

Heitor R. Guimarães

Last Update June 6, 2026

heitor.guimaraes@inrs.ca • +1 514 553 8381
www.hguimaraes.me • www.linkedin.com/in/hrguimaraes
800 Rue de la Gauchetière O • H5A 1K6 • Montreal • Quebec

Summary

Machine Learning Scientist / Engineer with 5+ years of experience in academia and industry, working with Speech & Audio Generative Models, Foundational models, Domain adaptation, and their applications to downstream tasks. My research agenda aims to adapt these models for edge deployment, making them efficient and robust to distribution shifts. Authored 20+ scientific papers on venues like IEEE ICASSP, ASRU, NeurIPS, and others.

Research Interests

Machine Learning: Self-supervised learning, generative models, foundational models, Diffusion & Flow Matching, Multimodal AI, Adversarial robustness, Domain Adaptation, Model compression, Embodied AI, Reasoning
Audio & Speech Processing: Representation learning, Speech LLM, Vocoder, Neural Codecs, Keyword Spotting, automatic speech recognition (ASR), text-to-speech (TTS), speech enhancement, speaker verification

Education

Ph.D. Machine Learning / Speech Processing, Université du Québec (INRS) - 2026
M.Sc. Electrical Engineering / Speech Processing, University of São Paulo (USP) - 2022
B.Eng. Computer and Information Engineering, Federal University of Rio de Janeiro (UFRJ) - 2018

Work Experience

RBC Borealis MONTREAL, QC
Machine Learning Researcher Mar 2026 – Current

- Research on Tabular Foundation Models (TFM) for credit applications.

Meta REDMOND, WA
Research Scientist Intern Sep 2024 – May 2025

- Led ultra-low-resource speech enhancement research for smart glasses (< 500K parameters) via a DDSP vocoder, delivering a $\approx 19\%$ DNSMOS uplift and $\approx 5\%$ STOI gain upon current baselines.
- Published a paper at IEEE ASRU 2025 entitled "Improving Resource-Efficient Speech Enhancement via Neural Differentiable DSP Vocoder Refinement". [\[Link\]](#)

Adobe Research SAN FRANCISCO, CA
Research Scientist Intern Jun 2024 – Sep 2024

- Developed DiTSE, a Latent Diffusion Transformer for Generative Speech Enhancement, reducing hallucination (-47% WER) and improving quality (+24% MOS) over SoTA models. [\[Demos\]](#).
- Published a paper to IEEE ICASSP 2026 entitled *DiTSE: High-Fidelity Generative Speech Enhancement via Latent Diffusion Transformers* [\[Link\]](#).

Itaú-Unibanco SÃO PAULO, SP
Senior Data Scientist Jun 2018 – May 2022

- Developed a wide range of classical ML models, from conception to deployment, for the credit card business, impacting over 20 million users and generating more than USD \$60 million in revenue.
- Implemented a tool based on large language models to analyze client needs in chat and commercial WhatsApp conversations with their account managers, enabling more targeted business actions.

Selected Publications

For a more complete list: [\[Google Scholar\]](#)

- (i) **Heitor R. Guimarães**, Jiaqi Su, Rithesh Kumar, Tiago H. Falk, and Zeyu Jin. "DiTSE: High-Fidelity Generative Speech Enhancement via Latent Diffusion Transformers." IEEE International Conference on Acoustics, Speech, & Signal Processing (ICASSP) (2026). [\[Link\]](#)
- (ii) **Heitor R. Guimarães**, Ke Tan, Juan Ortiz, Jesus Alvarez, Prabhav Agrawal, Ashutosh Pandey, and Buye Xu. "Improving Resource-Efficient Speech Enhancement via Neural Differentiable DSP Vocoder Refinement." Accepted (to appear) to IEEE Automatic Speech Recognition and Understanding Workshop (2025).
- (iii) **Heitor R. Guimarães**, Mahsa Abdollahi, Yi Zhu, Ségolène Maucourt, Nicolas Coallier, Pierre Giovenazzo, Tiago H. Falk. "Benchmarking Self-Supervised Audio Representations for IoT-enabled Acoustic Beehive Monitoring." IEEE IoT Journal (2025) [\[Link\]](#).
- (iv) **Heitor R. Guimarães**, Arthur Pimentel, Anderson Avila, and Tiago Falk. "VIC-KD: Variance-Invariance-Covariance Knowledge Distillation to Make Keyword Spotting More Robust Against Adversarial Attacks." IEEE International Conference on Acoustics, Speech, & Signal Processing (ICASSP) (2024). [\[Link\]](#)
- (v) **Heitor R. Guimarães***, Mahsa Abdollahi*, Yi Zhu, Ségolène Maucourt, Nico Coallier, Pierre Giovenazzo, and Tiago H. Falk. "Adapting Self-Supervised Features for Background Speech Detection in Beehive Audio Recordings." IEEE International Workshop on Metrology for Agriculture and Forestry (2023). [\[Link\]](#)
Best Paper Presented by a Young Researcher Award
- (vi) **Heitor R. Guimarães**, Yi Zhu, Orson Mengara, Anderson R. Avila, and Tiago H. Falk. "Assessing the Vulnerability of Self-Supervised Speech Representations for Keyword Spotting Under White-Box Adversarial Attacks." IEEE International Conference on Systems, Man, and Cybernetics (SMC) (2023). [\[Link\]](#)
- (vii) **Heitor R. Guimarães**, Arthur Pimentel, Anderson Avila, Mehdi Rezagholizadeh, Boxing Chen, and Tiago Falk. "RobustDistiller: Compressing Universal Speech Representations for Enhanced Environment Robustness." IEEE International Conference on Acoustics, Speech, & Signal Processing (ICASSP) (2023). [\[Link\]](#)
- (viii) **Heitor R. Guimarães**, Arthur Pimentel, Anderson Avila, Mehdi Rezagholizadeh, and Tiago Falk. "Improving the Robustness of DistilHuBERT to Unseen Noisy Conditions via Data Augmentation, Curriculum Learning, and Multi-Task Enhancement". Efficient Natural Language and Speech Processing (ENLSP-II) Workshop - NeurIPS (2022). [\[Link\]](#)

Honors & Awards

- Best Paper Presented by a Young Researcher Award - IEEE MetroAgriFor 2023
- IEEE Signal Processing Society (SPS) Scholarship 2023
- CIFAR Inclusive AI Scholarship 2023 to attend the CIFAR DLRL Summer School
- Travel Grant from TD Assurance to attend the ICASSP 2023
- Finalist, spotlight oral presentation (top 8 out of 70+ papers) at the ENLSP Workshop at NeurIPS - 2022
- Scholarship for International Students INRS - 2022
- 2nd place in the L3DAS Challenge, Task 1 (Speech Enhancement) - 2021
- Scholarship from the Foundation for Supporting the Development of Scientific Computing - 2013 - 2015

Additional Information

Reviewer Expert Systems with Applications, IEEE TASLP, MLSP 2021-25, SMC 2023-25, ICASSP 2023-26

Mentorship Experience

- **Professional Master's 2023** - Co-supervised a student on adversarial attacks for speech emotion recognition.
- **MUSAE Summer Internship 2023** - Co-supervising one student on audio-based deep-fake detection.

Relevant Coursework & Summer Schools

- CIFAR Deep Learning + Reinforcement Learning (DLRL) Summer School - 2023
- Speech Communications (TEL250 - INRS / ECSE523 - McGill, A) - 2023
- Representation Learning (IFT6135 - Mila, A) - 2022
- Adversarial Attacks (TEL351 - INRS, A+) - 2022