Mohammad Tawhidul Hasan Bhuiyan

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Education

Columbia University — *New York, USA*
PhD in Electrical Engineering — Sept. 2024 – May 2030 (expected)

Bangladesh University of Engineering and Technology — *Palashi, Dhaka, Bangladesh*
Masters of Science in Computer Science and Engineering — July 2021 – Aug. 2024

Bangladesh University of Engineering and Technology — *Palashi, Dhaka, Bangladesh*
Bachelor of Science in Computer Science and Engineering — Mar. 2016 – Feb. 2021
Class rank: 1st

Experience

Columbia University — *New York, USA*
Graduate Research and Teaching Assistant — Sept. 2024 – Present

Bangladesh University of Engineering and Technology — *Dhaka, Bangladesh*
Lecturer, Department of CSE — Sept. 2021 – Aug. 2024

Publications

- **Tawhid Bhuiyan**, Sumya Hoque, Angelica Moreira, Tanvir Ahmed Khan, **Wax: Optimizing Data Center Applications With Stale Profile**, Submitted to ASPLOS-2026
- **Tawhid Bhuiyan**, Ryan Piersma, Tanvir Ahmed Khan, and Simha Sethumadhavan, **MoneyTree: A Highly Scalable Power Management Protocol For Interconnected System Components**, Submitted to ISCA-2026
- Ryan Piersma, **Tawhid Bhuiyan**, Tanvir Ahmed Khan, and Simha Sethumadhavan, **Reverse Engineering DVFS Mechanisms**, *2025 IEEE International Symposium on Hardware Oriented Security and Trust (HOST), San Jose, CA, USA, 2025*, https://doi.ieeecomputersociety.org/10.1109/HOST64725.2025.11050037
- **Mohammad Tawhidul Hasan Bhuiyan**, Muhammad Rashed Alam and M. Sohel Rahman, **Computing the Largest Common Almost-Increasing Subsequence**, *Theoretical Computer Science, Volume 930, 2022, Pages 157-178, ISSN 0304-3975*, https://doi.org/10.1016/j.tcs.2022.07.021
- **Mohammad Tawhidul Hasan Bhuiyan**, Irtesam Mahmud Khan, Sheikh Saifur Rahman Jony, Renee Robinson, Uyen-Sa D. T. Nguyen, David Keellings, M. Sohel Rahman, and Ubydul Haque, **The Disproportionate Impact of COVID-19 among Undocumented Immigrants and Racial Minorities in the US**, *International Journal of Environmental Research and Public Health, Volume 18(23): 12708, 2021, PubMedID 34886437, ISSN 1660-4601*, https://doi.org/10.3390/ijerph182312708

Projects

Optimizing GPU energy efficiency for LLM | *C++, Computer Architecture, Simulation* — *Feb. 2025 – Present*
My eventual plan is to create a profile-guided optimization of LLM compiler to minimize energy consumption.

- **Fine-grained GPU DVFS**: We are characterizing NVIDIA datacenter GPUs and using simulators (e.g., Accel-sim, Astra-sim) to model power and latency to develop new fine-grained DVFS techniques for GPU cores.
- **HBM DVFS**: Investigating the high idle power consumption of High Bandwidth Memory (HBM) and planning to propose a DVFS mechanism for it. We are working on DRAMsim3 and Ramulator2 to create HBM models to propose a co-optimized DVFS mechanism for both GPU compute and HBM.

- **Collective Communication**: Aiming to make collective communication power-aware to minimize energy consumption in multi-GPU setups. We are using tools like Calculon and Astra-sim to incorporate energy models and plan to develop mechanisms to automatically determine the best parallelization strategy (e.g., Tensor Parallelism, Pipeline Parallelism, Data Parallelism).

Optimizing Datacenter Applications with Stale Profile | *C++, Python, LLVM* *Sept. 2024 – Present*

- Optimizing datacenter applications requires collecting profiles from deployed applications. We developed heuristics to properly map profiles to new application binaries, enabling effective optimization with stale data.
- We showed applicability of our system with BOLT, Propeller, and AutoFDO.
- A paper has been submitted to a top conference.

Parallelization Suggestion for Python Programs | *Python, Compiler* *Jan. 2022 – Aug. 2024*

- Profiled Python programs to provide suggestions for running them in a distributed environment.
- Developed a prototype that performed parallelization as fast as a manually parallelized program for a set of inputs.

Technical Skills

Languages: C/C++, Java, Python, Rust, Haskell, Bash, SQL, JavaScript
Tools: LLVM, NVIDIA Nsight, Accel-sim, Astra-sim, DRAMsim3, Ramulator2, Calculon
Libraries: Polars, Scikit-Learn, Tensorflow, PyTorch, Pandas, NumPy, Matplotlib, Numba
Relevant Courses: Natural Language Processing (Stanford), Mathematics for Machine Learning (Imperial College London), Deep Learning, Tensorflow Developer (DeepLearning.AI), Bioinformatics (UC San Diego), Reinforcement Learning (University of Alberta)

References

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