ADAM KHAN

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EXECUTIVE SUMMARY

Embedded Systems Engineer with 3+ years developing firmware for LiDARs in C, with hands-on experience across ARM Cortex (A53, R5, M4), Infineon AURIX TC3xx, and Xilinx Zynq UltraScale+. Deep background in low-level driver development and boot architecture design. Experienced technical lead with a track record of driving architectural decisions, mentoring junior engineers and collaborating with ASIC, hardware, and systems teams.

EXPERTISE

- Operating Systems
- C/C++, Rust & Python Dev
- Embedded Systems Design
- FPGA Workflows
- Firmware Development
- Mathematical Modelling

PROFESSIONAL EXPERIENCE

BluPelagos LTD December 2024 – Present

Senior Embedded Software Engineer – Cepton via BluPelagos

A software consultancy firm with ~10 employees, specializing in automotive and embedded projects for clients such as GM and Continental AG via ETAS and LiDAR projects via Cepton Technologies

In my role as a Senior Embedded Software Engineer, I act as a technical lead for LiDAR ECUs and sensor platforms used in automotive and non-automotive applications. I work closely with ASIC, hardware, and systems teams.

- **System Architecture Redesign:** Led the integration of a SPAD-based LiDAR firmware project into an in-house Rust-based build system, unifying BSP handling and allowing automated PC-Lint on modules to increase code quality.
- **Single-binary multi-core firmware architecture:** Designed the transition from three-core separate binaries to a single-binary architecture for a heterogeneous Zynq UltraScale+ system, handling boot code placement, C runtime initialization, and core start-up order; simplified OTA and size from three (3) images to one (1).
- **Unified Bootloader Architecture:** Planned and documented the bootloader architecture for a production LiDAR system, currently supporting 3 SKUs, defining reset sequencing, image layout, and OTAs while coordinating hardware/software co-design with ASIC and FPGA teams.
- **Guiding Junior Engineers:** Mentoring of junior engineers on MCU basics, hardware-level debugging (oscilloscope/logic analyser workflows) and code reviews.
- **Application Specific CPU Profiling:** Led the initiative to design a CPU profiling system for the LiDAR ECU, enabling a fourth core on the Zynq UltraScale+ as a dedicated profiling core. Hence, all trace collection and processing with minimal overhead, helping uncover pipeline bottlenecks.

BluPelagos LTD September 2022 – December 2024

Embedded Software Engineer – Cepton via BluPelagos

A software consultancy firm with ~10 employees, specializing in automotive and embedded projects for clients such as GM and Continental AG via ETAS and LiDAR projects via Cepton Technologies

As an Embedded Software Engineer, I developed low-level firmware and drivers for LiDAR ECUs and sensor platforms on ARM- and AURIX-based hardware, working mainly in C.

- **Cross-platform LiDAR ECU development:** Developed embedded software for LiDAR and sensor systems on Xilinx Zynq UltraScale+, ARM Cortex-R5/A53/M4, and Infineon AURIX TC3xx.
- **Custom driver design for sensors & DACs:** Designed custom drivers for sensors and peripherals, including a custom I2C driver and driver for an external DAC; validated behaviour with oscilloscope and logic analyser.
- **Custom PHY drivers & MDIO validation:** Wrote and debugged custom Ethernet PHY drivers, bringing up Clause 22/45 MDIO communication and link configuration in firmware; developed MDIO test routines and used a logic analyser to verify signalling, timing, and register access for board bring-up.
- **Boot Architecture Design:** Defined the boot architecture for a dual-processor system with an Infineon AURIX safety MCU and a custom ARM Cortex-R5 ASIC application processor. Designed the state machine where the AURIX owns external Ethernet communication and acts as the OTA gateway: receiving and validating update images, then using the Cortex-R5 UART boot mode to download and start application firmware under reset and safety conditions.

The University of the West Indies (UWI) January 2017 – December 2022

Instructor

A regional public university system with ~50,000 students and 10,000+ staff across five campuses, serving 18 English-speaking Caribbean countries, and recognized as the premier higher-education institution in the Commonwealth Caribbean

Taught courses and designed labs in the Department of Electrical and Computer Engineering.

- **Courses Taught:** Data Communications: Fundamentals of modern data networks, routing using graph theory and shortest-path algorithms, and performance metrics of MAC protocols using probability and statistics. Communication Systems: Modelling and analysis of analogue communication systems using Fourier techniques, and noise analysis/performance evaluation. Fluid Mechanics: Hydrostatic pressure and forces on submerged surfaces (vector calculus, PDEs), Bernoulli-based steady-flow analysis, and introductory pump and heat sink design.
- **Course material design:** Designed tutorials, problem sets, and coursework bridging theoretical material to practical engineering applications, including but not limited to networking using Python and electronic circuits to demonstrate modulation techniques.

RELEVANT PROJECTS

- **Nonlinear control & VR-based simulation:** Developed a 3D MoSART (Modelling, Simulation, Animation and Real-time Control) environment as part of a MASc research project, mathematically modelling two nonlinear plants (ball-and-plate and double inverted pendulum), implementing and comparing controllers in MATLAB, and building a virtual 3D world to visualize and test real-time system behaviour. (2015–2016)
- **3D reconstruction & computer vision for dental imaging:** Designed a MATLAB pipeline to calibrate a stereo imaging setup (extended to x-ray views) and reconstruct both internal and external tooth geometry for extracted dental samples. (2012–2013)

EDUCATION

Master of Applied Science (Electrical and Computer Engineering: Major – Control Systems)
The University of the West Indies (St. Augustine, Trinidad and Tobago)

Bachelor of Science (Electrical and Computer Engineering)
The University of the West Indies (St. Augustine, Trinidad and Tobago)

OTHER RELEVANT INFORMATION

- **Languages:** English (Mother tongue)
- **Programming:** C/C++, Python, Rust, MATLAB, SystemVerilog, ARM assembly (AArch32/64)
- **Targets:** ARM Cortex-A53, ARM Cortex R5, ARM Cortex M4, Infineon AURIX TC3xx
- **Development and Debugging:** Xilinx Vivado, Vitis, Lauterbach TRACE32, ETAS ISOLAR, PCLint, Ozone, GDB, RTOS: RTA-OS, FreeRTOS
- **Standards:** AUTOSAR, ISO 14229 (UDS), ISO 23150, ISO 13400, MISRA C
- **Protocols/Interfaces:** I2C, SPI, UART, CAN/CAN-FD, PTP / IEEE 1588, TCP/IP, MIPI-CSI2
- **Other:** GIT, GitHub Projects, Asana, GitHub Actions, Jenkins, Linux