Sean Robertson

Postdoctoral Researcher - Automatic Speech Recognition (ASR)

Education

2022–pres **Postdoctoral Fellowship**, *University of Toronto/Data Sciences Institute*
- Developed customizable **PyTorch** package with **AWS** and **SLURM** integration to train and probe the degree to which temporal context impacts downstream performance of **self-supervised** ASR (⊙ scpc).
- Mentored undergraduate researchers in the development of a speech benchmark for a **low-resource language**.
- Actively developing specialized benchmarks and diagnostics for teasing apart the impact of **accent** on state-of-the-art ASR performance.

2016–2023 **PhD in Computer Science**, *University of Toronto*
- Taxonomized existing and derived new methods for **sequence-to-sequence transduction** in ASR, utilizing **Adaptive Monte Carlo** techniques (⊙ conditional-bernoulli).
- Discovered and implemented a brand-new neural network layer in **C++/CUDA** for ASR, trained on **Azure ML** clusters (⊙ cnn-mellin).
- Experimented with a variety of feature front-ends for both **end-to-end** and **hybrid** ASR (⊙ more-or-let), implementing a variety of **Digital Signal Processing** algorithms in **Python** (⊙ pydrobert-speech).

2013–2015 **MSc in Computer Science**, *University of Toronto*
- Performed **human-subjects experiments** to measure the efficacy of state-of-the-art **Computer-Assisted Pronunciation Training** algorithms in ecologically valid settings.
- Deployed **mispronunciation detection** algorithms for beginner learners of French.

2008–2013 **BCS Hons., co-op**, *Univeristy of Waterloo*

Experience

2022 **Conversational AI Project Consultant and Teaching Assistant**, *Vector Institute*
- Delivered tutorials on the state of speech technologies to industry partners.
- Provided consultation to industry partners to support their ongoing applied **Natural Language Processing** projects.

2020 **AI Engineer**, *Sun Life Financial*
Developed training materials, evaluations, and systems for internal ASR systems.

2014–2018 **Contract Work**, *Speax Inc.*
- Responsible for designing, developing, maintaining, and integrating the ASR backend of a **language learning** mobile app.
- Offered continual feedback on the development of the main gameplay loop with respect to the capabilities of the ASR system.
- Received press coverage in CBC's "The National" (🔗 link).

Refereed Publications

- **Robertson, S.,** Munteanu, C., Penn, G. (2020). *FAB: The French Absolute Beginner Corpus for Pronunciation Training*. Language Resources and Evaluation Conference (LREC). 6613-6620
- **Robertson, S.,** Penn, G., Wang, Y. (2019). *Improving Speech Recognition with Drop-in Replacements for f-bank Features*. Conference on Statistical Language And Speech Processing (SLSP). 210-222
- **Robertson, S.,** Munteanu, C., Penn, G. (2018). *Designing Pronunciation Learning Tools: The Case for Interactivity against Over-Engineering*. Conference on Human Factors in Computing Systems (CHI). 356:1-356:13.
- **Robertson, S.,** Munteanu, C., Penn, G. (2016). *Pronunciation Error Detection for New Language Learners*. Interspeech, 2691-2695.
- Rudzicz, F., Frydenlund, A., **Robertson, S.,** Thaine, P. (2016). *Acoustic-Articulatory Relationships and Inversion in Sum-Product and Deep-Belief Networks*. Speech Communication, 79, 61-73.

Workshop Proceedings and Non-Refereed Papers

- **Robertson, S.** and Dunbar, E. (2023) *Bigger is not Always Better: The Effect of Context Size on Speech Pre-Training*. arXiv preprint, `arXiv:2312.01515`.
- **Robertson, S.,** Penn, G., Wang, Y. (2019) *Exploring Spectro-Temporal Features in End-to-End Convolutional Neural Networks*. arXiv preprint, `arXiv:1901.00072`.
- **Robertson, S.,** Munteanu, C., Penn, G. (2016). *Language Learning Dialogue systems: Lessons in Proving Yourself*. Designing Speech and Multimodal Interactions for Mobile, Wearable, and Pervasive Applications, CHI.
- Minhas, U. F., Liu, R., Aboulnaga, A., Salem, K., Ng, J., **Robertson, S.** (2012). *Elastic Scale-Out for Partition-Based Database Systems*. IEEE 28th International Conference on Data Engineering Workshops (ICDEW), 281-288.

Awards and Affiliations

2023–2024	**Vector Faculty Affiliate Researcher**, *Vector Institute*	
2022–2024	**Postdoctoral Fellowship**, *Data Sciences Institute*	
2018–2019, 2021–2022	**Vector Postgraduate Affiliate**, *Vector Institute*	
2017–2020	**Canadian Graduate Scholarship – Doctoral**, *National Sciences and Engineering Research Council of Canada (NSERC)*	
2016	**Ontario Graduate Scholarship**, *Government of Ontario/University of Toronto*	
2014–2015	**Canadian Graduate Scholarship – Master's**, *NSERC*	