

In the fall of 2007, the beginning of my second year at University of North Carolina, I sat in the library working on a paper while an idea spun in my head. I had been thinking about how I could combine my fascination with computer science with my passion for service and social justice for the better part of a year. I had come to believe – as I still do today – that access to technology in the developed world is a civil right, and an incredible tool for alleviating poverty and improving quality of life in the developing world. By that time, I had both learned about and developed my own criticisms of projects such as One Laptop Per Child, and I was eager to make my own contribution to efforts to bridge digital divides.

This intense brainstorming session planted the seeds of what would become Orangemesh, an open-source network management tool for wireless mesh networks. I had discovered a fascinating open-source project called Open Mesh, which was developing a complete, low-cost, zero-configuration, wireless mesh network system. I partnered with a non-profit organization working on expanding internet access in our community, and with other students interested in the concept we developed Orangemesh, a web-based tool for managing Open Mesh networks. With a special focus on features to help community wireless networks grow organically, our software soon had users globally. Today, I am still actively developing Orangemesh, and others have contributed code or built derivative projects.

As I became more involved with Orangemesh development and the Open Mesh community, I learned more about the ways people were using technology, particularly low-cost communication technology, to effect positive social change. In fact, my interest in networking, and systems more generally, was born out of this experience. I discovered projects that were using mobile devices to collect public health data and e-governance projects that were using technology to improve accountability in government. Yet most intriguing to me was some work I saw using commodity Wifi equipment to create communications links that were dozens, and sometimes hundreds, of kilometers long, creating an extremely low-cost, unregulated means of providing Internet access to remote locations worldwide. I believe strongly that one of the largest direct social impacts computers can have is the democratization of access to communication resources. The power of computers for disadvantaged populations is their ability to give voice to the voiceless, outside of the power structures which have caused those populations to be disadvantaged in the first place. When the costs of communication are reduced, individuals are more than able to take advantage of opportunities on their own. It is for this reason I've chosen to study networking, so I may help to design the new networks that will enable the ongoing democratization of communication the Internet has brought.

Yet, I realize that my goal of building systems with meaningful use for underserved populations is not solely an engineering or scientific problem; training and teaching are equally as important. As a computer science student, I unabashedly believe that being able to work with computers is one of the most exciting aspects of today's world, and I have sought to share that enthusiasm with the many introductory computer science students that come through the doors of the UNC Computer Science Department. To combat the often overwhelming feeling students get in their first programming course, I started a tutoring program for introductory CS courses, where upper level computer science majors hold open tutoring sessions for beginning CS and non-major students. By providing one-on-one attention and student-paced supplementary instruction, we've been able to help dozens of students, including many women and members of other groups underrepresented in computer science, develop deeper understanding of programming and comfort in their computer science courses. As the program's coordinator this year, I've sought to ensure it meets the needs of students and instructors, to develop metrics for

evaluating its impact, and to use my position on the Computer Science Club board to engage other majors in the tutoring program.

In addition to my tutoring efforts, I've been able to express my love for teaching by serving as a teaching assistant for a "Robotics with Lego" beginning programming course for first year students. I've had the opportunity to design assignments and exams, lead lectures, work one on one with students, and, of course, grade many papers. Being a TA for this course has shown me both the positives and negatives of teaching, as well as given me an opportunity to learn from my mistakes and improve my methods. Beyond the joys teaching can bring, I believe I have a responsibility to take an active role in the education of future generations of computer scientists, for the sake of the field, the students, and even my own personal and professional development.

In the last year, I've sought to put my interest in using technology for social benefit into practice by founding a student organization called Technology Without Borders, which seeks to close digital divides in all their forms both domestically and abroad. We have organized digital literacy training workshops with the homeless population and the Burmese refugee population in our area, teaching each group basic computer skills and educating them about resources that would be meaningful to each. We are currently in the process of building a community-based low-cost internet service provider for a low-income Latino immigrant community in a neighboring town, leveraging the resources of community partners, local government, and Open Mesh/Orangemesh to provide computers, internet access, and training to this underserved population.

Of course, my interest in technology has been only one facet of my undergraduate career. In my time at UNC, I've been involved in organizations as diverse as the Academic Affairs Committee of Student government, where I helped initiate an online advising evaluation system and the Renewable Energy Special Projects Committee, where I was one of the students responsible for managing a half-million dollar student fee-based fund for on-campus renewable energy projects. Most recently, I've served as a loan officer with the Community Empowerment Fund, a student-run microfinance organization serving the local homeless population – the first of its kind nationally. On top of my courses, research, and work experience, my involvement in organizations such as these have taught me how to apply my academic knowledge outside strictly academic contexts and how to carry a project from conception to implementation. Moreover, they have given me a firm understanding of the social context in which the systems we build operate.

These experiences have both motivated and prepared me for graduate study in computer science. I intend to pursue a career as a professor after obtaining a PhD, as I feel that particular career will give me the resources and flexibility to continue developing systems to bring access to computers and technology to underserved populations. The NSF Fellowship will greatly assist me in achieving this goal by providing support for my first years of graduate study, thus providing me the flexibility to be bold in my pursuit of my goal to bring meaningful access to technology to a wider portion of the world's population.