Teaching Statement

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During my years as an undergraduate and graduate student, I have been fortunate enough to interact with several great professors whom I consider role models as teachers and mentors. During graduate school, I enjoyed the first-hand experience of mentoring very smart and inquisitive undergraduate and graduate students. I believe, these experiences have prepared me well to take on the teaching responsibilities as a university professor.

Teaching Experience

During my first two years in graduate school, I gained teaching experience from being a teaching assistant for three undergraduate courses and one graduate course. In my first year, I was the lab instructor for an introductory programming course in Java (CS 302). I helped design the programming assignments for students ranging from none to intermediate programming experience. I also had to lead four laboratory sessions per week (75 minutes each) with 30 - 40 undergraduate students in per class. During these sessions, students were expected to solve one programming assignment with 3 – 4 milestones. From answering simple questions to helping them debug their code, my mission was to enable students to successfully complete these assignments with minimal handholding. Helping students progress on their learning curve to successfully complete these assignments was a really rewarding experience. I tried to build rapport with all my students to prevent any inhibitions on their part. I recall a difficult assignment where students were give a basic template of the classic Space Invaders game. They had to implement algorithms for spaceship movements, firing bullets and detecting spaceship-bullet collisions. Many students had difficulty in implementing the correct algorithms and I had to motivate the students towards identifying the bugs in their code. Once they were successful, many students stayed back in the lab, implemented additional features and kept playing the game. This helped me appreciate the importance of good mentoring in instilling self-confidence and passion within young students. The students gave me high ratings and encouraging feedback for my work as their TA.

During my second year, I was a teaching assistant for the newly offered mobile programming course (CS 638) attended by around 80 undergraduate and graduate students. This course consisted of both iOS and Android programming and I was the Android instructor for the course. The responsibility consisted of both classroom instruction and lab programming sessions. One of the most challenging parts of the course was to introduce students to this new programming paradigm. Furthermore, I was new to mobile programming myself and had to develop a deep understanding of this area in a short period of time. I appreciated the fact that teaching a new course required much greater rigor and command of the material than learning a course as a student. I developed assignments to quickly introduce students to various aspects of building Android apps -- creating UI layouts, writing background services, using network communication and event driven programming. For the programming sessions, I expended a lot of time and effort to create assignments with step-by-step instructions towards building simple applications such as a Photo Viewer and RSS feed reader. This material ensured that students were able to progress quickly with the course contents due to the hands-on experience and felt confident about their own abilities. Students had built interesting apps of their own by the end of this class, such as a Bluetooth based multi-player game, live bus tracker and a fitness app. Experiencing this transition over the course of a single semester was a great feeling. I also enjoyed brainstorming app related ideas with students and mentoring them towards building their own apps. Some of these students later became collaborators on my own research projects (e.g., Airshark).

In addition to being a TA, I gave many lectures for the graduate level wireless networking course (CS 707). They included lectures about wireless interference experienced by wireless LANs and techniques to mitigate these problems. Some of these lectures were based on my own research and the ensuing discussions with the young and energetic graduate students gave me ideas about progressing my own research work. This impressed upon me the fact that teaching is a complementary aspect of doing great research work.

Mentoring students during research projects

During the beginning of my graduate studies, I appreciated the perspectives that I learnt during my discussions with senior graduate students. In turn, I tried to give back by mentoring several junior students through discussions about their research work and collaborating on various papers. For my first research project, Insight, I worked with a senior undergraduate student (Michael Griepentrog) and fondly recall the stimulating discussions while working on the research paper and system deployment. Later, I mentored and supervised two undergraduate students (Nick Butch and Wes Miller) for the Airshark project. This project also won the second prize at the InterDigital Innovation Challenge 2012. More recently, I mentored two graduate students (Prakhar and Steve) on the WiSense project, which received good visibility in both the research community and industry. Google's Play Store featured the WiSense Android application. Finally, I collaborated with and mentored two junior graduate students (Srinivas Govindan and Nathan Moeller) while working on the WiSe project. This was an ambitious project involving a 9-month long deployment of 30 custom-built WiFi APs in Madison and was a great learning experience for everyone. Apart from research, I've also advised my junior colleagues about career related decisions, such as internships, jobs and applying to graduate school.

Teaching Plans

As a professor, I look forward to working with students of all backgrounds. I would like to teach both introductory and advanced courses related to my areas of expertise – introductory level computer networking, advanced computer networking, mobile programming, wireless networking and distributed systems. If needed, I'm also willing to teach courses in other related areas. Furthermore, my experience with prototyping systems during research as well as mentoring students should enable me to develop new and interesting course topics. I am a firm believer that classroom instruction should be complemented with extensive hands-on experience by writing code and building systems, especially for systems related courses. This helps students consolidate the concepts learnt during the classroom and gain confidence to apply them for solving problems.

I'm also interested in setting up a "Wireless Systems and Devices Laboratory". The goal of the laboratory will be to provide a venue for interested undergraduate students to experiment with ideas related to mobile and wireless networking. The lab will consist of mobile phones, tablets, embedded device platforms, wireless testbeds (smart router platforms) as well as workstations equipped with all necessary programming tools. I also hope to develop exercises through which students can introduced to a breadth of concepts – wireless networking protocols (IEEE 802.11, Bluetooth, ZigBee, infra-red), mobile programming frameworks, embedded platforms (Raspberry Pi, ALIX, Soekris), Software Defined Radios and Networks. The first set of undergraduate students trained in the lab will help build a larger community of passionate students. Engaging young undergraduate students early through this laboratory will also encourage them to work with graduate students on cutting-edge research topics as well as choose graduate studies for their future career paths.