My experience hanging around CSAIL (Computer Science an Artificial Intelligence Laboratory) at MIT contributes to my strong desire to pursue advanced study. Were it not for my exposure to computer science at CSAIL as an undergraduate, I would not even be in the field of computer science today. I love the open academic culture, where people freely and enthusiastically talk about their research. Aside from classes and projects, I've learned the most from hanging around my advisor's office, participating in discussions with other students, professors, and visiting researchers about various topics such as differential geometry, how fly embryos develop, computer architectures, and theories on how different parts of the mind communicate with each other. The discussions about human intelligence and learning were particularly fascinating. From observing and talking to TAs, graduate students and professors, I knew that research was the life for me.

An experience that has prepared me for graduate research is my master's thesis work with VMware. For my thesis, I implemented system level x86 binary translation from 32-bit mode to 64-bit mode, which enables running 32-bit operating systems in 64-bit mode. Technical challenges aside, this project taught me how to work on and maintain a long-term project that involves many other people. While ordinary undergraduate projects rarely exceed a term in length or involve more than 5 people, this project involved understanding and building upon an intricate body of knowledge built up over 10 years by 30 experts. As an undergrad, I was always able to fit all the details of the projects I was working on into my head. In order to make progress on my thesis work, I learned to work with complex systems (which may not fit in my mind all at once) by constantly asking myself questions, generating and verifying hypotheses, such that I am quick to notice and investigate when a system or model behaves in an unexpected way. This skill of asking the right questions when given an intricate problem has already helped me quickly absorb existing ideas, and will continue to help me as I research new ideas.

The main skills I bring to the table as a researcher are my energy to explore and persistence. A good example of this is when, motivated by the opportunity of freedom to direct my own interests and studies, I decided to come to the U.S. for high school and college, leaving my parents and brother in Taiwan. With persistence, I adapted to life and studies in the U.S. and had an excellent time during high school and college.

Finally, I demonstrated my energy to explore when I entered the field of computer science. As with fencing, I had no exposure to computer science before I came to MIT. Most of my peers were already very experienced in the field of their choosing, and had been exposed to their field of interest at a very young age; the decision to leap into an unfamiliar field was a little

daunting. However, I did not let worries about my relative inexperience prevent me from entering computer science. Since my decision to pursue CS, not only have I done well in all of my graduate-level computer science courses, my master's thesis work has advanced virtualization, resulted in useful code that will be released next year (2010), and I was able to present my work at the 2009 International Symposium on Code Generation and Optimization's software and hardware co-design workshop in Seattle, WA.

My energy to explore defines everything I do in life, academic, and even non-academic pursuits. Matching this energy is the persistence to follow through. While many things interest me, I can make significant progress by concentrating on mastering one thing at a time. The ability to take intellectual risks and follow them through is especially important in research, where it often takes a very long time to get results.

Because I've enjoyed computer science immensely and I often wish I were introduced to the field sooner, I am planning a computer science workshop for an event called in the spring called "Expanding Your Horizons" (EYH), with the goal of stimulating interest in math and science in middle school girls. In the workshop, the girls will work in groups to create efficient algorithms for solving puzzles such as Nim, spanning trees, and shortest path. Afterwards, we'll explain a few common solutions and the concept of induction over invariants. The girls will hopefully depart excited by how computer science can be applied to efficiently solve problems in their day-to-day life. Furthermore, a special session for parents will introduce educational and career opportunities involving math and science.

In the long term, I want to have a research position at a university or company. While I have had some success with industry-related research, the experience has only encouraged my desire to push my intellectual boundaries. Advanced graduate study at a university gives me the opportunity to take more exciting intellectual risks. One of my long term goals is to contribute to understanding human intelligence and learning. I hope to find an area of computer science that I not only enjoy, but can be applied to further this long term goal. The NSF fellowship will allow me to explore different fields and different research approaches in computer science to find which one is best for me. An NSF fellowship will also allow me to focus more on research instead of teaching assistantships. While I have enjoyed being a teaching assistant in the past, as a teaching assistant I put in well over the 20 hours per week required on testing interesting assignments and grading. An NSF fellowship will not only allow me to choose my research projects, but also allow me to work more on research. With an NSF fellowship, I can choose which teaching assistantship positions I take, such that when I do teach, the subject matter is enriching for me as well as for the students.