

Anton Melnychuk

+1 (475) 287 8907 • New Haven, CT, USA (F1 visa) • Volyn, Ukraine
anton.melnichuk@yale.edu • github.com/anton-mel • linkedin.com/in/antonmelnichuk

EDUCATION

Yale University

B.S. in Electrical Engineering & Computer Science

New Haven, CT
May 2026 (M.S./Ph.D. applied)

- **Coursework:** AI Infra Systems (LLMs, ongoing), Computer Architecture, VLSI Design, FPGA-Based Acceleration (Visitor), Quantum Information Processing and Communication, Operating Systems, Distributed Systems.
- **Research Advisors:** [Prof. Lin Zhong](#), [Prof. Abhishek Bhattacharjee](#), [Prof. Rajit Manohar](#).
- **Focus:** Scalable systems and infrastructure for data-intensive workloads.

Osaka Gakuin University

Certificate, Study Abroad Program

Osaka, Japan
Jun 2023 – Aug 2023

SELECTED EXPERIENCE

Riverlane Ltd.

Summer Research Intern (Quantum Science)

Boston, MA
Incoming Summer 2026

- Deltaflow: Real-time quantum error correction systolic-array infrastructure.

Diode Computers Inc.

Software Engineer (Compilers, YCombinator)

New York, Remote
Jan 2026 – Present

- Rust-based compiler for KiCad EDA tooling to enable AI-assisted hardware (PCB) design.

Computer Systems Lab : Wu Tsai Institute

Undergraduate Research (ASIC Design)

New Haven, CT
Jul 2025 – Jan 2026

- Designed and taped out a production-ready brain-computer interface for pharmacoresistant epilepsy treatment.
- Conducted Xilinx toolchain verification, Cadence design (NEO, THR, Gate) [\[View\]](#), and GUI lab software patching.

Efficient Computing Lab : Yale Quantum Institute

Summer Research Intern (Linux, FPGA)

New Haven, CT
May 2025 – Aug 2025

- Helios: Xilinx-based quantum error correction infrastructure [\[View\]](#).
- Led system-level hardware-software integration across Xilinx FPGAs and Linux.
- Designed a parallel decoding architecture achieving sublinear latency scaling with code distance.
- Redesigned the programmability model with custom runtime control file system (manuscript in preparation).

Yale CS Department

Teaching Assistant (Kernel Design)

New Haven, CT
Jun 2024 – May 2025

- Built a first Yale teaching-purpose operating system in Rust [\[View\]](#).

SELECTED PROJECTS

AI Photonic Integrated Circuit, YC Startup Concept (In Progress)

Dec 2025 – Present

- Prototyping custom photonic inference primitives to address power and data movement bottlenecks in AI systems.

MOS 6502 Microprocessor Design, VLSI Final Project [\[View\]](#)

Oct 2025 – Dec 2025

- Floorplanned a simplified MOS 6502-compatible CPU in the SCMOS 0.09 μm process.

CPU with Speculative OoO Execution, Computer Architecture Final Project [\[View\]](#)

Mar 2025 – May 2025

- Built and verified a Verilog CPU with speculative fetch, dynamic scheduling, reorder buffer, and in-order retirement.
- Achieved an average 33.2% speedup on SPEC-like benchmarks with robust handling of WAW hazards and data deps.

Fast Raft: Hierarchical Consensus Algorithm, Distributed Systems Final Project [\[View\]](#)

Nov 2024 – Feb 2025

- An optimized consensus protocol designed for wide dynamic networks.
- Containerized, deployed, end evaluated on AWS EKS, achieving up to 2 \times faster commit latency.

Rust for Linux, Open-Source Contributor [\[View\]](#)

Jun 2024 – Jul 2024

- Contributed to open-source Linux kernel (Ubuntu 22.04) to allow kernel cross-compile Rust loadable kernel modules.

PUBLICATIONS

Melnichuk, A.*, Liyanage, N.*, Zhong, L.

FPGAs: Cloud-Native Virtualization of Reconfigurable FPGA SoCs.

Manuscript in preparation; expected Spring 2026.

SELECTED SKILLS

Focused on scalable systems, high-performance infrastructure, and hardware–software co-design.

† Indicates areas of primary experience.

<i>Programming Languages:</i>	Rust [†] ; C/C++ [†] ; Python [†] ; Verilog/SystemVerilog
<i>AI Distributed Systems:</i>	data/model parallelism; communication primitives [†]
<i>Operating Systems:</i>	kernel development [†] ; loadable drivers [†] ; filesystem [†] ; concurrency; scheduling
<i>Accelerator Architectures:</i>	CPU [†] / GPU / FPGA [†] (Xilinx) / ASIC design; compute–memory co-design
<i>Hardware Design & VLSI:</i>	VLSI design (Cadence); timing; physical design awareness
<i>Memory & Interconnects:</i>	memory hierarchies; PCIe; NVLink; InfiniBand; high-throughput I/O
<i>AI Systems:</i>	LLM training & inference pipelines; model execution and optimization
<i>SoC & On-Chip Systems:</i>	NoC/CDC [†] ; SerDes; NICs; ARM SoCs [†] ; DDR4
<i>Neural Network Models:</i>	ResNet; VGGNet; AlexNet; transformer attention mechanisms
<i>Natural Languages:</i>	English; Japanese; Ukrainian; Russian

TEACHING

Systems Programming and Computer Organization	Spring 2025 – Spring 2026
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HONORS & AWARDS

STARS Summer Research Fellowship	2023
Ukraine Global Scholar	2021
Ukraine National Young Physicists' Tournament	2021
Ukraine Regional Physics Olympiad (2nd place)	2020
Ukraine Regional Mathematics Olympiad (2nd place)	2020

EXTRACURRICULARS

International Festival-Competition Parade of Stars (Guitar, 1st place)	2019, Ukraine
All-Ukrainian Folklore Guitar Competition (1st place)	2020, Ukraine
All-Ukrainian Folklore Guitar Competition (3rd place)	2019, Ukraine
National Festival-Competition "Sonyashnyk" (Guitar, 3rd place)	2018, Ukraine