

Sean Robertson

Senior Researcher in speech processing

Education

- 2022–2024 **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**.
 - Quantified the role of **language models** in speech recognition 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-less](#)), 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**, *University of Waterloo*

Experience

- 2024–pres **Senior Researcher**, *Huawei Canada*
- Researching and developing prototype consumer technologies involving **speech processing** and **machine learning**.
- 2022 **Conversational AI Project Consultant and Teaching Assistant**, *Vector Institute*
- Provided consultation and delivered tutorials to industry partners in their ongoing **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.

Refereed Publications

- **Robertson, S.**, Penn, G., Dunbar, E. (2024). *Quantifying the Role of Textual Predictability in Automatic Speech Recognition*. Interspeech. 4029-4033
- **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., Aboulmaga, 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

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