Jack- Cover Letter

The base-2 number system is only capable of interpreting two numbers, yet, is seemingly the foundation of our future. Something as simple as a stream of 1's and 0's being able to produce seemingly anything is simply amazing to me. As we continue to progress in our understanding of computational theory, the inevitability of advancements in the field never quite seems to fade away. This horizon of endless possibilities excites me and I aim to utilize the knowledge gained from my chosen course to be a future front-runner in the field.

I have studied GCSE and A-level computer science which I believe to have been my best academic decision to date. My continual engagement with the subject has only further catalyzed my interest in it and has paved an avenue for me to express my aptitude for mathematics whilst also being able to harness it practically through programming. My experience with computer science thus far has solidified my ambitions and makes me confident in my career path.

My infatuation with technology began watching my grandad tinker with his computer, and wondering what 'this-or-that' did. When I was 7, I received my first PC and was utterly enthralled by it. It seemed boundless; it was something in which the only limiting factor was my imagination, and that was addicting. As I grew older, I began commissioned Lua scripting for various projects in which I learned to work collaboratively with others to achieve a clear goal. The problem-solving and algorithmic approach to programming seemed almost instinctual and posed as a logical expansion of what I had been used to in mathematics. I believe the similarity, alongside my enthusiasm to learn, have been some of the main factors contributing to my success academically in the subject as I have consistently achieved A* in all assessments, and frequently boast the highest score throughout my year.

I frequently code outside of academics and have made an array of functional applications; replacing the built-in calculator app on my PC with a scientific calculator and making a dynamically generated WinForms chess game for example. With recent developments in artificial intelligence being so profound, such as GPT-4, I have also delved into the field myself and have utilized a recursive 'minimax' algorithm to implement a basic Chess-AI into my aforementioned project.

Recently, a fascinating intersection between my major interests (Physics, Maths, and Computer Science) has emerged in the form of Quantum Computing. I have begun to read up on how principles such as quantum superposition can be leveraged by quantum logical processors and their qubits, which leaves the previously unthinkable now open to thought. Cryptographic hash functions (such

as SHA-256) are definitively unbreakable today, yet, will they be so insurmountable to a quantum-powered computer of tomorrow?

For my A-Level, I have designed a complex property management system that uses OleDB to query an Access database. During development, I independently investigated the use of NuGet packages within Visual Studio to amplify the professionalism and capabilities of my project; implementing frameworks such as 'Guna2UI' (to enhance the GUI of the program) and 'LiveCharts' (to add statistical distributions and analysis from my database in real-time.) Although modules were available, I quickly noticed their distinct lack of documentation online; especially for more uncommon languages such as VB.NET. Therefore, I try to pass on what I have self-taught to other students to aid in their A-Level coursework.