Teaching Statement
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I look forward to working with students, both in and out of the classroom. Throughout my graduate education, I have been fortunate to have a number of opportunities, including serving as a teaching assistant for a senior-level undergraduate networking course and mentoring both undergraduate and graduate students on a wide range of research projects. Below, I discuss these experiences, along with thoughts on my approach to both teaching and mentoring.

Teaching

Approach My approach to teaching is shaped by one question: how can I provide the most added value to the students? This question does not have a single answer because it varies from student to student; for example, some students learn concepts directly from the textbook, while others require more personal assistance in understanding the core concepts. One benefit of attending a live lecture, as opposed to trying to learn the concepts from a textbook or a growing number of online resources, is that students can actively participate. There is no substitute for allowing students to ask specific questions about what is currently being taught. These interactions are not only for the benefit of the students to fill in the gaps in their understanding, but also serve as guides for instructors in refining their lectures. The instructor can also engage students with interactive problem solving to promote active learning, allowing the students in the class work together (with guidance from the instructor) to construct a solution from the ground up. This participation even extends beyond the students who actively participate; personally, I enjoyed working out the solution alongside the others, and even occasionally tried to contribute as well.

In structuring my lectures, I employ a mix of both slides that I have prepared in advance as well as the whiteboard. I find that slides are helpful to efficiently convey static information, especially when detailed figures are needed to convey and understand certain concepts. However, for the more interactive portions of the course (e.g., problem solving), there is no substitute for writing on the board since the exact content will always be different. Two different classrooms of students with different backgrounds and experiences may have different ways of approaching the solution to a problem, or even come up with different solutions.

Finally, both in my education and my research, I have continuously bridged across both electrical engineering and computer science. I strongly believe this breadth of knowledge across all layers has been invaluable to me in my work. Additionally, in an era where hardware advancements come in the form of new heterogeneous processing units (e.g., GPUs), it is more important than ever to provide students with an understanding of the functioning of lower layers of both software and hardware.

Experience As a graduate student, I served twice as a TA for Computer Networks (CMSC417) at the University of Maryland. This senior-level undergraduate course introduces students to the principles of networking, with a particular focus on the network, transport, and application layers. My role involved developing and grading project assignments, interacting with students, lecturing, writing and grading exams, and managing the other TAs.

I developed new project assignments that ranged from introductory assignments for implementing basic TCP/UDP clients and (concurrent) servers, to more advanced assignments that involved reverse engineering the network protocol for a chat application. In particular, the reverse engineering project has been well received by the students; we host a chat server and provide the students with a chat client binary that they use, along with traffic analysis tools such as tcpdump, to determine the network protocol and implement a replica server. These projects, along with a Git-based system I implemented for project submissions and grading, continue to be used in subsequent semesters for this course.

I supported students both in and out of office hour sessions to clarify concepts discussed in lecture and to address any questions regarding their implementations for the project assignments. During these interactions, I learned how (in many cases) it is important to not simply provide students with direct answers to their questions, but instead engage with them in solving the problem while guiding them in the right direction. These office hours have also provided a number of opportunities to share my own past and present research with interested students; in the future, I plan to extend such discussions to the courses I teach, providing students with an understanding of open problems in the area as well as my own ongoing work (which could serve as a conduit for student involvement).

I lectured in both the undergraduate (CMSC417) and graduate (CMSC711) networking courses on topics including wireless networking and error correcting codes. I also have had the opportunity to deliver
several guest lectures on my research, such as my work on Android power management to undergraduate students in the Programming Handheld Systems course (CMSC436), and my work on reliable on/off control of peripherals for smart devices in the Graduate Computer and Network Security course (CMSC818O).

**Courses** I can teach undergraduate and graduate courses in the areas of computer networks, operating systems, and computer/network security, as well as introductory computer science courses. In particular, I look forward to teaching the following courses:

- A graduate-level core operating systems course. As part of this course, I plan to include course projects that will help give students experience in modifying open-source operating systems.
- An undergraduate-level course on embedded systems that would serve to bridge the gap between hardware and software for many computer science students. I plan to include projects that span the various layers (hardware, driver, operating system, application).
- A graduate-level systems course with a focus on building secure systems that leverage recent advancements in hardware virtualization and security extensions such as TPMs, Intel SGX, and ARM TrustZone.

**Mentoring**

While working towards my PhD, I have had the opportunity to work with a number of students at both the undergraduate and graduate levels, on topics such as encounter-based networking and censorship-resistant communication. One such collaboration was with an undergraduate student Rohit Ramesh, currently a PhD student at UC Berkeley, as part of our ongoing work on encounter-based networking [1,2]. Rohit developed and built a battery-powered, embedded hardware node that could be placed in a stationary location to form secure encounters with nearby users’ devices.

In my experience as a mentor, I have found that fostering each student’s ability to act as an independent researcher is vital to their growth. There are several aspects to this. First, letting each student drive their own research gives them a sense of ownership over their work; this internal source of motivation is stronger than any external motivation I could provide. Second, I want students to gain confidence in the results that they generate, whether in the form of software programs that they built or experimental data that they collected and plotted. Ultimately, the quality of the results (and not the quantity) is what is important.

During graduate school and my time working at various government and industrial research labs, I have had the privilege of working on a wide variety of research projects that span many areas within electrical engineering and computer science. I strongly believe that developing skill sets across many disciplines is extremely beneficial. In some cases, my research in one area has even directly influenced another; our work on designing a privacy-preserving protocol for secure encounters [2] led us to discovering an inefficiency in operating system power management which we addressed in future work [3]. As a mentor, I would welcome students coming to work with me on a breadth of different topics.

**References**

