Michael Cho

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Research Interests

Research interests lie at the intersection of biomedical engineering and machine learning, focusing on federated and deep learning, edge AI, and data engineering with an emphasis on fairness, ethics, privacy, and security. Expertise includes designing end-to-end machine learning systems, high performance computing, and embedded system architectures utilizing deep learning accelerators (e.g., Coral TPU) for real-time, on-device anomaly detection and classification for wearable health monitoring.

Education

2022 – Present	Ph.D. in Electrical and Computer Engineering Atlanta, GA	**Georgia Institute of Technology** GPA: 4.0/4.0
2022 – 2025	MSc. in Electrical and Computer Engineering Atlanta, GA	**Georgia Institute of Technology** GPA: 4.0/4.0
2020 – 2022	Bachelor of Science in Computer Science Seattle, WA	**University of Washington** GPA: 3.9/4.0

Experience

Jan 2023 - Present
Graduate Research Assistant — **Georgia Institute of Technology**
Inan Research Lab — *Advisor: Dr. Omer T. Inan*

Developed and applied Deep Learning algorithms for cardiovascular signal processing (e.g., ECG, SCG, PPG), collaborating with interdisciplinary teams to advance cardiac health research. Curated a large-scale dataset of over 17,000 annotated heartbeats. Leveraging this dataset, developed deep learning signal quality classification models that achieved 25% greater accuracy for signal quality determination of cardiac signals over traditional algorithms. Spearheaded the implementation of on-device deep learning frameworks on edge accelerators (Coral TPU), enabling real-time anomaly detection and few-shot personalization for wearable cardiac signals. Automated annotation workflows to improve ML benchmarking and reproducibility, while integrating HPC clusters and hardware systems to characterize physiological stress responsivity.

Feb 2023 - Sep 2023
Educator Workforce Data Specialist — **Professional Educator Standards Board**
Olympia, WA

Orchestrated an organization-wide data restructuring and automated backup initiative, modernizing legacy architecture to ensure 100% data redundancy and improve query efficiency by 37%. Led the rigorous analysis of complex educator workforce datasets, synthesizing quantitative trends to inform state-level policy and drive evidence-based improvements in regulatory standards.

Dec 2020 - Jun 2022
Research Assistant — **University of Washington**
Ubicomp Lab — *Advisor: Dr. Afra Mashhadi*

Implemented Federated Learning (FL) frameworks (TensorFlow Federated, PyTorch) for crowdsourced object detection, achieving 85.13% accuracy across distributed edge devices while ensuring 100% data privacy by keeping raw user data on-device. Optimized model aggregation to outperform local training baselines by 15%, validating the communication efficiency and efficacy of decentralized learning for sensitive data.

Jun 2021 - Jun 2022
Research Assistant — **University of Washington**
Engineering and Mathematics — *Advisor: Dr. Sunwoong Kim*

Developed HELPSE (Homomorphic Encryption-based Lightweight Password Strength Estimation) to enable privacy-preserving analysis on cyber-physical systems. Built a virtual keyboard-based client-server system utilizing a polynomial degree of 32K to capture and encrypt passwords. Implemented numerical algorithms in C++ within the homomorphic encryption domain, achieving a server-side execution time of approximately 5 seconds and an average error rate of less than 1% compared to standard baselines.

May 2020 - Aug 2020 **Laboratory Process Analyst** **King County Water Treatment**
Seattle, WA

Conducted rigorous chemical and biological analyses of wastewater samples utilizing standard laboratory instrumentation (e.g., spectrophotometry, titration) to assess water quality parameters. Managed data logging and quality control protocols to ensure strict compliance with state and federal environmental regulations. Collaborated with operations staff to interpret analytical results, identify process inefficiencies, and recommend real-time adjustments for optimal plant performance.

Publications

Cho, Michael and Afra Mashhadi (2022). "Caring Without Sharing: A Federated Learning Crowdsensing Framework for Diversifying Representation of Cities". en. In: *Mobile and Ubiquitous Systems: Computing, Networking and Services*. Ed. by Takahiro Hara and Hirozumi Yamaguchi. Cham: Springer International Publishing, pp. 601–616. ISBN: 978-3-030-94822-1. DOI: 10.1007/978-3-030-94822-1_39.

Cho, Michael et al. (June 2022). "HELPSE: Homomorphic Encryption-based Lightweight Password Strength Estimation in a Virtual Keyboard System". In: *Proceedings of the Great Lakes Symposium on VLSI 2022*. GLSVLSI '22. New York, NY, USA: Association for Computing Machinery, pp. 405–410. ISBN: 978-1-4503-9322-5. DOI: 10.1145/3526241.3530338.

Abbaraju, Vikram and Michael Cho et al. (2025). "Characterizing Central-Autonomic Dynamics during an Episodic Memory Task using Multi-Modal Neural and Cardiomechanical Signals". In: *IEEE Transactions on Biomedical Engineering*, pp. 1–12. ISSN: 1558-2531. DOI: 10.1109/TBME.2025.3622916.

Cho, Michael, Vikram Abbaraju, et al. (2025). "Quantifying Opioid Withdrawal through Cardio-mechanical Variability using Multimodal Wearable Sensors". In: *IEEE-EMBS International Conference on Body Sensor Networks 2025*. URL: https://openreview.net/forum?id=q91O03HCa9.

Cho, Michael, Cem Yaldiz, et al. (Accepted). "Seismocardiography Pig Hypovolemia Dataset for Signal Quality Indexing and Validated Cardiac Timings". In: *Nature Scientific Data*.

Awards, Honors and Memberships

NSF Graduate Research Fellowship (GRFP)
President's Fellowship, Georgia Institute of Technology
Steve W. Chaddick Fellowship, Georgia Institute of Technology
Mary Gates Research Scholarship, University of Washington
Ronald E. McNair Post-baccalaureate Achievement Program, University of Washington
Officer, Association for Computing Machinery (ACM)
Member, Tau Sigma National Honor Society & MESA (Mathematics Engineering Science Achievement)
USPA, Current Georgia Powerlifting Record Holder for Bench (486lbs), Deadlift (705lbs), and Total (1731lbs)

Teaching and Service

2022 **Graduate Teaching Assistant**, Georgia Institute of Technology (ECE 3005)
Mentored students in technical communication, writing, and presentation skills.

2022 **Childrens Volunteer**, Hands On Atlanta
Supported education and community development activities for children.

2020 – 2022 **Mentor**, Seattle Central College Reentry Support
Mentored formerly incarcerated students, advocating for social equity and educational access.

2016 – 2019 **Academic Tutor**, Centralia College
Provided academic support in multiple subjects to strengthen foundational knowledge.

Technical Skills & Languages

Languages: Python, C++/C, MATLAB, Bash, Lua, Java, SQL, LaTeX
Data Science: PyTorch, TensorFlow, Pandas, Dask, Plotly, Scikit-learn, NumPy
DevOps & Tools: Docker, Kubernetes, Spark, Slurm (HPC), Proxmox, VMs, Unix, AWS, S3
Spoken Languages: English (Advanced), Spanish (Conversational), Japanese (Basic), Korean (Basic)

Last updated: February 2, 2026