

Personal History Statement

EECS MS/PhD applicant for Fall—2015

I still remember the strange feelings of inadequacy after receiving my B.S. in engineering. Surely, by then, I should have felt like a confident young engineer. I had the credentials, yet I still remember showing up to my new job with the fear of being discovered as some sort of fraud. Thankfully after six months or so, these feelings began to subside. I had the realization that my education was just beginning. Since then, I have been happily along for the ride. My time in industry has given me some remarkable opportunities to naturally develop into the engineer I naively expected myself to be following graduation. Now as I apply for graduate school, I expect, perhaps naively once again, that I will truly be ready upon arrival. I intend to show that my time away from school has provided me with invaluable experience in giving high stakes presentations, conducting laboratory research, and acting as a leader and mentor for other young engineers. All of these experiences should facilitate my success in Berkeley's EECS graduate program.

Three and a half years after first arriving at my job at Johnson Space Center (JSC), I was introduced to a NASA graduate intern named Zu Qun Li. I had been tasked by boss to help get Zu Qun up to speed so that he could help with my work on a software model of a candidate life support system design for a deep space habitat for astronauts. Zu Qun was expected to build a software model of a Sabatier Reactor in two months time. This reactor is a component within the life support system that recycles carbon dioxide and hydrogen into water and methane. As a graduate student at Penn State, Zu Qun was familiar with the underlying numerical techniques required to build such a model, but he was less familiar with some of the software design patterns that I was using to build the software architecture for the entire life support system. I showed him how to approach the problem in such a way that would lend itself well to this architecture. Additionally, I created materials for him to use to learn our set of tools and processes. Most importantly, I helped introduce him to some of the experts he would need to work with, and I peer reviewed his papers and presentations. Zu Qun finished the Sabatier Reactor model on time, and his exit presentation to NASA was well received. I am happy to say that he will be joining our team as a full time employee in January 2015. Mentorship, collaboration and peer-review are important aspects of graduate school that I believe this experience has helped prepare me for.

Another important asset in graduate school is the ability to promote and communicate your work to stakeholders. This is an area where I know I have an edge over graduate students that plan to attend immediately following their graduation. A significant aspect of my job is demonstrating my work to the people at NASA headquarters who directly fund our efforts. I give several of these presentations each year. I'm one of the few on the team who the bosses trust to present directly to the headquarter's management. At first, this was a scary experience for me. Now I accept it as just another important part of my job. This experience should serve me well in graduate school whenever I need to get people interested in my research, demonstrate progress to stakeholders, and represent the department at conferences.

Outside of work, I have continued to prepare myself for a graduate degree in EECS. After my work day, I take graduate night classes at a local university in topics related to computer engineering and electronics. My goal in doing this is not for a promised salary increase, but rather to fill in some gaps in my formal electronics education. An undergraduate Aerospace Engineering degree offers some broad training in electronics, instrumentation, and control systems. However, I have found that taking extra night classes can really go a long way. Of all the things I have learned from classes in signals and systems, computer architecture, and wireless communications, it is probably the time management lessons that will stick with me the longest. Working full time and taking classes is no easy task. I look forward to the day where I can focus primarily on graduate research. I know there's more to graduate school than taking classes, and I have done well to prepare myself to manage the time commitments to extra-curricular activities expected from a Berkeley graduate student.

One such activity that I still find time to enjoy is my involvement in hobbyist robotics projects. Myself and two NASA friends have formed a local robotics club in which we share access to lab equipment that we jointly own. 3D printers, signal analyzers, soldering equipment, and microcontrollers are some common examples of often used equipment. Projects tend to involve building various gadgets mostly for fun. Some examples include a tachometer for a friend's car, a wireless IMU sensor platform, and various remote controlled vehicles. Probably the most impressive project is a flight controller for a custom built quad copter. The

most enjoyable memory I have from that project is spending all night in the garage working on a problem related to sensor fusion. Before we could achieve good control, it was critical to get reliable measurements of the vehicle's orientation. I worked late into the night attempting to apply a quaternion based gradient descent algorithm that I had read about in a research paper on adaptive filter implementations for IMUs. After a few adjustments to the algorithm, and some debugging with the signal analyzers, I was finally able to get it to work around 7 AM the following morning. Seeing clean roll, pitch, and yaw measurements coming in for the first time was a great feeling. After all my time spent in that garage, I feel confident that I could be a great asset in a legitimate research laboratory.

I feel that I have matured a great deal as an engineer after departing U.T. I confidently welcome the unknown challenges that lie ahead in my career. Since graduation, I have filled my time with productive activities for an aspiring graduate student. My time in industry has provided me with some unique opportunities that should serve me well as I transition back to academia. I am eager for the opportunity to attend Berkeley, and to start the new chapter in my engineering development.