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Mert Sefa AKGUN

Software Developer

Summary

Hey, I'm Mert. Passionate Software Developer and Open-Source enthusiast who is looking for a challenging position that feeds my desire to learn and do new things with experience in writing production quality firmware/software. I also can describe myself as an independent learner and self-motivated tech enthusiast who build knowledge around low-level programming and embedded systems. I am interested in with systems programming, robotics and autonomy. I am pretty sure, I'm gonna contribute at your business very well and we'll move it to next-level together.

Work Experience

Embedded System Softare Developer (Internship)
March, 2024 - June, 2024

Baykar

Created Real-time Networking Infrastructure for Military-level Aerial Vehicles

- To able to create RT-networking, IEEE 802.1 TSN (Time Sensitive Network) specification used as guide.
- Implemented Frame Replication and Elimination for Reliability (IEEE 802.1CB) on OSI layer 2 with minimum overhead by using state of the art technoligies like eBPF (extended Berkeley Packet Filter), XDP (eXpress Data Path).
- Used IEEE standards like generalized-Precious Time Protocol (802.1AS), Time-aware Shaper (802.1Qbv) and Frame Pre-emption 802.1Qbu.
- Worked with Linux Build Tools (Yocto/Buildroot) to achive RT-networking at the kernel.

Embedded System Softare Developer (Full-time)
March, 2022 - March, 2024

Fora

Worked on all variants of Mavisoft (Access Control System) product line and other large building/enterprise security/safety products.

- Development of versatile, reliable and precise embedded access control softwares on baremetal/RTOSs for brand new products.
- Developed a C/C++ library for Open Supervised Device Protocol (OSDP).
- Developed a symmetric encryption/authentication library in C for devices that do not support the integration of off-the-shelf TLS libraries. The implementation was verified by a 3rd party security audit company.
- Implemented many feature requests from customers in Mavisoft Access Control System.
- Maintaining code, dealing bugs like UB, addressing critical issues reported by site/customers.
- Developed lots of peripherasl device for different use cases like MiFare, HID, Proximity, NFC card readers.

Developed RTLS (Real-time In-door Localization System) that alternative to GPS.

- Worked with (UWB) ultra-wide band signals
- Implemented TDoA, TWR positing algorithms over systems.
- Worked with BLE stack.
- Developed client-side application for visualizing and configuring.
- Implementation of filtering, estimator algorithms such as EKF (Extended Kalman Filter)Worked on all variants of Mavisoft (Access Control System) product line and other large building/enterprise security/safety products.

Stack Set:
UART/USART, I2C/I2S, SPI, ModBus, RS232/RS485, TCP/IP Stack. MCUs(ST, Nuvoton, Renesas, ESP, Nordic, Atmel), Serial to Ethernet, Zephyr, Nuttx, FreeRTOS.

Academic History

BEng Degree
2020 - 2024

Cumhuriyet (Republic) University

Modules included : Algorithm Analysis, Data Structures, Object Oriented Analysis, Numerical Analysis, Physics, Differential Equations, Electronic Circuits and Design, Computer Architecture, Numerical Analysis, Automata Theory, Signals & Systems, Operating Systems, Computer Networks, Embedded Systems, Microcontrollers, Database Systems.

Activities & Accomplishments

- *Google Summer of Code 2020 - Python Fury*
- *Teknofest 2021 Unmanned Under-water Vehicle Competition - Finalist (7th)*
- *Teknofest 2021 International Unmanned Air Vehicle Competition - Finalist*
- *Teknofest 2022 International Fighter Unmanned Air Vehicle Competition*

Main Interest

I am interested in conducting research about evolutionary algorithms, genetic programming and autonomy using genetic algorithms. Another research interest of mine is distributed network protocols, RF systems and cryptography . In short, I like to deal any kind of objects that programmable. Also, I have trained myself on 3D modelling since I get a 3D printer. I like to design models (mostly for my projects).

Projects

Autonomy & Robotics ## Flight Controller Software

Flight-controller software that running on bare-metal(STM32F407VET6) for drones.

- *Built on Mbed OS which is Real-time Operating System by ARM.*
- *Extended Kalman Filter is available for main state estimator.*
- *Implemented lot of variants IIR and FIR to sensors output as DSP algorithms.*
- *Kalman based PID controller model tuned to be ready to use.*
- Implemented lot of hardware abstraction layer for couple of sensors.
- *Using 192-bit ChaCha20-Poly1305 and S-Box based PRESENT Chipper for encrypted communication.*
- *NRF24L01 libraries implemented for RC communication.*
- *GCS (Ground Control Station) for visualizing data that coming over telemetry. It's capable to set parameter of vehicle.*
- *One pair transmitter and receiver for wireless communication.*

System Crafting ## Oligarchy - x86 Kernel Project

Oligarchy is an X86 toy-kernel project. It's an operating system kernel I started to develop in C++ but later I decide to make it with Rust cause it's ownership model and fearless concurrency paradigms. Also it has more performance, guaranteed memory safety (barrow checker) and smaller footprint. At this point, it is not even close to feature-complete. I mostly use it as a testbed to try out interesting ideas. The kernel is developed for the x86 architecture. For now, no other architectures are planned due to the lack of manpower.

- *PCI support*
- *Network Stack*
- *Thread Scheduler*
- *64-bit higher half kernel*
- *4/5 level on-demand paging.*
- *Preemptive per-cpu scheduler*
- *Modern UEFI bootloader*
- *ACPI support (ioapic, lapic)*
- *Symmetric Multiprocessing (SMP)*

Additional Skills

Working Character: I can describe myself such a finisher person who is make things to work. Cause of that, I usually over-engineering at my job and details are matter for me. Also I'm such a compatible and flex person on teamworks.

Language Skills English (IELTS 6.5), Turkish (Native), German (Very limited)

Technical Skills

Programming Languages : I'm using C&C++, Python, Rust in my daily life, also using Dart, Java, VB.NET, C# languages on such of projects when i need them.

Data management : Relational databases (PostgreSQL, MySQL), Key-Value Stores (Redis) and Document stores (MongoDB), Real-time Databases (Google's Firebase, Supabase)

Embedded development : Experienced with Espressif (ESP32, ESP8266), Atmel (ATmega328P, SAM3X8E, SAMD21), STM (STM32F1, STM32F4, STM32H7) Nuvoton (NUC029), Nordic (nRF52832) ,Renesas (RA4M1) micro-controllers and SBCs like Nvidia Jetson (Nano, Xavier), Raspberry PI 3-4-5, Texas Instruments

Technologies: Familiarity with some cloud infrastructure providers (AWS: EC2, S3, Lambda & GCP : Cloud Engine, App Engine, Cloud Storage). Limited experience with ML tools such as PyTorch, Tensorflow. Web Frameworks or APIs (Django, FastAPI, Actix, Rocket).

Tools : Linux (Mostly spending my time on lovely Arch, also we have long history with Debian), NeoVim, Emacs, Bash, Selenium, Visual Studio, VS Code, IAR&GCC Toolchains, OpenCV

Production: Some of Adobe products (Photoshop, Premier, Lightroom, InDesign, Audation) Magix Vegas Pro, FL Studio

3D: Autodesk Fusion 360, FreeCad, KeyShot, Ultimaker Cura, Blender

References

Engineering Faculty Assistant Dean

Asst. Prof. UĞUR ATİCİ

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