Numerous scholarships that recognized my academic achievements and community contributions helped me to attend MIT. In the community service arena, I am particularly proud that I was chosen for the Rotary Club Student of the Year scholarship, which values positive impact on society as highly as academic success. At MIT, my commitment to community service continued, but this time I was the recipient of the most benefit because of a program I volunteered for called CommuniTech. The insights I received were life-changing.

CommuniTech aims to bridge the digital divide between those who have the skills and resources to access computer technology and those who do not. CommuniTech is composed of two parts - Families Accessing Computer Technology (FACT) and the Used Computer Factory (UCF). As a FACT teacher I helped people through one-on-one basic or advanced instruction gain proficiency in using a computer. This tutoring confirmed that I really like teaching and can explain concepts well. People who had completed the program even continued to call me, eager to learn more. With UCF I refurbished computers that were given to the underserved participants.

It was very important to me to confirm that I want to teach, but I benefited the most from some needed grounding that the hands-on experiences with computer users gave me. While I have always had an interest in novel interfaces, FACT gave me perspective. FACT helped me to realize the real impacts better interfaces could have on society. The digital divide could be bridged not only by attempting to familiarize users with existing computer technologies but also by making the computer interfaces themselves adaptive based on awareness of differences in users' abilities, interests, and goals. Previously I dreamed about fanciful, grandiose interface ideas. As I became more knowledgeable about the real world of computer users, there was a logical progression to dreams about more usable personal desktop interfaces that would effectively help users manage their information and have productive experiences.

Two FACT students in particular guided the evolution of my ideas. Marie and Jacques had entirely different computer backgrounds and goals. Marie's complete lack of experience with computers made me realize the need for assistive software agents and the fact that assistance needs to be in terms of things that are familiar. Jacques on the other hand knew computer basics but had trouble completing his goals because he didn't know how to use certain programs or found their functionality inadequate. The contrast of Jacques's needs with Marie's made me realize that interfaces should adapt to the competency and intentions of the user. I therefore wanted to study in depth the principles of effective user interface development, which led me straight to a course called Laboratory in Software Engineering because of its emphasis on usability and the end user.

The first half of the course had weekly assignments, and while I always created programs that satisfied specifications and executed correctly, I also focused on ensuring that my software was as usable as possible and spent significant extra time implementing UI improvements and extensions that were not required. The second half of the course centered around a team project. I worked with two other students to create a program that played antichess, a chess variant, against a computer or human opponent. We worked hard to create an effective artificial intelligence engine and were very successful, winning the “Antichess AI Grandmaster” Award for best Antichess and Antiking AIs and winning the Antichess AI tournament and the Antiking AI tournament. During the development of our antichess program, I was also extremely interested in the user game play experience. I spent hours designing, implementing, and evaluating interface features, while paying attention to usability heuristics and never letting the UI get overloaded, distracting, or unnecessarily complicated. On my own, I decided to continually perform user tests on friends, and I used the results to improve existing features and guide my development of new
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ones. The resulting user interface received high praise from course instructors. This class validated my ability to create not only functionally correct software but also software that is useful and usable to an end user. It cemented my interest in human computer interaction and compelled me to seek related learning opportunities.

Since I had previously done research with the World Wide Web Consortium in MIT’s Computer Science and Artificial Intelligence Laboratory, I knew I was partial to this kind of learning. Thus I sought out research opportunities with the Spoken Language Systems group (SLS) and the Haystack group. I chose to work with SLS because we share the common goal of wanting everyone to be able to interact with computers, in SLS’s case via natural spoken language. With SLS, I developed an intelligent user profiling and recommendation agent designed to assist a user in her interaction with a conversational system that functioned as a restaurant guide. This furthered my knowledge of software agents and adaptive systems. With Haystack, I worked on development of a tool called Relo that helped users better understand and work with information, specifically source code. I learned about the power semantic data holds, researched how to present large amounts of information to maximize its comprehensibility, and studied how to give a user intuitive control over the exploration of that information.

As graduation approached, my Haystack advisor asked me to join a spin-off based on Relo. I currently work there as the lead developer and head of all experimental features, and my projects all build on my educational and research history. I have now reached the point where I am ready to explore my own research idea, and it is time for me to return to university study to do that.

**Intellectual Merit.** At MIT, I worked in multiple research groups and embraced volunteer opportunities in community service while completing an S.B. in Mathematics with Computer Science. For over 3 years, I have been immersed in research projects at an MIT spin-off where I authored publications and presented my research findings at academic and industry conferences such as OOPSLA and EclipseCon. Along the way, I gained experience as a teacher, mentor, and leader. I have the background and skills to be a pioneer in my field of research. My graduate research proposal is borne of these academic, volunteer, and professional experiences. They have also refined and focused my goal to create intelligent, adaptive systems that mine personal data with a context aware approach and use it to enrich end-user tools capable of better information management and proactive assistance.

**Broader Impacts.** My work with the Spoken Language Systems group made the use of a conversational system more effortless, contributing to a form of interaction that is natural and all-inclusive. With the Haystack group, my work deepened the field's understanding of how to make source code concept visualizations more manageable and meaningful, and it made a user's code comprehension activities easier. My work with Architexa transforms all phases of the software development process by augmenting how developers design, understand, document, and maintain source code and by introducing novel ideas for how people can communicate about code concepts and collaborate during software development. These research opportunities along with volunteer activities formed my commitment to develop increasingly intelligent, user-aware, and adaptive software systems that are accessible to all segments of society. Such interfaces by their very nature will improve the productivity and satisfaction of all levels of users, but they will particularly open up information technology to those traditionally alienated.

I hope to be awarded an NSF fellowship because it will provide prestige, generous funding, and freedom to take a multidisciplinary approach. With these vital elements in place, I will be able to convert a transformative research idea into a reality.