Faruk **Volkan Mutlu**

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Education

Northeastern University | PhD in Computer Engineering *Sep 2018 – Present | Boston, MA*

- **GPA:** 3.94/4.00. **Courses:** Analysis and Design of Data Networks, Mobile and Wireless Networks, Graph Theory, Numerical Optimization, Computer Architecture, High Performance Computing, Machine Learning.
- **Machine Learning Project:** Proposed a novel class partitioning heuristic for fast binary tree SVM training. Used Python with the sklearn library to compare proposed method against state of the art.
- **High Performance Computing Project:** Implemented a projected gradient descent optimization algorithm using Julia and used with the CUDA.jl library to accelerate gradient computations with a GPU.
- **Computer Architecture Project:** Designed a custom ISA extension for RISC-V to accelerate SipHash and SHA256 computations. Benchmarked extension with simulations in gem5 using C and Assembly with the RISC-V GNU toolchain.

Middle East Technical University | BSc in Electrical and Electronics Engineering *Sep 2014 – Jun 2018 | Ankara, Turkey*

GPA: 3.47/4.00. **Courses:** Data Structures, Computer Architecture, Operating Systems, Microprocessors, Computer Networks.

Experience

Hewlett Packard Enterprise | Wireless Lab Network Simulation Intern *May 2022 – Aug 2022 | Boston, MA*

Developed novel technique to generate realistic traffic models of multimedia applications (e.g. Zoom, Skype) from real packet traces using Markov chains. Analyzed performance benefits of new Wi-Fi 6 features using ns-3 simulations and application traffic generated by this technique. Automated process that collects test data from real traces, runs simulations, then compares simulation output to validation data.

Northeastern University | Graduate Research Assistant *Sep 2018 – Present | Boston, MA*

- Designed hybrid caching model incorporating different types of memory and storage. Proposed a novel algorithm that optimally utilizes multiple tiers of cache based on network statistics and device parameters. Implemented a data-centric network simulator using Python with the SimPy library and compared algorithm performance against established methods.
- Integrated novel joint forwarding and caching algorithm with state-of-the-art NDN forwarder using C++ to enable high-throughput distribution of large data [1]. Deployed integrated forwarder to a large WAN testbed using Docker containers to study its performance in real settings.
- Developed algorithm that jointly optimizes caching and power resources to minimize delay in wireless HetNets [2]. Evaluated algorithm performance by simulating hetnet snapshots using Julia with the Convex.jl library.

Middle East Technical University | Undergraduate Researcher *Mar 2017 - Mar 2018 | Ankara, Turkey*

Developed a battery-aware status update policy for energy-harvesting devices with finite batteries [3, 4]. Assessed policy performance by simulating devices using MATLAB.

ASELSAN | Hardware Design Engineer Co-op *Dec 2017 - Mar 2018 | Ankara, Turkey*

Prototyped DRAM controller and AHB & APB peripherals for proprietary RISC-V chip by programming an FPGA using Verilog.

ASELSAN | Summer Intern *July 2017 – Aug 2017 | Ankara, Turkey*

Built reusable functional verification environment for proprietary RISC-V chip using SystemVerilog and the UVM standard.

Technical Skills

Languages: C/C++, Python, Julia, MATLAB, Bash, Assembly (x86, ARM, RISC-V), Verilog

Libraries, APIs & Tools: OpenMP, MPI, ns-3, SimPy, CVX, Docker

Publications

[1] Yuanhao Wu, Faruk Volkan Mutlu, Yuezhou Liu, Edmund Yeh, et al. "N-DISE: NDN-Based Data Distribution for Large-Scale Data-Intensive Science". In: *Proceedings of the 9th ACM Conference on Information-Centric Networking*. ICN '22. Osaka, Japan: Association for Computing Machinery, 2022, pp. 103–113.

[2] Derya Malak, Faruk V. Mutlu, Jinkun Zhang, and Edmund M. Yeh. "Transmission Delay Minimization via Joint Power Control and Caching in Wireless HetNets". In: *2021 19th International Symposium on Modeling and Optimization in Mobile, Ad hoc, and Wireless Networks (WiOpt)*. 2021, pp. 1–8.

[3] Baran Tan Bacinoglu, Yin Sun, Elif Uysal–Biyikoglu, and Volkan Mutlu. "Achieving the Age-Energy Tradeoff with a Finite-Battery Energy Harvesting Source". In: *2018 IEEE International Symposium on Information Theory (ISIT)*. 2018, pp. 876–880.

[4] Baran Tan Bacinoglu, Yin Sun, Elif Uysal, and Volkan Mutlu. "Optimal status updating with a finite-battery energy harvesting source". In: *Journal of Communications and Networks* 21.3 (2019), pp. 280–294.