Computer Science / Engineering Statement of Purpose (details changed)

After graduating cum laude from the ABC University with bachelor's degrees in both electrical engineering and computer engineering, I now hope to pursue a PhD in computer science at Target University. Based on my academic performance, research experience, and specific areas of academic and professional interest, I am confident that I am an ideal candidate for post-graduate academia and that I will make valuable contributions to the Target University community and beyond.

A PhD in this field will open up opportunities for me to research within both academia and the professional industries that I am passionate about. I am particularly interested in digging deeper into areas in which computer science crosses over with mathematics: automated reasoning systems, static program analysis, and proof assistants. I hope that better theoretical insights can lead to better tooling, which can, in turn, lead to more expedited and efficiently developed software.

Completing coursework at the ABC University developed my interest in computer science and instilled in me a passion for continuing my education in this field. I found Foundations of Computation to be fascinating; it was the first course I took that covered concepts such as first-order logic, the creation of rigorous proofs, and computability. Introduction to the Theory of Computation, which used a book of the same name by Professor K, was a natural extension of the most interesting parts of this class, the bulk of which was proof writing. Introduction to Algorithms was particularly compelling as well because I found the algorithms we studied interesting and because I loved doing the correctness proofs.

In addition to my coursework, I also had the opportunity to participate in research at the ABC University with Professor James Francis and his reconfigurable computing group. Our

project was funded by NBXD Computing, a local company that makes computer boards, which are frequently used in cryptographic applications. The focus of the research was creating a combination of software and firmware to accelerate an existing algorithm, which is the crux of a common approach to gene sequencing. A solution to this problem would enable biologists to employ the computer boards boards manufactured by NBXD to reduce gene sequencing operations that normally take a week down to a single day—a problem that we successfully solved. My contributions included conducting an initial survey and studying the source code of some existing open source solutions (mostly of BFAST). I also studied the statistical properties of various hash functions that would be used to implement an important data structure and showed that one was optimal, and I later discovered a very quick way to implement this function made possible by leveraging an understanding of linear algebra. (I am a huge fan of Robert Halbert's video lectures on linear algebra.)

Beyond this project, I did some additional work with the reconfigurable computing group with the goal of creating a programming language for describing computations as systems of interacting modules. The idea was that a program in this language could be mapped to a software program, a hardware accelerated program (such as the gene sequencing solution we had developed previously), or even a distributed system. On this project, I had the opportunity to implement an interpreted programming language from scratch, which was an amazing intellectual growth opportunity and an area of interest for further research.

My professional experiences also inform my desire and preparedness to study computer engineering at Target University. Before graduating, I had the opportunity to take some years off and work as an engineer at the startup of a professor from the ABC University , Richard Xu. The company, Hong Kong Technologies, funded partially from private sources and partially from

DARPA, focused at the time on accelerating the process of hardware circuit verification for analog, digital, and mixed-signal designs. Aside from working on the user interface—a Java program using Swing—I found that this work was also a huge opportunity to grow and learn how to maintain Linux systems, networks, and services on the network, as well as secure remote services and enable remote productivity for the employees there. I also found working with Professor Xu to be highly inspiring; he is an incredibly dynamic individual who is genuinely passionate about transforming the industry. It was enlightening to accompanying him at industry conferences, in meetings with DARPA, and on phone calls with major customers, as well as see him make the case for his product's relevance while also translating their needs into technical requirements that I helped implement. I gained invaluable insight into how entrepreneurship works in the industry, which I believe will serve me greatly down the line.

More recently, I was hired by George Will's International Software, where I worked (sometimes with George himself, amazingly) on prototyping innovative concepts for future productivity software using his company's International Software Platform, a framework for developing groupware-enabled software, among other things. This program had the dual purpose of helping to showcase the platform's capabilities and helping to drive the development of it. We were eventually acquired by Amazon, where my role has shifted to infrastructure and porting our organization's main product to web and mobile, which has been a great opportunity to learn new technologies and technology ecosystems.

Overall, the curiosity, drive, and dynamism I have exhibited academically and professionally are reflective of my ability to rise to the challenges of a PhD candidate in computer science at Target University. I believe Target University is the ideal educational environment for me for various reasons. One reason is its impressive history of pioneering

artificial intelligence research by figures such as Professor X and Professor Y, the latter being the author of the seminal essay "The Rise of Worse is Better," a piece that contrasts the so-called "University ABC" design with a "New Jersey" design and a piece I often reference in my own research. Moreover, Professor N, a giant in the field and a personal mentor, is a Target University alumnus, which solidifies for me that I would be part of an amazing and forward-thinking community.

Quite simply, Target University is a school with an amazing reputation that I would feel honored to be associated with. My coursework, research, and professional innovations underscore my intention to use mathematics and computer engineering to develop programs that evolve and advance scientific and social progress. I intend to live up to this purpose both during my tenure at Target University and beyond.