

College Statement of Purpose

I grew up in the nurturing environment of campus life, surrounded by the busy atmosphere of scientific research and innovation. As both my parents are faculty members at the Beijing Institute of Technology, I was impressed by academia at an early age. Since childhood, I enjoyed reading all kinds of books related to science and autobiographies of famous scientists, satiating my curiosity for the unknown.

When I was honored to be admitted to the University of Science and Technology of China, I chose Physics as my undergraduate major, as I considered physics to be the foundation of all science. However, I later regretted this choice. Especially as most professors in China barely interact with students during lectures, I found it difficult to grasp the essence of courses such as Thermodynamics and Quantum mechanics. After two years, I determined that Physics was not my field of greatest interest. As it was too late for me to transfer to another major, I devoted myself to laboratory experiments and research.

In my last two undergraduate years, I actively participated in many scientific research projects at the Laboratory of Plasma Physics. Even if I was not moved by Physics coursework, I found myself fascinated by research. In my senior year, I designed and created a new model of a plasma torch from scratch, which increases both discharging power and duration. This one-year project, along with my other research experience, improved my theoretical knowledge and practical abilities, while sharpening my skills to analyze and break down problems. In this way, I have laid a sound foundation for my future study and research.

After completing my undergraduate study, I was accepted into the MS program in Material Science and Engineering at Boston University. In my first semester, I took a course in C++ programming course to build a basic programming foundation for scientific simulation. Before this course, I had thought programming was just about writing codes. However, after the first few lessons, I was deeply enticed. In addition to coding, programmers can represent everything as objects, functions, and variables, and then use these to form different abstract logical systems. Unlike physics, the logic of Computer Science is straightforward and the intuition behind it is clear. I found this to be such a beautiful and interesting area, and I was thirsty to learn more.

I immediately switched my major to Computer Engineering, the closest program related to Computer Science inside the Engineering department. I had zero prior experience in this area, and it took a lot of time and effort for me to catch up in this Master's-level program. Nevertheless, I never regretted this decision, as I had finally the subject to which I wanted to devote my academic career.

Over the next two semesters, I collected the majority of missing pieces from an undergraduate Computer Science education through coursework and self-study in areas such as Algorithms and Data structure, Networking, Operating Systems, Databases, Full Stack and Mobile development. During the winter break of 2015, I undertook a software developer internship at Sogou, one of the largest software companies in China. This experience gave me clear insight into the software industry and the role of software developers. Although I learned a lot, I found that I was more interested in the work of a researcher than that of a software developer. I thus set my long-term career goal: a research track in Computer Science. At that point, I decided to pursue a Ph.D. in this area.

To prepare for the intensive research of a Ph.D. program, I devoted myself to my MS research project advised by Professor Lev Levitin. In this project, I endeavored to solve the deadlock problem in network topologies using a method called virtual channel. When I started the project, I did not make any progress for a month, as the problem was just too difficult to break down in the traditional virtual channel way. Still, I didn't give up. I changed my idea and decided to investigate other methods. Through consulting literature, I found an algorithm published ten years earlier called SCB, which I felt could be helpful but not fully solve the problem. After discussing with my advisor, I introduced a mechanism to combine SCB and virtual channel, and finally solved the problem. This new algorithm turns out to be a completely new way to solve the original problem, and it is theoretically more effective than existing methods. From this project, I reinforced the principle of keeping an open mind with no restrictions in research.

Meanwhile, I took a Machine Learning course and undertook a team project to establish a Convolution Neuron Network to learn different fonts. Still many questions remain unexplored in this area. Machine learning, unlike other areas of Computer Science, is still a virgin territory for scientists. Although deep learning and other AI technologies have been implemented in many areas and achieved laudable results, the theoretical foundations of the words 'learning' and 'intelligence' are yet unclear. Researchers have developed many different models to adjust the generated results closer to the required output, but they still fail to state why one model performs better than another. There is still a long way to go to create real artificial intelligence, and I would love to delve deeply into this area.

Carnegie Mellon University is well-known for its graduate education in Computer Science and Machine Learning. I am particularly drawn to the dedicated Machine Learning department at CMU, as well as the highly related departments of HCI and LTI. CMU has numerous talented professors with whom I would be honored to do research. I view CMU as my dream school for future study and to improve my scientific research ability. I am confident that I am well prepared to undertake the study and research work in your school by virtue of my everlasting interest in Computer Science, constant desire for the unknown, solid math and physics theoretical foundation, wide interdisciplinary knowledge, flexible mind, and rich industry and academic experience. Thank you for your consideration.

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