Ismet Dagli

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                                                                 Address: *Golden, CO, USA*

Research Interest

Heterogeneous architectures, system programming, security & privacy, domain-specific architectures, autonomous vehicles, parallel programming paradigms on AI and robotics, energy-performance trade-off, deep learning, high-level synthesis, runtime systems, compiler optimization,

Education

Colorado School of Mines   **Jan 2020 - Present**
- *Doctor of Philosophy in Computer Science*   *Golden, CO*
  GPA: 3.84   **(Exp. Graduate in 2025)**

Boğaziçi University   **Sept 2015 - Dec 2019**
- *Bachelor of Science in Computer Science and Engineering*   *Istanbul, Turkey*

Work Experience

Colorado School of Mines   **Jan 2020 – Present**
Research Assistant   *Golden, CO*
- Advisor: Mehmet E. Belviranli
- I modeled energy/performance trade-offs on heterogeneous accelerators. I applied mapping techniques for heterogeneous DNN workloads into heterogeneous accelerators to maximize the utilization of SoC. The models are evaluated on NVIDIA Orin/Xavier and Snapdragon 865 platforms.

Colorado School of Mines   **Jan 2024 – May 2024**
Adjunct Faculty for CSCI564: Advanced Computer Architecture   *Golden, CO*
- Primary instructor in a grad-level class of nearly 100 students, CSCI564: Advanced Computer Architecture

Pacific Northwest National Laboratory   **May 2021 – Dec 2021**
Ph.D. Intern   *Richland, WA*
- Supervisor: Antonino Tumeo
- Adapted some evolutionary algorithms on high-level synthesis
- Applied MLIR optimizations on high-level synthesis

Colorado School of Mines   **August 2020 – May 2021**
Teaching Assistant   *Golden, CO*
- Taught as a TA in a senior class of more than 150 students (per semester) for two semesters
  CSCI442: Operating System

Tubitak Research Center   **August 2019 – Dec 2019**
Part-Time Artificial Intelligence Engineer   *Istanbul, Turkey*
- Supervisor: Ali Rıza Ekti
- Worked on recognizing the class of voices in a domestic environment on STM32

Baykar Tactical UAS   Jul 2018 – Sept 2018
Software Engineer Intern   *Istanbul, Turkey*
- Supervisor: Tolga Büyükyazı
- Developed a CNN semantic segmentation model on Jetson TX2 for sky objects

BGA Security   June 2017 – August 2017
Security of IoT devices Intern   *Istanbul, Turkey*
- Exploring the vulnerability testing on wearable IoT devices

Publications

- **Ismet Dagli**, Mehmet Belviranli, "H-EYE: Holistic Resource Modeling and Management for Diversely Scaled Edge-Cloud Systems", **under submission**
- **Ismet Dagli**, Mehmet Belviranli, "MC3: Memory Contention based Covert Channel Communication on Shared DRAM System-on-Chips", **under submission**
- **Ismet Dagli**, Alexander Cieslewicz, Soner Seckiner, Jake Hertz, Bo Wu, Selcuk Kose, Mehmet E. Belviranli, "Extracting Neural Network Models via Contention-based Side Channel Attacks on Shared Memory Embedded System-on-Chips", **under submission for IEEE TDSC journal**
- **Ismet Dagli**, Mehmet Belviranli, "Shared Memory-contention-aware Concurrent DNN Execution for Diversely Heterogeneous System-on-Chips", Proceedings of the 29th ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming, **PPoPP'24**
- Justin Mcgowen, **Ismet Dagli,** Neil Dantam, Mehmet Belviranli. "Scheduling for Cyber-Physical Systems with Heterogeneous Processing Units under Real-World Constraints" in 38th ACM International Conference on Supercomputing, **ICS 2024**
- Justin Mcgowen, **Ismet Dagli,** Neil Dantam, Mehmet Belviranli. "Constraint-aware resource management for cyber-physical systems" in Design, Automation and Test in Europe Conference as short paper, **DATE 2024.**
- Amid Morshedlou, **Ismet Dagli**, Jamal Rostami, Omid Moradian, Mehmet Belviranli, "Enhancing Reliability and Safety in Rock Excavation Using A Machine Learning Approach Through Wear Condition Identification" 58th US Rock Mechanics/Geomechanics Symposium, **ARMA 2024**
- H. Umut Suluhan, Serhan Gener, Alexander Fusco, Joshua Mack, **Ismet Dagli**, Mehmet E. Belviranli, Cagatay Edemen, Ali Akoglu. Title: A Runtime Manager Integrated Emulation Environment for Heterogeneous SoC Design with RISC-V Cores, in Heterogeneity in Computing Workshop (HCW), **IPDPS workshop 2024**
- Amid Morshedlou, **Ismet Dagli**, Austin Olltmans, 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 2024**
- **Ismet Dagli**, Andrew Depke, Andrew Mueller, Sahil Hassan, Ali Akoglu, Mehmet Belviranli, "Contention-aware Performance Modeling for Heterogeneous Edge and Cloud Systems", 3rd workshop on Flexible Resource and Application Management on the Edge (FRAME), **HPDC Workshop 2023**
- **Ismet Dagli**, Alexander Cieslewicz, Jedidiah McClurg, Mehmet E. Belviranli, "AxoNN: Energy-Aware Execution of Neural Network Inference on Multi-Accelerator Heterogeneous SoCs", 59th ACM/IEEE Design Automation Conference, **DAC 2022**
- Justin McGowen, **Ismet Dagli**, Mehmet Belviranli, Neil Dantam; "Representations for Scheduling of Heterogeneous Computation to Support Motion Planning"; Implicit Representations for Robotic

Manipulation, **RSS Workshop 2022**

- Antonino Tumeo, Marco Minutoli, Vito Giovanni Castellana, Limaye Ankur, Tan Cheng, **Ismet Dagli,** Nicolas Bohm Agostini, Serena Curzel, Amatya Vinay, Manzano Joseph; "Accelerating Data Processing at the Edge with Extreme Specialization"; 2022 Advanced Scientific Computing Research Workshop on the Management and Storage of Scientific Data, **ASCR Workshop 2022**
- <u>**Ismet Dagli**</u>, Mehmet E. Belviranli, "Multi-accelerator neural network inference in diversely heterogeneous embedded systems"; 2021 IEEE/ACM Redefining Scalability for Diversely Heterogeneous Architectures Workshop (RSDHA), **SC Workshop 2021**
- Serena Curzel, Nicolas Bohm Agostini, Shihao Song, <u>**Ismet Dagli**</u>, Ankur Limaye, Cheng Tan, Marco Minutoli, Vito Giovanni Castellana, Vinay Amatya, Joseph Manzano, Anup Das, Fabrizio Ferrandi, Antonino Tumeo; "Automated generation of integrated digital and spiking neuromorphic machine learning accelerators" 40th IEEE/ACM International Conference On Computer Aided Design, **ICCAD 2021**

Posters

- **Ismet Dagli,** Mehmet E. Belviranli, "H-EYE: Holistic Performance Modeling for Diversely Scaled Systems", Student Research Competition (SRC) at **CGO 2024, Finalist (selected top-3)**
- **Ismet Dagli**, Mehmet E. Belviranli, "Layer-wise Concurrent DNN Execution Characterization and Scheduling for Heterogeneous System-on-Chips", C-MAPP 2023
- **Ismet Dagli,** Alexander Cieslewicz, Soner Seckiner, Jake Hertz, Bo Wu, Selcuk Kose and Mehmet Belviranli, "Extracting Neural Network Models via Contention-based Side Channel Attacks On Shared Memory System-on-Chips, C-MAPP 2023
- **Ismet Dagli,** Mehmet E. Belviranli, "HaX-CoNN: Heterogeneity-aware Execution of Concurrent Deep Neural Networks", Student Research Competition (SRC) at **MICRO 2022, Finalist (selected Top-3)**
- **Ismet Dagli**, Mehmet E Belviranli, "Multiple Neural Network Inference on Heterogeneous SoCs", GRADS 2022
- **Ismet Dagli**, Mehmet E Belviranli, "Energy-Aware Execution of Neural Network Inference on Multi-Accelerator Heterogeneous SoCs", C-MAPP 2022
- **Ismet Dagli**, Levent Akin, "Increasing the Localization Performance via Semantic Segmentation" CMPE BOUN, Poster Presentation, 2019

Awards

- **MLCommons Rising Star** (selected 41 out of 170 applicants, ~24%)
- **CGO'24 ACM Student Researech Competition (SRC) 2024, Finalist** (selected as 3rd), $200
- **MICRO'22 ACM Student Research Competition (SRC) 2022, Finalist** (selected as 3rd), $200
- Travel awards/grants (PPoPP'24, HPDC'23, STOC'23, GSG Mines'21/23) ~4K $
- ScienceSlam@SC21, Full registration for SC21 conference, accommodation, stipend, ~4K $
- GSG Mines, Travel grant, 900$, 2021.
- Monthly stipend during bachelor degree by Turkish government, nearly 10K $, Turkey, 2015-2019.

Talks/Presentations

- Ismet Dagli, Guest Lecturer at Heterogeneous Computing (CSCI-598), Colorado School of Mines 2023,
- Ismet Dagli, The International Symposium on Code Generation and Optimization (CGO), Finalist Talk, 2024
- Ismet Dagli, IEEE/ACM International Symposium on Microarchitecture (MICRO), Finalist Talk, 2022

Group (As mentor) & Personal Projects

Fatima Fellowship mentor   **Sept 2023 - Present**
  - Role: Team Lead
    I lead underrepresented and international three students (two of which are women) to run LLM models at the edge devices to run inference by using DRAM and storage intelligently.

Google ExploreCSR mentor   **Jan 2023 - May 2024**
  - Role: Team Lead
    I led two senior and junior undergrads to run DNN efficiently on Google Coral Dev Boards.

Gumus R&G Autonomous Car Team   **Aug 2020 - Aug 2024**
  - Role: Software Team lead
    I lead a team of up to 30 students for autonomous vehicle competition (Robotaxi). I lead the software team for any task, such as object detection and recognition, SLAM, path planning, and simulation.

Kozalak Drone   **Mar 2018 - Sept 2018**
  - Related Skills: Autonomous drone framework on Jetson TX2
    I was a part of a team with 7 engineers for a UAV competition. I conduct the whole part by myself by running various object detection models to pick the best results and integrating them with an autonomous drone framework Jetson TX2.

Skills

- **Programming Skills:** C++, Python, C, Java, ROS, Verilog,
- **Tools & Technologies:** Linux, TensorRT, Jetson platforms, CUDA, OpenMP, Z3 Solver, Keras, Tensorflow, Caffe, OpenCV
- **Interests:** F1, Tennis, Archery
- **Committee Member:** EuroSys'25 Fall and Spring Artifact Evaluation Committee
- **External Reviewer:** AI4SC'24, DAC'2023, ICS'2023, ISC-HPC'2023, RSDHA'23, DAC'2022, HIPS'2022, ICS'2022, RSDHA'22, IEEE Access, IEEE TPDS, Parallel Computing (PARCO) Journal, ACM TECS