I believe students are more motivated to learn in a class when they see the real-world applications of the fundamentals they are learning. Thus, my teaching philosophy is to balance practical applications with strong foundational knowledge at each teaching stage, from individual class organization to course syllabus design.

My most significant teaching experience was in Fall 2022, when I co-created and co-taught a class with my advisor Prof. Fadel Adib on wireless sensing (we called it "How to Wirelessly Sense Almost Anything"). The class aimed to teach wireless sensing to graduate students and senior undergraduate students. The course covered topics from seeing through walls and contactless vital sign monitoring to multi-modal sensing for augmented reality headsets and robots. The key challenge in designing this class was that it required advanced knowledge from different fields such as signal processing, mobile computing, wireless communication systems, and underwater acoustics. However, there isn't a single standard textbook that succinctly covers all such background material. To deal with this challenge, we structured the class to cover the fundamentals of wireless sensing for the first three weeks. Each week, we focused on one of three core components: communication, sensing, and power. In the subsequent weeks, we built on these fundamental concepts and included new background material such as FMCW signals and piezo-acoustic backscatter, as well as new state of the art systems such as WiStress and battery-free underwater camera. This allowed us to balance between teaching fundamentals, novel concepts, and state-of-the-art systems applications. Thus, it made the class engaging to students as well as equipping them with important concepts of wireless sensing systems. The class had extremely high ratings (even on its first offering) and I received 7 out of 7 in my teaching evaluation scores.

Co-creating and co-teaching this class enabled me to come up with a rubric for designing classes and syllabi that simultaneously create excitement about the topic while teaching students fundamentals and novel concepts. My teaching approach now involves 3 stages: 1) exciting students by demonstrating and discussing applications, 2) then investing time on teaching fundamentals, 3) finally teaching and discussing how these fundamentals are incorporated into the state of the art systems.

I applied this technique, when I was a guest lecturer in the Computer Networks class at MIT in Fall 2023. While this class mostly focuses on wired networking, the lecturers (Prof. Manya Ghobadi and Prof. Mohammad Alizadeh) asked me to teach the lecture on wireless and backscatter networking. I structured my lecture so that I first introduced students to the applications and their importance, then I taught them the fundamentals such as RF backscatter and piezo-acoustic backscatter. Finally, I showed how these fundamentals lead to the state of the art system such as an AR headset with non line of sight perception, and underwater battery-free imaging. At the end of the class, multiple students shared their ideas about new techniques to improve and extend the functionalities of underwater imaging and RFID localization.

Mentoring

Throughout my PhD, I had the opportunity to mentor five graduate, and five undergraduate students. I have found that the best approach, especially with mentoring more junior students, is to give them tasks with an increasing level of difficulty and ownership. For instance, I first start by carving out a part of the project for them to work on. I help them to segment it into smaller tasks, and I give them feedback over regular meetings to ensure they are well-equipped to make progress.

This is important because a well-defined task helps them to deliver and builds their confidence. As they progress and gain more experience, I give them more complex tasks, and with them, more ownership of the project.

My most rewarding mentoring experience was with Laura Dodds. I started working with her when she was an undergraduate student in our lab. Initially, she helped me with running experiments to test my RFusion system [SenSys'21]. That experience made her very interested in wireless sensing for robotics applications and she asked to be part of the subsequent project. So, we worked together over 6 months to build FuseBot, leading to her first publication in [RSS'22] as second author. Currently, I am working with Laura, now a PhD student in our lab, on a project where we are co-primary authors. This is a rewarding experience because it started with a mentee who was an undergraduate student and became my peer over time. Throughout this process, I have seen Laura grow as a researcher and become much more confident in herself. This is how I envision training my students in the future.

I recognize the importance of personalizing my mentoring style for each mentee through open communications. Aside from our regular project meetings, I arrange 1-1 meetings with each mentee every 6-8 weeks to discuss topics beyond research. In these meetings, I focus on understanding our method of communication, their workload, the aspects of the projects that excite (or bore) them, and explore ways to improve our mentor-mentee relationship. Through these meetings, I learned how to be a better mentor for each person, adapting our method and frequency of communication as well as their workload. As I transition into a professor role, I plan to continue employing this strategy of personalized mentorship and open communication in my group

Courses I can Teach

Given my research background, I feel confident teaching a variety of courses, including topics such as mobile and sensor computing (or an IoT class), embedded systems, wireless networks, user-focused sensing systems, as well as introductory classes in computing systems, signals and systems, signal processing, and machine learning.

Beyond these courses, I am interested in designing a new special topic course on machine learning for multi-modal sensing. First, I will focus on machine learning techniques for processing vision, RF, and acoustics sensing data. I will then introduce students to state of the art systems that combine multiple sensing modalities for enhanced perception. Towards the end of the course, I will cover the latest research in robotic manipulation and control, such as vision-transformer policies and vision-language-action models, and discuss how multi-modal sensing can improve them.

References

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