Harshvardhan R

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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
B.Tech. (ECM)	Vellore Institute of Technology, Chennai	9.23 (Current)	2022-Present
Senior Secondary	CBSE Board	89.80%	2022

Experience

- **Embedded Systems Trainee (Cohort 3)** *September 2025 – December 2025*
  Infineon Technologies Bangalore
  - Built bare-metal firmware on **ARM Cortex-M0+** (PSoC 4100S Plus), implementing **GPIO, TCPWM timers, PWM, SAR ADC**, and **interrupts** at register level
  - Developed **startup code, linker scripts, and Makefile**-based build systems using the **GCC toolchain**. Configured **clock tree** and **peripheral clocks** for deterministic operation
  - Debugged low-level firmware using **GDB/OpenOCD**, analyzing memory maps, registers, stack usage, and interrupt execution flow
- **Embedded Systems Intern – Gun Health Monitoring System** *May 2025 – June 2025*
  DRDO Chennai
  - Developed low-level firmware on the **NXP MPC5674F** microcontroller using S32 Design Studio IDE. Configured and synchronized **eQADC (ADC), eSCI (UART), FlexCAN, PIT timers, system clocks, NVSRAM, and interrupt routines** to enable low-latency, deterministic signal acquisition and communication
  - Implemented gain/offset-compensated **eQADC driver** and **DMA-driven eSCI** achieving **100% verified sampling precision** across 10+ sensor channels, with fault-tolerant SRAM logging for health diagnostics
  - Debugged firmware using **breakpoints, watch variables, and real-time signal tracing**; verified interrupt latency and ADC sampling timing via **oscilloscope measurements**, reducing data latency by **20%**

Projects

- **Auto Street lamp control system - Infineon Hackathon (3rd Place)** *December 2025*
  - Designed a multi-rate bare-metal control system on **PSoC 4100S Plus** using dual **TCPWM** timers to decouple ADC sampling (1 kHz) from lighting control updates (100 Hz)
  - Configured **clock tree, peripheral clocks, 12-bit SAR ADC (12 MHz), GPIO, and timer interrupts**. Implemented flag-based **ISR** coordination for **deterministic** execution
  - Implemented noise-tolerant ambient light detection by averaging ADC samples over a 10 ms window and dynamically controlling 9 **GPIO**-driven LEDs based on light intensity thresholds
- **Bare-Metal Analog Joystick** *December 2025*
  - Designed a timer-driven bare-metal control system where **ADC**-sampled potentiometer input was translated into LEFT/RIGHT decisions and transmitted to a PC game via **UART**
  - Implemented **SAR ADC, TCPWM interrupts, GPIO routing, and SCB UART** using direct register programming
  - Validated real-time behavior through deterministic 20 ms sampling, interrupt-driven execution, and end-to-end **human-in-the-loop** testing
- **Wearable Fitness Watch (ESP32-based)** *Jan. 2025 – May 2025*
  - Developed and programmed an embedded fitness tracker on ESP32 to support step counting, workout tracking, and heart rate monitoring
  - Integrated **MPU6050 IMU**, **MAX30102**, **touch sensor**, **piezo buzzer** and **OLED display** for step counting and exercise tracking
  - Implemented dynamic threshold calibration to improve motion detection precision by **15%** and reduce false positives and achieved >**95%** accuracy in rep counting across multiple workouts

Certifications

- **Etalvis Certifications:** C Programming Foundation, Electronics Foundation, Embedded Hardware, Embedded Software - (GPIO, Controller), Microprocessors Internals, ARM Foundation

Achievements

- **3rd Place -** Infineon Embedded Systems Hackathon *Sep. 2025 - Dec. 2025*
- **Top 5 Finalist out of 1000+ teams** at DVCon India 2025 *Feb. 2025 - Aug. 2025*

Technical Skills

- **Embedded Systems:** ARM Cortex-M, Interrupts, Timers, PWM, ADC, DMA, UART, SPI, I2C, Linker Scripts
- **Programming:** C, C++, Embedded-C, Verilog
- **Tools:** GDB/OpenOCD, S32 Design Studio, Git, Linux