It is a fact that we are approaching the physical limit on the miniaturization of transistors and it will soon be necessary to design innovative architectures and technologies in order to keep up with Moore’s Law and continue to make better computers. Although my studies as an electrical engineer have given me a deep understanding of how today’s CPUs work, from the molecular level to the global network level, but it was my personal curiosity that led me to branch out to other paradigms that force me to question every aspect about conventional electronic design.Some of these technologies include carbon nanotube transistors, quantum computing, and neurosynaptic computing. As stated by the influential computer pioneer, Alan Kay, “the best way to predict the future is to invent it.” I anticipate that neurosynaptic computing architecture will be a significant player in the future of computing, and I plan to be involved in the development of this technology.

As we approach the physical limit on the miniaturization of transistors, it will soon be impossible to keep up with Moore’s Law. I believe that Neuromorphic Computing is a fascinating idea and expect to see it enter the marketplace in my lifetime. Whether there is a breakthrough with quantum computing or a replacement for the transistor, I believe that Neuromorphic Computing could have certain significant advantages that will ensure its dominance, or at least survival, in the future world.

I spent my undergraduate career learning about how to design, build, and implement conventional CPU’s, despite their inefficiencies in bottle-necking data, susceptibility to data corruption, and power consumption. The human brain has evolved into an immensely complex data processing system that uses a fraction of the power that computers use and can perform tasks such as visual and auditory recognition much better than a computer. However, the brain, as far as we know, works fundamentally differently from a CPU in that data is robust in the way that it is distributively encoded and neural networks provide rapid and parallel data processing. In addition to the virtually endless creative applications people will apply this technology to when it is readily available, neuromorphic computing will be useful in computer vision, data processing, personalized education, and biological research. I imagine that digital logic could become a minor elective, if not obsolete, in the standard Electrical Engineering curriculum.

However, it was the result of many eclectic research and internship experiences that led me to converge on these interests. My first real research experience was at Pennsylvania State University designing and building MRI microcoils for imaging individual cells. Although this project was academically interesting, I later found other kinds of work that I enjoyed more.

The next summer, I was accepted into the NanoJapan program through Rice University. Shortly after accepting the position, I was accepted as an intern at SpaceX, which I wanted more than anything else. In order to be able to do both, I decided to take two consecutive semesters off of school.

Because of concerns over the Fukushima incident, I conducted research in the Ajayan Lab at Rice University rather than at Tohoku University in Sendai, Japan. Although I did not get a chance to immerse myself in Japanese culture and practice my Japanese skills that I spent about three years developing, I gained a lot of experience working with graphene and nanomaterials for energy storage applications. Immediately after, I went to Los Angeles to work in Avionics Integration at SpaceX. This juxtaposition of fundamental scientific research and results-based industry work had a profound affect on my academic trajectory. While research at Rice was exciting and cutting-edge, seeing my work fly to space at SpaceX was enthralling. While research was full of dull moments waiting for chemical reactions to occur, SpaceX moved so quickly and put me under so much pressure that it was sometimes difficult to catch my breath. I decided that nanomaterials was not a field that I would enjoy spending the rest of my life in, nor was Avionics Integration.

One of my SpaceX projects, however, threw me a bone. I worked on the thermal imaging systems that monitors temperatures of the vacuum nozzle on the second stage of the F9R rocket. This sparked a heavy interest in photonics and led me to take a Photonics class at my university and apply to the Optics in the City of Light REU through University of Michigan. My project was designing and characterizing a full-field optical coherence tomography setup that could be coupled with optical tweezers for cell-level biological studies. Although I found this to be the most interesting and exciting work up to that point, I was still not satisfied settling on photonics as a career. I was developing a deep interest in computer and information science at the time.

I returned to SpaceX the next summer in the Hardware Development department to see if I would enjoy the hardware-software interface in industry. Although I found, for the second time, that SpaceX is not where I want to establish my career, I had the chance to work on a project that employed a small amount of machine learning in order to automate certain parts of the rocket design process. I loved programming the various algorithms and continued to learn more about the subject.