Teaching Statement

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My path to becoming an educator began early in my PhD when I was selected for UMD's prestigious **Future Faculty Fellowship**, a two-year intensive program that prepares doctoral students for academic careers. Through this program, I gained deep pedagogical training in course design, active learning techniques, and inclusive teaching practices. This foundation, combined with serving as a teaching assistant nine times at UMD, shaped **my teaching philosophy: making complex technical concepts accessible through interactive learning and hands-on experiences**. My dedication to student learning and innovative teaching approaches earned me recognition as an **Outstanding Teaching Assistant (top 2%)** among 2800+ teaching assistants.

Teaching Philosophy

My teaching builds on three core principles I developed through classroom experience and pedagogical training. First, I believe in **creating an interactive and engaging learning environment**. I regularly employ techniques like *think-pair-share* and peer instruction to encourage active participation. In my embedded AI lectures, students work in pairs to debug code and brainstorm system designs, leading to deeper understanding through collaborative problem-solving. Throughout, I've developed a toolkit of active learning techniques that consistently boost student engagement.

Second, I **connect abstract concepts to real-world applications**. In my wireless systems course, I demonstrate OFDM concepts using software-defined radios before introducing mathematical foundations. This approach helps students grasp the practical significance of theoretical principles. When teaching embedded AI, I start with demonstrations of wake-word detection on smartphones before exploring neural network architectures. Students consistently report that these real-world connections help them retain and apply complex concepts.

Third, I emphasize **learning through carefully designed hands-on projects**. Rather than just lecturing about distributed systems in my computer networks course, I guide students in building their own BitTorrent servers. These projects help students discover key insights themselves - an approach I've found more effective than traditional lectures. Through the Future Faculty Program, I learned to design projects that progressively build skills while maintaining student engagement.

Teaching Experience

My teaching journey began in my undergraduate years, where I noticed many peers lacked access to robotics resources. I co-founded the IEEE robotics chapter and secured funding to **build a makerspace**, teaching over **50 hands-on workshops** in embedded systems and robotics. The curriculum guided over **200 students** from Arduino basics to deep learning on Raspberry Pi, teaching me to break down complex topics and adapt to diverse learning styles.

Figure 1: Teaching a hands-on Embedded AI workshop in Spring 2023.

At UMD, I progressed from TA to course designer and mentor, supporting nine courses across wireless systems, computer networks, and data structures. In the wireless systems course, I created assignments integrating AI with embedded systems and developed technical workshops, including an **Embedded AI bootcamp**, a **TinyML workshop**, and a **Socket Programming tutorial** series.

Beyond traditional TA duties, I took help sessions addressing student struggles with embedded programming, focusing on sensor data collection and AI inferencing on Arduino boards. These sessions helped students turn projects into research publications at top venues, demonstrating the impact of hands-on teaching.

My commitment earned the **Outstanding Teaching Assistant Award (top 2%)** among 2800+ TAs at UMD. Students consistently praised my efforts: **"The TA's patience and willingness to work past office hours really helped me succeed,"**, **"I was really struggling until the TA showed us how to break down the project into manageable steps."** These responses affirm my teaching philosophy of combining theory with practical implementation and personalized support.

Mentoring

I have mentored several undergraduate, MS, and PhD students, helping them grow from initial research exposure to independent researchers. My mentees have published papers at top venues, continued to PhD programs at **UIUC, UW, and UMass**, and joined leading tech companies. My undergraduate mentees have achieved significant research outcomes.

Mahir Javeri's honors thesis on RF sensing led to a paper submission at a top conference. As a TA for the wireless systems course, I mentored **Usama Younus** in developing an eye-tracking system that resulted in an arXiv paper. These early research experiences helped students discover their passion for research and pursue graduate studies.

When **Irtaza Shahid** joined our lab during the pandemic, I adapted my mentoring to remote collaboration, helping him establish a home acoustic lab and conducting weekly debugging sessions. His research on noise-cancelling earphones led to a **ACM MobiSys publication**. I also mentored four talented undergraduates in developing novel embedded systems. Their projects - **IMUOptimize** for efficient motion sensing and **ThermWare** for thermal-based malware detection - resulted in prepreint and workshop publication at **HotMobile 2023**.

As a senior doctoral student, my mentoring of **Aritrik Ghosh** demonstrates my growth in understanding student motivation. Recognizing his RF expertise, I helped him expand into embedded systems through progressive challenges. This approach led to developing the first cellular-based battery-free localization system, published at **SenSys'24** (earning **Best Poster Runner-up award**), and a demo at **MobiCom'24**.

Through course projects, I've guided student teams to transform class work into research publications. The wireless systems course alone produced successful projects, including embedded security solutions and sensor optimization techniques published at top venues. In my future research group, I will maintain this hands-on approach while fostering an environment where students develop research independence. My experience shows that combining technical guidance with understanding individual motivations helps students reach their full potential.

Courses I Can Teach

My work in embedded AI, and mobile systems prepares me to teach courses bridging theory and engineering across levels.

Undergraduate Courses: I will teach core courses in Computer Systems, Computer Networks, Digital Signal Processing, and Embedded Systems, alongside foundational courses in Signals and Systems and Machine Learning. The ML course will emphasize practical implementations on resource-constrained devices, teaching students to deploy neural networks on microcontrollers while balancing model accuracy with hardware constraints.

Graduate Courses: At graduate level, I will teach Mobile Computing, Wireless Networks, and Sensor Networks, plus develop two specialized courses: **1. AI for Physical Computing**: Exploring physics-informed machine learning for nextG systems. Students will integrate domain knowledge into neural architectures, implement NeRF for 3D reconstruction, and develop physics-constrained models for perception. Projects combine multiple modalities including RF, acoustics, vision, and inertial sensors. **2. Intelligent Edge Systems**: Covering networking and systems aspects of edge computing, including distributed inference, intermittent computing, and tinyML. Students will build robust cyber-physical systems under power and connectivity constraints through practical projects.

To support these courses, I will establish an IoT systems laboratory with sensors, embedded platforms, and wireless devices, serving as a shared resource for courses, research, and interdisciplinary collaboration. This hands-on experience will prepare students for careers in autonomous systems and smart infrastructure.

Community and Outreach

I believe technology education and digital access can transform lives, especially in underserved communities. During my PhD at UMD, I led the **BRIDGE project**, a community-focused **initiative providing free WiFi in public parks**. The COVID-19 pandemic exposed the digital divide when students lacked online education access. Our solution transforms greenspaces into internet hubs, creating spaces where children complete homework and families access essential online services. This project exemplifies how **wireless networking research can directly benefit society**.

My commitment to accessible STEM education began during my undergraduate years, where I conducted **over 100 free workshops** on Robotics and AI for K-12 students in India. In 2017, I developed a K-12 robotics curriculum for Academic Heights Public School in India, fostering early exposure to hands-on technology.

Every year, I serve as a **judge at the Montgomery County Science Fair** and mentor UMD undergraduates in the **BIPOC research track** at UMD Hackathon. As a **Marconi Young Scholar**, I organize the Celestini Program competition, empowering undergraduates in developing countries to create social impact through technology, addressing challenges from healthcare access to agricultural optimization.

These experiences taught me how **technical expertise combined with community engagement creates lasting impact**. I remain committed to using technology education as a tool for social change.