

Alexander Metzger

<https://sanderger.com>

Seattle, WA 98195

alex@sanderger.com

My research aims to bridge gaps in information access for underserved languages and communities through a combination of algorithm design, machine learning, and edge device technology.

EDUCATION

University of Washington – 3.85 GPA, 3.97 in CS 09/22 – 06/26
BS/MS Computer Science and BS Mathematics, Graduate Compilers Teaching Assistant, UWSO First Violin Section, Accelerated Honors Math, Guest Lecturer [T7, T8, T9], NeurIPS reviewer, COM² Mentor.

AWARDS

[H2] **CRA Outstanding Undergraduate Researcher Award: Honorable Mention** 2025
[H1] **Akvelon Mentor’s Choice: Outstanding Leadership** 2023

FUNDING

[F6] **Mozilla Builders Accelerator** – \$39K research grant, \$35K cloud credits 2024
Youngest out of 14 founders and researchers selected from 44 countries & 100s of applicants. Featured on the Stack Overflow podcast with more than 2 million viewers. Praised as “most promising” by Silicon & Pulse.
[F5] **Microsoft Imagine Cup: Semifinalist**, \$5K cloud credits 2025
[F4] **Facebook AI for Health Challenge: 1st Place**, \$1K Prize 2025
[F3] **Google Research: Special Google TPU Research Cloud Access** 2025
[F2] **Nvidia Inception: Accepted Startup Founder**, GPUs 2025
[F1] **Clean Energy Institute: TARs Research Grant** 2025

RESEARCH EXPERIENCE

Ubiquitous Computing Lab – Advisor: Dr. Shwetak Patel Jun. 2024 – Present
Battery-Free DL on MCUs via Agentic Model and System Optimization. Embedded ML. [Link](#).
Goal: Automatically adapt Deep Learning models to ultra-low-power hardware/microcontrollers.

- Developed a novel model compression framework for hardware constraints in MCU accelerators.
- Co-first-authored paper submitted to ACM IMWUT [P6] analyzing applications including animal monitoring to prevent crop destruction, and wearables to assess linguistic development in toddlers.

CS 4 The Environment – Advisor: Dr. Vikram Iyer Jun. 2024 – Present
Multi-modal automated lifecycle assessments of consumer electronics. ML for sustainability. [Link](#).
Goal: Democratize access to environmental impact estimates and empower sustainable consumption.

- Co-authored study design and research papers [P2, P4] and designed the multi-modal pipeline.

ICTD Lab – Advisor: Dr. Richard Anderson Sep. 2022 – May 2024
Digital phone directory for subsistence farmers in rural Tanzania. ICTD. [Link](#).
Goal: Study the economic impacts of digital agricultural information systems in Sub-Saharan Africa.

- Co-first-authored the paper [P5] accepted to ACM SIGCHI 2024. Presented talks [T7, T12].
- Led team of 4 developers for the USSD server and later also the Android App optimizing latency by 40%.
- Designed a binary protocol reducing data costs by 70%, making the platform affordable for 10K farmers.

University of Washington – Advisor: Dr. Stefan Steinerberger Sep. 2024 – Present
Practical algorithms for graph embedding. Graph Theory, Algorithms, Combinatorics. [Link](#).
Goal: Compute the genus of the previously intractable (3, 12)-cage graph (turns out it is 17).

- Invented and implemented SoTA algorithm in C with visualization and verification in Python.
- Started as independent research and then reached out to Professor Steinerberger and Brinkmann.

PUBLICATIONS

[P6] – In Review to ACM IMWUT

Embedded ML, Wearables, Agents

Alexander Metzger*, Jiuyang Lyu*, Chun-Cheng Chang, Jiayi Shao, Emmanuel Azuh, Yujia Liu, Zachary Englhardt, Ethan Schwartz, Devin Mackenzie, Gregory D. Abowd, Edward Wang, Tingyu Cheng, Kurtis Heimerl, Shwetak Patel, Vikram Iyer, Zhihan Zhang. Battery-Free Deep Learning on MCUs via Agentic Model and System Co-Optimization.

[P5] – ACM SIGCHI

HCI, ICTD

Ananditha Raghunath*, Alexander Metzger*, Hans Easton, XunMei Liu, Fanchong Wang, Yunqi Wang, Yunwei Zhao, Hosea Mpogole, and Richard Anderson. 2024. eKichabi v2: Designing and Scaling a Dual-Platform Agricultural Technology in Rural Tanzania.

[P4] – ACM IMWUT

ML for Sustainability, CV, HCI

Zhihan Zhang, Puvarin Thavikulwat, Alexander Metzger, Yuxuan Mei, Felix Hähnlein, Zachary Englhardt, Gregory D. Abowd, Shwetak Patel, Adriana Schulz, Tingyu Cheng, and Vikram Iyer. 2025. Living Sustainability: In-Context Interactive Environmental Impact Communication.

[P3] – Pre-print, in review to Discrete Mathematics

Algorithms, Graph Combinatorics

Alexander Metzger* and Austin Ulrigg*. An Efficient Genus Algorithm Based on Graph Rotations.

[P2] – Pre-print, in review to ACM SIGCHI

ML for Sustainability, CV, Agents

Zhihan Zhang, Alexander Metzger, Yuxuan Mei, Felix Hähnlein, Zachary Englhardt, Tingyu Cheng, Gregory D. Abowd, Shwetak Patel, Adriana Schulz, Vikram Iyer. Towards Autonomous Sustainability Assessment via Multimodal AI Agents.

[P1] – University of Washington Student Research Paper

Topology, Graph Theory, Algorithms

Alexander Metzger. A Practical Algorithmic Approach to Graph Embedding. University of Washington. Department of Mathematics. Honors Thesis. <https://hdl.handle.net/1773/53829>.

TALKS

[T13] – In-Context Interactive Environmental Impact Communication

Oct. 2025

DUB Research Day, Seattle, WA [100s of attendees, only undergrad of 8 invited speakers]

[T12] – eKichabi v2: Designing and Scaling a Dual Platform Technology in Rural Tanzania

May 2024

DUB Para.chi Event, Seattle, WA [100s of attendees, youngest invited speaker]

[T11] – Deploying Speech Technology at Scale

Aug. 2025

Interspeech Conference, Rotterdam, Netherlands [2K attendees, 1 of 4 speakers invited for the science slam]

[T10] – In-Context Interactive Environmental Impact Communication

Oct. 2025

Paul G. Allen's Annual Research Showcase, Seattle, WA [100s of attendees, 3 posters and a talk]

[T9] – Embedded ML - Computer Vision Demo

Oct. 2025

University of Washington Embedded Systems Capstone Guest Talk, Seattle, WA [20 students]

[T8] – Computational Linguistics for Machine Aided Pronunciation Learning

Oct. 2024

University of Washington Computational Linguistics Group Guest Talk, Seattle, WA [30 PhD attendees]

[T7] – Designing and Deploying Digital Information Systems in Sub-Saharan Africa

Oct. 2023

University of Washington CHANGE Seminar Guest Talk, Seattle, WA [40 PhD attendees]

[T6] – Graph Algorithms and Optimization

Nov. 2025

Northwest Undergraduate Mathematics Symposium, Bothell, WA [30 attendees]

[T4&T5] – Graph Embedding and Genus | Speech Technology Built For Everyone, Everywhere

May. 2025

University of Washington Research Symposium, Seattle, WA [60 attendees]

[T2&T3] – The Future of Language Learning

Sep. & Dec. 2024

Mozilla Builders, New York, NY | Mozilla Builders, San Francisco, CA [500 attendees]

[T1] – Building Inclusive Speech Technology

Apr. 2025

DubHacks Next Demo Day, Seattle, WA [100 attendees]

WORK EXPERIENCE

Koel Labs – *Founder and CEO*

Aug. 2024 – Present

- **Raised \$100K in funding** (Mozilla, Microsoft, Google, Nvidia) for computational linguistics research.
- **Trained** SoTA NLP models, cutting streaming latency by 60% and doubling accuracy.
- **Managed** open-source team of 4 engineers and 6 researchers from CMU, UToronto, UT Austin, and UBC.
- **Established** strategic partnerships and research collaborations with 5 companies and 5 institutions.

Gooley.AI – *Software Engineer*

Jun. 2023 – Sep. 2024

- **Led** client communication and 4-member intern team, merging 70+ PRs across production ML pipelines.
- **Deployed** ML solutions to 10M+ farmers across 5+ countries, demoed to 193 world leaders at the UN.

Akvelon, Inc. – *Software Development Intern*

Jun. 2023 – Aug. 2023

- **Led** team of 4 to make 200K open-source contributions to 7 Microsoft repos across 27 pull requests.

LEADERSHIP

Seattle Tutoring Partners – *Founder and Research Mentor*

May 2022 – Present

- **Mentoring** research projects for High Schoolers, and collaborating on internationally recognized projects.
- **Developed** software for 500+ youth musicians and antenna software for 10K+ aspiring scientists.

Cascade Enrichment – *Technical Lead*

Sep. 2022 – Sep. 2024

- **Managing** certification and curriculum for 30+ tutors; developed online platform for 100+ students.

Design Build Fly – *Lead Computer Scientist*

Sep. 2023 – Sep. 2024

- **Coordinated** optimization algorithms and data analysis for 30 engineers; placing 3rd nationally.