Kandarp Vaidya

Pune, India — +91-9081234224 — kandarpvaidya03@gmail.com — LinkedIn — GitHub

Summary

Embedded Systems Engineer with 1.5+ years of Embedded C/C++ on microcontrollers (bare-metal and FreeRTOS) for hardware control over UART, I2C and SPI. Built an interrupt-driven Linux IIO driver with a Buildroot image, and an STM32 bootloader with signed firmware update and rollback. Python for device simulation, host tools and test automation.

Education

Indian Institute of Information Technology (IIIT), Surat — Gujarat
B.Tech in Electronics and Communication Engineering, CGPA 7.8/10 — 2021 – 2025

Experience

PHN Technology Pvt. Ltd. — Pune, Maharashtra
Embedded Systems Engineer – R&D — Aug 2025 – Present

- Ported a P10 LED matrix driver from AVR to ESP32 (core 3.x, FreeRTOS). Ruled out logic-level and SPI timing causes, then traced the failure to init order: GPIO setup after VSPI start detached the pins from the SPI peripheral. Fixed it and added PWM-on-OE brightness control (0–100%).
- Architected a distributed multi-sensor presence system (ceiling sensor hub, Raspberry Pi HMI, ESP32 relay and power-meter nodes): defined 35 features with multi-sensor fusion, selected hardware and drafted the BoM.
- Root-caused CNC plotter motion artifacts to tolerance and gear-meshing faults; fixed them with iterative 3D-printed part revisions.

R&D Intern — Jan 2025 – Aug 2025

- Worked on 35+ embedded projects: sensor interfacing (digital and ADC), PWM motor and servo control, SPI, I2C and UART.
- Built an automated validation platform for 60+ sensors (electrical and response-level pass/fail tests), cutting validation time by ∼80%.
- Built closed-loop control systems: a self-leveling platform and line- and wall-following robots.

Projects

Interrupt-Driven Linux IIO Driver for ADXL345 (Raspberry Pi 5) — GitHub

- Wrote an out-of-tree I2C driver in C using regmap, devm resources, a threaded IRQ, a data-ready IIO trigger and a triggered buffer with kernel timestamps, bound through a device-tree overlay; `checkpatch --strict` clean.
- Benchmarked it against user-space polling with Python capture tools: 3.2 kHz sustained with zero dropped samples on 400 kHz I2C (polling peaked near 2.3 kHz) at 57–62% less CPU per sample; a 10-minute run at 800 Hz captured 470,000 samples with no gaps.
- Built a minimal cross-compiled Buildroot image (185 MB) that loads the driver at boot by modalias; fixed a bind failure caused by the I2C controller module not loading.

Bare-Metal Bootloader with Signed Firmware Update and Rollback (STM32F401RE) — GitHub

- No-HAL C bootloader with its own linker scripts, startup code and UART, flash and timer drivers: receives images over a CRC-32 framed UART protocol, verifies SHA-256 and ECDSA P-256 signatures after transfer and on every boot, then relocates VTOR and jumps (9.7 KB footprint).
- A/B update with backup, trial boot, self-confirmation and automatic rollback, driven by a write-once flash flag state machine whose decision logic is tested across all 64 flag states.
- Python board simulator (NOR flash, boot state, UART protocol) that cuts power at every one of 585–778 flash operations per update: the board always recovered; it also caught a host-tool bug.
- Python host tools to sign, pack and send images, plus a C# (.NET) version of the update tool tested against the simulator; unit and simulator tests run in GitHub Actions CI.

Skills

- **Languages:** C, Embedded C, C++, Python (device simulation, host tools, test automation)
- **Embedded:** Bare-metal, FreeRTOS, interrupts, timers, PWM, ADC, GPIO, bootloaders, firmware upgrade
- **Embedded Linux:** Kernel drivers (I2C, IIO, regmap, IRQs), device-tree overlays, Buildroot, cross-compilation, Raspberry Pi
- **Protocols:** UART, I2C, SPI, MQTT, ZeroMQ
- **Microcontrollers:** STM32 (ARM Cortex-M), ESP32, ATmega328P
- **Tools:** arm-none-eabi-gcc, OpenOCD, Make, Git, GitHub Actions CI, pytest, oscilloscope, multimeter

Achievements

- 4 granted Indian design patents (2026) for IoT and solar product designs. Presented embedded projects to Acer's Taipei R&D team at COMPUTEX 2026.