MD DANISH

+91-9060777541 | 9661346164h@gmail.com | Portfolio | GitHub | LinkedIn | LeetCode | npm

Education

Vellore Institute of Technology (VIT), Bhopal — **Bhopal, India**
B.Tech, Computer Science and Engineering | CGPA: 7.99 / 10 — *2024 2028*

Experience

Software Engineer Intern — **Remote IIT Bombay**
FOSSEE, IIT Bombay semester-long internship (part-time) | certificate | report — *2026 (6 months)*

- Led an **18-person team** over 3 months, architecting the platform across **10 repositories** and authoring **554 commits** with **236 merged PRs** spanning frontend, backend, emulator, and CLI.
- Shipped **OpenHW Studio** from an empty repository to a public deployment hosted by FOSSEE at openhw-studio.fossee.in, and continue as **maintainer and admin** of the live platform.

Projects

OpenHW Studio Browser-Based Embedded Systems Simulator — **2026**
Rust (WASM), TypeScript, React, Node.js, Web Workers, Docker | openhw-studio.fossee.in

- Built a Rust-WASM **Manhattan autowiring & Auto-Fix engine** that detects shorts, draws dynamic SVG fix splines, generates C++ code, and packages projects into portable **PNG/JSON** bundles with embedded schematics and firmware.
- Slashed build latency from **~8s to <200ms** via a **SHA-1 cache** (IndexedDB/RAM) across multi-stage Docker images pre-baked with AVR/STM32/RP2040 toolchains, backed by GitHub Actions CI/CD and a Telegram VM health alert bot.
- Integrated an in-browser **Rust-WASM autograding engine** scoring topology (25%), pin logic (25%), and behavior (40%), alongside a cycle-budgeted Wi-Fi/WebSocket stack (CYW43 SPI, ESP32/Pico W).
- Architected a 5-file **modular component standard** (`manifest.json` specs, `logic.ts` state machines, `ui.tsx` dynamic SVGs, `validation.ts` electrical net verifiers, `index.ts` registry) to scale virtual hardware models.

Bare-Metal MCU Emulator Suite ARM Cortex-M, Xtensa & RISC-V — **2026**
Rust, WebAssembly, Unicorn (QEMU), C/C++, TypeScript, Node.js | F103 demo | F407 demo | ESP32 | ESP32-C6

- **STM32F103 (Cortex-M3)**: Emulated full silicon at **5.1M inst/sec** (browser) and **24M/sec** (headless) running real STM32duino/libopencm3/HAL firmware with cycle-accurate 72 MHz timing across **40+** peripherals (electrical GPIO, ADC S&H, DMA WS2812).
- **STM32F407 (Cortex-M4)**: Paired Unicorn WASM with a Rust peripheral model and Ethernet MAC, running real DHCP/TCP/HTTP firmware over gVisor network gateways, 31 test binaries, and booting DOOM in-browser at ~25 FPS.
- **ESP32 (Xtensa LX6)**: Emulated dual-core boot ROM and ESP-IDF firmware with zero-overhead Rust-WASM MMIO dispatch and a multi-threaded **SharedArrayBuffer** ring buffer pipeline for parallel test workers.
- **ESP32-C6 (RISC-V) & NPM Distribution**: Built a bare-metal RV32IMAC SoC emulator for `arduino-cli merged.bin` images (GPIO, I2C, SPI, CAN, ADC, RMT); packaged all 4 engines as modular JS/WASM libraries for npm release.

Ankur (CNAMS) Child Growth & Malnutrition Screening System — **2026**
Embedded C++, BLE, Flutter, Next.js 14, TypeScript | cnamsfrontend.vercel.app

- Cut malnutrition triage for Anganwadi workers from a lab round-trip to an on-the-spot result, contributing to a system that computes WHO LMS z-scores (WAZ/HAZ/WHZ/MUAC) on-device and classifies SAM/MAM/normal with no network dependency.
- Removed manual transcription from the measurement loop by bridging the BLE weighing hardware to the Flutter field app, so height and weight land directly in the child's record.

ESP32-S3 Hardware Security Key, HID Console & KVM Bridge — **2026**
Embedded C++, FreeRTOS, WebAuthn / CTAP 2.1, AES-256-GCM, TinyUSB, Python | live docs

- Implemented **W3C WebAuthn / CTAP 2.1** (NIST P-256 ECC, HMAC-secret PRF) verified with Google, GitHub, Microsoft, and Bitwarden, plus official **YubiKey 5 emulation** recognized by `ykman` and KeePassXC challenge-response.
- Built an on-device zero-knowledge vault using **AES-256-GCM** with **PBKDF2-HMAC-SHA256** at **100,000** iterations, featuring live TOTP auto-fill and encrypted `.esp32vault` backups across dual NVS partitions.
- Achieved sub-frame input latency over the network with a custom **16-byte UDP** KVM protocol and a dual-core FreeRTOS architecture (Core 0 network/PSRAM, Core 1 real-time TinyUSB HID).
- Designed 3 hardware-toggled modes (Ducky HID + 2MB MSC drive, FIDO2 passkey, YubiKey 5) driven by a <30 KB Python client across Linux (`evdev`), Windows, and macOS with Web OTA and REST APIs.

Technical Skills

Languages:	C / C++, Rust, Python, TypeScript / JavaScript, Java, SQL
Embedded & Systems:	Embedded C++, Arduino / STM32duino, FreeRTOS, ARM Cortex-M, Xtensa & RISC-V, BLE & Wi-Fi stacks
Web & Tooling:	React, Node.js, WebAssembly, Web Workers, FastAPI, Streamlit, Docker, Git, GitHub Actions CI/CD
ML & Data:	TensorFlow, TensorFlow Lite, OpenCV, Pandas, NumPy, Matplotlib; Random Forests, model deployment

Achievements & Leadership

Open-Source Leadership: Led an 18-member team over 3 months at IIT Bombay FOSSEE; maintain the live OpenHW Studio simulator. • **NPM Ecosystem**: Authored and published 4 bare-metal MCU emulator engines (ARM Cortex-M, Xtensa, RISC-V) on npm. • **FOSSEE Internship 2026 — verified certificate**, IIT Bombay • **Club Vice-Captain**, House Blue Club, Cambridge Public School, Motihari.