Hayawardh Vijayakumar – Teaching Statement

My perspective is that teaching and research are two sides of the same coin. While research gains new knowledge, teaching disseminates gained knowledge. My experiences on both sides of the teaching divide – as a teacher and as a student – have both given me valuable insights into both the importance of teaching, and effective teaching techniques.

During the course of my graduate studies, I have been fortunate to have had several opportunities to teach. I co-designed and co-taught the graduate level computer security course (CSE 543) in Fall 2013, delivering the lectures in cryptography, software vulnerabilities and defenses, network security, intrusion detection and web security, and designed assignments on carrying out a man-in-the-middle attack on SSL, exploiting format string vulnerabilities, a few web security problems, and their corresponding defenses. I have delivered guest lectures in the undergraduate (CMPSC 443) and graduate (CSE 543) computer security courses, and also the advanced systems security course (CSE 544) at Penn State.

My teaching style is strongly practical. When teaching a topic, in addition to just presenting the subject material, I try to: (i) impress upon students the relevance and importance of the topic with real-world data, and (ii) supplement taught material with demos, where applicable. For example, after delivering lectures on software security, I had in-class demos on buffer overflow, return oriented programming, and how stack canaries and ASLR defend these attacks. Student feedback about the demos was very positive, and they said it helped them understand the topic much better.

I am qualified to teach undergraduate- and graduate-level courses in computer security and operating systems. In addition, I can teach introductory courses to computer science. I believe that teaching computer security requires a slightly different perspective, since security is not a topic in isolation, but a part of various systems. What is required is the integration of security into the design and implementation of various systems, and I believe I have sufficient insight to convey this to students. In course of time, I plan to develop a course on systems security that would deal with secure programming, operating systems and virtualization security. Initially, I would prefer teaching a computer security course, which would help me encourage students to join my research group.

I have also had the opportunity to advise students. I advised the master's thesis of a student on Web Security, which involved investigating content management systems (CMS) for attacks during resource access. We found that commonly-used CMSes do not integrate well with the operating system, leading to attacks such as authorization bypass. In addition, I am currently mentoring a junior Ph.D. student on his research.

I believe my experiences in designing and teaching courses, and mentoring students, have prepared me to be an effective teacher and advisor.