

SABBOSHACHI SARKAR

Embedded Software Engineer | C/C++ | STM32 | FreeRTOS | CAN | MODBUS | MQTT

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PROFESSIONAL SUMMARY

Embedded software engineer with nearly two years of experience, including an internship, in C/C++ firmware development on STM32, using FreeRTOS, GPIO, interrupts and protocols such as CAN, UART, I2C, SPI, MODBUS TCP and MQTT. Experienced in taking projects from requirement analysis to test bench validation, and in working directly with a US client. Seeking to contribute to embedded C/C++ projects for international clients.

TECHNICAL SKILLS

Programming Languages: C, C++, Python, MATLAB, Dart (Flutter)

Microcontrollers and Hardware: STM32 (Nucleo F446RE, H755ZI-Q), Arduino, Raspberry Pi 4, HED CL450 controller

Embedded Firmware Development: FreeRTOS-based firmware design, GPIO, interrupt handling, peripheral configuration with STM32CubeMX, hardware bring-up and debugging on a test bench

Communication Protocols: CAN, UART, I2C, SPI, MODBUS TCP, TCP/Ethernet, MQTT, SAS, ID003, TLS

Hardware Design and Integration: Wiring harness design, electrical component specification and sourcing, message specification, test bench setup, PCA9685 and DC motor drivers

Tools and Platforms: STM32CubeIDE, STM32CubeMX, Orchestra Suite, VS Code, Git/GitHub, Jira, Wireshark, MATLAB/Simulink, Microsoft Azure IoT Hub, Flutter (Windows desktop), ST-Link, logic analyzer, oscilloscope, CAN analyzer.

AI-Assisted Development: GitHub Copilot, Claude, Gemini

Engineering Practices: Requirement analysis, project estimation and timeline planning, version control, product testing and validation, test report preparation, client communication (including on-site testing with a US client)

Additional: Data analysis and machine learning, Linux (basic)

PROFESSIONAL EXPERIENCE

Software Engineer | BJIT Limited, Dhaka

March 2025 - Present

1. CAN-Based Fire Truck Component Control Interface

My Responsibilities:

- Analyzed client requirements and investigated the technical approach
- Developed firmware to control vehicle components
- Analyzed electrical component specifications and the wiring harness
- Prepared the CAN message specification and established the CAN communication channel using a proprietary controller
- Programmed the controller using Orchestra Suite
- Set up a test bench and tested the developed product

Technology Used: HED CL450 Controller, Orchestra Suite, CAN Protocol, VS Code, GitHub Copilot, Git/GitHub, Jira

2. CAN-Based Vehicle Lighting Control System (Front and Rear Indicators)

My Responsibilities:

- Analyzed requirements, and prepared the project estimation and timeline
- Developed FreeRTOS-based firmware for STM32 Nucleo F446RE
- Prepared the CAN message specification and established CAN communication
- Analyzed electrical component specifications, sourced components and the wiring harness
- Managed version control with Git

Technology Used: STM32 Nucleo F446RE, FreeRTOS, CAN Controller, STM32CubeIDE, STM32CubeMX, CAN Protocol, VS Code, GitHub Copilot, Git/GitHub

3. FreeRTOS-Based Control System for an Industrial 6-DOF Robotic Arm Production Line

My Responsibilities:

- Analyzed requirements, and prepared the project estimation and timeline
- Developed FreeRTOS-based firmware for STM32 Nucleo F446RE
- Prepared the message specification and established UART communication
- Analyzed electrical component specifications, sourced components and designed the wiring harness
- Managed version control with Git

Technology Used: STM32 Nucleo F446RE, FreeRTOS, UART Protocol, STM32CubeIDE, STM32CubeMX, VS Code, GitHub Copilot, Git/GitHub

4. PWM Motor Speed Control System using MATLAB/Simulink

My Responsibilities:

- Analyzed requirements and set up the Simulink environment
- Developed block-based control design in Simulink to control motor speed with PWM signals
- Integrated Raspberry Pi and STM32 with Simulink

Technology Used: MATLAB, Simulink, STM32 Nucleo F446RE, Raspberry Pi 4, DC Motor, Motor Driver, Potentiometer

5. Cloud-Connected Smart Home Management System (MQTT and Azure IoT Hub)

My Responsibilities:

- Set up the MQTT environment (publisher, broker, subscriber)
- Connected the MQTT broker with Microsoft Azure IoT Hub
- Configured Microsoft Azure to capture and store device data
- Developed an interactive Flutter Windows app to control the MQTT subscriber through the cloud

Technology Used: MQTT, Microsoft Azure IoT Hub, Flutter, GitHub Copilot, Git/GitHub

6. Secure Client-Server Communication System using MODBUS TCP and TLS

My Responsibilities:

- Analyzed requirements and the MODBUS specification, and designed the system
- Developed firmware for the communication system
- Prepared the message specification and established MODBUS TCP communication using a proprietary controller
- Developed a custom Wireshark parser to capture and analyze communication data
- Applied TLS security to the TCP communication

Technology Used: Python, MODBUS TCP, TLS, Wireshark, Proprietary controller

7. Casino Gaming Machine Communication and Transaction System (SAS and ID003)

My Responsibilities:

- Analyzed client requirements and investigated the technical approach
- Developed firmware for the machine communication
- Analyzed electrical component specifications and designed the wiring harness
- Prepared the message specification and established UART communication using a proprietary controller
- Programmed the controller using STM32CubeMX and CubeIDE
- Worked directly with the US client and conducted on-site testing

Technology Used: STM32 Nucleo F446RE, STM32 Nucleo H755ZI-Q, UART Protocol, SAS Protocol, ID003 Protocol, GitHub Copilot

8. Flutter-Based Windows Terminal for STM32 Control (COM Port and Ethernet TCP)

My Responsibilities:

- Analyzed client requirements
- Designed and developed a Flutter terminal application using Claude
- Prepared the message specification and integrated features into the terminal
- Integrated COM port and Ethernet TCP communication to control STM32 boards

Technology Used: Flutter, GitHub Copilot, Ethernet, MODBUS TCP, STM32 Nucleo H755ZI-Q, STM32CubeIDE

Intern, C/C++/Embedded | BJIT Limited, Dhaka

November 2024 - March 2025

My Responsibilities:

- Developed C/C++ firmware for projects using Arduino, Raspberry Pi and STM32
- Implemented vehicle interface management systems using UART, I2C, SPI and CAN
- Built a 6-DOF robotic arm application (STM32, Arduino, PCA9685 motor driver over I2C)
- Researched and prototyped solutions for client-specific requirements

Technology Used: C/C++, Arduino, Raspberry Pi, STM32, UART, I2C, SPI, CAN

EDUCATION

B.Sc. in Electronics and Telecommunication Engineering (ETE)

2017 - 2024

Rajshahi University of Engineering and Technology (RUET), Rajshahi

Relevant Courses: C Programming, Data Structures and Algorithms, Electronics, Computer Networks.

Undergraduate Thesis (2023): Analysis of Stock Market Forecasting Utilizing an LSTM Approach, comparing five DSE companies with NASDAQ using an RNN model.

ACADEMIC AND RESEARCH PROJECTS

1. Text Classification and Prediction using NLP and Machine Learning

2023, Research Project

My Responsibilities:

- Applied NLP techniques and machine learning algorithms to classify and predict text data
- Analyzed and visualized the results

Technology Used: Python, Pandas, NLP, scikit-learn, Matplotlib, Google Colab

2. Raspberry Pi-Based Vehicle Number Plate Detection and User Management System

2020, University Project

My Responsibilities:

- Implemented number plate detection on Raspberry Pi using image processing and a deep learning model
- Developed a Django-based user management system

Technology Used: Python, Django, Raspberry Pi, OpenCV, TensorFlow

3. Arduino-Based Smart Road Accident Detection and Communication System

2018, University Project

My Responsibilities:

- Developed an Arduino-based system to detect road accidents using a vibration sensor
- Integrated GPS and GSM modules to determine and communicate the vehicle's location
- Integrated Bluetooth and motor driver modules for the prototype

Technology Used: Arduino, GSM Module, GPS Module, Bluetooth Module, Vibration Sensor, Motor Driver Module

ACHIEVEMENTS

- **Amra Notun Young Changemakers' Award, 2024** (Brac Youth Platform)
- **4th place, Mud-Rover section, Robotronics, 2021** (Intra-university robotics competition, Dept. of MTE, RUET)

REFERENCES

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