

Bibin Alias

Embedded Systems & Firmware Engineer

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Professional Summary:

Engineering professional with 6+ years of hands-on experience designing and developing complex embedded software, firmware, and low-level device drivers using Embedded C. Proven expertise across wireless networking protocols (Wi-SUN, NB-IoT, Bluetooth, Wi-Fi, Z-Wave), RTOS, and Embedded Linux. Experienced in Python-based automated testing, MVC architecture, and hardware board bring-up. Skilled in AI-assisted engineering with GitHub Copilot and LLM-based tools for accelerated code design and development, automated unit test generation, and technical documentation. Strong track record of executing complex projects under tight deadlines while ensuring compliance and high reliability.

Technical Skills:

- **Languages & Scripting:** Embedded C, Python, Bash, MicroPython, Assembly, MATLAB, HDL
- **Operating Systems & RTOS:** FreeRTOS, Embedded Linux (Yocto), Bare-Metal
- **Protocols & Wireless:** Wi-SUN, NB-IoT, Bluetooth (GATT, GAP, HCI), Wi-Fi, Z-Wave, Zigbee, MQTT/MQTTS, OpenTherm, CAN, I2C, SPI, QSPI, UART, RS-485, RS-232, TCP/UDP, D-Bus
- **Microcontrollers & Hardware:** STM32 (STM32H563, STM32F091RC), ARM Cortex-M0/M4/M33, i.MX 8M Mini, ZG28, MGM210P, ZGM130S, Raspberry Pi, BeagleBone Black, Arduino
- **Firmware & Development:** Firmware Development, Device Drivers, Board Bring-Up, Debugging (JTAG/SWD), Unit Testing
- **AI-Assisted Engineering:** GitHub Copilot and LLM-based tools for accelerated code design & development, automated unit test generation, and technical documentation
- **IDE & Tools:** Eclipse, Simplicity Studio, STM32CubeMX, Keil, Coverity, Wireshark, Git, Gerrit, Jira, Qt Designer, OrCAD Capture
- **Hardware Testing & Lab:** Digital Storage Oscilloscope, Logic Analyzer, Arbitrary Waveform Generator, OpenTherm Certification Tool, 5S Standardized Laboratory Practices

Professional Experience:

Senior Software Engineer

Bosch Global Software Technologies — Bangalore

November 2023 – Present

- Designed, implemented, and tested the OpenTherm Plus (Slave) protocol for Bosch HVAC systems.
- Contributed enhancements to the OpenTherm Master protocol, since the MH220 also serves as a gateway and controlling device.
- Led OpenTherm certification testing for both Master and Slave protocols, achieving a 100% pass rate and ensuring full compliance with industry standards.
- Conducted unit testing and prototype validation to guarantee robust and reliable protocol execution.
- Developed Smart Meter Network Interface Card (NIC) applications utilizing TCP client/server architecture over Wi-SUN wireless mesh technology.
- Implemented the Wi-SUN application layer and constructed a custom UDP application for diagnostic and monitoring purposes.
- Configured Raspberry Pi border routers to establish IPv6 connectivity across Wi-SUN end nodes using Linux D-Bus inter-process communication.
- Designed and deployed secure MQTTS applications for NB-IoT modules.
- Performed Decision Analysis and Resolution (DAR) evaluations and project estimation across critical engineering deliverables.

Projects at Bosch:

- **HVAC MH220 Modules** (*STM32H563, embOS*): Firmware development enabling seamless communication between appliances/heat pumps and HMI units for building climate control.
- **Smart Meter NIC** (*ZG28, FreeRTOS*): Developed NIC firmware providing internet connectivity to smart meters via Border Routers for periodic Head End System (HES) and Network Monitoring System (NMS) telemetry.

Software Engineer

Thinkpalm Technologies Pvt. Ltd. — Kochi

November 2022 – October 2023

- Developed, maintained, and debugged Bluetooth and WLAN device drivers and firmware across various host platforms and wireless chipsets.
- Analyzed Bluetooth/WLAN subsystem source code flow and managed protocol stacks including GATT, GAP, and HCI.
- Leveraged Coverity static analysis and Wireshark protocol analyzer to detect, investigate, and resolve firmware/driver bugs, significantly enhancing system stability.
- Modified and configured hostapd user-space daemon to ensure seamless integration and optimal performance with Wi-Fi chipsets.
- Participated in structured code reviews using Git and Gerrit across multi-vendor codebases.
- Received team recognition award for outstanding contribution and commitment to delivery excellence.

Projects at Thinkpalm:

- **Bluetooth & Wi-Fi Chipset Drivers** (*Linux, Bluetooth/Wi-Fi Chipsets*): Driver/firmware maintenance, bug resolution, and feature integration for host platforms.

Software Engineer

Gadgeon Smart Systems Pvt. Ltd. — Kochi

April 2021 – November 2022

- Designed and developed Linux applications for MQTT (libmosquitto, mDNS), Zigbee, and Bluetooth (bluez) interfaces.
- Built a Network Co-Processor (NCP) application to enable Z-Wave communication for IoT gateways.
- Developed low-level Linux SPI device drivers for analog-to-digital converter (ADC) chips.
- Executed full board bring-up and hardware validation for HVAC controllers using logic analyzers and digital oscilloscopes.
- Designed and built a Model-View-Controller (MVC) automated Test Fixture Application using Python and PyQt5 for PCB component verification.
- Built custom Linux images and packages using Embedded Linux (Yocto Project).
- Collaborated with cross-functional teams to author technical documentation, software specs, and troubleshooting guides.

Projects at Gadgeon:

- **HVAC System with IoT** (*i.MX 8M Mini, MGM210P, ZGM130S, Embedded Linux*): Fan-coil firmware development and IoT stack integration.
- **Automated PCB Test Jig** (*Open-Q 845 uSOM, Linux, ARM Cortex-M0/M4, DAQ*): Test fixture for drone PCB board validation and functional diagnostics.

Firmware Engineer

Transight Systems — Kochi

November 2019 – April 2021

- Architected firmware for ARM Cortex-M0/M4 microcontrollers using FreeRTOS 10, bare-metal C, and Open CPU architecture.
- Designed and implemented low-level device drivers for Flash Memory (QSPI) and Inertial Measurement Units (IMU via I2C).
- Integrated and validated industrial communication protocols including CAN, I2C, QSPI, RS-485, and RS-232.
- Developed custom algorithms using IMU sensor data to detect driving events (harsh acceleration, hard braking, sharp turns, roll-over) for AIS 140 compliance.
- Built Python automated test tools for hardware/firmware validation, achieving Automotive Research Association of India (ARAI) certification.
- Integrated 2G/4G cellular telemetry modules and GPS receivers for real-time fleet positioning and diagnostics.
- Performed reverse engineering, schematic reviews (OrCAD), and board bring-up using oscilloscopes.

Projects at Transight:

- **Fleet Management Solution** (*ARM Cortex-M0/M4, RTOS, Bare-Metal, Open CPU*): Real-time GPS vehicle tracking system monitoring driver behavior, fuel metrics, and route telemetry.

Education:

- **Bachelor of Technology in Electronics and Communication Engineering**
Mar Athanasius College of Engineering – Mahatma Gandhi University (2015 – 2018)
- **Diploma in Electronics Engineering**
Board of Technical Education, Kerala (2012 – 2015)

Certifications & Workshops:

- IoT: Converging Technologies for Smart Environment National Workshop (2017)
- IoT with Microsoft Azure (2017)
- Entrepreneurship Awareness Camp (2016)
- Metabotics Workshop (2015)
- Robotic Workshop — National Robotic Championship (2014)
- High Power Transmitter Station Training — Doordarshan (2014)