Deniz KARAKOYUN

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PROFILE

Computer Engineering student with a strong foundation in **Low-Level Programming**, **Computer Organization**, **Assembly**, and **Operating Systems (OS)**, with a keen interest in **Algorithm Design**. Experienced in C/C++, Assembly (x86-64), and developing high-throughput data pipelines with complex process synchronization. Passionate about bridging hardware and software to engineer reliable, architecture-aware systems.

EDUCATION

Middle East Technical University (METU) *Sep 2021 – Expected 2027*
B.Sc. in Computer Engineering **CGPA: 3.62 / 4.00**

Süleyman Demirel Anatolian High School *2017 – 2021*
Graduated with 94.41 / 100

TECHNICAL SKILLS

Languages: C++, C, C#, Assembly (x86-64), Java, Python, SQL, Haskell, Verilog
Domains: Algorithms & Data Structures, Low-level Programming, Memory Management, OOP, Operating Systems, Computer Organization
Tools: Git, GDB, ROS 2, Kafka, ZeroMQ, MySQL, PostgreSQL, Docker, MATLAB

EXPERIENCE

Software Engineering Intern, KUARTIS *2026 – Present*
- Contributing to a C++17 ROS 2 (Humble) lifecycle node that monitors GNSS signal health for an autonomous platform running on NVIDIA Jetson.
- Test-drove a signal-loss watchdog: wrote the failing integration test exposing a case where a silent GPS feed looked healthy, then implemented the freshness check and fix-quality state machine that close it.
- Fixed a data race between a DDS subscription callback and the test thread in a multi-threaded test harness.

Candidate Engineer, ASELSAN *Feb 2026 – Jul 2026*
- Architecting data generation pipelines processing millions of data points for robust system evaluation and offline experimentation.
- Implementing advanced multi-threading and synchronization mechanisms to manage high-volume data streams without race conditions.

Undergraduate Researcher, ROMER *Jan 2026 – Jul 2026*
Project: Honey Bee Orientation Detection
- Developing deep learning pipelines using CNN and ResNet architectures for precision computer vision tasks.
- Managing the full model lifecycle, from custom dataset generation to hyperparameter tuning for optimization.

Intern, BİTES *Aug 2025 – Sep 2025*
- Developed modular C# desktop applications using WPF and the MVVM architectural pattern.
- Implemented complex data binding and validation logic to ensure high UI responsiveness.
- Conducted testing procedures to isolate service layers and ensure software stability.

Intern, ASELSAN *Jul 2025 – Aug 2025*
- Developed C++ test scenarios using Google Test to verify the reliability of embedded systems.
- Automated GUI workflows for critical internal desktop tools using Python scripts (Pywinauto).

Intern, EXA4MIND (EU Research Project) *Aug 2024 – Sep 2024*
- Architected low-latency streaming pipelines utilizing Kafka, Flink, and ZeroMQ for scientific data.
- Optimized fault-tolerance mechanisms to ensure data integrity during large-scale simulations.

PRODUCTS

Guild — Student Community App *getguild.app · App Store & Google Play*
- Co-founded with Emirhan Güler (METU); sole developer of the product: verified university-email accounts, a forum

with anonymous posting and live polls, campus events with seat reservations and door check-in, and a nationwide opportunities board.
- Live in production at nine universities (METU, Hacettepe, Ankara University and more) on iOS, Android, and the web.

Phera Labs — Digital Art Platform *pheralabs.com*
- Co-founded with Sabri Ilgaz; sole developer of the platform: a university-gated digital art gallery whose best works are curated into an international NFT collection.
- Built the full commerce stack: limited-edition print sales, QR-ticketed events with door check-in, referral rewards, and the admin back-office.

PROJECTS

Concurrent Data Pipeline Orchestrator *C/C++, Unix API*
- Developed a robust process controller in C/C++ to orchestrate multi-stage CSV data processing pipelines utilizing Unix system calls (`fork`, `exec`, `pipe`, `dup2`).
- Engineered an n-ary tree process architecture, merging streams from recursive sub-merger nodes.
- Implemented strict inter-process communication (IPC) and synchronization using bidirectional Unix domain stream sockets (`socketpair`) to prevent deadlocks during concurrent operations.

Pipelined Processor Optimization *Assembly, HCL, Y86-64*
- Extended a Y86-64 pipelined processor simulator by modifying Hardware Control Logic (HCL).
- Reduced Cycles Per Element (CPE) significantly by implementing loop unrolling, instruction reordering, and custom function design to optimize assembly benchmarks.

Bomb & Attack Labs *x86-64, GDB*
- Reverse-engineered stripped x86-64 binaries stage by stage to defuse a multi-stage binary bomb; built code-injection and return-oriented-programming exploits in a sandboxed course lab.

Embedded Systems Control Simulator *Assembly (PIC18), MPLAB X*
- Developed a concurrent system controller on a PIC18F8722 architecture, utilizing a round-robin approach to manage three independent state machines.
- Implemented precise I/O operations and hardware state management for multiple LED arrays (PORTB, PORTC, PORTD) without relying on hardware timers or interrupts within strict timing constraints.

Flight Finder System *C++, Graph Theory*
- Developed a high-performance search engine using a Directional Multigraph and Hash Table.
- Implemented Dijkstra's algorithm with heuristics for cost-time blending and airline filtering.

REFERENCES

Available upon request.