H. Umut Suluhan

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EDUCATION

Electrical and Computer Engineering *PhD* Expected May 2027

University of Arizona, Tucson, AZ

Computer Science *BS* February 2023

Ozyegin University, Istanbul, Turkey

EMPLOYMENT

Google LLC | *Software Engineering Intern* May 2026 - Aug 2026

- Engineered an RDMA transport for Apache Spark and Celeborn, bypassing the host kernel for zero-copy scatter-gather transfers, and scaled it to route traffic between dedicated Spark and Celeborn clusters.
- Accelerated distributed shuffle by 1.27x on a shuffle-heavy baseline and delivered 1.10x end-to-end speedup on 1TB TPC-DS/TPC-H, cutting shuffle write time 2x and read time 1.5x.
- Eliminated user/kernel-space memory copies, reducing kernel CPU overhead 67% and increasing active user-space compute 1.67x.

University of Arizona | *Graduate Teaching Assistant* Aug 2025 - May 2026

- Created a Chipyard installation and customization tutorial to support Computer Architecture and Design students in RISC-V SoC development, and assisted students with debugging and project guidance.

University of Arizona | *Graduate Research Assistant* Jan 2023 - Present

- Designed a framework enabling concurrent execution of PyTorch ML models on a heterogeneous SoC platform (custom FPGA accelerators + ARM cores) and NVIDIA Jetson AGX (ARM cores + GPU), improving resource utilization and end-to-end throughput.
- Deployed signal processing applications on FPGA-based heterogeneous SoCs with RISC-V cores and FFT accelerators, studying trade-offs between scheduler complexity, workload heterogeneity, and performance.
- Developed a CAD algorithm for placement of heterogeneous kernels on 2D systolic arrays, achieving 132× speedup via rapid context switching for domain-specific accelerators.
- Contributed to two DARPA-funded programs (DSSoC #FA8650-18-2-7860, PROWESS #HR001123C0130) on software-reconfigurable heterogeneous SoCs.

SKILLS

- **Programming:** C, C++, Python, Scala, Verilog, SystemVerilog, Chisel, CUDA, OpenMP.
- **Runtime & Systems:** Task-graph scheduling, kernel placement/prefetching, context switching, RDMA (RoCE, verbs API), kernel-bypass networking, Apache Spark/Celeborn.
- **Hardware & SoC Design:** Heterogeneous SoCs, domain-specific accelerators, systolic arrays, CGRAs, RTL design, RISC-V SoC design (Chipyard), FPGA prototyping (ZCU102, VC707, VCU128), high-level synthesis, embedded Linux.
- **ML & Signal Processing:** PyTorch, ML deployment on hardware, video super-resolution, real-time spectrum sensing.
- **Performance Analysis:** Benchmarking, throughput/latency modeling, dataflow optimization, design-space exploration.

PUBLICATIONS

- J. Lin, H. U. Suluhan, C. Chakrabarti, A. Akoglu, and U. Ogras, *"CADAS: Communication-Aware Dynamic Scheduler on CGRAs for Large-Volume and Real-Time Processing,"* ACM Transactions on Embedded Computing Systems, 2026.
- M. Ghanim, S. Gener, H. U. Suluhan, P. Dattilo, and A. Akoglu, *"HOPPERFISH: Holistic Profiling with Portable Extensible and Robust Framework Intended for Systems with Heterogeneity,"* ACM Transactions on Architecture and Code Optimization, vol. 22, no. 4, pp. 1–27, 2025.
- H. U. Suluhan, J. Lin, S. Gener, C. Chakrabarti, U. Ogras, and A. Akoglu, *"K-PACT: Kernel Planning for Adaptive Context Switching—A Framework for Clustering, Placement, and Prefetching in Spectrum Sensing,"* in Proceedings of the 2025 IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2025, pp. 1–9.
- A. Dutta, J. Lin, H. U. Suluhan, G. Gubash, U. Y. Ogras, A. Akoglu, B.-P. Paris, and D. W. Bliss, *"Reconfigurable System Design and Trade Studies for Dynamic Spectral Sensing,"* in Proc. 2025 59th Asilomar Conference on Signals, Systems, and Computers, 2025, pp. 668–673.
- S. Gener, S. Hassan, H. U. Suluhan, L. Chang, C. Chakrabarti, T.-W. Huang, U. Ogras, and A. Akoglu, *"A Portable Framework with Generalized Runtime Features for Task Graph Execution and Concurrent Multi-Application Deployment on Heterogeneous Systems,"* Future Generation Computer Systems, art. no. 108184, 2025.
- H. U. Suluhan, A. E. Doruk, H. F. Ates, and B. K. Gunturk, *"Hstr-net: reference based video super-resolution with dual cameras"*, Machine Vision and Applications, vol. 36, no. 3, Apr. 2025.
- J. Lin, H. U. Suluhan, H. Chung, A. Dutta, A. Vipperla, G. Gubash, J. Holtom, B.-P. Paris, C. Chakrabarti, D. W. Bliss, *et al.*, *"An Overview of Challenges and Requirements for Real-Time Spectrum Sensing in Modern RF Autonomy Systems,"* IEEE Design & Test, 2025.
- L. Chang, S. Gener, J. Mack, H. U. Suluhan, A. Akoglu, and C. Chakrabarti, *"Coarse Grained Task Parallelization by Dynamic Profiling for Heterogeneous SoC Based Embedded System"*, ACM Transactions on Embedded Computing Systems, vol. 24, no. 1, pp. 1–32, Nov. 2024.
- H. U. Suluhan, S. Gener, A. Fusco, J. Mack, I. Dagli, M. Belviranli, C. Edemen, and A. Akoglu, *"A Runtime Manager Integrated Emulation Environment for Heterogeneous SoC Design with RISC-V Cores"* in Proc. 2024 IEEE Int. Parallel Distrib. Process. Symp. Workshops (IPDPSW), 2024, pp. 23-30.
- H. U. Suluhan, S. Gener, A. Fusco, H. F. Ugurdag and A. Akoglu, *"PyTorch and CEDR: Enabling Deployment of Machine Learning Models on Heterogeneous Computing Systems"* 2023 20th ACS/IEEE International Conference on Computer Systems and Applications (AICCSA), Giza, Egypt, 2023, pp. 1-8.
- J. Mack, S. Gener, S. Hassan, H. U. Suluhan, and A. Akoglu, *"CEDR-API: Productive, performant programming of domain-specific embedded systems"* in 2023 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), 2023, pp. 16-25.
- H. U. Suluhan, H. F. Ates, and B. K. Gunturk, *"Dual camera based high spatio-temporal resolution video generation for wide area surveillance"* in 2022 18th IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS). IEEE, 2022, pp. 1–8.

FUNDED PROJECTS

- DARPA-DSSoC: Domain-Focused Advanced Software-Reconfigurable Heterogeneous System on Chip (DASH-SoC) Grant # FA8650-18-2-7860
- DARPA-PROWESS : Dynamic Runtime Domain-Focused Software-Reconfigurable Heterogeneous (DR-DASH) Processor HR001123C0130

AWARDS

IEEE Circuits and Systems Student Travel Grant and ICCAD 2025 Student Scholar Program | *2025*

- Awarded a travel grant to attend ICCAD 2025.

ACADEMIC SERVICE

- IEEE Transactions on Sustainable Computing
- IEEE Transactions on Circuits and Systems for Video Technology
- Springer The Visual Computer
- Springer Signal, Image and Video Processing
- Springer Scientific Reports
- Springer Computing
- Springer International Journal of Networked and Distributed Computing

LEADERSHIP AND EXTRACURRICULAR ACTIVITIES

Turkish Student Association | *Vice President* Jan 2024 - Present

- Co-founded and led the development of a new student organization to create a Turkish community at the University of Arizona.
- Planning future initiatives, including cultural workshops, networking events, and collaboration with other student organizations to increase outreach and participation.