In Grade 8, I was transfixed when my acid solution climbed up the walls of my burette, triumphant over gravity. Hooked, I went on to look up concepts like surface tension and meniscus, which were foreign to me. Gradually, my initial obsession with the application of scientific concepts to explain natural phenomena morphed into a deep interest in assembling and analyzing various processes to manufacture innovative materials. The desire to advance our quality of life by sustainably utilizing materials eventually propels me towards studying Chemical Engineering.

Motivated to understand better how engineers apply scientific theories, I sought to determine the activation energy of the decomposition of hydrogen peroxide after learning Arrhenius Law. However, my research advisor rejected my research proposal, stating my investigation would be too derivative of the research already available on the topic. Nevertheless, I found it implausible that experimental procedures can only be approached from one angle. Further research led me to “Determination of the Activation Energy of the Iodide-Catalyzed Decomposition of Hydrogen Peroxide” by William Sweeney et al, where they proposed tracking the temperature instead of the concentration to monitor the extent of the decomposition. This inspired me to carry out an experiment utilizing the high enthalpy of the decomposition reaction to relate the rate of reaction to the rate of temperature change. The results evinced that this approach surpasses other methods in time and material efficiency. This investigation taught me to explore and challenge scientific assumptions, which is paramount when approaching complex engineering problems.

Eager to further understand how the interlinked understanding of physics and chemistry can be applied to improve real-life issues, I browsed through various universities’ chemical engineering course syllabi, where I found Mark Miodownik’s “Stuff Matters” and became intrigued by graphene’s unique electrical, tensile, and optical properties, as well as the challenge in mass-producing this carbon allotrope. My research eventually led me to Jason Stafford et al’s article on production methods for large-scale graphene production. In bottom-up production, the quantity of graphene grown is very limited, involving a complex process to extract graphene from its substrate, thus spiking the cost of high-quality graphene. I intend to further study this production approach, in hope to increase its efficiency, which would be beneficial for developing countries like Indonesia in the future.

My desire to further enhance my analytical skills led me to participating in the Northern Hemisphere Maths Championships. Solving abstract mathematical problems by condensing them into logically coherent sections, I was able to answer the diverse and oft unexpected questions, which propelled me to be one of the 20 finalists selected across 70 nations. The competition has taught me the merit of being adaptable, which is crucial for engineers as we often have to pivot appropriately during unforeseen circumstances.

Incorporating my academic exploration and passion for education, I also created a website where I published blogs and videos to aid students in acing their IGCSE exams. However, I often found myself explaining concepts in a manner only I would understand. Onward, I ensured that my explanation did not take any shortcuts and would make sense for students of varying levels. The project honed my communication skills, which would be helpful when disseminating innovative ideas to fellow engineers and non-engineers alike.

Ultimately, exploring chemical engineering will bring me closer to the idea of pushing the boundaries of science and technology towards positive change. I aspire to apply the skills I have garnered back in Indonesia, in hopes of propelling breakthroughs in manufacturing processes to drive the accessibility of technological innovations to the general public.