Teaching Statement

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The chance to interact with students through teaching is one of the main reasons I am pursuing an academic career. I have had the opportunity to teach courses in a variety of topics, ranging from an undergraduate computer graphics course, to an advanced graduate class in distributed algorithms for mobile wireless networks. My research background makes me particularly well suited for teaching courses in theory of computation, algorithms, distributed systems, distributed robotics and programming.

Teaching Experience

Very early in my academic career I had the opportunity to teach fellow university students. As a junior in college I was the head teaching assistant for the advanced computer graphics course. In addition to designing the problem sets, I also had the pleasure to guide and help the students through their final project.

While completing my masters degree, I was the head teaching assistant for the algorithms course. I found that it was especially challenging to come up with problems that teach the basic concepts of algorithms and data structures, while at the same time making the students feel that these concepts were relevant and important in the real-world. However these efforts paid off, since later I was told by the students the course had been their favorite of the program, in no small part because of the engaging problem sets.

During my PhD at MIT I was the head teaching assistant for the graduate courses in distributed algorithms, and algorithms for mobile wireless networks. Given the amount of overlap with my main research interests, in addition to holding office hours and designing the problem sets, I was also invited to lecture some of the topics. As part of the lectures I included a list of open problems and suggested possible directions to tackle them. I was glad to see that several of the students approached me after class and expressed interest in working on them outside the classroom. I was glad to learn that at least one of these projects eventually led to a publication.

At Harvard University I developed the online programming environment `kilobotics.com`, which is designed to lower the entry barrier to swarm robotics. The website provides both an editor and a compiler and allows potentially anyone to create and program a swarm of Kilobots in a matter of minutes. Our hope is that this project will allow other research groups to start experimenting with swarm robotics while avoiding the hurdles associated with embedded systems programming (which is all handled behind the scenes). This project will play an important role in an NSF outreach initiative in robotics whose aim is to accelerate the use and development of robots in the US.

Teaching Philosophy

My teaching philosophy builds on my own research, education and teaching experience. I believe that it is important to relate the course material to real-world problems, accommodating for the

background and interests of the students. For example, when teaching the course on distributed algorithms for mobile networks in 2010, I would use the then recent BP oil spill incident as a motivating example to study the distributed coverage control problem. This serves the purpose of keeping the students engaged in the classroom, as well as encouraging them to think about the problems in depth, and to continue thinking about them beyond the boundaries of the classroom.

When teaching theoretical courses it is particularly important to keep simple running examples that allow the students to understand the key ideas behind an algorithm or data structure. I am a strong believer that students learn more when doing than by watching, so well designed problem sets which are fun and yet challenging play a key role in helping the students learn a new subject. Puzzle solving is one of the aspects of research which I enjoy the most, which is why I always try to design problem sets in a way that makes the students feel like they are solving an fun puzzle and not performing a chore.

Although supervising undergraduates can often entail a lot of effort, I believe that it is well worth the effort since undergraduate research is a very important aspect of a student's life and it often yields new prospective graduate students or research contributions. When teaching graduate classes I always strive to dedicate the last minutes of the lecture to explaining the current research frontiers in the field, and if possible mention some of the most prominent open problems.

Finally, I am aware the not everyone participates in the class in the same way, and in particular some students are sometimes afraid to speak up in class. In the past I have found that it is possible to engage these students by utilizing online course communication software, such as Piazza. This allows even the most timid of students to ask and answer questions in writing, and in turn this is often translated into a more confident and open attitude in the classroom.