College Statement of Purpose

My parents are both faculties in Beijing Institute of Technology, so I have been nurtured under the influence of campus life, and impressed with busy scientific researchers and students. Growing up in such an environment with dense academic atmosphere, I get access to science earlier than my peers. Since my childhood, I enjoyed reading all kinds of science books and autobiography of famous scientists in my spare time to satiate my curiosity for the unknown.

Later, I was honored to be admitted to University of Science and Technology of China. I chose Physics as my undergrad major since physics is considered the foundation of all science. However, it was not a wise decision. I found it was hard for me to grasp the essence of courses like Thermodynamics or Quantum mechanics, especially when most professors in China share little interactions with students during lectures. After two years of studying, I found myself lacking both intuition and interest in Physics. It was too late for me to transfer to another major at that time. I then decided to spent my majority of time in lab experiment and research instead.

During the last two years of my undergraduate period, I went to the Laboratory of Plasma Physics and actively participated in many scientific research projects. Though not interested in Physics itself, I found myself quite enjoy doing research work. In the last year of my undergraduate period, I designed and created a new model of plasma torch from scratch, which increases both discharging power and duration. This one year project, along with all the other projects I did, not only improved my theoretical knowledge and practical ability, but also sharpened my skills to analyze and break down problems, which have laid a sound foundation for my future study and research.

After I finished my undergraduate study, I got accepted into the MS of Material Science and Engineering program at Boston University. In the first semester, I selected a C++ programming course to achieve some basic programming skills for scientific simulation. Before taking this course, I thought programming or computer science is just about writing codes. But after the first few lessons and assignments, I was deeply attracted. There are so many things behind, and on top of coding. Programmers could represent everything as objects, functions, and variables, and use them to form different abstract logical systems. Unlike Physics, the logic of Computer Science is straightforward and the intuition behind is clear. It is such a beautiful and interesting area and I was thirsty to learn more. I immediately switched my major to Computer Engineering, the closest program relating to Computer Science inside the Engineering department, despite the fact that I had zero prior experience in this area while the program I switched to is a master-level one. Although it took a lot of time and effort for me to catch up, I have never regretted this decision since I finally find what I'm interested in.

In the next two semesters, I collected the majority of pieces I missed in undergraduate Computer Science education by course and self-study including Algorithms and Data structure, Networking, Operating System, Databases, Full Stack and Mobile development. During the winter break of 2015, I worked as a software developer internship in Sogou, one of the largest software company in China. This experience gave me a clear sight of what the actual software industry is like and the role of software developers in it. Although I learned a lot there, I found that working as a software developer is not as interesting as being a researcher like I was before. Therefore, the long term plan for my career become simple: A research track in Computer Science. I then decided to pursue for a Ph.D. in this area.

Applying for a Ph.D. requires Research experience. In the last semester, I started my MS research project advised by prof. Lev Levitin. The topic was trying to solve the deadlock problem in network topologies using a method called virtual channel. when I started the project, I was not making any progress in a month because the problem was just too difficult to break down in the traditional virtual channel way. I was depressed but I didn't give up. I knew there must be difficulties in research, and one should keep trying and solve the problem by all means. I changed my idea and decided to investigate some other methods. Later, through consulting literature, I find an algorithm published ten years ago called SCB could be helpful, but it cannot fully solve the problem. After discussing with my advisor, I introduced a mechanism into the combination of 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 realize that we should keep an open mind and do not restrict ourselves in research.

Meanwhile, I took a Machine Learning course and did a team project trying establishing a Convolution Neuron Network to learn different fonts. I learned a lot but there are still many questions remains uninvestigated. Machine learning, unlike other Computer Science areas, is still a virgin territory for scientists. Although deep learning and other AI technologies have been implemented in many areas and achieve laudable results, the theoretical foundation of the word 'learning' and 'Intelligence' is yet unclear. Researchers today have developed many different models trying to adjust the generated result closer to the required output, but fail to state why one model performance better than another. There is still a long way to go for creating real artificial intelligence, and I would love to go deeper in this area.

The Carnegie Mellon University is well-known for its graduate education in Computer Science and Machine Learning. It is considered the top1 graduate program in Computer Science. Moreover, CMU has a whole Machine Learning department as well as several highly related department (HCI and LTI). It have numerous talented professors and students are encouraged to do research with them. I view CMU as my dream school for future study as well as improve my scientific research ability. It will be my honor to learn from masters here. I believe that I'm competent in the study and research work in your school by virtue of my everlasting interest in Computer Science, constant desire for unknown things, solid math and physic theoretical foundation, wide interdisciplinary knowledge, flexible mind, as well as rich industrial and academic experience.