Teaching Statement

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Introduction

I have engaged in many different types of teaching experiences since grad school, including developing an entire curriculum for a practicum class, organizing and preparing two tutorials at top-tier conferences, and mentoring graduate, undergraduate, and high school students for research projects.

Curriculum Teaching

Teaching Experience. I have been involved in various roles in curriculum teaching. First, I have worked as a teaching assistant for undergraduate and graduate classes at UCSD and Cornell University. Second, I have taken a leadership role in developing the lab materials for an overhauled practicum class at UCSD. Third, I have organized two tutorials targeting junior researchers at top-tier conferences. Through all these experiences, I have developed my own philosophy of teaching, which I hope to apply to my future career as a professor.

Teaching Philosophy. I believe teaching is a service, and students are customers who invest their time to acquire skills and knowledge to prepare for their careers and lifetime goals. Although it differs slightly from typical customer service, where the goal of the service agent is to seek instant or short-term satisfaction, the goal of teaching ultimately serves the long-term satisfaction of students. In that regard, as a teacher, I believe curriculum teaching should be automated, approachable, adjustable, and renewable.

- *Automated.* There are many assignments and interactions that students must complete in a typical computer engineering class. Even though there are teaching assistants to help, evaluations should be automated as much as possible to reduce the workload of the teaching staff. I always encourage the use of automated scripts for grading lab assignments and envision that in the future, AI-based grading will play an important role.

- *Approachable.* Across many fields in computer engineering and science, there is a gap between the engineering details that need to be covered and the limited time a semester-based curriculum can offer—especially in systems and architecture, where new systems software and hardware stacks are becoming increasingly complex. This gap makes many classes less approachable for students. Many of the hidden, unwritten details and difficulties derail students from learning the key points and can lead to a loss of interest. I believe approachability is essential in teaching, and we should design materials so students encounter or spend less time on non-core issues. I put a great deal of effort into preparing class and lab materials. For instance, in my tutorial on RL for computer systems at ISCA 2024, where the focus is on applying RL to computer systems rather than on RL fine-tuning, I designed the lab such that fine-tuning is automatically invoked and transparent to the students, allowing them to focus solely on applying RL methods. The tutorial was well received at ISCA.

- *Adjustable.* I have experience at small private schools and large public schools and have interacted with students both before and after the COVID period. Students come from different backgrounds, levels of expertise, attention to specific classes, and career plans. I believe class materials should be adjustable based on the average student in class. For example, during COVID, we adjusted the course materials and merged four original labs into three, reducing the pressure on students.

- *Renewable.* Modern computer science and engineering is a rapidly evolving field, and both researchers and students need to keep up with the latest research and industry knowledge. Teaching

the latest material better prepares students for their careers. I have devoted significant effort to modernizing a decade-old laboratory class at UCSD. The class materials previously focused on digital design using Verilog, a language that is becoming less popular in the research community. We overhauled the entire course, designing labs using BlueSpec, a modern language that is more concise and easier to use. We created new labs, such as an elevator controller, a greatest common divisor module, and others. The course instructor, Arvind, who was visiting UCSD at the time, was pleased with the effort, and the course received positive feedback from students about BlueSpec. I believe that future teaching efforts should continue to incorporate the latest knowledge.

Classes to Teach. I have been the lead teaching assistant for two undergraduate classes, Digital Circuits Laboratory and Digital Circuits Design, at UCSD, and for one undergraduate class, Digital Logic and Computer Organization, at Cornell University. I have also been a teaching assistant for a graduate class, Secure Computer Systems, at Cornell University. I am comfortable teaching core classes in the areas of digital design, computer architecture and organization, as well as computer security. In addition to these core classes, my research interests focus on using AI for systems and security, as well as creating secure AI systems. I would like to develop a seminar class in that direction.

Research Mentoring

Mentoring Experience. Since grad school, I have been engaged in a lot of research mentoring experiences. At Cornell University, I have mentored Master of Engineering students as well as junior Ph.D. students in the lab. As a postdoc at UT Austin, I have also mentored undergraduate, master's, and junior Ph.D. students. Many of these collaborations have resulted in publications where the mentee is the first author or a contributing author. Throughout these mentoring experiences, I have developed my own research mentoring strategies, which will be valuable for mentoring students in my research lab.

Mentoring Philosophy. In academia, the primary goal of mentoring students in research projects is to equip them with the skills to eventually conduct and lead research projects independently. Through undertaking specific research projects under mentorship, students can acquire skills, knowledge, confidence, and mental endurance that are transferable to greater challenges in their careers and lives. My mentoring strategy can be summarized as *motivational, disruptive, supportive.*

- *Motivational.* I believe it is essential to motivate students to take the initiative rather than micromanage them in research projects. Original research projects are unpredictable and often involve a lot of trial and error. Traditional micromanagement, where the mentor closely instructs the mentee at every step, leads to inefficiencies. Instead, I emphasize students taking full ownership of their projects. Rather than asking me what to do, I encourage students to explore and identify potential solutions. This approach has been effective for several students. For example, one undergraduate student took the lead and implemented a project using reinforcement learning to find speculative execution attacks, which resulted in a paper submitted to IEEE CAL.

- *Disruptive.* I believe disruptive thinking is critical for original research, and I work hard to instill this in the students I mentor. I engage in deep discussions with my students to help shape their research ideas, aiming to identify concepts that are original rather than incremental and reasonable in terms of engineering effort. I also encourage them to consider questions like, "If someone else had better engineering resources but not the same idea, would they achieve better results?" This approach fosters research ideas that stand out, even with a proof-of-concept implementation. This strategy has produced substantial results. One of my mentees, an undergraduate, was able to identify a valuable research idea and wrote a 10-page research manuscript, which was submitted to MLSys, a top-tier conference, and later presented the work at the DefCon AI Village—an accomplishment even some senior Ph.D. students struggle to achieve.

- *Supportive.* As a research mentor, I provide the resources necessary for successful research. Research is a process of trial and error that requires endurance. Experiments may not work as expected, papers may get rejected, and submission deadlines may be missed. I am committed to offering both the practical resources and mental support needed to navigate these challenges.