Anirudh Sivaraman — Teaching Statement

I believe teaching is central to an academic: instructing students in classroom lectures, mentoring advisees through research and career advice, and communicating ideas to industry during technology transfer.

My first formal teaching experience was in MIT’s undergraduate class on digital communication systems in Spring 2012. This class introduces EECS undergrads to several EE and CS concepts through a semester long study of digital communication from the physical layer through the transport layer. A unique aspect of the class was integrating both EE and CS perspectives by having EE faculty teach linear time-invariant systems and CS faculty teach routing and congestion control. While the EE material was new to me, I found the process of teaching students an excellent way to learn and clarify the material myself. I won the MIT EECS Frederick C. Hemie III Teaching Award for my efforts in this class.

I assisted in MIT’s graduate networking class in Spring 2013. My colleague, Keith Winstein, and I developed a congestion-control contest, where students worked in teams to create a congestion-control protocol for a cellular network. The students were given a trace of packet deliveries from a cellular network, which they used to train their protocol, which was then tested on a new testing trace. The goal was to beat Sprout [1], a protocol we had developed previously with the explicit goal of high throughput and low latency on cellular links. Two student protocols matched or outperformed Sprout on the specific goal of throughput divided by delay, providing a clear example of how integrating research with teaching can demonstrably advance the state of the art [2]. This contest has since been run in Stanford’s Network Application Studio (CS 344G) in Winter 2015 and Winter 2016, and in MIT’s graduate networking class in Fall 2016.

I co-lectured in MIT’s Introduction to Software Engineering in Java in January 2012. This is a month-long class during MIT’s Independent Activities Period, which prepares students for the software engineering class during the regular term. In addition, I also guest lectured on programmable routers in an advanced topics in networking seminar in Spring 2016 and MIT’s graduate networking class in Fall 2016.

I was privileged to work closely with several excellent students at various levels. I provided guidance as a senior graduate student to Tiffany Chen [3] and Ravi Netravali [4], when they were working on their master’s theses. I supervised Pratiksha Thaker [5], Somak Das [4], and Pauline Varley [2] as undergraduates. I have found that students are most happy and productive once they are emotionally invested in their own work. Getting to this point is not easy—and may in fact be the hardest part of graduate school—but it is well worth the effort and prepares the student well for the inevitable setbacks that accompany research. Thus, my role as an advisor would be that of a facilitator, suggesting research directions that I think are interesting and helping students get “unstuck”, but otherwise getting out of the way and letting them independently lead projects.

I would be qualified to teach undergraduate and graduate classes in computer networking and computer systems. I would like to develop a graduate class on router design that gets students to build real hardware for a router that could either be taped out as an ASIC or run on an FPGA at the end of the semester. While I find router design to be a fascinating area, it still remains tribal knowledge, localized to a handful of ASIC designers scattered across a few companies. I would like to systematize router design and make it more broadly accessible to students with the hope of attracting a larger number of students to the field.

References


