Mohamed **Salah**

Software Engineer

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Summary

I am a passionate software developer specializing in embedded systems, IoT, and Linux-based solutions. With experience in programming languages such as C, C++, Python, and Rust, I have worked on diverse projects ranging from microcontroller-based systems to Raspberry Pi and embedded Linux applications. My hands-on expertise includes working with Yocto, Docker, Qt, and hardware components like ESP32 and AVR microcontrollers. Additionally, I currently serve as a part-time mentor at PN Junction, where I guide new trainees in the Linux Embedded Systems course. I am dedicated to delivering innovative solutions through a combination of technical skills and a problem-solving mindset. My goal is to contribute to impactful projects while continuously expanding my knowledge and expertise.

Experience

Embedded Linux Systems | PN Junction

Remote, Egypt

Mentor (Part-time)

May. 2024 - Present

- and guiding new trainees in Embedded Linux Systems concepts and project implementation.
- students in understanding topics such as Yocto, Device Drivers, and Bash scripting.
- Providing technical advice and code reviews to ensure project success and quality.
- Assisting in building strong foundations in Linux administration and embedded Linux workflows.

PN Junction

Cairo, Egypt

Intern (Embedded Linux)

Aug. 2023 - Jul. 2024

- Gaining expertise in Embedded Linux Systems, focusing on C++, Python, and Bash scripting.
- Hands-on experience with Raspberry Pi, Yocto, Device Drivers, and embedded Linux workflows.
- Working on projects including custom device driver implementation and embedded software development.
- Rust basics and leveraging monitoring tools for embedded applications.

EME Innovation Hub

Alexandria, Egypt

IOT Intern

Apr. 2023 - Jul. 2023

- Gained hands-on experience with Arduino ESP32 for IoT projects.
- Developed skills in Python programming, IOT concepts, and protocols.
- Explored embedded Linux components, including YOCTO and Buildroot.
- Enhanced proficiency in Linux system administration and embedded workflows.

EME Innovation Hub

Alexandria , Egypt

PCB Design Intern

JUL. 2022 - Sep. 2022

- Designed and analyzed circuits for various hardware projects.
- Learned decision-making processes for design based on cost, performance, and mechanical constraints.
- Developed block diagrams, schematics, and PCB layouts with attention to manufacturing methods.

IMT-School

Cairo , Egypt

Embedded System Software Trainee

JUL. 2021 - AUG. 2021

- Worked on Atmega32 microcontrollers using C programming.
- Gained knowledge in Embedded Systems concepts and interfacing.
- Explored automotive bus technologies and their applications.

Projects

IOT Smart Home System

Remote, Egypt

PN Junction Workshops — *Aug. 2024*

- Developed a smart home system leveraging Internet of Things (IoT) technologies.
- Integrated functionalities such as controlling lights, fans, and other appliances via a mobile application.
- Implemented real-time security and monitoring features using **Node.js** for backend, **MongoDB** for database management, and **React.js** for frontend design.

Infotainment System OS

Cairo, Egypt

Graduation Project — *Aug. 2023, May. 2024*

- Developed an infotainment system integrating features like music streaming, navigation (MAPS), voice assistant, messaging, and call functionalities.
- Implemented **Android Auto** connectivity, enabling seamless interaction between smartphones and vehicle systems using **AASDK**.
- Designed a layered architecture comprising:
  - **HMI Layer**: Included MAPS, Music, Call, Message, and Voice Assistant features.
  - **APP Layer**: Integrated **QT Libraries**, **RT Audio**, **AASDK**, **CMake**, and **Boost Libraries** for robust application development.
  - **OS Layer**: Utilized **Linux**, a Debian-based image, **Docker** for containerization, and **OpenAuto Core** to manage Android Auto functionalities.
  - **HW Layer**: Leveraged hardware components including **Raspberry Pi**, a touchscreen, SD card, and ESP8266 for network communication.
- Designed USB and Some/IP communication protocols to establish data transfer between **Phone**, **Raspberry Pi 4b**, and **Touch screen**.
- Deployed **OTA updates** using a web-based server to ensure continuous software improvement and feature upgrades.
- Enabled Android Auto authentication through phone connections and built GPIO interfaces for custom functionalities.
- Ensured compatibility with external services such as GPS data providers, music streaming platforms, and an OTA server over **4G LTE/WIFI** networks.

FOTA (Firmware Over-the-Air)

Cairo, Egypt

PN Junction Projects — *May. 2024*

- Implemented a C++ application to handle firmware updates for IoT systems with seamless user experience and robust error handling.
- Used Raspberry Pi to download and manage firmware updates, ensuring version consistency, integrity, and system reboot.
- Developed rollback mechanisms to restore the system to the last stable version in case of update failures.
- Tested the solution on multiple IoT devices to ensure scalability and compatibility across platforms.
- Optimized memory usage and minimized update time to improve performance on resource-constrained devices.
- Integrated a web-based interface for remote monitoring and controlling of update campaigns.

PC Control via Phone

Cairo, Egypt

PN Junction Projects — *Feb. 2024*

- Developed a system to control a PC using a mobile application through the **API Tester** app.
- Wrote **C++** code to implement functionalities for executing system-level commands remotely.
- Created a server-client architecture where the mobile app acted as a client sending requests to the PC.
- Used RESTful APIs for communication between the mobile app and the PC, ensuring secure and efficient data exchange.
- Designed use cases like file operations, media control (e.g., play/pause videos), and basic automation of repetitive tasks.
- Enabled compatibility with both Wi-Fi and Bluetooth protocols for flexible connectivity options.
- Tested the solution on multiple devices and operating systems to ensure cross-platform functionality.

Python Assistant Device (Alexa)

Cairo, Egypt

PN Junction Projects

Oct. 2023

- Designed an intelligent assistant device using Python to process and respond to voice or text commands with pre-defined functionalities.
- Integrated features for controlling smart home devices like lights, fans, and security systems using **IoT protocols**.
- Implemented natural language processing (NLP) techniques to enhance the device's ability to understand user queries.
- Used APIs to connect the assistant device to external services such as weather updates, news feeds, and task scheduling.
- Deployed the device on a **Raspberry Pi** for portability and integration with other hardware sensors and actuators.
- Ensured voice feedback functionality by integrating **text-to-speech (TTS)** libraries and enabling smooth two-way communication.

Flutter Development

Remote, Egypt

Flutter Application for Car

Mar. 2024

- Designed and developed a mobile application for controlling in-car features using **Flutter**.
- Implemented the user interface (UI) with an intuitive design for ease of use in a car environment.
- Integrated functionalities for music playback, navigation, and camera access to provide a seamless in-car experience.
- Developed a home screen layout with customizable options for quick access to important features.
- Enabled remote access to control and monitor car features via mobile, allowing users to interact with the car system on the go.
- Integrated navigation system with real-time map data and turn-by-turn directions for a smoother driving experience.
- Implemented camera functionality to allow users to monitor car surroundings or use the camera as a rear-view system.
- Ensured cross-platform compatibility with both Android and iOS devices, leveraging Flutter's capabilities.
- Used Flutter packages for media playback, location services, and hardware interactions with car systems.

Biofuel System

Alexandria, Egypt

EME Innovation Hub

2023

- Developed Arduino Mega code to manage five relays controlling a pump, motors, sensors, and a load cell.

Digital Alarm Clock

Alexandria, Egypt

EME Innovation Hub

MAY. 2022

- Developed a digital alarm clock using drivers for AVR-ATMEGA32 controller.
- Integrated hardware modules like **LCD**, **Keypad**, and **ADC** for input/output functionalities.

Smart Home System

Cairo, Egypt

Embedded IMT Projects

Aug. 2021

- Created a smart home prototype utilizing AVR-ATMEGA32.
- Used drivers for components like **Stepper Motor**, **LCD**, and **Keypad** for controlling devices.

Clinic Management System

Cairo, Egypt

Embedded IMT Projects

Aug. 2021

- Built a clinic management system using C with linked lists and file handling.
- Implemented a user-friendly interface utilizing Windows APIs for enhanced usability.

Calculator

Cairo, Egypt

Embedded IMT Projects

Sep. 2021

- Implemented a calculator using AVR-ATMEGA32 drivers.
- Utilized DIO and keypad for input and LCD for output display.

Drivers Development for AVR-ATMEGA32

Cairo, Egypt

Embedded IMT Projects

Oct. 2021

- Created drivers for AVR-ATMEGA32 controllers based on static software.
- Included support for DIO, ADC, LCD, and KPAD peripherals.

Skills

Docker Gdb VSC Eclipse	**Software Management**	Git Git Extension GitHub
	Operating Systems	Linux Yocto
	Programming	C/C++(Modern Cpp) OOP Bash Python Rust (Basic Knowledge) Dart UML (Basic Knowledge) CMake Make (Basic Knowledge) Matlab Flutter
	GUI Development	QT6 (Basic Knowledge) Python Tkinter
	Embedded Systems HW	AVR (Atmega32 Microcontroller) ESP32 ESP8266 Embedded Linux (Raspberry Pi 4b)
	Languages	Arabic English

Education

Higher Technological Institute 10th of Ramadan

Giza ,Egypt

B.E. in Electronics and Communications

Sep. 2019 - Aug. 2024

- Got a Bachelor of electronics and communications engineering program with very Good grade