Sean Robertson

Research scientist in speech processing

Experience

2025–pres **Research Scientist**, *Otter.ai*
Speech processing research and development for meeting transcription & assistant software.

2024–2025 **Senior Researcher**, *Huawei Canada*
Researched and developed prototype consumer technologies involving **speech enhancement**, **speech recognition**, and **large language models**.

2022 **Conversational AI Project Consultant and TA**, *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.

Education

2022–2024 **Postdoctoral Fellowship**, *University of Toronto/Data Sciences Institute*
- Developed customizable **PyTorch** package for training and evaluating **speech foundation models** (scpc).
- Mentored undergraduate researchers in the development of a speech benchmark for a **low-resource language**. (faetar-dev-kit).
- 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-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*

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Refereed Publications

- Ong, M., **Robertson, S.,** Peckham, L., de Aberasturi, A.J.J., Arkhangorodsky, P., Huo, R., Sakhardande, A., Hallap, M., Nagy, N., Dunbar, E. (2025). *The Faetar Speech Recognition Benchmark*. Interspeech. To appear
- **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., 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*

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