

ABDUL BARI M

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EXPERIENCE

IoT & Embedded Intern

Bridgeon Solution

February 2025 - Present, Malappuram, Kerala, India

- Developed C/C++ firmware for ESP32-based edge devices, interfacing 5+ sensors and actuators using GPIO, ADC, PWM, UART, and I2C with FreeRTOS task scheduling for real-time operation.
- Implemented MQTT (QoS 1) and HTTP communication layers to transmit device telemetry, validating data exchange across 50+ controlled transmission cycles under simulated packet loss and reconnection scenarios.
- Improved firmware response time from ~1.7 seconds to under 800 ms by replacing delay-based execution with event-driven state handling and non-blocking task logic.
- Logged and validated 50+ simulated sensor readings during development to test filtering, sorting, and API-level database operations.
- Performed hardware–firmware debugging across 10+ build and flash iterations, resolving timing mismatches, peripheral communication errors, and unstable Wi-Fi reconnections.
- Assisted in integrating firmware with Flask-based REST APIs and SQL/NoSQL databases, enabling structured telemetry storage and remote device monitoring.
- Documented system architecture, communication flow, and API endpoints to support repeatable deployment and structured testing.

PROJECT

Remote Door Security System (ESP32-CAM, PIR Sensor, Servo, Telegram Bot)

January 2025 - March 2025

- Built a Telegram-based smart door security system using ESP32-CAM and PIR sensor for motion detection and remote locking.
- Secured remote alerts and control through HTTPS communication with the Telegram Bot API.
- Tuned servo movement for consistent 0°–90° locking response and structured logic to avoid repeated image flooding.
- Reduced image delivery delay to ~2 seconds by optimizing capture and transfer flow.

Cybersecurity in IoT — Wi-Fi Packet Monitoring (ESP32)

July 2024 - October 2024

- Created a Wi-Fi security analysis tool using ESP32 promiscuous mode to examine nearby wireless traffic.
- Filtered packet metadata to detect devices transmitting more than 10 packets within a 10-second interval.
- Recorded and categorized MAC-layer data to improve traffic visibility during controlled testing.
- Conducted environment-based test runs to analyze abnormal transmission behaviour.

Device Health Monitoring API (Flask, JWT, SQLite)

June 2025 - June 2025

- Designed a RESTful diagnostics API to track device status and performance metrics.
- Enforced JWT-based authentication to protect endpoints from unauthorized access.
- Structured filtering, sorting, and pagination to handle 50+ diagnostic records efficiently.
- Strengthened input validation to maintain database consistency.

EDUCATION

Bachelor of Vocation (B.Voc) in Software Development

Farook College (University of Calicut) • 2025

CERTIFICATIONS

Junior Software Developer (NSQF Level 4) – NASSCOM • 2022

K-DISC IoT Embedded Engineering - Foundation Module • 2025

SKILLS

Embedded & Firmware: C, C++, ESP32, FreeRTOS, GPIO, ADC, PWM, Interrupts, Timers

Hardware Interfaces & Protocols: UART, I2C, SPI, MQTT (QoS 1), HTTP/HTTPS, Modbus (basic concepts)

System Integration & IoT: Sensor interfacing, actuator control, telemetry processing, edge-to-cloud communication

Development Environment & Tools: Linux (Ubuntu/CLI), Docker, Git, Mosquitto, EMQX

Backend & Data Handling: REST API development (Flask), MySQL, MongoDB, InfluxDB, Redis