

# Alvin Abraham

## Embedded Software Engineer

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## Summary

Dedicated Embedded Software Engineer with over 2 years of experience in C and foundational knowledge of C++, specializing in STM32 and nRF microcontroller development. Seeking a challenging role to apply my technical expertise, problem-solving abilities, and collaborative skills to drive innovation and optimize embedded system performance in a dynamic environment. Eager to deliver efficient, high-quality solutions that meet organizational goals.

## Work Experience

**Associate Engineer – Lanware Solutions LLP: Nov 2021- Present**

- **Industrial Wastewater Management System**

- Developed firmware for sensor input using the AD4111 module on BeagleBone Black for real-time data acquisition.
- Integrated Notecard module for cloud communication via the Blues Notehub.
- logic for sensor polling, threshold monitoring, and alarm generation, with configurable trip and RTN delays.
- Implemented relay control based on sensor thresholds and scheduled timestamps using Protobuf messages for cloud data exchange.
- Utilized I2C communication and ADC to gather and process sensor data, triggering alarm notifications when thresholds are exceeded.

- **Vending Machine Controller (VMC)**

- Developed firmware using STM32H7 microcontroller and FreeRTOS for real-time functionality.
- Integrated MDB protocol for communication with coin changers and bill validators.
- Designed user interface using a 4x3 keypad and 2x20 LCD display for customer interaction.
- Implemented motor control and sensor functionality for vend-dispense operations.
- Utilized I2C-based EEPROM (24LC32A) for storing transaction data, product details, and motor information.

- **High-Accuracy Object Detection Sensor**

- Created firmware using IR sensor arrays for detecting falling objects in a vending machine.
- Enhanced detection accuracy using PWM signals and timer logic on STM32F103 to precisely track objects within the designated area.

- **Wi-Fi Enabled Smart Touch Switches**

- Developed embedded software for STM32F103 microcontroller for smart switches.
- Implemented touch and relay control features.
- Designed UART-based serial protocol for communication with Tuya Wi-Fi module for remote switch operation.
- Utilized I2C-based EEPROM (24LC32A) for storing and retrieving switch states.

- **Bootloader for Over-the-Air (OTA) Updates**

- Designed custom bootloader for STM32F103 microcontroller enabling OTA firmware updates.
- Managed flash partitioning using linker script and updated vector table for seamless bootloader operation.
- Implemented UART protocol for serial communication with Tuya Wi-Fi module to update firmware in flash memory.

- **Matter-based Smart Touch Switches**

- Developed firmware using nRF Connect SDK for Matter-compatible smart touch switches.
- Implemented touch and relay controls for user interaction.

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## Technical Skills

- Language : Embedded C, Basics of C++
- Communication Protocols : UART, SPI, I2C, MDB
- RTOS : FreeRTOS
- Debugging : Logic Analyzer, Oscilloscope, Breakpoint
- Version Control : GIT
- Microcontroller : STM32F103C8/R8/Z8, STM32H723ZGT6, nRF52840, nRF5340
- IDE : STM32CubeIDE, nRF Connect for VS Code

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## Education

- Bachelor of Technology    A P J Abdul Kalam Technological University, India    CGPA: 6.8    2020

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## Personal Details

- Date of Birth : 18 January 1998
- Nationality : Indian
- Languages : English, Malayalam
- Hobbies : Films, Music, Reading