Teaching Statement

Mohan Sridharan

Education and outreach are important aspects of being an academic. Teaching is an enjoyable way to gain a deeper understanding of core concepts and establish well-motivated research goals. I use my research in robotics and artificial intelligence as tools to engage graduate, undergraduate and school students from diverse backgrounds in computing research, encouraging them to pursue advanced degrees and careers in science and engineering. My courses seek to train students to collaborate and discuss ideas with their peers, read and critically evaluate research, and develop innovative solutions to open research problems.

As a faculty member at Texas Tech University, I have developed and taught introductory courses, electives and research seminars in artificial intelligence, robotics, computer graphics, machine learning, human-computer interaction, and programming principles, for graduate and undergraduate students. My courses are designed to be challenging, training students to think and learn independently while sharing ideas and collaborating with their peers. I predominantly use assignments and projects to evaluate students instead of closed-book in-class exams. In the introductory courses, I use assignments to ground core concepts and include a final project that provides students the opportunity to solve real-world problems and explore research ideas. I have also introduced a service learning component in my introductory programming courses; undergraduate students in these courses have the opportunity to ground the programming concepts learned in class by mentoring school students and addressing the computing needs of the local community. My research seminars, on the other hand, train students to formulate and address significant research challenges. In such seminars, I use reading and programming assignments to bring students to the state of the art in the field, and then provide the freedom and guidance students need to explore their research interests. It has been my experience that if the bar is set high and students are encouraged to learn and ask questions, most students measure up to the high expectations. My courses therefore involve a considerable amount of student participation in discussions and presentations that seek to explain subtler details and provide a deeper understanding of the course material. Such an interactive environment also helps get the students excited about research and serves as a source of constructive feedback for research ideas. Designing and teaching such courses has helped me refine my teaching strategy, and I have been able to establish and achieve challenging research goals.

A considerable amount of my time is spent mentoring students and supervising their research projects. As a faculty member, I supervise graduate and undergraduate students on a variety of cutting-edge research projects that lead to dissertations, theses, and senior projects. My philosophy for research supervision is similar to my teaching philosophy: I encourage students to set challenging research goals, and give them the freedom, support and guidance required to achieve these goals. Prior collaborations with graduate and undergraduate students have resulted in award-winning algorithms, publications and presentations at premier venues, and the development of innovative tools for education and outreach. Mentoring students and helping them achieve their research and career objectives has been a rewarding experience.
My research in robotics also serves as an exciting and powerful medium for outreach activities. I conduct workshops and summer camps for middle school and high school students drawn from West Texas communities that are economically disadvantaged and have long-standing underrepresentation in science and engineering. I have co-developed a novel educational tool that integrates graphical programming with robotics. School students without any prior experience in robotics or programming can create graphical routines to solve problems in virtual worlds; these routines are automatically translated to support concurrent physical enactment on one or more robots. Middle school and high school students use this tool and robots to learn concepts such as data abstraction, problem solving and information processing, which form the basis of computing in engineering and science disciplines. Unlike educational efforts that focus on designing robots from existing kits or on programming in simulated domains, my outreach efforts thus focus on the building blocks of computing, i.e., key skills that will prepare students for advanced degrees and careers in science and engineering. School students also have the opportunity to help graduate and undergraduate students implement and evaluate algorithms, participate in robotics competitions that provide a hands-on learning environment, and contribute to research projects with significant broader impacts. Furthermore, my robotics research supports demonstrations at different venues, e.g., science fairs at local schools, presentations to external advisory boards, and field trips by organizations that mentor and host K-12 students from local schools.

In summary, my long-term teaching goals include the development of a broad range of courses in computer science and engineering. I am particularly committed to using robots for teaching courses at all levels. I look forward to further integrating my research with educational initiatives and outreach activities in order to enthuse, educate and inspire students from diverse backgrounds to pursue advanced degrees and careers in science and engineering. More details regarding my teaching plans and outreach efforts, including information on past achievements and future plans, can be found online:

http://www.cs.ttu.edu/~smohan/Teaching.html
http://www.cs.ttu.edu/~smohan/Outreach.html