Berk Ali Demir

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EDUCATION

Politecnico di Torino, Torino, Italy
B.Sc. Computer Engineering — 120/180 Credits Achieved

TED University, Ankara, Turkey (Transferred to Italy)
B.Sc. Computer Engineering, Economics Minor

EXPERIENCE

Private Tutor, Torino, Italy — Spring 2025 – Present
Digital Electronics Design

- One-on-one sessions with peers and junior students on fundamental topics and practice problems.
- Taught junior peers fundamental topics such as **Assembly (x86)**, **Propagation Delay**, and basic circuit timing.
- Designed exercises and practice problems to reinforce **core ECE** knowledge.

TEDU-APP, Ankara, Turkey — Fall 2022 – Spring 2023
University Mobile App Development Team

- Developed the calendar module **TEDUApp Scheduler** as part of the university's mobile application.
- Improved usability for students and academic staff by integrating intuitive interfaces.
- **Java (Spring Framework)**.

SARJJET, Istanbul, Turkey — Summer 2022
Hardware Engineering Intern

- Gained hands-on experience with **Embedded Systems** and low-level hardware debugging.
- Developed **Embedded Firmware** for real-time control systems using **PIC16F1516 Microcontroller**.

ACADEMIC PROJECTS

x86 Mini CPU Simulator, Politecnico di Torino
Individual Project, Fall 2025

- **Developed a lightweight 16-bit CPU simulator** with an integrated assembler and Qt-based IDE.
- **Implemented core CPU components (registers, memory, stack, flags)** and a subset of the x86 Instruction Set.
- **Built a custom parser** to support immediate, register, and **memory addressing modes, as well as label-based branching**.
- **Designed the GUI** for an interactive code editor, **register/flag view, and memory visualization** with step-by-step execution.
- Published as an **open-source project on GitHub**, with portable builds for Windows, MacOS and Linux.

Gate-Level Design of an 8-Bit Von Neumann CPU, Politecnico di Torino
Individual Project, Summer 2025

- **Designed and built an 8-bit CPU** from scratch based on the **Von Neumann architecture**.
- **Developed a custom Arithmetic Logic Unit (ALU)** supporting 8 distinct arithmetic and logical operations.
- **Implemented core components (registers, memory cells, control unit)** using fundamental logic gates.
- **Engineered the full datapath**, including an **8-bit data bus and address bus**, managing data flow with tri-state buffers.
- Designed a hardwired **Control Unit based** on a state machine to **fetch, decode, and execute** a **custom-defined Instruction Set Architecture (ISA)**.

SIMD Optimization Case Study, Politecnico di Torino
Faculty-assigned, Spring 2025

- Completed a technical **case study as part of a research group** selection process.
- Explored vector operations and matrix multiplication in **C++ using multithreading** (Pthreads) and **SIMD (AVX)**.
- Focused on **parallelism strategies, memory layout**, and **hybrid CPU performance** considerations.
- Project was discontinued due to external reasons unrelated to performance.
- **Final report available** upon request.

SKILLS

- Key Courses: Computer Architecture, Digital Electronics Design, Data Structures and Algorithms, Automatic Controll (on going), Operating Systems (on going)
- **Interests: CPU Design, Pipeline, Parallel Programming**
- **Technical:** Computer Architecture, Digital Electronics, Verilog, VLSI Design, RTL Design, High Performance Computing (HPC)
- **Programming:** C (Embedded), C++, Proteus, LaTeX
- **Soft Skills:** Future Focused, Leadership, Teamwork

EXTRA-CURRICULAR ACTIVITIES

CYBERTEDU, Ankara, Turkey
Founding President Fall 2022 – Fall 2023

- Founded the university's cyber security student community.
- Organized events and workshops, including **Capture the Flag (CTF)** challenges.
- Fostered collaboration among students interested in digital systems and security.

LANGUAGES

- **Turkish:** Native Speaker
- **English:** Professional Proficiency
- **Italian:** Limited Profiency
- **French:** Limited Profiency

REFERENCES

- **Avaible on upon request. (from; Politecnico, TED)**