To an engineer, a sustainable system is one that is in equilibrium or that changes slowly at a tolerable rate. Sustainability and the idea of meeting our own needs today without compromising the ability of future generations to meet theirs intrigue me, and my desire for a sustainable future through a career in electrical and electronic engineering fuels my passion to be part of this field that is instrumental in improving our lives.

Reading ‘Engineering Fundamentals: An Introduction to Engineering’ by Saeed Moaveni, the topic of engineering in sustainability particularly resonated with me. Enthralled by the significance of engineering in improving designs for environmental and social benefit, I furthered my knowledge by writing my EPQ on how nanotechnology impacts the efficiency of solar cells. Learning about the characteristics of nanomaterials captivated me - specifically, the black silicon etching method creates gold nanoparticles that catalyze the etch to produce a nanometer-scale porous surface on the cell wafer. The nanoporosity results in a gradual change in silicon density with depth and refractive index, suppressing reflection and improving efficiency by eighteen percent. Through this project, I realised the importance of efficiency; tiny improvements can cause large amounts of energy to be saved.

To extend my interest in power systems and improving them, I analysed the electrical systems in Karas Island during my summer internship with Quadran Energi. Currently, the diesel generators used are failing to provide sufficient energy to the island’s residents, so I modelled the systems with HOMER and DIgSILENT to investigate the potential of using renewable energy and evaluate the flow of voltage in the power system performance. I found that implementing diesel, PV and battery increased RE penetration by 106%, and optimised electricity generation from diesel and PV to meet the island’s load profile. It was exciting to deal with real-life engineering issues whilst developing my analytical thinking skills and enriching my wider knowledge of the technical processes involved.

Curious about the components incorporated in innovative solutions, I delved into these devices (including transistors and op-amps) while taking Georgia Tech’s Introduction to Electronics course. My inclination to learn more about their applications inspired my peers and I to lead our own engineering society, Project Tech Talk. With a complementary combination of teamwork and independent research, I honed my enthusiasm for sustainable technology by researching and sharing the potential that these inventions have in the form of engaging articles to over four hundred young readers. A question that I found fascinating was whether we could live without transistors. Quantum computers have the possibility to replace classical computation as they directly encode information onto elementary particles. However, the superposition and entanglement of qubits cause them to easily lose their collective coherence and induce large errors.

Striving to contribute to the community, I took part in the annual DIDI Project Design Space competition, where I gained hands-on experience with the design process. My team designed a faucet attachment that spreads water efficiently to save up to twenty-two litres of water daily and promotes good hand-washing techniques. After receiving feedback from the judges, we completed several iterations, and it was rewarding to achieve first place out of over three hundred teams across the Middle East.

Through these experiences, I was able to gain an insight into the changes made in systems to meet our needs and make them more sustainable. I believe that I have gained valuable skills that will aid my journey through higher-level education in electrical and electronic engineering. With this degree, I hope to be integrated into the global community of engineers and contribute to a more sustainable future using my own ideas and designs.