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Mert Sefa AKGUN

Software Developer

Summary

Hey!** I'm **Mert**, a **passionate Software Developer** and **Open-Source enthusiast** with a **deep-seated drive to learn**, **explore**, and **tackle new challenges**. With a **strong background** in **production-quality systems software development**, I have **cultivated** a **particular interest** in **embedded systems**, **real-time systems**, **systems programming**, **robotics**—and these days, **Artificial Intelligence**, of course. I am **continuously inspired** by the fields such as: **Aviation** and **space** industries. Those are areas where I am **eager to contribute** and **make a lasting impact**. As a **results-driven**, **highly motivated individual**, **I committed** to **ensuring** that projects are **not only successfully completed** but **also fully functional**. I believe that **attention to detail is key**. Ultimately, attention is all you need, right? I have a **strong work ethic**, sometimes leaning toward **over-engineering solutions** because I understand that **meticulousness is crucial**. Moreover, **being adaptable** and **highly collaborative**, **I thrive in team environments**, **consistently pushing the boundaries** of what technology can achieve. I am **confident** that **my skills** and **passion** will **bring significant value**, and **I look forward** to the **opportunity to collaborate** and **drive innovation together**, **taking any endeavor to new heights.

Experiences

ML/OPS Engineer — VYVO

October 2024 - Present | *Florida, U.S. | Remote*

Building next-generation real-time multi-modal pipelines that serves users as personal AI agents.

- ***Developing AI agents** by **deploying various AI models** and bringing them together with **efficient**, **low-overheaded**, **real-time pipelines**.*
- *Building Retrieval-Augmented Generation systems with **multi-modal** and **vector databases** such as: SurrealDB and Qdrant.*
- ***Utilization of powerful GPU infrastructures** such as **NVIDIA H100/A100** to **accelerate computations** (makin GPUs go brr).*
- ***Utilizing containerization** and **orchestration** tools for **deploying**, **auto-scalling** and **load-balancing**.*
- ***Developed** an **peer-to-peer communication service** with WebRTC.*
- ***Utilized reverse proxies** for **enhanced security** and **robustness**.*

Stack Set: Python, Pytorch, Numpy, Linux, Docker, SurrealDB, ChromaDB, LanceDB, Qdrant, Livekit, Pipecat, Rust and WebRTC.rs.

Systems Software Developer — Baykar

March, 2024 - June, 2024 | *Istanbul, Turkiye | On-site*

Developed a custom Real-time Networking Stack for Military-level Aerial Vehicles.

- ***Utilized** the IEEE 802.1 TSN (**Time-Sensitive Networking**) specification as a guide to develop real-time networking stack.*
- ***Implemented** Frame Replication and Elimination for Reliability (**IEEE 802.1CB**) on **OSI Layer 2** with **minimal overhead** by leveraging **cutting-edge technologies** such as eBPF (**extended Berkeley Packet Filter**) and XDP (**eXpress Data Path**).*
- *Worked with **IEEE standards**, including the Precision Time Protocol (**IEEE 802.1AS**), Time-Aware Shaper (**IEEE 802.1Qbv**), and Frame Pre-emption (**IEEE 802.1Qbu**).*
- *Built with **Rust** for **fearless concurency** and **memory safety** at **kernel space**. Aya and libbpf-rs used for libbpf bindings and tooling.*
- ***Utilized Linux build tools** (Yocto/BuildRoot) to **built custom kernel** with **features enabled** such as **real-time networking capabilities**.*

Stack Set: Linux, eBPF, XDP, FreeRTOS, Bare-metal, Real-time Networking Stack, OSI 2-3, Rust, C/C++, BuildRoot, Yocto.

Embedded Systems Software Developer — Fora

March, 2022 - March, 2024 | *Istanbul, Turkiye | Hybrid*

Worked on Mavisoft's Access Control System product lines and other enterprise security and safety products.

- ***Developed versatile**, **reliable**, and **precise embedded software** on **bare-metal** and **RTOS** targets for new product lines.*
- ***Created** a **C/C++ library** for the SIA's Open Supervised Device Protocol (OSDP).*
- ***Developed** a symmetric encryption and **authentication library** in **C** for devices that do not support **off-the-shelf TLS libraries**, with the **implementation verified** by a **third-party security audit company**.*
- ***Implemented various feature requests** from **customers** in the **Mavisoft Access Control System**.*
- ***Maintained code**, **resolved** bugs like **undefined behavior** (UB), and **addressed critical issues** reported by sites or customers.*
- ***Developed numerous peripheral devices** for different use cases, including **MiFare**, **HID**, **Proximity**, and **NFC** card readers.*

Developed a Real-Time Indoor Localization System (RTLS) as an alternative to GPS for in-door use cases.

- *Worked on Ultra-Wideband (**UWB**) signals since UWB is **less effected** by **inference** and **noise**.*
- ***Implemented** Time Difference of Arrival (**TDoA**) and Two-Way Ranging (**TWR**) positioning algorithms.*
- *Worked with the BLE (**Bluetooth Low Energy**) stack.*
- ***Developed** a **client-side application** for **visualization** and **configuration**.*
- ***Implemented filtering** and **estimator algorithms**, such as the Extended Kalman Filter (**EKF**).*

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

System Administrator
January, 2017 - Present

Self-employed
Remote

Hosted numerous, low to medium-scale client's websites and projects on dedicated servers.

- *Worked with cloud providers such as GCP, AWS, Azure and those days Hetzner.*
- ***Managed** and **optimized server resources** to meet specific client requirements.*
- ***Created secure client access** by **setting up network tunnels**, SSH jump servers, and NGINX reverse proxy through both web and shared server instances.*
- *Configured dual-node Proxmox cluster with RAID 10 and **in-memory replication** for **enhanced reliability**.*
- *Fine-tuned Qemu/KVM for improved **efficiency** and **fair resource** dist.*
- *Configured Ceph for **distributed block storage** to **ensure data redundancy** and **high availability**.*
- *Utilized Opnsense for advanced **firewall management**, NAT/TC **policing**, IP tables **configuration**, and VLAN **routing**.*
- *Set up **VPNs** using WireGuard and OpenVPN-DCO to **optimize efficiency**.*
- *Tuned web servers **NGINX** and **Apache**, and databases including **PostgreSQL**, **MySQL**, and **MongoDB**.*
- *Configured **multi-protocol** (**IMAP/SMTP/POP3**) mail server with **TLS** for **enhanced security**.*

Stack Set: Linux, NGINX, Apache, MySQL, PostgreSQL, MongoDB, GCP, AWS, Azure, Hetzner, OpenVPN, WireGuard, OpnSense, S3, Ceph, Qemu/KVM, Docker, Proxmox, PHP, NodeJS.

Academic History

Bachelor's Degree
2020 - 2024

Cumhuriyet University

*Taken courses: **Operating Systems**, **Computer Networks**, Embedded Systems, **Microcontrollers**, Algorithm Analysis, **Data Structures**, Object Oriented Analysis, Numerical Analysis, Physics, Differential Equations, Electronic Circuits and Design, **Computer Architecture**, Numerical Analysis, **Automata Theory**, **Signals & Systems**, Database Systems, Cyber Security, **Machine Learning**, Probability and Statistics, Cloud Technologies.*

Activities and Accomplishments

- ***Google Summer of Code 2020** - Python Fury*
- ***Teknofest 2021 Unmanned Under-water Vehicle Competition** - Finalist (7th) - Wanna Look?*
- ***Teknofest 2021 International Unmanned Air Vehicle Competition** - Finalist - Wanna Look?*
- ***Teknofest 2022, 2023 International Fighter Unmanned Air Vehicle Competition** - Wanna Look?*

Hobbies and Interests

It isn't about my profesional life but,

*I am **passionate about conducting research** in **evolutionary algorithms**, **genetic programming**, and **autonomy** through **AI algorithms**. I am also deeply interested in **operating systems**, **distributed networks**, **RF systems**, and **cryptography**. In essence, I enjoy working with any **software-programmable/hackable systems**.*

I can call myself as a maker,

*Being a maker, **gives me the freedom to create whatever I want**, and **I enjoy that feeling**. **I enjoy building things** whenever I find some free slots in my schedule. I'm **quite proficient in 3D modeling** now, thanks to Fusion 360. I use Cura and OrcaSlicer for the slicing process. I have an Artillery Sidewinder X1, which I use to **print my designed models**. It's a bit outdated, but it works well. I'm also somewhat **interested in electronics**. I spend a lot of time **designing electronic circuit boards (PCBs)** with KiCad.*

I am an audiophile,

*I believe **music is universal and has healing effects on our souls**. I enjoy listening to Hi-Fi/lossless music on my high-end audio equipments. I **mostly listen to EDM**, but I have a **large repertoire** and I **can get the taste of any genre of music**, easily. No joke! I'm also **interested in music production**. I have a MIDI keyboard and use FL Studio and Ableton Live as DAW software. I enjoy to **generating rumble kicks** and **synthesizing trance synths**.*

I love nature and extreme sports,

*I think, **being an engineer can lead to mental fatigue due to its higher cognitive load** compared to other jobs. For me, **spending time in nature** provides a **mental reset**. I enjoy **cycling**, **hiking**, and **camping** whenever I have the chance. I also **participate in extreme sports** like **climbing** and **snowboarding**. I believe that **engaging in these activities enriches my life**, but unfortunately, **living in a metropolitan area limits** my opportunities to do so.*

Skills

Languages	English (IELTS 6.5), Turkish (Native), German (Fundementals)
Programming Languages	Languages that I'm using primary/daily and most proficient with: ***C&C++, Python, Rust***. Languages that I have little proficiency : **JS/TS, Dart,** *Java, VB.NET, C#*
Data Management	PostgreSQL, MySQL, Redis, Firebase, Supabase, MongoDB, SurrealDB, LanceDB, Chroma, Qdrant
Embedded development	Espressif (ESP32, ESP8266), Atmel (ATmega328P, SAM3X8E, SAMD21), STM (STM32F1, STM32F4, STM32H7) Nuvoton (NUC029), Nordic (nRF52832) ,Renesas (RA4M1), Texas Instruments, Raspberry PI 3-4-5, Nvidia Jetson (Nano, Xavier).
Technologies	AWS [EC2, S3, Lambda], GCP [Cloud Engine, App Engine, Cloud Storage], PyTorch, Tensorflow, OpenCV Django, FastAPI, Actix, Rocket, Axum.
Tools	Linux [Arch, Debian, Ubuntu], Neovim, Emacs, Bash, Selenium, Visual Studio, VS Code, IAR, GCC, LLVM, Clang, CMake, GNU Make
Production	Adobe [Photoshop, Premiere, Lightroom, InDesign, Audition], FL Studio, Ableton Live, Vegas Pro
3D and Electronic Design	Autodesk Fusion 360, FreeCad, KeyShot, Blender, OrcaSlicer, Ultimaker Cura, KiCad