Mohamed Bilel Khadhraoui Embedded Systems Engineering Student

mohamedbilel.khadhraoui@insat.ucar.tn | Mohamed Bilel Khadhraoui | AKhadhraoui47 | Recommendations

EDUCATION

Master of Engineering in Embedded Systems, 09/2020 – 09/2025 | Charguia, Tunisia
National Institute of Applied Sciences and Technologies
Control Theory • Electronics • Algebra • Calculus • Assembly • UML • OOP • Algorithms • Linux

WORK EXPERIENCE

Embedded Linux Intern, *STMicroelectronics* 07/2024 – 09/2024 | Tunis, Tunisia
- Conducted an in-depth exploration of the boot chain of the MP135 microprocessor; U-Boot, TF-A, OP-TEE, Kernel
- Crafted a high-performance kernel module for the Grove WiFi V1/V2 module using the TTY framework for serial communication (UART).
- Designed and implemented a Command Line Interface (CLI) in C, delivering efficient abstraction and control of the kernel module.
- Authored Yocto recipes for Device Tree configuration and cross-compilation, ensuring seamless deployment on the MP135 Microprocessor.

Embedded Software Engineer, *Shanon Technologies* 09/2023 – 01/2024 | Toulouse, France
- Benchmarked ShanonDSPWizard through complex block diagram implementation, performance evaluation, and live demonstration.
- Developed a cross-platform Software Abstraction Layer for STM32H723 FMAC Peripheral, enhancing portability and IIR/FIR filters implementation.

Embedded Software Intern, *Shanon Technologies* 07/2023 – 08/2023 | Toulouse, France
- Studied and analyzed the performance and hardware limitations of STM32H723 CRC and CORDIC hardware accelerators.
- Designed a cross-platform middleware for CORDIC and CRC, providing APIs for configuration, manipulation with a technical documentation.
- Expanded the STM32H723 CORDIC's and FMAC's function range by implementing a recursion-based approach for mathematical decomposition to address the fixed-point system.

PROJECTS

IoT-Enabled Atmospheric Monitoring Node 03/2024 – 04/2024
- Engineered a custom Linux image with Yocto, automating Wi-Fi connection with a static IP and integrating OpenSSH for secure remote access.
- Devised a custom recipe that installs and creates a boot service automating the reading of data from a DHT11 temperature sensor
- Established communication through MQTT protocol to publish data to server, enabling real-time visualization through Node-Red dashboard.

Real-Time Motion Tracker 01/2024 – 02/2024
- Mastered core principles of Embedded Linux, building a strong technical foundation; Makefile, GCC, Yocto.
- Generated a custom Yocto image for Raspberry Pi 4 to interface with the MPU6050 IMU via I2C, enabling data reading and logging.

International Robotics Competition Eurobot 11/2022 – 06/2023
- Realized autonomous mechanical systems for advanced automation; 3 DoF Robotic Arm, Rolling base.
- Optimized Dijkstra-based path planner using 2D geometric model of the robot's environment, achieving 4x faster computation-to-travel time.
- Integrated a state machine within the ROS environment using Python 3, enabling seamless mechanical synchronization.

Trajectory Planner of an autonomous robot 09/2022 – 10/2022
- Assembled a differential wheel robot with a custom navigation framework, generating a trapezoidal velocity profile reaching 1.8 m/s.
- Formulated a control algorithm implemented on an STM32H745 MCU, employing odometry and PID control for enhanced maneuverability.
- Fine-tuned 12 parameters of the PID control algorithm to achieve an error margin of less than 1 mm from the desired coordinates.

SKILLS

Computatinal Thinking: Composition/Debugging/Abstraction | **Embedded Peripherals:** GPIO/TIMER/ADC/DAC/CORDIC/FMAC/CRC |
Programming: Embedded C/Python/Bash/C++ | **Microcontrollers:** STM32/ATmega/ESP32 | **Communication Protocols:** UART/I2C/SPI |
Microprocessors: Raspberry Pi/ STM32MP | **Test Equipements:** Logic Analyzer /Oscilloscope | **Version Control System:** Git/Gitlab |
Embedded Linux: Yocto/Makefile/GCC/Cross Compilation/Kernel Development/GDB | **Softwares:** CubeIDE/CubeProgrammer/Matlab/VSCode

CONTRIBUTIONS

Open Source Contribution 08/2024 – present
- Deployed and maintained a kernel module for the SeeedStudio Grove WiFi V1/V2.
- Provided and maintained a user-friendly CLI to interact with the module .

ORGANIZATIONS

Son FM, *Radio Presenter* 06/2024 – present
- Led the MagTech IT Segment live, delivered tech insights to over 5000 listeners and produced engaging content with over 9000 interactons.

TechMag, *Digital Creator* 01/2024 – present
- Produced high-quality digital content on advanced deeptech topics, engaging an audience of over 10,000 viewers on social platforms.

IEEE RAS INSAT Student Branch, *Technical Trainer* 09/2022 – present
- Spearheaded more then 5 workshops; Embedded Linux, STM32 in collaboration with 3 different institutes, hosting more 30 participans each.

LANGUAGES

- French | C1
- English | C1
- Arabic | Native Language
- German | A1