My desire to pursue a PhD in Power Engineering has been an unusual journey. Let me tell you my story.

By the time I was 8, I had live in 4 different countries (Uruguay, United States, Mexico, and Spain) and was completely fluent in Spanish and English. Already at this young age I had seen how big the world was, and lived in a variety of cultures and lifestyles that most people don’t get to experience in a lifetime. I understood the world was bigger than my small bubble, and that not everyone came from the same walk of life with the same opportunities.

I always loved solving problems and knowing how things worked. In 6th grade I tried to join the Math club, because I wanted to do more math problems after school. Unfortunately my teacher informed me that the club was for students struggling with math and needed extra tutoring. The following year the school offered advanced math courses, which have always been my foundation of how to study and work hard at concepts that were difficult to understand.

Entering High School, I committed to the pre-engineering to learn about different engineering disciplines. We completed small projects with teams. My favorite project was building toy bridges out of balsa wood to test how much weight different designs could carry. We also learned simple circuitry in a robotics class, learned how to draw in CAD, and designed a 3D printed toy telephone.

I knew I wanted to be an engineer so I attended Pitt for their engineering school. I was drawn to the physics, but also to the unlimited applications of electronics, so I decided on Electrical Engineering. I wanted to focus on hardware, because it seemed to be the perfect mix of physical constraints and unlimited possibilities of coding.

After my second year of college I pursued a summer internship at a Pennatronics, a high quality circuit board manufacturing company. It opened my eyes to how circuits were produced, but the bottom line was making money and I felt like the technicians at the company were compensated unfairly. In order to get more work experience I decided to attend a Cooperative internship through the University of Pittsburgh, where I ended up at Bridge Fusion Systems, a tiny electrical engineering consulting company that was able to complete projects outside the scope of companies that hired them. Since I was only the third employee at the company, I worked on meaningful projects. I built test fixtures, designed circuit boards, programmed microcontrollers and learned multiple coding languages. Learning how to start, develop, debug, and complete multiple professional projects was an invaluable experience that I will never forget. Still, the end product was just supporting larger companies, and though the work was fun, there was not much focus on giving back.

I decided I wanted to try my hand at undergraduate research. So I reached out to Dr. Thomas McDermott, and was sponsored by the SSOE undergraduate research internship program for the summer of 2015. This was my introduction to the field of Electric Power. That summer, I started what would become a 3 summer project. The goal was to develop a method to convert Duquesne Light Company’s (DLC), the local electric utility in Pittsburgh, distribution circuit maps into models. That summer I spent learning the capabilities of AutoCAD and OpenDSS, an open source electric power distribution system simulator, and I was able design and code a procedure to build a single connected model. Though I had made a lot of progress, the project was incomplete and there would not be anyone to finish what I had started. So the following summer Dr. McDermott sponsored me as an undergraduate research assistant to improve my method, and by the end of the summer I was able to construct 7 models.

Around this time I decided I wanted to move to Phoenix, Arizona to live closer to my grandmother because she had been diagnosed with Alzheimer’s and was aging quickly. My Aunt, who was her primary caregiver, was also running a business and raising her teenage son and I knew I was the only one in the family that would be able to offer much needed support. I had been in Pittsburgh over half my life and I knew that I had to venture away because I feared getting stuck in my comfort zone. At the time, I was still unsure of where I wanted to take my career but on top of helping my grandmother, Phoenix had a lot to offer in terms of job and schooling opportunities.

Entering my last year of undergrad at Pitt the research project was still incomplete so I decided I would pursue an internship at DLC the summer after I graduated. My goal was to finish the project at DLC and then move to Phoenix to begin my adult life. With some guidance from one of my co-workers, I was able to build accurate and useful models in OpenDSS. This project originated because distribution circuit models were the only way to adequately assess the impacts of photovoltaic generation (PV) on a system, so I developed and conducted studies to assess the DLC’s two circuits that had the most PV penetration. Because the method of building models was unique and did not require any Geographic Information System data, we decided to publish a conference paper on the project, where I was the primary author.

While preparing to move to Phoenix, I was still struggling to decide what I wanted my future career to look like. I had a few phone interviews with hardware and software companies in Phoenix, but the products they produces were for bigger companies with lots of money, and I could not see myself devoting my time to this type of work. This all changed when I went on a three day backpacking trip with my father in the Rocky Mountains. Nearing the completion of the hike, I climbed up to a vantage point and was completely isolated. I could not believe the beauty and the grace of my surroundings, and in that moment I decided I need to devote my career to make sure that what I was currently seeing, would be there when I came back in 20 years. Working at a utility that summer, I was learned about many of the challenges utilities are facing at integrating PV into electric grid. So I decided that I would devote my career to working within the power sector and solving the problems of integrating renewable energy into the current system.

I remained fully committed to moving to Arizona to fulfill the promise I had made to my grandmother 2 years prior but my project had gained some traction at DLC and begun to produce results. This led to a job offer from DLC, as the first and only remote employee at the company. As a remote employee, I have been able to create circuit models that DLC engineers can use to study our system, and I have continued to broaden my knowledge of an industry that is at the beginning of going through substantial change. Though I can see a future where I work at DLC for my entire career, I want to use my knowledge and talents to positively impact a greater scope of humanity, and solve problems that all utilities are facing, rather than just one.

Because of the flexible schedule that came with being a remote employee

My life goal is to work toward providing free renewable energy to world, starting with communities with the most need.

My contribution to broader impacts of science have been using my skills to improve and advance projects with my lab teammates. At Pitt I was able to use the experience I gained working with microcontrollers in the Sustainable Design Lab. I joined a small team of undergraduate students working on building low-cost microcontroller-based air quality sensors. My teammate’s backgrounds with microcontrollers were limited, and circuits being built for the sensors were difficult to debug and tedious to build. I was able to identify problems with the circuits, and recommend changing the implementation of the project leading to more resilient and accurate sensors. Another team in this lab was testing how ultraviolet LEDs could be used to decontaminate water. But their circuit design, and implementation was preventing the LEDs from being operable. I was able to redesign their code and adjust their circuitry so that they could control and record the intensity of the light. Working in this lab allowed me to collaborate with engineers outside of my field of study, and learn how to apply my skills to projects that can have real positive impacts.

In my free time I routinely tutor my younger cousin with his Algebra and Geometry homework. He has a lot of potential, but is a typical teenager who struggles to care about anything other than video games. During our tutoring time I am able to impart some of my young wisdom and life advice. By building a bond with him I hope to nudge him in the direction of enjoying school, building empathy, and fulfilling his dreams of going to a prestigious east coast college. Though I’ve spent most of my college and post college career working on projects, this has given me the opportunity to work on a person. Being a positive influence on my cousin has been one of the most rewarding experiences in my life and fostered a passion to make people better. I am excited to bring this passion towards helping my future students as a teaching assistant during my graduate studies.

The Graduate Research Fellowship would give me the means to pursue my passion for renewable energy. It would let me

What has been my contribution to the broader impact of sciences?

Tutor younger cousin on math homework

Tutor friends in classes at Pitt

Tutor friend about python coding at Pitt

Helped build and debug circuits in a lab at Pitt

Give back besides science:

Coach impulse over the summer

Coach ASU Frisbee this year