

ARUNKUMAR NUNAVATH

Embedded Systems Engineer | Firmware Development | Electronics Design | IoT

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PROFESSIONAL SUMMARY

Embedded Systems Engineer with hands-on industry experience developing mission-critical firmware for a medical-grade device. Proficient in Embedded C/C++, STM32 microcontroller programming, and hardware-software integration across CAN Bus, RS485, SPI, I2C, and UART protocols. Writes peripheral device drivers from application layer to baremetal register access, and designs real-time interrupt-driven architectures that meet stringent medical-grade accuracy and reliability standards. Completed IISc semiconductor fabrication training; tracking RTOS and industrial communication developments. Delivered embedded software end-to-end — from schematic bring-up and PCB validation to field-stable firmware — across cross-functional engineering teams.

EXPERIENCE

Embedded Engineer — Plebc Innovations Pvt. Ltd.

Dec 2025 – May 2026

- Developed Embedded C firmware for TORUS, a medical-grade device, implementing real-time peripheral control, interrupt-driven architecture, and hardware abstraction layers on STM32 microcontrollers.
- Implemented CAN Bus communication across MCU nodes, achieving deterministic, noise-resistant message delivery with zero data loss across the device network.
- Integrated RS485 serial communication for long-distance data transfer between control modules and peripheral sensors; validated signal integrity through systematic protocol testing.
- Developed ADC-based load cell calibration routines that met medical-grade accuracy requirements — delivering precise, repeatable force measurements for clinical use.
- Designed 3 interactive HMI screens in DGUS for the TORUS operator interface, enabling real-time parameter monitoring and reducing reliance on manual controls.
- Wrote 5 peripheral device drivers (SPI, I2C, UART, GPIO, ADC) on STM32, enabling full peripheral control from application layer to bare-metal register access.
- Performed PCB schematic capture, layout, and bring-up using KiCad; applied IEC/IEEE compliance awareness and EMI/EMC principles during hardware validation.
- Resolved hardware-firmware integration issues through systematic debugging — cutting debug cycles by ~30% and measurably improving system stability.
- Collaborated with cross-functional engineering teams to define software requirements and specifications; contributed to design reviews and validation testing throughout the development cycle.

VLSI Intern — National Small Industries Corporation (NSIC)

Sep 2024 – Oct 2024

- Completed structured training in VLSI design and fabrication, covering semiconductor process steps, design verification, and digital logic analysis across 45 days.
- Documented circuit simulation outputs for CMOS logic cells; analysed timing, propagation delay, and power characteristics across process nodes.

PROJECTS

Smart Urban Parking Solution | ESP32, C/C++, MQTT, GPIO, ADC

- Built an ESP32-based IoT parking system tracking real-time slot occupancy across 6 bays, achieving a ~1.5s cloud refresh rate via MQTT firmware integration.
- Developed embedded firmware covering sensor data acquisition, slot-state logic, Wi-Fi communication, and cloud telemetry — full stack from hardware interfacing to cloud integration.
- Optimised for low power consumption and cost-efficiency, making the system viable for large-scale urban deployment.

EEG Signal-Based Home Automation | ESP32, MQTT, Machine Learning (LDA)

- Built a BCI-to-IoT automation system using EEG signal processing (LDA), ESP32, and MQTT — enabling handsfree appliance control for physically disabled users.
- Performed EEG signal preprocessing, PSD-based feature extraction, and cognitive state classification; routed outputs into an embedded control layer modelled on IoT controller architectures.
- Delivered an assistive, scalable system from EEG acquisition through to embedded actuation — covering hardware interfacing, ML inference, and real-time firmware control.

TECHNICAL SKILLS

Programming Languages: Embedded C, C++, Python

Microcontrollers: STM32 (ARM Cortex-M), ESP32, 8051 — peripheral control, HAL drivers, RPI PICO W

Device Drivers: SPI, I2C, UART, GPIO, ADC, RTC, EEPROM, Flash, Watchdog

Communication Protocols: CAN Bus, RS485, UART, SPI, I2C, USB, TCP/IP, MQTT, Ethernet, BACnet (awareness)

Wireless Communication: LoRa, LoRaWAN, Wi-Fi, BLE, LTE

Electronics Design: Schematic capture, PCB layout (KiCad), circuit simulation & testing, component selection

RTOS: FreeRTOS (working knowledge), Linux System Programming basics

Hardware Debugging: Serial debugging, PCB bring-up & validation, oscilloscope, multimeter

Standards & Compliance: EMI/EMC fundamentals, IEC & IEEE standards awareness, medical device hardware reliability

Tools: KiCad, Xilinx, MATLAB, Simulink, GitHub, Platform IO, Edge AI

EDUCATION

B.E. – Electronics and Communication Engineering

Nov 2022 – May 2026

Chaitanya Bharathi Institute of Technology (CBIT), Hyderabad | CGPA: 7.1 / 10

XII Std. (CBSE) — Jawahar Navodaya Vidyalaya, Warangal | 79.79% | Jun 2022

X Std. (CBSE) — Jawahar Navodaya Vidyalaya, Mamnoon, Warangal | 90% | Mar 2020

CERTIFICATIONS & TRAINING

- Semiconductor Fabrication Training (15 days) — CENSE, IISc Bangalore
- Certificate of Industrial Training & Internship — NSIC
- AI Foundation Certificate — Hexart.In (in association with Li2 Group, NASSCOM Foundation, HCCI)