

SANDEEP GULATI

Senior Embedded / Firmware Engineer | ARM Cortex M | Secure Firmware | IoT

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PROFESSIONAL SUMMARY

Senior Embedded Software / Firmware Engineer with 15+ years of experience **designing, developing, and validating firmware for ARM Cortex-M microcontrollers and complex embedded systems**. Strong background in **bare-metal development, RTOS, secure firmware, board bring-up, unit testing, and IoT connectivity**.

Skilled in **pre-silicon and post-silicon validation, hardware-software integration**, and developing high-quality APIs aligned with robust design principles.

Known for strong root-cause analysis, quality-driven engineering, and effective communication with cross-functional teams and customers. Passionate about exploring new technologies, mentoring colleagues, and delivering high-quality embedded solutions across diverse projects.

TECHNICAL SKILLS

- **Embedded Platforms:** ARM Cortex-M(STM32), MSP430, Bare-metal & MCU bring-up (ARM Cortex-M, STM32, MSP430)
- **Real Time Operating System (RTOS):** VXWORKS, FREE-RTOS, QNX – interrupts, timers, scheduling, memory mgmt.
- **Security:** Secure boot concepts, authenticated firmware update, SEI CERT C/C++ coding practices, fault tolerant firmware.
- **Testing and Validation:** Unit Testing(Vector Cast), pre/post-silicon validation, Board bring-up, system debug, field diagnostics, HW/SW debugging.
- **IoT & Connectivity:** TCP/IP, Wi-Fi, BLE, MQTT, sensor networks
- **Bootloaders:** U-Boot, VxWorks Bootloader, secure update/rollback mechanisms
- **Debug & Tools:** JTAG, GDB, Logic Analyzers, Oscilloscope, printk/log analysis
- **Test Automation:** Python, Bash
- **Embedded Programming:** C, C++, assembly
- **Hardware Interfaces:** GPIO SPI, I2C, RS232, CAN, Ethernet, USB, PCIe, Flash,
- **Performance diagnostics:** logging, performance optimization
- **Development Tools:** GNU Make, CMake, IAR, Keil uVision, Xilinx, static code analyzer, QT, vector case for C++.
- **Version Control & Issue Tracking:** Git, GitHub, SVN, CVS, ClearCase, JIRA, Bugzilla, code collaborator
- **Software Development Lifecycle:** Agile (Scrum), Waterfall, code review, design documentation, Sprint planning, daily standups, retrospective

PROFESSIONAL EXPERIENCE

Senior Embedded Software Engineer | Nov 2022 - Present

MCA Netherlands B.V (Client – ASML)

- Designed and debugged firmware for custom **ARM**-based motion, sensing, and control modules.
- Performed **board bring-up** and **post-silicon validation**, improving system stability and reducing field defects.
- Implemented structured firmware **unit testing and diagnostic tooling**, reducing debugging time by 25%.
- Collaborated with hardware and architecture teams to define specifications, validate requirements, and optimize performance.
- Enhanced reliability through rigorous **HW/SW boundary debugging** using **JTAG, logic analyzers, and performance logging**.
- Led development of a **C/C++** embedded module on **VxWorks** with strict deterministic and real-time constraints.
- Delivered well-documented APIs and improved internal developer experience with standardized design patterns.

Senior Embedded Software Engineer | May 2019 – Sep 2022

Thermo-fisher Scientific Pte Ltd, Singapore

- Developed **ARM Cortex-M** firmware (**bare-metal and RTOS**) for scientific instruments involving sensor processing.
- Executed **system bring-up** for new hardware subsystems, validating power sequencing, clocks, and startup code.
- Performed root-cause analysis for lab/field issues across firmware, sensors, and electronics layers.
- Designed and optimized interrupt handling, memory management, and safety-critical embedded modules.
- Collaborated with electronics and application teams to translate requirements into validated embedded solutions

Assistant Principal Embedded Software Engineer | Oct 2017 – May 2019

Panasonic Asia Pacific Design Centre, Singapore

- Developed firmware for **IoT** devices with Cortex-M controllers and FreeRTOS platform, including drivers, communication stacks, and secure connectivity.
- Integrated wireless modules (BLE/Wi-Fi) and implemented sensor/wireless subsystem firmware.
- Contributed to **secure firmware** concepts including **protected boot sequences**.
- Participated in architecture reviews and mentored junior engineers.

ADDITIONAL ROLES

- Senior Embedded Software Engineer | Oct 2016 – Oct 2017
Nuvista Technologies Pte Ltd, Singapore | (Client – Rockwell Automation)
- Embedded Software Consultant | Nov 2015 – Oct 2016
Comtel Solutions Pte Ltd, Singapore | (Client – Continental Automotive)
- Technical Leader - Embedded Software | Jan 2012 – Nov 2015
Aricent/Capgemini Technologies Pvt Ltd, India
- Senior Embedded Software Engineer | Mar 2009 – Jan 2012
Mistal Solutions Pvt Ltd, India, HAL-Edgewood Technologies Pvt Ltd, India

EDUCATION

Post Graduate Diploma in Embedded System Design

CDAC-ACTS, Pune, India

2008-2009

Bachelor's in engineering (Electronics & Communication)

MDU University, India

2003 - 2007

TRAININGS / CERTIFICATIONS

- Free-RTOS system development - Thermo-Fisher Scientific
- Linux Device Driver Development – NTU, Singapore
- VxWorks and RTOS training – WindRiver
- Agile Software Development – Coursera
- Design Thinking and Product Development certification – Udemy.
- SEI Cert secure coding standards for C/C++, MISRA/DO-178B Safety coding standard – Mistral/HAL-Edgewood
- Vector-Cast for C/C++ software testcase automation – Rockwell.