Computer Science lies at the root of all advancements in society; from the possibilities of increasing processing power to the potential of sophisticated models in machine learning, I believe that Computer Science remains the key to future progress. I am fascinated by the fact that Computer Science always has more to uncover. Its depth and versatility, alongside the technicalities of the mathematics and algorithms that embody the subject, is why I am so interested in reading it at university and contributing to the rapid growth of the field.

Image recognition and driverless cars aroused my curiosity towards machine learning, sparking my desire to learn how such systems work. To research this, I took the "Artificial Intelligence A-Z" course on Udemy, and was excited to discover links to AS Further Statistics in reinforcement learning. This prompted me to learn more about the mathematical proofs within this area and understand the underlying principles of deep neural networks. Thus, I read "Neural Networks and Deep Learning" by Michael Nielson and was inspired by the beautiful applications of matrices and calculus in stochastic gradient descent and back propagation, which led me to derive the associated equations. This allowed me to swiftly grasp PyTorch, realising the relation between reverse mode differentiation and the computational tree when training a simulated self-driving car using Deep Q-Learning.

The systematic approach Computer Science demands to problem solving is thrilling. I often find myself contemplating the most efficient algorithm for a self-proposed computational problem. I have completed 3 consecutive years of Advent of Code which have honed my independent research skills through my drive to create the fastest solutions. My ability to think abstractly has been greatly enhanced by exploring areas such as Graph Theory and Number Theory, involving my implementations of the Extended Euclidean algorithm and the Chinese remainder theorem.

Additionally, I recently participated in the 'Tomorrow's Engineers EEP Robotics Challenge' where my team developed a Bluetooth interface connecting an Xbox controller to a Spike Prime robot for remote control. Communicating instructions to the robot was a highlight; I researched the transmission of serialised commands using Python, and the expected signals by reverse engineering communication between Putty and the robot using serial monitors. The precise nature of continual experimentation was captivating during the analysis of bytes, and was similar to developing my VBScript program for Mach3 to calculate the centre of a circular pocket for a CNC machine.

I have secured an award each year in the UKMT Maths Challenge, twice achieving gold, as well as obtaining 'Best in The Year' and qualifying for the Intermediate Olympiad in 2019. Studying A-Level Further Maths and Physics taught me how to tackle unfamiliar questions which prove useful in Saturday AMSP Problem Solving Classes. Solving such challenging questions with the computational thinking Mathematics teaches is exhilarating and inspires me to attempt MIT Integration BEE puzzles for the sheer entertainment one may get from a sudoku. These experiences show that I have the passion, analytical thinking, and mathematical competence vital for undergraduate study in Computer Science.

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I have realised the limitless possibilities of Computer Science, its links to other fields, and the chance to begin an intellectually fulfilling vocation. I know I have the motivation and mindset to succeed. Always accepting a challenge, I eagerly anticipate the next chapter of my studies in such a dynamic subject.