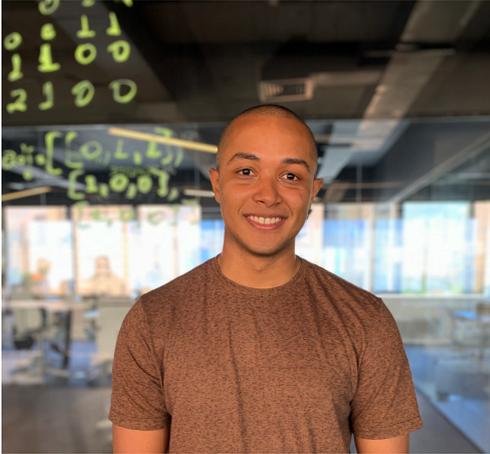


SMC eNewsletter's Student Corner Column (March 2026 Issue)

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In this issue of the Student Corner Column, we feature interview with a Ph.D. student who is making significant contributions to the fields of computer science and technology.



Heitor R. Guimarães is a final-year Ph.D. candidate at INRS (Université du Québec). He obtained his BSc in Computer Engineering from the Federal University of Rio de Janeiro and his MSc in Electrical Engineering from the University of São Paulo (Brazil). His research focuses on adapting large-scale audio foundation models for deployment in resource-constrained, real-world settings. During his Ph.D., he interned at Adobe Research and Meta Reality Labs, where he worked on generative models for speech enhancement. He is a recipient of the IEEE SPS scholarship. Prior to his Ph.D., Heitor worked as a data scientist at Itaú Unibanco in Brazil, supporting credit card operations and omnichannel communications for retail banking strategies.

1. Can you tell us about your academic journey and how you arrived at your current research topic?

I was lucky to be introduced to Machine Learning (ML) early in my undergraduate studies (around 2013), while working as a research assistant on image-processing projects for the Oil & Gas industry. That experience was my first exposure to research and sparked my interest in how data-driven methods could be applied to real-world problems. At the time, the use of ML methods in computer vision problems was already a very active research area, but fewer groups were working on audio. During a telecommunications course, I proposed a final project that later evolved into my senior-year thesis, in which I explored music genre classification using deep learning and compared it with traditional hand-crafted feature-based approaches.

From there, my interests naturally expanded to problems such as source separation and speech enhancement. These topics gradually led me deeper into speech processing and, more recently, into research on audio and speech foundation models. Since then, I have continued working in the field of audio and speech. I find the technical challenges fascinating, and what makes this area especially exciting is that there are still many open problems to explore. For students interested in machine learning, audio remains a rich and rewarding field with many opportunities for discovery.

2. What inspired you to pursue research in your chosen field? How do you see it impacting society and humanity?

When I started working with self-supervised learning for audio and speech, I was fascinated by how these models could learn meaningful features from large amounts of unlabeled data. What impressed me most was their versatility: once trained, they could be applied to a wide range of tasks and achieve strong performance on many established benchmarks.

However, I quickly realized that training and deploying these models often require a huge amount of computational resources. Many of the most advanced methods were developed in large industry labs or well-funded research institutions. This raised an important question for me: how can we reduce the barriers to entry and make these technologies more accessible to a broader community?

A second motivation came from reverse engineering and trying to better understand how these models work outside controlled benchmark settings. For example, what happens when they are deployed in real-world environments with noise or acoustic conditions that differ significantly from the training data? How robust

are they to unexpected inputs, or even to malicious manipulation? These are questions that a few other researchers in the field have also explored in recent years.

My research is motivated by the goal of addressing these challenges: developing audio and speech models that are not only powerful, but also more efficient, robust, and reliable. Ultimately, I believe that making these technologies more accessible and trustworthy can help bring advanced intelligent systems to everyday devices, enabling applications that support communication, accessibility, and human-machine interaction in meaningful ways, and that this is not restricted to large corporations but extends to society as a whole.

3. What motivated you to join the IEEE and the SMC Society?

The old idea that a scientist works alone and suddenly makes a discovery out of the blue no longer reflects how research actually happens today. Modern science is highly collaborative, and building connections with peers is a fundamental part of the process. For me, joining IEEE was a way to become part of a community of researchers, engineers, and builders who share a curiosity about complex systems and a desire to develop technologies that can have a meaningful impact. Through IEEE conferences, workshops, and seminars, I've had the opportunity to meet many inspiring colleagues from around the world.

4. How has being a member impacted your academic or professional journey?

Some of the most valuable experiences in my research journey have come from interactions at IEEE events: exchanging ideas, learning from others' perspectives, and sometimes even starting collaborations. These interactions led me to publish papers with peers outside my university and helped me learn more about research opportunities in industry, which later gave me the chance to pursue internships and further expand my experience.

5. Where do you see yourself in the next 5-10 years?

I hope to continue working as a researcher in an industry lab, but with a close relationship with academia. Both academia and industry offer exciting problems to pursue, and I deeply admire the role academia plays in advancing fundamental knowledge and developing new technology. At the same time, I enjoy the dynamic environment of industry and the opportunity to explore multiple ideas while seeing how research can quickly translate into applications that impact users within a shorter time window. What I find particularly exciting is how ideas developed in this environment can be tested at scale, allowing researchers to learn from user feedback and iterate faster on new approaches.

That said, I hope to maintain a close connection with academia by organizing events, reviewing papers, and mentoring students. I believe these interactions are essential, both to give back to the research community and to help young researchers discover the many paths available to them after graduation.

6. What advice would you give to other students considering joining IEEE or a specific society like SMC?

I would definitely encourage students to join IEEE and its societies. It is a unique opportunity to connect with their peers and senior researchers in the community, participate in events, and build meaningful professional relationships. This is the place where you will have the chance to talk with authors that you have been citing for years and have inspired you. It is also a great way to showcase your work, exchange ideas, apply for awards and scholarships, and discover new opportunities that can help shape your career.