

**Mehmet Esat Belviranli**

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**Research Interests**

- Diversely heterogeneous architectures, performance & resource modeling, constraint-aware computing for autonomous systems, machine learning acceleration, parallel programming paradigms, runtime systems, performance modeling for future compute systems, embedded and mobile system security.

**Education**

- **University of California, Riverside** Riverside, CA  
*Doctor of Philosophy in Computer Science and Engineering* Sep. 2009 - Sep. 2016  
**Thesis:** Efficient Execution of Scientific Applications on Heterogeneous Architectures  
**Advisor:** Prof. Laxmi N. Bhuyan
- **Bilkent University** Ankara, Turkey  
*Master of Science in Computer Science and Engineering* Sep. 2006 - Aug. 2009  
**Thesis:** A Circular Layout Algorithm for Clustered Graphs  
**Advisor:** Prof. Ugur Dogrusoz
- **Bilkent University** Ankara, Turkey  
*Bachelor of Science in Computer Science and Engineering* Sep. 2001 - May 2006

**Work Experience**

- **Colorado School of Mines** Golden, CO  
*Assistant Professor, Computer Science Department* Aug. 2019 - Current
- **Oak Ridge National Laboratory** Oak Ridge, TN  
*Computer Scientist, Computer Science and Mathematics Division* Dec. 2018 - Aug. 2019  
**Supervisor:** Dr. Jeffrey S. Vetter
- **Oak Ridge National Laboratory** Oak Ridge, TN  
*Postdoctoral Research Associate, Computer Science and Mathematics Division* Nov. 2016 - Nov. 2018  
**Mentor:** Dr. Jeffrey S. Vetter
- **University of California, Riverside** Riverside, CA  
*Research Assistant, Computer Science and Engineering Department* Sep. 2010 - Sep. 2016  
**Advisor:** Prof. Laxmi N. Bhuyan
- **Samsung Information Systems America** San Jose, CA  
*Processor Architect Intern, Advanced Processor Lab* Jun. 2013 - Sep. 2013  
**Mentor:** Dr. Sung-Soo Park
- **Tom Sawyer Software** Oakland, CA  
*Software Engineer* Aug. 2007 - Jul. 2008  
**Manager:** Dr. Brett Zane-Ulman

**Grants and Fellowships**

My research has been funded by ten federal and industry awards, four of which I am the lead or the sole PI, for a total award of \$3.45M and a total faculty share of \$914K.

- **NSF Award:** FMitF: Track I: Robust Enforcement of Customizable Resource Constraints in Heterogeneous Embedded Systems. Role: *Lead PI*. Total amount: 750,000 USD. Faculty Share: 250,000 USD.

- **NSF Award:** SaTC: CORE: Small: Exploration of Shared Memory Related Security Challenges in Mobile Computing Platforms. Role: *Lead PI*. Total amount: 600,000 USD. Faculty Share: 275,000 USD.
- **DoE Award:** Modeling the Memory-Compute Gap in Large-scale Superconductive Systems. Role: Co-PI. Total amount: 400,000 USD. Faculty Share: 86,750 USD.
- **NIOSH Award:** Smarter Nanoelectronics with Atomically Precise Graphene Nanoribbons . Role: Co-PI. Total amount: 391,000 USD. Faculty Share: 73,106 USD.
- **DoD - Microelectronics Commons:** SMILE: Semiconductor Manufacturing via Innovative Learning Experience. Role: Co-PI. Total amount: 200,000 USD. Faculty Share: 66,666 USD.
- **SRC Award:** Smarter Nanoelectronics with Atomically Precise Graphene Nanoribbons . Role: Co-PI. Total amount: 391,500 USD. Faculty Share: 58,725 USD.
- **NSF Award:**Atomically Precise Graphene Nanoribbon-based Transistors: Materials, Devices, Circuits, and Systems. Role: Co-PI. Total amount: 330,000 USD. Faculty Share: 55,300 USD.
- **AFRL Summer Faculty Fellowship Award** for Summer 2022. Role: Sole PI. Total amount: 24,560 USD.
- **AFRL Summer Faculty Fellowship Award** for Summer 2021. Role: Sole PI. Total amount: 24,560 USD.

## Peer-Reviewed Publications

- Student authors advised or co-advised by me are appended with a single asterisk (\*).
- Student a authors mentored by me are appended with a double asterisk (\*\*).

## Journals

- J1. Fareed Qararyah, Mohamed Wahib, Doğa Dikbayır\*\*, Mehmet E. Belviranli, Didem Unat, “A computational-graph partitioning method for training memory-constrained DNNs,” *Parallel Computing (PARCO)*, 2021.
- J2. Mehmet E. Belviranli, Laxmi N. Bhuyan, and Rajiv Gupta, “A Dynamic Self-Scheduling Scheme for Heterogeneous Multiprocessor Architectures,” *ACM Transactions on Architecture and Code Optimization (TACO)*, January 2013.
- J3. Ugur Dogrusoz, Mehmet E. Belviranli, and Alptug Dilek, “CiSE: A Circular Spring Embedder Layout Algorithm,” *IEEE Transactions on Visualization and Computer Graphics*, June 2013.
- J4. Alptug Dilek, Mehmet E. Belviranli, and Ugur Dogrusoz, “VISIBIOweb: Visualization and Layout Services for BioPAX Pathway Models,” *Nucleic Acids Research*, July 2010.

## Conferences

- C1. Ismet Dagli\*, Justin Davis\*, Mehmet E. Belviranli, “HARNESS: Holistic Resource Management for Diversely Scaled Edge Cloud Systems,” *ACM International Conference on Supercomputing (ICS)*, June 2025.
- C2. Ismet Dagli\*, James Crea\*, Soner Seckiner, Yuanchao Xu, Selcuk Kose, Mehmet E. Belviranli, “MC3: Memory Contention based Covert Channel Communication on Shared DRAM System-on-Chips,” *IEEE Design, Automation & Test in Europe Conference & Exhibition (DATE)*, March 2025.
- C3. Justin McGowen\*, Ismet Dagli\*, Neil Dantam, Mehmet E. Belviranli, “Scheduling for Cyber-Physical Systems with Heterogeneous Processing Units under Real-World Constraints,” *ACM International Conference on Supercomputing (ICS)*, June 2024.
- C4. Amid Morshedlou, Ismet Dagli\*, Jamal Rostami, Omid Moradian, Mehmet E. Belviranli, “Enhancing Reliability and Safety in Rock Excavation Using A Machine Learning Approach Through Wear Condition Identification” 58th US Rock Mechanics/Geomechanics Symposium ARMA, June 2024

- C5. Amid Morshedlou, Ismet Dagli\*, Austin Oltmans, Andrew Petruska, Mehmet Belviranli, Jamal Rostami, “Enhancing Safety Using Energy-Efficient Machine Learning Algorithms Through Prediction of Rock Type and Cutter Wear” Society for Mining, Metallurgy & Exploration: Annual Conference & EXPO, SME Annual Conference - MINEXCHANGE, February 2024
- C6. Justin Davis\*, and Mehmet E. Belviranli, “Context-aware Multi-Model Object Detection for Diversely Heterogeneous Compute Systems,” *IEEE Design, Automation & Test in Europe Conference & Exhibition (DATE)*, March 2024. [Outstanding Paper Award in Autonomous System Design]
- C7. Ismet Dagli\*, Mehmet E. Belviranli, “Shared Memory-contention-aware Concurrent DNN Execution for Diversely Heterogeneous SoCs,” *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, February 2024.
- C8. Jedidiah McClurg, Miles Claver, Jackson Garner, Jordan Schmerge, Jake Vossen and Mehmet E. Belviranli, “Optimizing Regular Expressions via Rewrite-Guided Synthesis,” *31st International Conference on Parallel Architectures and Compilation Techniques (PACT)*, October 2022.
- C9. Ismet Dagli\*, Alexander Cieslewicz\*, Jedidiah McClurg Mehmet E. Belviranli, “AxoNN: Energy-Aware Execution of Neural Network Inference on Multi-Accelerator Heterogeneous SoCs,” *Proceedings of 59th ACM/IEEE Design Automation Conference (DAC)*, July 2022.
- C10. Yuanchao Xu\*\*, Mehmet E. Belviranli, Xipeng Shen, Jeffrey S. Vetter, “PCCS: Processor-Centric Contention-aware Slowdown Model for Heterogeneous System-on-Chips,” *Proceedings of the 54th Annual IEEE/ACM International Symposium on Microarchitecture (MICRO)*, October 2021.
- C11. Mohammad Monil\*\*, Mehmet E. Belviranli, Seyong Lee, Malony Allen, and Jeffrey S. Vetter, “MEPHESTO: Modeling Energy-Performance in Heterogeneous SoCs and Their Trade-Offs,” *2020 International Conference on Parallel Architectures and Compilation Techniques (PACT)*, September 2020.
- C12. Mehmet E. Belviranli, and Jeffrey S. Vetter, “FLAME: Graph-based Hardware Representations for Rapid and Precise Performance Modeling,” *IEEE Design, Automation & Test in Europe Conference & Exhibition (DATE)*, March 2019.
- C13. Pak Markthub\*\*, Mehmet E. Belviranli, Seyong Le, Jeffrey S. Vetter, and Satoshi Matsuoka, “DRAGON: Breaking GPU Memory Capacity Limits with Direct NVM Access,” *ACM/IEEE International Conference for High Performance Computing, Networking, Storage, and Analysis (SC)*, November 2018.
- C14. Mehmet E. Belviranli, Seyong Lee, and Jeffrey S. Vetter, “Designing Algorithms for the EMU Migrating-threads-based Architecture,” *IEEE High Performance Extreme Computing Conference (HPEC)*, September 2018. [Best Paper Finalist]
- C15. Mehmet E. Belviranli, Seyong Lee, Jeffrey S. Vetter, and Laxmi N. Bhuyan, “Juggler: A Dependency-Aware Task Based Execution Framework for GPUs,” *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, February 2018.
- C16. Amir A. Abdolrashidi, Devashree Tripathy, Mehmet E. Belviranli, Daniel Wong, and Laxmi N Bhuyan, “Wireframe: Supporting Data-dependent Parallelism through Dependency Graph Execution in GPUs,” *IEEE/ACM International Symposium on Microarchitecture (MICRO)*, October 2017.
- C17. Mehmet E. Belviranli, Farzad Khorasani, Laxmi N. Bhuyan, and Rajiv Gupta, “CuMAS: Data Transfer Aware Multi-Application Scheduling for Shared GPUs,” *ACM International Conference on Supercomputing (ICS)*, June 2016.
- C18. Farzad Khorasani, Mehmet E. Belviranli, Rajiv Gupta, and Laxmi N. Bhuyan, “Stadium Hashing: Scalable and Flexible Hashing on GPUs,” *IEEE International Conference on Parallel Architectures and Compilation Techniques (PACT)*, October 2015.
- C19. Mehmet E. Belviranli, Peng Deng, Laxmi N Bhuyan, Rajiv Gupta, and Qi Zhu, “PeerWave: Exploiting Wavefront Parallelism on GPUs with Peer-SM Synchronization,” *ACM International Conference on Supercomputing (ICS)*, June 2015.
- C20. Chih H. Chou, Mehmet E. Belviranli, and Laxmi N. Bhuyan, “Thermal Prediction and Scheduling of Network Applications on Multicore Processors,” *ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS)*, October 2013.

## Under review

- C1. Alexander Cieslewicz\*, Ismet Dagli\*, Mehmet Ozaslan\*, Soner Seckiner, Jake Hertz, Selcuk Kose, Mehmet E. Belviranli, “Extracting neural network architectures via memory-contention-based side channel attacks”.
- C2. Ryan Marsala\*, Yerzhan Mustafa, Prabhath Tangella, Mohammad Sonji, George Michelogiannakis, Selcuk Kose, Adwait Jog, Mehmet E. Belviranli, “End-to-end architectural simulation framework for hybrid sfq/cmos-memory compute systems”.
- C3. Justin Davis\*, Ismet Dagli\*, Mehmet E. Belviranli, “DRIFT: Dynamic region-based inference for fast object detection on multi-accelerator SoCs”.

## Workshops

- W1. H. Umut Suluhan, Serhan Gener, Alexander Fusco, Joshua Mack, Ismet Dagli, Mehmet E. Belviranli, Cagatay Edemen, Ali Akoglu, “A Runtime Manager Integrated Emulation Environment for Heterogeneous SoC Design with RISC-V Cores,” *Heterogeneity in Computing Workshop (HCW)*, May 2024.
- W2. Ben Wagley, Pak Markthub, James Crea, Bo Wu, and Mehmet E. Belviranli, “Exploring Page-based RDMA for Irregular GPU Workloads. A case study on NVMe-backed GNN Execution,” *The 16th Workshop on General Purpose Processing Using GPU (GPGPU, co-located with PPOPP)*, February 2024.
- W3. Ismet Dagli\*, Andrew Depke\*, Andrew Mueller\*, Md Sahil Hassan, Ali Akoglu, and Mehmet E. Belviranli, “Exploring Page-based RDMA for Irregular GPU Workloads. A case study on NVMe-backed GNN Execution,” *Proceedings of the 3rd Workshop on Flexible Resource and Application Management on the Edge (FRAME)*, August 2023.
- W4. Justin McGowen, Ismet Dagli, Mehmet E. Belviranli, Neil Dantam; “Representations for Scheduling of Heterogeneous Computation to Support Motion Planning”; Implicit Representations for Robotic Manipulation RSS Workshop 2022
- W5. Ismet Dagli\*, Mehmet E. Belviranli, “Exploration of Multi-Accelerator Neural Network Inference in Diversely Heterogeneous Embedded Systems,” *Redefining Scalability for Diversely Heterogeneous Architectures (RSDHA, co-located with SC)*, November 2021.
- W6. Mehmet E. Belviranli, Weize Yu, and Selcuk Kose, “Ultra-Fine Grain Power Management at Datapath-Level: Fact or Fiction,” *ACM International Conference on Architectural Support for Programming Languages and Operating Systems - Wild and Crazy Ideas Session (ASPLOS - WACI)*, January 2015.
- W7. Mehmet E. Belviranli, Chih Hsun Chou, Laxmi N. Bhuyan, and Rajiv Gupta, “A Paradigm Shift in GP-GPU Computing: Task Based Execution of Applications with Dynamic Data Dependencies,” *Sixth International Workshop on Data Intensive Distributed Computing (DIDC, co-located with HPDC)*, January 2014.

## Posters

- P1. Justin McGowen\*, Ismet Dagli\*, Neil Dantam Mehmet E. Belviranli, “Constraint-aware Resource Management for Cyber-physical Systems,” *IEEE Design, Automation & Test in Europe Conference & Exhibition (DATE)*, March 2024.
- P2. Ismet Dagli\*, Mehmet E. Belviranli, “H-EYE: Holistic Performance Modeling for Diversely Scaled Systems,” *ACM Student Research Competition (SRC) at International Symposium on Code Generation and Optimization (CGO)*, March 2024. [Finalist, 3rd place]
- P3. Ismet Dagli\*, Mehmet E. Belviranli, “HaX-CoNN : Heterogeneity-aware Execution of Concurrent Deep Neural Networks,” *ACM Student Research Competition (SRC) at IEEE/ACM International Symposium on Microarchitecture (MICRO)*, October 2022. [Finalist, 3rd place]
- P4. Guilherme Prado Alves\*, Marco Minutoli, Mehmet E. Belviranli, Antonino Tumeo, “Breadth-First Search on Xilinx Versal,” *ACM/IEEE International Conference for High Performance Computing, Networking, Storage, and Analysis (SC)*, November 2021.

- P5. Mehmet E. Belviranlı, Seyong Lee, and Jeffrey S. Vetter, “Programming the EMU Architecture: Algorithm Design Considerations for Migratory-Threads-Based Systems,” *ACM/IEEE International Conference for High Performance Computing, Networking, Storage, and Analysis (SC)*, November 2018.
- P6. Pak Markthub\*\*, Mehmet E. Belviranlı, Seyong Le, Jeffrey S. Vetter, and Satoshi Matsuoka, “Efficiently Extending GPU Addressable Memory with NVM,” *NVIDIA GPU Technology Conference (GTC)*, March 2018.
- P7. Cagri Aksay, Fatma Arik, Esra Ataer, Asli Ayaz, Ozgun Babur, Mehmet E. Belviranlı, Ahmet Cetintas, Emek Demir, and Ugur Dogrusoz, “PATIKAweb: A Web Service for Querying, Visualizing, and Analyzing a Graph Based Pathway Database,” *Intelligent Systems for Molecular Biology (ISMB)*, June 2005.

## Teaching and Mentoring Experience

- **Teaching** Colorado School of Mines  
CSCI-582 Computing beyond CPUs, CSCI-442 Operating Systems Fall’19 - Present
- **Mentoring** Oak Ridge National Laboratory  
Mentored five Ph.D. students via  
ORNL/ORISE-ASTRO internship program Spring’17, Summer’17, Spring’18, Summer’18
- **Co-Lecturer & Teaching Assistant** University of California, Riverside  
Parallel Processing Architectures Spring’14, Spring’15, > 30 students  
Advanced Computer Architecture Fall’13, > 30 students  
Design and Architecture of Computer Systems Spring’15, > 30 students
- **Teaching Assistant** Bilkent University, Ankara, Turkey  
Object Oriented Software Engineering Spring’09, > 100 students  
Algorithms and Programming Fall’08, > 100 students

## Professional Activities and Service

- Organizing committee:
  - IEEE International Symposium on Workload Characterization (IISWC), 2025, Role: *Registration Xhair*
  - Redefining Scalability for Diversely Heterogeneous Architectures (RSDHA), 2021, 2022, 2023 Collocated with SC, Role: *Lead Organizer/Founder*
  - International Conference on Supercomputing (ICS), 2025, Role: *Workshops and Tutorials Chair*
  - IEEE International Symposium on Smart Electronic Systems (ISES), 2021, Role: *Co-chair for Hardware/Software for Vehicular Intelligent Systems track*
  - Principles and Practice of Parallel Programming (PPoPP), 2020, Role: *Local PC-meeting co-chair*
  - International Conference on Supercomputing (ICS), 2015, Role: *Publications and web chair*
- Program committee member
  - The International Symposium on Computer Architecture (ISCA), 2025
  - International Conference on Supercomputing (ICS), 2025
  - The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC), 2023, 2024, 2025
  - IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2020, 2021, 2022, 2023, 2024, 2025, 2026
  - Design Automation Conference (DAC’22, DAC’23)
  - ISC High Performance (ISC), 2019, 2022
  - International Conference on Parallel Processing (ICPP), 2020, 2021, 2022
  - ACM/IEEE International Conference for High Performance Computing, Networking, Storage, and Analysis (SC), 2021 — Grad student poster and BoF
  - Principles and Practice of Parallel Programming (PPoPP), 2020
  - ACM/IEEE System Level Interconnect Prediction Workshop (SLIP), 2019
  - IEEE Computer Society Annual Symposium on VLSI (ISVLSI) Student Research Competition, 2019
  - Principles and Practice of Parallel Programming (PPoPP) Artifact Evaluation, 2018

- External reviewer
  - International Conference on Parallel Architectures and Compilation Techniques (PACT), 2019
- External reviewer
  - Journals: TPDS, TACO, JPDC, PARCO, JETCS, CCPE
  - Conferences: ASPLOS, ISCA, MICRO, IPDPS, EURO-PAR
- Served at 4 NSF Panels (2022-2024).
- Lab-level point of contact and reviewer for DoE- Exascale Computing Project (ECP) Pathforward Program, 2017-2019
- Served as mentor in SC Mentor-Protege program, 2018, 2019, 2020
- Mentored 5 Ph.D. students under Oak Ridge Institute for Science and Education program, 2016-current
- Professional societies
  - Member, IEEE
  - Member, ACM

## Awards

- Outstanding paper award at the DATE'24 Autonomous Systems Design (ASD) initiative, 2024.
- Ph.D. student, Ismet Dagli, placed in top 3 at the CGO Student Research Competition (SRC), 2024
- Ph.D. student, Ismet Dagli, placed in top 3 at the MICRO Student Research Competition (SRC), 2022
- Best research poster award at Computing-Mines Affiliates Partnership Program (C-MAPP), 2022
- Best research poster runner-up award at Computing-Mines Affiliates Partnership Program (C-MAPP), 2022
- Colorado School of Mines tech fee proposal award for heterogeneous computing class, 2020
- Xilinx equipment and license donation, 2020
- Oak Ridge National Laboratory (ORNL) Significant Event Award, 2019
- Best Paper Finalist in IEEE High Performance Extreme Computing Conference, 2018
- 1<sup>st</sup> year graduate fellowship awarded by University of California, Riverside, 2009
- Full scholarship and stipend awarded by Bilkent University, Ankara, Turkey, 2001-2006
- Outstanding success in national university entrance exam:
  - 89<sup>th</sup> over 1.5 million candidates, Turkey, 2001
- Abroad Undergraduate Education Fellowship by Turkish Government, Turkey, 2001