

# TONY ABRAHAM

## Embedded Systems Engineer

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### ABOUT ME

Embedded Software Developer with over 2 and Half years of experience in driver development, firmware engineering, and functional safety validation. Skilled in C/C++, real-time systems, and low-level hardware interfacing. Proven expertise in Zephyr RTOS, communication protocols (UART, SPI, I2C, DAC), and functional safety compliance (ISO 26262, IEC 60730). Adept at board configuration, device tree integration, and hardware abstraction with strong debugging and optimization skills.

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### SKILL

- Programming Languages: C, C++, Python
- Microcontrollers: ARM Cortex-M, ATSAMD5x/E5x, ATSAMC21, ATSAMD1x, PIC18F65, ESP32
- RTOS & Frameworks: Zephyr RTOS, Device Tree, Kconfig, Board Support Package
- Protocols & Peripherals: UART, SPI, I2C, DAC
- Functional Safety: ISO 26262, IEC 60730, A-Spice, MISRA C
- Tools: GIT, GitHub, Bitbucket, MPLAB X IDE, Visual Studio Code
- Project Management: Jira, Confluence
- Testing & Debugging: Ztest, Twister (Zephyr), OpenOCD

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### EDUCATION

- Master of Science in Electronics, Mahatma Gandhi University, Kottayam (2020-2022)
- Bachelor of Science in Electronics and Computer Science, Mangalore University, Mangalore (2017-2020)

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### WORK EXPERIENCE

**Emirates Automation Pvt Ltd** – Embedded Design Engineer

Nov 2022 – May 2025

**1. Zephyr Driver Development** – Client: Microchip Technology Pvt Ltd

- Added support for Microchip SoCs into Zephyr RTOS
- Integrating Microchip device families into Zephyr's platform
- Developing and upstreaming device support for microchip peripherals in Zephyr
- Creating and maintaining Device Tree files and Kconfig entries for Microchip devices.
- Focused on board-level support package, driver abstraction and hardware validation
- Added HAL of Microchip device to Zephyr Platform

**Target Microcontrollers:** ATSAMD5x/E5x, ATSAMD1x

**Skills and Tools:**

- Zephyr RTOS, Embedded C, Device Tree and Kconfig configuration
- Board Support Package and low-level driver development, Git, West build system, OpenOCD Debugging
- UART, SPI, DAC
- Visual Studio Code, MPLAB X IDE

**Additional Contribution:**

- Developed a custom Visual Studio Code extension "[zephyr-build](#)" to simplify Zephyr command execution during development
- Zephyr Upstream Contribution: [Microchip SAMD5x/E5x](#)

## 2. Aroma - Home Automation Product (In-House)

- Developed application-level firmware for a custom embedded project targeting Microchip PIC18F and Espressif ESP32 platforms.
- Validated and verified the working of the device in Real-Time with the setup.
- Managed requirement analysis, prioritized development features, and facilitated effective communication between stakeholders.
- Translated customer requirements into actionable software development tasks, ensuring alignment with product goals and timelines.

**Target Microcontrollers:** PIC18F65, PIC18F66, ESP32-DevKit.

### **Skills and Tools:**

- C Programming, MPLAB X IDE, ESP-IDF
- I2C, USART, RTC, ADC Integration
- Debugging with UART, Logic Analyzer, Git, Embedded Systems Debugging

## 3. ClassB Library development and validation – Client: Microchip Technology Pvt Ltd

- Developed and validated a Class B Software Library to comply with IEC 60730 safety standards
- Implemented critical startup and runtime tests: CPU register test, Program counter test, Variable memory test, EEPROM/Flash memory test, Clock test
- Ensured functional safety using MISRA C guidelines and hardware fault injection methods
- Used automated and manual unit testing and code coverage tools for validation

**Target Microcontroller:** PIC32CMJH

### **Skills and Tools:**

- C Programming, MPLAB X IDE, Git, GitHub, Jira, Confluence, Functional Safety Standards (IEC 60730), MISRA C

Additional Contribution:

- ClassB Contribution: [CLASSB PIC32CMJH Library](#)

## 4. Functional Safety Validation – Client: Microchip Technology Pvt Ltd

- Verification and Validation of ATSAMC21 and ATSAMV71 as per ISO 26262
- Followed **ASPICE V-Model** development process for plan, implementation and validation
- Developed **test scenarios** and **test cases** aligned with **ASIL-B** functional safety requirements
- Conducted **Qualification Test**, **Integration Test** and **Unit Test** across the Software requirement, Architectural Design and Detailed Design.
- Contributed to the safety analysis documents: SWE.4, SWE.5, SWE.6

**Target Microcontroller:** ATSAMC21 and ATSAMV71

### **Skills and Tools:**

- C Programming, Git, Bitbucket, Functional Safety Checklist, Static Code Analysis
- Vector Cast, MPLAB X IDE, Jira, Confluence, Polarion
- ISO 26262, ASPICE V-Model