering task priorities, serialising libSRTP encryption under one mutex, and enforcing the lwIP core lock on MQTT calls.

IoT Intern

Mar 2026 – Apr 2026

Emertæ Information Technologies

Bengaluru, India

- Achieved 5-second deterministic reporting latency to cloud dashboards by designing modular firmware architecture (sensor, network, telemetry, RPC layers) with real-time MQTT telemetry pipelines.
- Eliminated network-induced downtime by implementing automated fault handling, sensor fallback mechanics, and threshold-based local automation routines across all hardware acceptance tests.

Engineering Intern

Jan 2026 – Feb 2026

Variable Energy Cyclotron Centre (VECC), DAE

Kolkata, India

- Architected safety-critical firmware for a cyclotron stripper foil control mechanism at a national nuclear research facility under strict real-time execution constraints.
- Resolved intermittent bus failures observed during stress testing by engineering a multi-slave I2C hardware system featuring hardware-level fault detection, watchdog recovery, and non-volatile memory (NVM) error logging.
- Debugged critical control paths and isolated timing hazards using PSoC 5LP step-through hardware debuggers, hardware breakpoints, and rigorous static code analysis tools.

Embedded Systems Intern

Dec 2025 – Jan 2026

Emertæ Information Technologies

Bengaluru, India

- Authored PIC-based bare-metal firmware incorporating timer-driven interrupt service routines (ISRs), matrix keypad hardware handling, and finite state machine (FSM) control logic using MPLAB X IDE.

Project Intern

Jul 2025 – Sep 2025

Amantya Technologies (5G Lab)

Shillong, India

- Engineered and deployed an end-to-end IoT soil monitoring architecture utilizing ESP32 nodes and Raspberry Pi edge gateways for real-time micro-climate sensing.
- Optimized low-power sensing cycles and implemented local data caching mechanisms to guarantee zero telemetry loss over an experimental high-bandwidth 5G network environment.

PROJECTS

Vaccine Cold Chain Monitor — Embedded Linux Gateway | *Buildroot, C, Python, MQTT, ESP32, TFLite*

- Compiled a custom minimalist Linux OS image (Buildroot, 110 MB) optimized for Raspberry Pi 4 targets, embedding an isolated MQTT broker, a local SQLite database, and automatic system diagnostics scripts.
- Implemented a high-throughput SPI kernel module exposing a clean Unix character device interface, cross-compiling the system against an optimized aarch64 Buildroot toolchain.
- Maintained 97.4% quorum availability across 43,112 consensus samples over a 21-hour continuous stress test with a degraded node running at the RF noise floor—validated via a custom Python analysis dashboard.
- Created an asynchronous Python telemetry tool generating network mesh health metrics (including convergence time and link quality parameters) from raw CSV system logs.
- Integrated a redundant multi-network failover sub-system (Wi-Fi, 5G, Ethernet) ensuring secure gateway-to-cloud data stream connectivity during sudden physical transport layer disruptions.

Sparse Stereo Vision Rover | *ESP32-CAM, Python, FastAPI, OpenCV, YOLO*

- Prototyped a low-cost, resource-constrained stereo vision platform achieving sub-100ms real-time depth estimation at 8–9 FPS using dual synchronized ESP32-CAM hardware modules.
- Optimized a detection-first pipeline that reduced disparity matrix computation by 40% by strictly bounding deep compute fields to dynamically segmented visual regions of interest.

ESP32 MQTT Cloud Libraries (Open Source) | *C, ESP-IDF, Arduino, AWS IoT, Azure IoT*

- Published verified open-source Arduino libraries for AWS IoT and Azure IoT ecosystems featuring hardened MQTT transport (mTLS, SAS tokens) and automated network reconnect state machines.

EDUCATION

North-Eastern Hill University

B.Tech in Electronics and Communication Engineering | **CGPA: 8.75/10**

Shillong, India

2022 – 2026