

RESEARCH INTERESTS

Communication Efficient Computer Architecture, Systems of Large Language Model, Hardware-Software Co-Design, Distributed Training, Scalable Machine Learning Accelerator

EDUCATION

Texas A&M University Ph.D. in Computer Science; Supervisor: <i>Dr. Eun Jung Kim</i>	College Station, Texas Aug 2022–Jul 2027(Expected)
Bangladesh University of Engineering and Technology B.Sc. in Computer Science and Engineering	Dhaka, Bangladesh Feb 2015–Apr 2019

WORK EXPERIENCE

Samsung Semiconductor, Inc. Computer Architecture Research Intern, AGI Computing Lab	San Jose, California May 2025–Jan 2026
Texas A&M University Graduate Research Assistant, High Performance Computing Lab	College Station, Texas Aug 2022–Current

SELECTED PUBLICATIONS

1. **S. Laskar**, P. Majhi, A. Muzahid and E. J. Kim. 2025, “SuperMesh: Energy-Efficient Collective Communications for Accelerators,” In 58th IEEE/ACM International Symposium on Microarchitecture (**MICRO ’25**), October 18–22, 2025, Seoul, Republic of Korea. 16 pages. <https://doi.org/10.1145/3725843.3756085>
2. **S. Laskar**, P. Majhi, S. Kim, F. Mahmud, A. Muzahid and E. J. Kim, “Enhancing Collective Communication in MCM Accelerators for Deep Learning Training,” 2024 IEEE International Symposium on High-Performance Computer Architecture (**HPCA’24**), Edinburgh, United Kingdom, 2024, pp. 1-16, doi: 10.1109/HPCA57654.2024.00069
3. P. Majhi, **S. Laskar**, A. Muzahid and E. J. Kim, “Compression-Aware Gradient Splitting for Collective Communications in Distributed Training,” 2026 IEEE International Symposium on High-Performance Computer Architecture (**HPCA’26**), Sydney, Australia, 2026.

RESEARCH EXPERIENCE

DNN Collective Communication Algorithm for Multi-Chip-Modules(MCMs) Aug 2022–Jul 2023
 Supervisor: *Dr. Eun Jung Kim, Dr. Abdullah Muzahid*

- Proposed a new tree-based AllReduce algorithm named **TTO** to ensure high link utilization in MCMs
- Designed bidirectional Ring AllReduce algorithm for odd-sized mesh
- Achieved more than 30% training time reduction compared to best performing state-of-the-art algorithms

Energy-Efficient Collective Communications for Accelerator Mar 2024–Aug 2024
 Supervisor: *Dr. Eun Jung Kim, Dr. Abdullah Muzahid*

- Proposed a new topology for mesh-based accelerators with additional peripheral links to reduce collective time
- Analyzed area and power consumption of the proposed topology using Synopsys and DSENT
- Achieved a speedup of 1.19× to 1.75× with the proposed topology compared to mesh

Accelerating Gradient Synchronization in Distributed DNN Training Jul 2023–Jun 2024
 Supervisor: *Dr. Eun Jung Kim, Dr. Abdullah Muzahid*

- Reduced gradient synchronization frequency by accurately predicting gradients with smaller auxiliary models
- Proposed system achieved a $1.25\times$ speedup over existing gradient prediction-based data parallel training methods

Topology-Aware AllToAll Collective for Large-Scale Distributed DL

Mar 2024–Nov 2024

Supervisor: *Dr. Eun Jung Kim, Dr. Abdullah Muzahid*

- Proposed a topology-aware AllToAll algorithm, optimizing communication latency and link utilization
- Achieved $1.12\times$ to $8.92\times$ speedup over NCCL, TACCL, and TECCL across diverse topologies, including multi-chassis DGX-2, NDV-2, high-dimensional Mesh, and Torus

SKILLS

- **Programming Languages:** Python, C/C++
- **System Design Simulators:** BookSim, ScaleSim, Astra-Sim, LLMCompass
- **Tools & Frameworks:** Pytorch, OpenMPI, Synopsys, NCCL, TACCL, DSENT, SLURM, Docker

TEACHING ASSISTANT

- CSCE 614 Computer Architecture: Fall 2023, Fall 2024, Spring 2025
- CSCE 312 Computer Organization: Spring 2023, Spring 2024

RELEVANT GRADUATE COURSE-WORKS

Computer Architecture | Machine Learning | Analysis of Algorithms | Parallel Computing | Large Language Models

AWARDS AND HONORS

- Distinguished Artifact Award, MICRO 2025
- Student Travel Award, MICRO 2025
- Student Travel Award, HPCA 2024
- Higher Secondary School Certificate Scholarship, Dhaka Education Board, 2014
- Secondary School Certificate Scholarship, Rajshahi Education Board, 2012