Parker Carlson

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EDUCATION

University of California, Santa Barbara
Ph.D. in Computer Science (GPA: 4.00) — Sep 2023 – Jun 2028

Oregon State University
B.S. in Computer Science (GPA: 3.98; *summa cum laude*) — Sep 2019 – Jun 2023

CONFERENCE PUBLICATIONS

1. **Carlson, P.**, Xie, W., He, S., and Yang, T. Dynamic superblock pruning for fast learned sparse retrieval. In *Proceedings of the 48th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR '25)*, 2025. AR=28%
2. He, S., Xie, W., Qiao, Y., **Carlson, P.**, and Yang, T. Low-cost document retrieval with dense pseudo-query encoding. In *Proceedings of the 48th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR '25)*, 2025. AR=28%
3. Yang, Y., **Carlson, P.**, Qiao, Y., Xie, W., He, S., and Yang, T. Lstm-based selective dense text retrieval guided by sparse lexical retrieval. In *The 47th European Conference on Information Retrieval (ECIR '25)*, 2025. AR=23%
4. Qiao, Y., **Carlson, P.**, He, S., Yang, Y., and Yang, T. Threshold-driven pruning with segmented maximum term weights for approximate cluster-based sparse retrieval. In *The 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP '24)*, 2024. AR=21%; Outstanding Paper Award (Top 0.4%)
5. Yang, Y., **Carlson, P.**, He, S., Qiao, Y., and Yang, T. Cluster-based partial dense retrieval fused with sparse text retrieval. In *Proceedings of the 47th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR '24)*. ACM, 2024. AR=24%
6. **Carlson, P.** and Donnelly, P. J. Deep learning approaches for sung vowel classification. In *Proceedings of the 13th International Conference of Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART '24)*, volume 14633, pages 67–83. Lecture Notes in Computer Science, Springer, 2024, doi:10.1007/978-3-031-56992-0_5
7. Donnelly, P. J. and **Carlson, P.** Transposition of simple waveforms from raw audio with deep learning. In *Proceedings of the 12th International Conference of Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART '23)*, volume 13988, pages 341–356. Lecture Notes in Computer Science, Springer, 2023, doi:10.1007/978-3-031-29956-8_22. AR=36%

PROFESSIONAL EXPERIENCE

Apple Inc.
Machine Learning Engineer Intern — Jun 2025 – Sep 2025

University of California, Santa Barbara
Research Assistant — Sep 2023 – Present

- Conceived and implemented a two-level cluster pruning algorithm for sparse retrieval resulting in up to a 3x speedup for safe search and 10x speedup for approximate search. Under review for SIGIR '25.
- Developed an algorithm to improve pruning accuracy for cluster-based approximate sparse retrieval, resulting in over a 4x speedup compared to existing methods. Outstanding Paper Award in EMNLP '24.
- Designed an efficient hybrid retrieval algorithm. Found a 14x to 27x speedup over other disk-based methods like SPANN and DiskANN for on-disk LLM-based embeddings. Published in SIGIR '24 and ECIR '25.

Teaching Assistant — Aug 2024 – Present

- Taught lab sections for Intro to Computer Science, Parallel Programming, and Operating Systems.

Oregon State University
Research Assistant — Dec 2022 – Sep 2023

- Introduced the first successful models for classifying sung vowels by training neural models. Existing methods failed to replicate and methods for spoken vowels did not generalize. Published in EvoMUSART '24.
- Developed recurrent neural networks to transpose audio while maintaining timbre without spectral analysis. RNNs better preserved the timbre and phase of audio, but introduced noise. Published in EvoMUSART '23.

Micro Systems Engineering Inc.
Data Science Intern Jun 2022 – Dec 2022

- Created TIBCO Spotfire dashboards to provide analytics and quality assurance of manufacturing processes.
- Reduced manual data examination during root cause failure analysis by 95% using data mining.
- Presented analytic-enabled dashboards to 20 employees, including 5 department heads.

Viewpoint, a Trimble Company
Data Science Intern Jun 2021 – Sep 2021

- Created interactive Domo charts featured in Viewpoint's Executive QBR to inform market decisions.
- Forecasted spending in the construction industry using time-series analysis and machine learning.
- Optimized frequent SQL queries to reduce length by 64% and execute over 300% faster.

Oregon State University
Research Assistant Nov 2019 – Sep 2020

- Designed and implemented a library for efficient data processing for Tensorflow, used by 10+ lab members
- Developed technical tutorials for audio-based machine learning and Slurm used by 15+ lab members
- Engineered and implemented various deep learning models in Tensorflow, Pandas, and SKLearn
- Animated custom graphics to explain audio-based deep learning visually in Adobe After Effects

MENTORSHIP & LEADERSHIP

University of California, Santa Barbara
Early Research Scholars Program Mentor Sep 2023 – Present

ERSP supports undergraduates from traditionally underserved backgrounds in their first research experience

- Annually led groups of undergraduates to develop and complete a research project and present their findings
- Met with the students for an hour each week, giving lectures on important background material, answering research questions, solving technical problems, and providing career and academic advice
- Supported two students in developing their successful graduate school applications

Oregon State University
Academic Learning Assistant Sep 2020 – Jun 2022

- Assisted new college students in navigating university resources and cultivating strong academic habits
- Engaged with 200+ students, mainly first-generation students, women in STEM, and international students
- Organized and promoted several academic and professional skill-building workshops, with up to 40 attendees
- Led a team of six to write, film, produce, advertise, and distribute seven educational videos in two months

AWARDS & FELLOWSHIPS

UCSB Regents' Fellowship	AY2023; AY2027
UCSB Excellence in Computer Science Fellowship	2024
OSU URSA Engage Research Fellowship	2020
OSU Engineering Virtual Showcase - 2nd Place Industry Choice	2020

SKILLS

Programming Languages: Python, C, C++, Rust, Java, SQL, HTML, CSS, JavaScript
Packages: Tensorflow, PyTorch, Transformers, Numpy, Pandas, SKLearn, MatPlotLib, Seaborn, React
Selected Coursework: Information Retrieval, Operating Systems, Web-scale Systems, Distributed Systems, Deep Learning, Machine Learning, Data Structures & Algorithms, Linear Algebra, Mathematical Statistics
Communication: Led teams of 5+ both in-person and remote, presented to small (2-20) and large (100+) groups
Languages: English (native), French (DELF B2)