

# Ashwani Kesharwani

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## Summary

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Detail-oriented Embedded Software Engineer with 3 years of experience in developing and optimizing firmware for embedded systems. Proficient in C/C++, RTOS, and hardware-software integration. Demonstrated ability to troubleshoot complex issues and implement solutions that enhance system performance. Strong collaborator with experience working in Agile environments, dedicated to delivering high-quality software products. Eager to leverage technical expertise and innovative mindset to contribute to exciting projects in a forward-thinking organization.

## Professional Experience

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### Senior Software Engineer

Nov 2023–Present

HAPPIEST MINDS TECHNOLOGIES LIMITED, Bangalore, Karnataka

#### Smart Relay Module

- Integrated firmware to manage and measure current across 5 relay channels with LIN data transmission, adapting to hardware changes in the revision C board.
- Utilized the BTS70012-1ESP Smart High-Side Power Switch for current management, integrating protection functions and diagnosis.
- Developed firmware based on ADC data and the specific characteristics of the BTS70012-1ESP, ensuring reliable current measurement and system control.
- Worked with the Microchip dsPIC33EV MCU and used MPLABX IDE as the integration platform for firmware development.

#### Boy-II

- Served as the system validation engineer, owning the validation of serial communication protocols (UART, I2C, SPI, LIN, CAN) on a Cortex-M33-based microcontroller.
- Developed firmware for full-chip validation, covering key peripherals such as TCPWM, watchdog timer, ADC, SMARTIO, CAN, and CANFD.
- Conducted comprehensive validation of the Peripheral Protection Context (PPC) to ensure secure and nonsecure operation of peripherals.
- Led the validation process for serial communication protocols and system-level integration, ensuring robust performance across all interfaces.

### Software Engineer-Firmware

Oct 2022–Nov 2023

KAHA TECHNOLOGIES PVT LTD, HSR Layout, Bangalore, Karnataka

#### Custom Firmware Development for AI-ML Data Acquisition

- Designed and implemented custom firmware to facilitate data acquisition for the AI-ML team, enabling real-time data collection and processing.
- Added custom logic to optimize data handling and ensure seamless integration with AI-ML algorithms, enhancing the system's overall performance.
- Utilized Keil IDE as the development platform, working with Ambiq Apollo3b and Realtek microcontrollers for efficient firmware development.

## Proof of Concept (POC)

- Enhanced the custom minimal graphics library (Ming) by adding touch algorithms for various interaction scenarios, enabling screen-based interactions for multiple activities.
- Ported the MicroPython library to Ambiq Apollo3p and Realtek microcontrollers as part of the Boat OS project, expanding the OS's hardware compatibility.
- Designed and implemented a simple BLE protocol for data transmission (RX/TX), ensuring efficient communication between devices.
- Developed a HAL layer between hardware components and the application, enabling smooth integration of sensors, displays, and microcontroller features.
- Successfully ported third-party libraries such as LVGL, FreeType, and MicroPython onto the SoC, ensuring smooth performance and functionality for the application.

## Firmware Development Engineer

Nov 2021– Sept 2022

OYO, Tin Factory, Bangalore, Karnataka

### Key-box

- Worked with the Cortex M4-based NRF52840 MCU and used Eclipse IDE as the integration platform for firmware development.
- Developed BLE range extension and optimized battery power measurement using low-power BLE modes.
- Designed and implemented BLE disconnection handling for stable communication in real-world scenarios.
- Optimized Bluetooth advertising parameters for enhanced power efficiency and connection stability.
- Performed bug fixing and maintained comprehensive doxygen documentation for team collaboration.

### Gateway

- Worked with the Cortex M4-based ESP32-C3 MCU and used Eclipse IDE as the integration platform for firmware development.
- Developed robust BLE disconnection management to ensure connection stability and recovery.
- Collaborated on firmware bug fixing and contributed to project documentation using doxygen.

## Environmental Monitoring Sensor

- Worked with the Cortex M4-based NRF52811 MCU and used Eclipse IDE as the integration platform for firmware development.
- Integrated sensor drivers for SPS30 Particle and BME688 for real-time data collection and environmental monitoring.
- Implemented an interrupt-based user button for multiple event handling, enhancing user control and interaction.
- Developed BME688 smoke training algorithms for advanced smoke detection and environmental analysis.
- Managed microcontroller firmware development for seamless sensor communication and performance optimization.

### Switch Device

- Worked with the ATmega32 MCU and ESP8266 for Wi-Fi, using Eclipse IDE as the integration platform for firmware development.
- Integrated relay control mechanisms for reliable device switching functionality.
- Resolved critical firmware bugs and maintained well-documented codebases using doxygen.

## Education

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PG Diploma in Embedded Systems Design

05/2021 - 09/2021

Centre for Development Of Advanced Computing/ ACTS, Pune, Maharashtra

Bachelor of Technology in Electronics and Communication Engineering  
Institute of Engineering & Technology/Dr. Rammanohar Lohia Avadh University  
Ayodhya, Uttar Pradesh

09/2017 - 09/2020

Diploma in Electrical Engineering  
LDC Institute of Technical Studies, Prayagraj, Uttar Pradesh

08/2014 - 09/2017

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## Additional Skills

- **Programming Languages:** Embedded C, C/C++, Python
- **Embedded Systems:** Real-Time Operating Systems, Threads, ARM, Microcontroller Bring-up, Device Driver Development, POC development, MISRA C
- **Development Tools & Environments:** VS Code, MPLAB, KEIL, STM32Cube IDE, Eclipse, Segger Embedded Studio, GIT, JIRA, SDK, Windows, Linux
- **Debugging Tools:** JTAG, J-LINK, SWD, ICD3, Logic Analyzer, CANoe, Oscilloscope
- **Communication Protocols:** UART, I2C, SPI, LIN, CAN, RS-232, BLE
- **Documentation Tools:** MS Office (Word, Excel, PowerPoint), Outlook
- **Languages:** Hindi, English

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## Personal Project

### IoT-Based Fleet Control for Secure Transportation

- Developed an IoT-based system to ensure secure fleet transportation using an STM32F4 microcontroller connected to a Beaglebone board via CAN protocol for efficient device communication.
- Gathered GPS location data via UART on the STM32F4 and transmitted it to the Beaglebone every minute over CAN for real-time tracking.
- Forwarded collected data to the AWS cloud via MQTT for centralized monitoring and analysis.
- Managed the truck's ignition system and integrated an emergency alarm button to enhance safety measures.
- Enabled real-time fleet tracking and emergency response capabilities, improving security and operational efficiency in transportation logistics.

### Air Pollution Monitoring

- Designed a system to measure air pollutants, focusing on PM2.5 and PM10 particles using an SPS30 sensor integrated with an NRF52840 microcontroller via I2C protocol.
- Incorporated an ILI9341 TFT display using SPI protocol for real-time visualization of pollutant levels.
- Enabled comprehensive monitoring and analysis of airborne pollutants, utilizing advanced sensor technology and efficient communication protocols for informed environmental monitoring and decision-making.