ABDALLA YAHYA

Embedded Software Engineer - IoT

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SUMMARY

Embedded Software Engineer - IoT with 8+ years in software and 3+ years in embedded systems. Hands on with MCU/SoC platforms (STM32, ESP32,ESP8266) and Embedded Linux. Designs firmware and applications, builds device cloud pipelines using MQTT (QoS/LWT/TLS), develops drivers for UART/SPI/I2C/I2S , and optimizes systems for real time and low power . adept in Qt/QML GUI development and debugging . Experienced in cross functional collaboration, hardware reviews, and embedded Continuous Integration pipelines .

SKILLS

Firmware & Embedded

C, C++, Python, Embedded C, low-level programming, real-time optimization, memory efficiency, low power, driver development, coding standards, RTOS (FreeRTOS basics)

MCU / SoC Platforms

STM32, ESP32, ESP8266 (ESP-IDF), Raspberry Pi, Embedded Linux

Embedded Linux & Build

Embedded Linux, Yocto Project, systemd, cross-compiling (CMake, PlatformIO), GCC/Clang, Make, build automation

IoT Connectivity & Protocols

MQTT (QoS 0/1/2, retained, TLS/SSL), WebSockets, UART, SPI, I2C, I2S, network stacks, error correction, security

Wireless / RF

Wireless / RF. WiFi 802.11 b/g/n), BLE, Zigbee, LoRa LoRaWAN, 4G LTE, 5G LTE, RF long range, antenna design/tuning, interference mitigation, regulatory compliance (CE/FCC awareness)

UI & Applications

Qt, QML (embedded GUI), C++, Qt Creator, REST, GraphQL, Node.js, NestJS (integration exposure)

Debugging & Tools

Oscilloscopes, logic analyzers, embedded debuggers, multimeter, Git, CI/CD (GitLab, Docker), VS Code, STM32CubeIDE, IAR, Embedded Linux logs (dmesg, journalctl, systemd), Wireshark, perf, top/htop

Collaboration & HW Review

Solutions architecture, version control, communication skills, teamwork; review schematics, PCB layouts, datasheets, application notes CI best practices

EXPERIENCE

Freelance Embedded/IoT Engineer - Self-employed | (part-time, concurrent)

2019 - Present remote

- Designed ESP8266/ESP32 firmware with MQTT (QoS 0/1, retained , LWT) and topic schema; strong Mosquitto configuration (TLS)
- LED Matrix - MQTT live text: phone - broker - ESP render; sub-200 ms publish to render path
- Motion triggered pipeline: PIR - FFmpeg/ffserver live stream + MQTT alert + SMS (Gammu); auto start/stop.
- Qt/QML dashboard (RPi): 8 channel temperature with smoothing & thresholds; custom gauge widgets.
- ESP8266 custom PCB: power/RF layout notes , test points, bring up, current/RSSI measurements.
- Stack: C/C++, Python, MQTT/Mosquitto (TLS), Qt/QML, Raspberry Pi, UART-SPI-I2C-GPIO-PWM-ADC, FFmpeg, Gammu, Docker.

EXPERIENCE

Back End & IoT Systems Developer

Prosoft Solutions

10/2023 - 08/2025 Saudi Arabia

- Built NestJS REST/GraphQL services; integrated MQTT telemetry and Qt/QML dashboards alongside backend work .
- Scope: Co built a full stack ERP + POS and eCommerce for medical-pharma multi-branch inventory, batches-expiry , purchasing-sales
  invoicing-VAT , suppliers-returns users-roles, audit logs; plus modules for accounting, procurement, project management, risk & compliance,supply chain
- Backend: delivered 4 NestJS microservices on AWS (EC2, S3) exposed REST-GraphQL APIs designed PostgreSQL schemas
- Object Storage: implemented S3 pre-signed + multi-part uploads (≤ 5 GB) with retries-monitoring raised upload success and availability for images/docs
- Business Impact: kicked off with a process analysis to streamline the business cycle developed effective efficiency across warehouses , sales , and customer interactions

Backend Developer

Code Chef

06/2021 - 08/2023 Egypt

- Developed & refactored ERP-POS & e-commerce backends Nest.js-Express.js
- Built a GraphQL gateway with Redis caching increased RPS 30% without extra infra cost
- Built a full stack server monitoring & management system using Node .js and MQTT for real time communication . Deployed a lightweight agent (child .js) on each server to publish live IP , CPU/memory usage , disk space, MAC address uptime/health via MQTT topics. Designed a web dashboard (grid view) showing real time server status (up/down), disk capacity/usage and live metrics . Click through on any server opens a terminal-like interface that's simpler and quicker than SSH for routine ops supports remote command execution with streamed output in real time . Used Socket.IO for UI updates and Node's os module for system metrics improved visibility and incident response through low latency telemetry .

Mid-Level Embedded Software Engineer - IoT

RemnumOffice

01/2020 - 12/2021 Egypt

- Developed Qt6QuickMongoDB a QML plugin by encapsulating the MongoDB C Driver within a C++ library Registered typed APIs with QQmlEngine, enabling asynchronous CRUD operations connection pooling, signals-slots integration with QObject-Q_PROPERTY for QML access, and facilitated BSON to JSON conversion. Utilized CMAKE for packaging on Linux-ARM (Raspberry Pi). Achieved a significant decrease of approximately 70% in MongoDB integration efforts per project
- Participated in the development of a Raspberry Pi CoovaChilli captive portal, which included setting up a hotspot and managing DHCP, DNS, and iptables, along with authentication and session management. Implemented backend features for promotions using Twilio for SMS and an email library. This initiative led to a significant boost of approximately 25% in mall sales by providing on-login promotions and focused remarketing strategies.
- Worked in a 3 engineer embedded team to deliver an ESP8266 custom-PCB solution with real-time MQTT telemetry to a backend and Raspberry Pi touchscreen dashboard threshold alerts (temp/humidity/gas/fire) via Twilio SMS/email for residential & industrial use.
  Contributed the device firmware MQTT topicsschema while teammates covered PCB revisions and server dashboards.

Junior Embedded Software Engineer - IOT

RemnumOffice

01/2018 - 01/2020 Egypt

- built a image editor using QT-QML-C++ worked in ubuntu desktop and raspberry pi touch screen
- learned basics linux commands line install raspberry pi os system like Stretch OS and enapled ssh and configuerd system files
- worked with hardware sensors like temp sensor - gas sensor - motion sensor and raspberry pi cam
- read sensors data via I2C-SPI-UART-GPIO using wiring pi lib and publish the data over mqtt protocol
- Integrated IoT Devices with AWS: Connected Raspberry Pi, ESP8266, and ESP32 with AWS IoT Core and created Lambda functions for seamless integration with DynamoDB.
- built a car security system using Raspberry Pi, Raspberry Pi Camera, a GSM module with SIM card, and a motion sensor. when motion is detected, it sends an SMS alert and starts video streaming from the car using FFmpeg & FFserver. internet connectivity runs over the SIM card, and Gammu is used to send the SMS via the GSM dongle.

PROJECTS

Qt6QuickMongoDB - C++/QML MongoDB Plugin (Qt 6, Ubuntu)

https://github.com/RemnumOffice/Qt6QuickMongoDB

C++/QML
plugin that integrates MongoDB database operations into Qt apps , callable directly from QML. Tested on Ubuntu (Qt 6 + MongoDB C Driver + CMake).

- Capabilities: full CRUD, filtered queries, aggregation pipelines, counts from QML
- Integration: Qt signals/slots for database responses and error handling
- Build & Install: CMake + Qt 6 on Ubuntu; packaged as QML module (import QtQuick.MongoDB)

PROJECTS

ESP OS Test - MQTT Messaging with Raspberry Pi Touch UI

https://www.youtube.com/watch?v=h3zAmSCWqdE

Prototype showing end-to-end MQTT messaging between an ESP device and a Raspberry Pi Touch UI, built with Qt/QML (C++)

- Hardware: ESP8266/ESP32 device + Raspberry Pi Touch Screen
- Connectivity: MQTT publish/subscribe for telemetry exchange
- Software: Qt/QML (C++) UI rendering messages in real time

Qt6QuickMosquitto - C++/QML MQTT Plugin (Qt 6, Ubuntu / Embedded Linux)

https://github.com/RemnumOffice/Qt6QuickMosquitto

Exposes Mosquitto MQTT client as QML types for publish/subscribe in QtQuick apps.

- Purpose: provide MQTT connectivity inside Qt/QML apps for device telemetry and UI updates.
- Core API: connectToBroker(), disconnectBroker()
- Config: setHost()/host(), setPort()/port(), setUsername()/username(), setPassword()/password()
- Subscriptions: setSubscribe(QStringList); actual subscribe occurs in connect_callback with QoS 2
- Signal: newMessage(QString topic, QString payload) on incoming messages
- Callbacks: connect_callback(...), message_callback(...), subscribe_callback(...), log_callback(...)
- Internals: mosquitto_lib_init(), mosquitto_new(), mosquitto_connect(), mosquitto_subscribe(), mosquitto_loop_start(), mosquitto_destroy()

Smart Waiter Robot — Raspberry Pi Autonomous Food Delivery (In-Place Rotation Test)

https://www.youtube.com/watch?v=txRomTCKbFQ

Raspberry Pi 4–based robot with 4 DC motors, Raspberry Pi Touch Screen, ultrasonic sensors, and acid battery. Real-time control and UI built with Qt/QML (C++), motor control via wiringPi (C++) and motor driver boards

- Platform: Raspberry Pi 4, Raspberry Pi Touch Screen
- Actuation: 4 DC motors with motor driver (differential / in-place turning)
- Sensors: ultrasonic for obstacle detection and rotation safety
- Software: Qt/QML (C++) UI, wiringPi (C++) for GPIO/motor control
- Power: acid battery pack; field-tested rotation stability
- Outcome: reliable in-place turning and live telemetry/controls on touch UI

Simple Test Custom IOT Board (based on ESP8266) with Node-red Using MQTT Protocol

https://www.youtube.com/watch?v=jQ-_0xbeHdE

- ESP8266 firmware publishes telemetry to Node-RED dashboard using MQTT pub/sub
- Demonstrates cloud messaging and real-time updates.

ESP8266 LED Matrix - Real Time MQTT Text Stream

https://www.youtube.com/watch?v=m2xZrMsxVBw

ESP8266-based LED matrix display streaming text in veridical time over MQTT . Demonstrates IoT messaging, low power microcontroller control, and live optic feedback.

- Hardware: ESP8266 microcontroller, LED matrix presentation
- Connectivity: MQTT pub/sub for real time text messages
- Outcome: low latency text streaming on LED matrix with dependable MQTT messaging

Custom Thermo Gauge - Qt/QML on Raspberry Pi (Touch UI)

https://youtu.be/ZEys9ikd3L4?si=eDZl07wlbEi2SJn6

- Custom temperature gauge widget and interactive touch interface in Qt/QML
- Designed for Raspberry Pi with real-time rendering.

EDUCATION

Bachelor of Commerce (B.Com) - Accounting

Port Said University - Faculty of Commerce

09/2017 - 07/2022 Port Said, Egypt

- Relevant coursework Business Process Design, Project Management, Financial Accounting
- Operations & Logistics
- Built foundation in business workflows (invoicing, VAT, inventory, supply chain), later applied
- To ERP/POS system development

LANGUAGES

Arabic Native **English** Advanced