TERGEL MOLOM-OCHIR

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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 Enterprise (HPE) — May 2025 - Present
Research Associate Intern | Emerging Accelerators Team — Mentor: Dr. Aishwarya Natarajan

Nanodevices and Integrated Systems Laboratory, UMass Amherst — May 2022 - May 2023
Research Intern — PI: Dr. Qiangfei Xia

Efficient and Intelligent Computing Lab, Rice University — May 2021 - August 2021
Google-Rice REU Data Science Intern — PI: Dr. Yingyan Lin

EDUCATION

Duke University — August 2023 – Present
Ph.D Candidate in Computer & Electrical Engineering — Advisors: Dr. Yiran Chen, Dr. Hai "Helen" Li

University of Massachusetts Amherst — August 2019 - May 2023
Bachelor of Science in Electrical Engineering | GPA: 3.9/4 — Advisor: Dr. Qiangfei Xia

PUBLICATIONS

Journal Articles

[J9] J Chen, **T Molom-Ochir**, T Kawakami, X Zhao, M Horton, B Morris, A Chindris, H Li, Y Chen, T Roy. "BEOL-compatible oxide-semiconductor Flash content-addressable memory for in-memory transformer attention." *Nature Electronics* ***(In Preparation)***, 2026.

[J8] **T Molom-Ochir**, V Ravichandran, H Li, Y Chen, L Chua, R Williams, Q Xia. "Three-dimensional cellular neural networks for volumetric computing." *Nature Communications* ***(Under Review),*** 2026.

[J7] **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**.**" *IEEE Transactions on Circuits and Systems I (TCAS-I)* ***(Accepted with Major Revisions),*** 2026.

[J6] X Zhuang, A Alorf, J Yang, **T Molom-Ochir**, MD Sazzadur Rahman, B G Taylor, I K Bernardino, J Chen, R B Serpa, V M Ravel, X J Zhao, S J Chauhan, A Chopra, Y Shen, H F Hishe, A Sarkar, C B Parker, M Lanza, A D Franklin, J T Glass, H Li, Y Chen, T Roy. "Fully parallel programming on 1k graphene interfacial memristor crossbar array for edge computing." *Nature Electronics* ***(Under Review),*** 2026.

[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,* 2026.

[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. Twiggs, T G. Pannuti. "MARCo: Solar Powered Autonomous Robotic Unmanned Surface Vehicle." *Journal of Undergraduate Research (JUR),* 2021.

Conference Proceedings

[C15] X Zhuang, **T Molom-Ochir**, T Kawakami, J Yang, S Chauhan, A Alorf, A Natarajan, J Ignowski, T Roy, X Yang, H Li, Y Chen. "ReLoRA: Efficient and Accurate In-Situ LoRA Fine-Tuning on Analog ReRAM-based Processing-in-Memory." International Conference on Computer-Aided Design ***(Under Review),*** 2026.

[C14] N Ramos, **T Molom-Ochir**, T Kawakami, H Li. "Biologically Plausible Learning and ADCless Neuromorphic Architectures for Energy-Efficient Spiking Neural Networks." International Joint Conference on Neural Networks 2026 ***(Under Review),*** 2026.

[C13] X Zhuang, H F Hishe, S Shubham, K Jaiswal, T Kawakami, J Yang, J Chen, A Padovani, A Alorf, R Ma, **T Molom-Ochir**, H Li, Y Chen, V Deshpande, T Roy, G Thareja. "A 5.24TFLOPS Compute-In-Memory DTCO by M3D Integrated Graphene

Interfacial Memristor on 2nm GAA CMOS for LLM fine-tuning." *IEEE Symposium on VLSI Technology and Circuits* ***(Under Review),*** 2026.

[C12] B Morris, **T Molom-Ochir**, N Ramos, R Ma, J Chen, T Roy, H Li, Y Chen. "ContinualCAM: Virtualizing the Matchline for Native Sequential Data Support in Content-Addressable Memory." *The 53rd IEEE/ACM International Symposium on Computer Architecture (MICRO 2026)* ***(Under Review)***, 2026.

[C11] **T Molom-Ochir**, B Morris, Y He, A Gajjar, G Pedretti, H Li, Y Chen, J Ignowski, A Natarajan. "In-Memory Acceleration of Monte Carlo Tree Search." *The 53rd IEEE/ACM International Symposium on Computer Architecture (MICRO 2026)* ***(Under Review)***, 2026.

[C10] X Yang, P Chen, **T Molom-Ochir**, Y Chen. "End-to-End Transformer Acceleration Through Processing-in-Memory Architectures." *37th International Conference on Microelectronics (ICM),* 2025.

[C9] 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." *IEEE International Symposium on Circuits and Systems (ISCAS),* 2026.

[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." *Proceedings of the 32nd IEEE International Symposium on High-Performance Computer Architecture (HPCA-32),* 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." *ArXiv,* 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] **T Molom-Ochir**, A Natarajan. "In-Memory Accelerator for Monte Carlo Tree Search." Hewlett Packard Enterprise, IDF-178803 (*Patent Review Committee, October 2025)*

Academic Services

Manuscript Reviewer | Nature Scientific Reports	2026 - Present
Manuscript Reviewer | Nature Computational Science	2026 - Present
Manuscript Reviewer | Discover Artificial Intelligence (Springer Nature)	2026 - Present
Manuscript Reviewer | International Journal of Machine Learning and Cybernetics (Springer Nature)	2025 - Present
Manuscript Reviewer | AI and Ethics (Springer Nature)	2025 - Present
Manuscript Reviewer | Archives of Computational Methods in Engineering (Springer Nature)	2025 - Present
Manuscript Reviewer | IEEE Design & Test	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: IEEE Member (2025-Present), Eta Kappa Nu (2023), UMass Turing Program (Mentor and TA)

AWARDS AND HONORS

- 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*