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Mert Sefa AKGUN

FULL-TIME R&D SPECIALIST && UNDERGRADUATE STUDENT

Summary

Hey, I'm Mert. Currently, studiying Computer Engineering on BEng degree at Cumhuriyet (Republic) University. I can describe myself as an independent learner and self-motivated tech enthusiast who build knowledge to himself at low-level programming and embedded systems. I am interested in with autonomy, robotics and system crafting. I am pretty sure, I'm gonna contribute at your business very well and we'll move it together to next-level.

Activities and 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*

Projects

You can also check my website for detailed information about my projects.

Autonomy & Robotics

Flight Controller Software

I made an flight-controller software which is running at STM32F407VET6 for my drone projects.

- *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. So, the project going with Rust because, 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)*

Radio & Ultra-wide Band

Mavisoft UWB - Indoor Localization

When I joined to Fora Technology crew, I have started developing RF based in-door localization system which is uses Ultra-wide band spectrum.

- *Narrowband interference for insusceptible.*
- *TDOA, TWR, AOA based algorithms for position calculation.*
- *Kalman Filter at location engine for more accurate results.*
- Terminal CLI for configuring standalone devices.
- Web application for visualizing and configuring.
- Nodes has mesh network between them via UWB.
- Multiplexing time domain via TDM.
- Mobile application for visualizing and configuring via bluetooth.

Work Experience

R&D Specialist
May, 2022 - Current

Fora Technology

- Development of high precision access control systems. That systems are communicate between them and managing thousands of access with hundreds of readers as standalone.
- Building an in-door localization system from scratch with using ultra-wide band.
- Crafting peripheral devices like card readers with MiFare, HID, Proximity, NFC.

Stack Set: Communication Protocols (UART/USART, I2C/I2S, SPI, ModBus, RS232/RS485), TCP/IP Stack, management and organizing of limited resources (Flash Memory, SRAM, CPU Cycle, IO), UDP Casting, Wireless data transfer via UWB & Wi-Fi & Bluetooth), Cross-compiling with GCC&IAR Toolchains.
Deal With: Serial To Ethernet Chips (Wiznet), Micro-controllers(ST, Nuvoton, Renesas, Nordic, ESP), Memory (Micron, ST), Transceivers (ST),

Academic History

High School Degree
2014 - 2018

Fatin Rüştü Zorlu High School

- *Attended some CTF competitions.*
- *As SAFTAS Team we won the social-content short film contest at Spain.*

(The video links are available at my LinkedIn Profile)

BEng Degree
2020 - Present

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.

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).

Additional Skills

Working Character:	I can describe myself such a finisher person who is make things that works. Cause of that, I usually over-engineering at my job and details are matter for me. Also I'm compatible and flex for teams.
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)**
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)**
Technologies:	**Familiar 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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