

TERGEL MOLOM-UCHIR

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RESEARCH INTERESTS

I am deeply engrossed in software-hardware co-design and the development of AI accelerators, aiming to drive forward energy-efficient hardware systems for enhanced machine intelligence, machine learning acceleration, and neuromorphic computing in the realm of AI.

RESEARCH EXPERIENCE

Hewlett Packard Labs

Research Associate Intern | Emerging Accelerators Team

May 2025 - Present

Mentor: Dr. Aishwarya Natarajan

Nanodevices and Integrated Systems Laboratory, UMass Amherst

Research Intern

May 2022 - May 2023

PI: Dr. Qiangfei Xia

Efficient and Intelligent Computing Lab, Rice University

Google-Rice REU Data Science Intern

May 2021 - August 2021

PI: Dr. Yingyan Lin

EDUCATION

Duke University

Ph.D Candidate in Computer & Electrical Engineering

August 2023 - Present

Advisors: Dr. Yiran Chen, Dr. Hai “Helen” Li

University of Massachusetts Amherst

Bachelor of Science in Electrical Engineering | GPA: 3.9/4

August 2019 - May 2023

Advisor: Dr. Qiangfei Xia

PUBLICATIONS

Journal Articles

[J5] V Ravichandran, Y Huang, B Flannery, **T Molom-Ochir**, T Maurer, S Asapu, A Abdel-Maksoud, N Heermance, R Yoo, J Tackie, A Guo, J Yang, Q Xia. “Memristive Cellular Neural Networks for Ultrafast In-Pixel Computing.” *Nature Electronics (Accepted in principle)*, 2025.

[J4] Y Chen, C Guo, Y He, M Ma, **T Molom-Ochir**, N Ramos, H Shan, C Wei, H Li. “Circuits to Systems: Co-Designing Efficient AI Hardware.” *IEEE Design & Test*, 2025.

[J3] **T Molom-Ochir**, B Taylor, H Li, Y Chen. "Advancements in Content-Addressable Memory (CAM) Circuits: State-of-the-Art, Applications, and Future Directions in the AI Domain." *IEEE Transactions on Circuits and Systems I (TCAS-I)*, 2025.

[J2] C Guo, F Cheng, Z Du, J Kiessling, J Ku, S Li, Z Li, M Ma, **T Molom-Ochir**, B Morris, H Shan, J Sun, Y Wang, C Wei, X Wu, Y Wu, H F Yang, J Zhang, J Zhang, Q Zheng, G Zhou, H Li, Y Chen. "A Survey: Collaborative Hardware and Software Design in the Era of Large Language Models." *IEEE Circuits and Systems Magazine*, 2024.

[J1] **T Molom-Ochir**, R J. Twigg, T G. Pannuti. “MARCo: Solar Powered Autonomous Robotic Unmanned Surface Vehicle.” *Journal of Undergraduate Research (JUR)*, 2021.

Conference Proceedings

[C11] X Yang, P Chen, **T Molom-Ochir**, Y Chen. "End-to-End Transformer Acceleration Through Processing-in-Memory Architectures." *IEEE ICM (Under Review)*, 2025.

[C10] T Kawakami, **T Molom-Ochir**, X Zhuang, J Yang, T Roy, H Li, Y Chen. "DirectGeMM: Eliminating the GeMV Bottleneck in Analog In-Memory Computing." *ISCAS (Under Review)*, 2025.

[C9] **T Molom-Ochir**, B Morris, M Horton, P Liu, C Wei, C Guo, D Fan, S Wang, H Li, Y Chen. "CAMformer: Associative Memory is All You Need." 2025.

[C8] B Morris, **T Molom-Ochir**, B Sweezy, C Zhou, A Jones, H Li, Y Chen. "NP-CAM: Efficient and Scalable DNA Classification using a NoC-Partitioned CAM Architectures." *HPCA (Accepted)*, 2025.

[C7] M Horton, **T Molom-Ochir**, P Liu, B Gopal, C Wei, C Guo, B Taylor, D Fan, S Wang, H Li, Y Chen. "Hamming Attention Distillation: Binarizing Keys and Queries for Efficient Long-Context Transformers." *ARR (Under Review)*, 2025.

[C6] **T Molom-Ochir**, N Saxena, J Kim, Y Chen, Z Wang, M Pajic, H Li. "Efficient Neuro-Symbolic Policy using In-Memory Computing." *International Conference on Neuro-Symbolic Systems*, 2025.

[C5] **T Molom-Ochir**, B Taylor, H Li, Y Chen. "MonoSparse-CAM: Efficient Tree Model Processing via Monotonicity and Sparsity in CAMs." *IEEE International Symposium on Circuits and Systems (ISCAS)*, 2025.

[C4] P M Mammen, C Zakaria, **T Molom-Ochir**, A Trivedi, P Shenoy, R Balan. "WiSleep: Scalable Sleep Monitoring and Analytics Using Passive WiFi Sensing." *ACM Journal on Computing and Sustainable Societies*, 2024.

[C3] **T Molom-Ochir**, R Shenoy. "Energy and Cost Considerations for GPU Accelerated AI Inference Workloads." *IEEE MIT Undergraduate Research Technology Conference (IEEE URTC)*, 2021.

[C2] W A. Hanafy, **T Molom-Ochir**, R Shenoy. "Design Considerations for Energy-efficient Inference on Edge Devices." *The Twelfth ACM International Conference on Future Energy Systems (ACM e-Energy)*, 2021.

[C1] E Cecchet, A Acharya, **T Molom-Ochir**, A Trivedi, P Shenoy. "WiFiMon: A Mobility Analytics Platform for Building Occupancy Monitoring and Contact Tracing Using WiFi Sensing." *The 18th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys)*, 2020, Best Poster Award.

Patent Pending:

[P1] Tergel Molom-Ochir, Aishwarya Natarajan. "In-Memory Accelerator for Monte Carlo Tree Search." Hewlett Packard Enterprise, IDF-178803 (Patent Review Committee, October 2025).

Academic Services

Manuscript Reviewer AI and Ethics (Springer Nature)	2025 - Present
Volunteer Embedded Systems Week (ESWEEK)	2024
Presenter 2021 IEEE MIT Undergraduate Research Technology Conference	
Presenter SenSys '20: Proceedings of the 18th Conference on Embedded Networked Sensor Systems	

Research Mentorship

Undergraduate Students

- **Arham Banhsali (Fall 2025)**
 - Undergraduate student at Duke University ECE and Physics
 - Research Topic: Neuromorphic Computing and In-Memory Computing
- **Alex Chindris (Fall 2025)**
 - Undergraduate student at Duke University ECE
 - Research Topic: Neuromorphic Computing
- **Samir Travers (Spring 2025)**
 - Undergraduate student at Duke University ECE
 - Research Topic: DNA classification
- **Sandith Ganhewage (Spring 2025)**
 - Undergraduate student at Duke University CS
 - Research Topic: Knowledge distillation

Teaching and Advising

TA for ECE 529: Digital Integrated Circuits

Spring 2025

Instructor: Dr. Hisham Massoud

SKILLS

Programming Languages/Frameworks: Python, PyTorch, C, MATLAB, RTL, TEX

EDA & Simulation Tools: HSPICE, Cadence Virtuoso, Synopsys Design Compiler

Other: Deep Learning Optimization, Git, VLSI design, Linux, Jetson Nano

Organizations/Outreach: Eta Kappa Nu (Electrical Engineering Honor Society), UMass Turing Program (Mentor and TA)

AWARDS AND HONORS

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| • Fall 2022 Rising Researcher – One of eight students honored for excellence in research, or scholarship | December 2022 |
| • Best Poster Award – Awarded by the ACM for best COVID-19 response research | October 2020 |
| • Dean's List – Awarded for achieving a grade point average of 3.5 or better | Every Semester |