Aditya Arun

Teaching Statement

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I am grateful to have had knowledgeable and inspiring mentors in my life, and more importantly, I have gained an understanding of the critical role this has played in my development. Apart from my parents, my high school STEM teachers (Sujatha Ramdas and Rohit Gupta), Prof. Anant Sahai[1] and Prof. Dinesh Bharadia have been critical in my development as a confident leader and independent thinker. Through my faculty appointment, **I aim to provide other students with the learning, confidence, and passion I imbibed from my mentors in an effort to pay my gratitude forward.** I have had the opportunity to TA the beginner electrical engineering course, EE16B, during my junior and senior years of undergraduate degree at U.C. Berkeley (4 semesters total). Most notably, I was the content TA, tasked to write new content for weekly lectures and questions for homework and exams during my senior year. Additionally, I have TA'ed a graduate-level wireless systems and communications course, ECE257B, at U.C. San Diego for one quarter.

These experiences and my background in wireless systems and robotics will help me teach **digital signal processing, embedded systems, sensing and estimation for robotics, probability, and linear algebra**. Moreover, my research and engineering experience has primarily taught me how to build end-to-end systems, combining hardware, firmware, algorithms, and software to deliver a specific application. However, I never had a chance to learn these essential skills through my various classes. I will develop and teach courses as a faculty to fill this learning gap. More broadly, I would like to develop classes that can help students learn how to build hardware systems through hands-on experience, how to break down larger problems and think systematically, and finally, how these broken-down smaller problems can be distributed within a team to achieve building the final application.

▬ Undergraduate and graduate student instructor

During the four semesters of teaching EE16B, I filled two roles – leading discussion sections and developing content for the class. These two roles fed into each other as I gathered insights from teaching discussion sections and incorporated changes into the course content throughout the semester. During the quarter of teaching ECE257B, I primarily held office hours to help students walk through problems, discuss class projects, and debug code. Through these experiences, I learned three primary lessons.

1. **Patience**: During my first semester of EE16B, I was given poor reviews about my impatience when answering questions and teaching the content. However, over the semesters of teaching, I got a better understanding of the incoming students' knowledge of the course material, which helped cultivate patience in my teaching.
2. **Empathy**: Similar to patience, I had to learn to empathize with a student's needs. I held a strong opinion that through struggle and grind comes learning. However, over the semesters of teaching, I have come to understand there is a threshold for the struggle beyond which learning stops. I am slowly understanding this threshold by being empathetic; however, I believe there's room for improvement.
3. **Intuition**: Building intuition requires me to often return to when I learned that specific topic, express my thoughts clearly, and adapt them according to the student's background. I enjoy this part of teaching the most, as I can relearn fundamentals and get gratification from watching the student arrive at the "aha" moment.

Some quotes that indicate my growth as a teacher:
1. "*Very good at answering student questions; often stays past the allotted time to make sure he gives a full explanation.*", EE16B Student, Sp 2018.
2. "*Aditya is super knowledgeable about the material and his boardwork is very clear. He also provides a lot of mathematical motivation for the material and intuition on how to think about concepts, which I really appreciated.*", EE16B Student, Sp 2019.
3. "*Interacts with students very well and gives clear responses*", ECE257B, Wi 2022.

▬ Research mentorship

My growth during my Ph.D. career has primarily come from three sources – reading papers and research articles, building systems, and mentoring and learning from other students. I have found the more students I work with, the larger percentage of my learning comes from mentorship. This **opportunity to continue mentoring students on independent research projects throughout my career is the most alluring aspect of being a faculty.**

Highschool students

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[1] taught and developed content for his iteration of EE16B

Over the past three years, I have worked with Polygence to mentor seven high school and one middle school students. Through a ten-session/three-month project, I guide students in carrying out independent research on topics of their interest. I help students ask the right questions to direct their research, provide insights on potential problems to consider and clarify technical questions that crop up during their research. This has been an immense learning opportunity as I have honed my skills to juggle mentoring multiple independent projects, inspire students to stick through the research grind, and actively listen to their weekly research presentations and questions.

Undergraduate and graduate students

Throughout my Ph.D. career, I have worked with and mentored over 20 undergraduate and graduate students studying at different U.S., Indian, and Japanese institutions. I took up a mentorship and leadership role to fulfill a need to work collaboratively in developing fundamental wireless systems for our research. I have particularly had the pleasure of mentoring Chenfeng Wu (B.S./M.S.), Minghui Zhao (B.S., Ph.D. at Columbia), Tyler Chang (B.S., M.S. at UCLA), William Hunter (B.S./M.S.), and Sureel Shah (M.S.), who have gone on to co-author papers within our group published in Mobicom, NSDI, IMWUT and ICRA. I have learned extensively from them, and I believe my mentorship has been valuable in their development as strong and independent engineers. I have also worked with undergraduate student organizations at UCSD to improve their wireless sensing and communication exposure. I recently helped organize and provide our open-source WiFi sensing hardware, WiROS, to the first in-person ECE hackathon "Hard Hack" held post-COVID. My team and I provided support throughout the 36-hour hackathon to help students bring up our hardware, teach the basics of wireless sensing, and be their sounding board as they worked through their projects. I have also worked with YonderDeep, a student organization, to help them improve their communications systems for their underwater robot systems using our 5G ORAN system. As with other projects, this opportunity has allowed me to learn and explore new topics in communications and the deployment of radio access network (RAN) systems.

These mentorship experiences have provided a testing ground for me to hone my capabilities as a mentor further. I have found a stark difference in my ability to achieve something and my ability to mentor someone to help them achieve the same goal. I have found the latter to be more challenging and more rewarding, as it requires strong interpersonal skills to provide motivation and direction to solve the problem. With the primary motivation to pay forward the opportunities and learning I have received from my mentors and teachers, I hope to continue to grow as a teacher, not just within the classroom but also as a research mentor. I believe a position as a faculty will provide the best opportunity **to continue improving my teaching skills, learning from others, and developing as a servant-leader**.