

Michael Cho

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RESEARCH INTERESTS

Research interests lie at the intersection of biomedical engineering and machine learning, focusing on wearable cardiomechanical sensing, generative modeling of physiological signals, 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 edge and deep learning accelerators for real-time, on-device anomaly detection and classification for wearable health monitoring.

EDUCATION

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

RESEARCH EXPERIENCE

Jan 2023 – Present	Graduate Research Assistant Inan Research Lab  · Advisor: Dr. Omer T. Inan	Georgia Institute of Technology Atlanta, GA
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- 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 seismocardiogram (SCG) heartbeats for fiducial point and signal quality assessment.
- 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 and deep learning accelerators, enabling real-time anomaly detection and few-shot personalization for wearable cardiac signals.
- Designed and implemented quantitative metrics for cardiac event detection, supporting research in heart health and stress analysis.
- Automated annotation workflows to improve ML benchmarking and reproducibility.
- Integrated HPC clusters, hardware systems, and clinical study data to characterize cardiac and musculoskeletal health and physiological stress responsivity.
- Contributed to edge-efficient seismocardiogram denoising and geometry-aware generative models for translating cardiovascular signals across wearable sensor locations.

Jun 2021 – **Research Assistant** **University of Washington**
Jun 2022 *Engineering and Mathematics* · Advisor: Dr. Sunwoong Kim Seattle, WA

- Developed HELPSE (Homomorphic Encryption-based Lightweight Password Strength Estimation) to enable privacy-preserving, server-side password assessment on cyber-physical systems utilizing cloud infrastructure.
- Built a virtual keyboard-based client-server system utilizing a polynomial degree of 32K to capture and encrypt passwords for secure analysis on embedded hardware.
- 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.
- Refined LPSE to overcome depth constraints and improve computational efficiency.

Dec 2020 – **Research Assistant** **University of Washington**
Jun 2022 *Ubicomp Lab*  · Advisor: Dr. Afra Mashhadi Seattle, WA

- Implemented Federated Learning (FL) frameworks (TensorFlow Federated, PyTorch, Flower) 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.
- Ported existing ML workflows to FL, ensuring integration and compatibility.
- Programmed and configured edge clients and embedded devices for efficient FL participation and privacy-focused workflows.
- Built secure cloud infrastructure for encrypted user data uploads, enabling secure FL training.

WORK EXPERIENCE

Jul 2026 – **Applied Machine Learning Scientist** **WHOOOP**
Dec 2026 *Core Machine Learning Research*  Boston, MA

- During this co-op, developed machine learning algorithms on wearable physiological data and productionized them for deployment.
- Built end-to-end ML pipelines for production, spanning data processing, model training and evaluation, and integration into production services.

Feb 2023 – **Educator Workforce Data Specialist** **Department of Education**
Sep 2023 *Professional Educator Standards Board*  Olympia, WA (Remote)

- Orchestrated an organization-wide data restructuring and automated backup initiative, modernizing legacy architecture to ensure 100% data redundancy and improve query efficiency by 37%.
- Gathered, analyzed, and interpreted qualitative and quantitative educator workforce data on practices and standards for paraeducators, synthesizing trends to inform state-level policy and regulatory standards.
- Collaborated with a team to design research methodologies and presented findings through reports.

May 2020 – Aug 2020	Laboratory Process Analyst 	King County Water Treatment Seattle, WA
	• Performed comprehensive analysis of wastewater samples and conducted tests to assess water quality parameters. • Monitored treatment processes and ensured regulatory compliance. • Provided recommendations for process optimization and improvement to enhance overall plant efficiency.	
Apr 2017 – Nov 2019	Wastewater Treatment Plant Operator 	Cedar Creek Corrections Center Littlerock, WA
	• Performed operation, maintenance, and testing activities related to wastewater treatment according to city, state, and federal wastewater treatment requirements.	
Sep 2010 – Apr 2012	Assembly Structure Mechanic 	The Boeing Company Everett, WA
	• Performed precision assembly of aircraft structures, including fuselage, wings, and control surfaces. • Ensured adherence to engineering specifications, performed inspections, and collaborated with team members to meet production targets while maintaining strict quality standards.	

PUBLICATIONS

- O. S. Kilic, A. Nawar, C. O. Yaldiz, **M. J. Cho**, A. R. Emirdagi, D. Tangolar, A. Aghazadeh, A. J. Shah, and O. T. Inan (2026). “Cylindrical Geodesic Flow Matching for Quasiperiodic Physiological Signal Transformation”. In: *Advances in Neural Information Processing Systems (NeurIPS 2026), Main Conference, Sydney*. arXiv: [2610.08510](https://arxiv.org/abs/2610.08510).
- V. Abbaraju, F. N. Rahman, **M. J. Cho**, J. C. Liu, Y. Yang, C. E. Murray, A. Nawar, J. A. Berkebile, J. Chiok, J. Choi, R. Bull, L. H. Shallenberger, V. Vaccarino, J. W. Welsh, S. Patel, A. J. Shah, D. Bremner, and O. T. Inan (2026). “Towards Monitoring Acute Opioid Withdrawal Severity Using a Multimodal Wearable Chest Patch”. In: *ACM Transactions on Computing for Healthcare*. DOI: [10.1145/3833425](https://doi.org/10.1145/3833425).
- M. J. Cho**, C. O. Yaldiz, A. Nawar, V. Abbaraju, R. C. Emadi, O. S. Kilic, Z. Bouzid, F. N. Rahman, C. Chen, J. M. Cook, A. R. Emirdagi, R. L. Saigal, M. Paulus, and O. T. Inan (2026). “Seismocardiography Pig Hypovolemia Dataset for Signal Quality Indexing and Validated Cardiac Timings”. In: *Scientific Data*. DOI: [10.1038/s41597-026-06733-2](https://doi.org/10.1038/s41597-026-06733-2).
- J. M. Cook, C. Chen, F. B. Inan, C. J. Nichols, F. N. Rahman, A. Nawar, L. J. Reichelt, **M. J. Cho**, Y. Sangar, J. Hester, and O. T. Inan (2026). “SCRIBE Design and Validation: Simultaneous Cardiac and Respiratory Impedance Biomarkers with Electromechanics”. In: *IEEE Sensors Journal*. DOI: [10.1109/JSEN.2026.3702932](https://doi.org/10.1109/JSEN.2026.3702932).
- A. R. Emirdagi, C. O. Yaldiz, O. S. Kilic, **M. J. Cho**, and O. T. Inan (2026). “EffSCG: An Efficient Framework for Real-Time Seismocardiogram Denoising on Resource-Constrained Edge Devices”. In: *IEEE Journal of Biomedical and Health Informatics*. DOI: [10.1109/JBHI.2026.3718375](https://doi.org/10.1109/JBHI.2026.3718375).
- V. Abbaraju, T. Lees, **M. J. Cho**, R. Emadi, D. J. Lin, J. A. Berkebile, N. Lee, J. L. Nawfel, R. M. Dougherty, R. Dunayev, M. A. Karker, L. M. Bonacci, D. Mathew, T. D. Mauk, J. B. Goodman, A. Wexler, P. Pedrelli, D. A. Pizzagalli, D. G. Dillon, A. K. Webb, and O. T. Inan (2025). “Characterizing Central-Autonomic Dynamics during an Episodic Memory Task Using Multi-Modal Neu-

- ral and Cardiomechanical Signals”. In: *IEEE Transactions on Biomedical Engineering*, pp. 1–12. DOI: [10.1109/TBME.2025.3622916](https://doi.org/10.1109/TBME.2025.3622916).
- M. J. Cho**, V. Abbaraju, F. N. Rahman, J. C. Liu, A. Nawar, C. E. Murray, Y. Yang, J. Chiok, J. Choi, R. Bull, L. H. Shallenberger, V. Vaccarino, A. J. Shah, D. Bremner, and O. T. Inan (2025). “Quantifying Opioid Withdrawal through Cardio-Mechanical Variability Using Multi-Modal Wearable Sensors”. In: *2025 IEEE 21st International Conference on Body Sensor Networks (BSN)*, pp. 1–4. DOI: [10.1109/BSN66969.2025.11337294](https://doi.org/10.1109/BSN66969.2025.11337294).
- M. Cho**, K. Lee, and S. Kim (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, pp. 405–410. DOI: [10.1145/3526241.3530338](https://doi.org/10.1145/3526241.3530338).
- M. Cho** and A. Mashhadi (2022). “Caring Without Sharing: A Federated Learning Crowdsensing Framework for Diversifying Representation of Cities”. In: *Mobile and Ubiquitous Systems: Computing, Networking and Services*, pp. 601–616. DOI: [10.1007/978-3-030-94822-1_39](https://doi.org/10.1007/978-3-030-94822-1_39).

AWARDS AND FELLOWSHIPS

National Science Foundation Graduate Research Fellowship (NSF 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 

Undergraduate Research Conference Travel Award, University of Washington 

Dr. Charles H. Mitchell Scholarship, Seattle Central College 

HONORS AND MEMBERSHIPS

Officer, Association for Computing Machinery (ACM) 

Member, Tau Sigma National Honor Society 

Member, Mathematics Engineering Science Achievement (MESA) 

Member, Seattle Central Computer Science and Engineering Club

USPA, Current Georgia Powerlifting Record Holder for Bench (486lbs), Deadlift (705lbs), and Total (1731lbs)

TEACHING AND SERVICE

Aug 2022 – Dec 2022	Graduate Teaching Assistant, ECE 3005  Supported the instruction of ECE students in technical and professional communication, including writing, presentations, and teamwork skills. Provided guidance on technical writing style, document structure, and strategic communication for engineering contexts. Assisted in course administration and offered one-on-one mentorship to students.	Georgia Institute of Technology Atlanta, GA
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Jan 2022 – Sep 2022	Children's Volunteer 	Hands On Atlanta Atlanta, GA
	Participated in outreach activities connecting volunteers to nonprofits and schools to support education and community development for children.	
Apr 2020 – Jun 2022	Mentor, Reentry Support Program 	Seattle Central College Seattle, WA
	Provided mentorship for currently and formerly incarcerated students, fostering a welcoming learning environment and advocating for social equity. Supported educational access and assisted individuals in employment and housing stabilization efforts.	
Jan 2016 – Nov 2019	Academic Tutor	Centralia College Centralia, WA
	Provided tutoring support in multiple subjects, helping students strengthen foundational knowledge and succeed academically.	

TECHNICAL SKILLS & LANGUAGES

Languages: Python, C++/C, MATLAB, Bash, Lua, Java, SQL, L^AT_EX

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), Tagalog (Basic)

Last updated: October 20, 2026