

Felix Baumgartner fell 39 km towards the Earth, breaking the speed of sound. What amazed me most watching this was not the jump itself but how an elite team of Aerospace engineers got Felix up that high and then down safely. This impressive feat had me wondering - if a soft drinks company can get a man to space, what can my country, Saudi Arabia, achieve?

My first experience in the field was at a space camp in Dubai. During the week, we learnt about rocketry and planning a three-person Mars mission. However, we encountered a problem regarding developing an efficient way to take off and land. My team agreed on a robotic propulsion system I proposed, which was unique, as it could scan for an appropriate landing site. Even though we were each working on something independent, we complemented and supported each other's fundamental skills within engineering.

Another challenge encountered was providing Astronauts with enough oxygen for the 6-month-long return trip. Research led me to the Mars Oxygen In-situ Resource Utilisation Experiment (MOXIE), a machine that can create pure oxygen for the journey. I learnt more about this through a video on "The Insane Engineering of the Perseverance Rover". Since oxygen is limited and essential to getting humans to explore space, I read more articles on MOXIE's operation. Since MOXIE produces oxygen from the Martian atmosphere, we integrated it into our mission as it proved valuable.

An Introduction to Aerospace Engineering course built upon my interest in space exploration, teaching me about Astrobiology and developing an Aerospace industry based on emerging technologies. Given my interest in space exploration, I designed an industry based on terraforming, extraterrestrial colonisation and intergalactic travel as a project. A limitation I encountered was travelling time, as several light years would need to be traversed in days. Courses such as "The Ultimate Simple Guide to Rocket Engineering" and an "Introduction to Orbital Mechanics" further introduced me to Newton's and Kepler's laws. Python and quantum computing courses made me more aware of coding's importance to Aerospace Engineering. I developed a calculator program that included the four mathematical operations during my learning. After seeing the calculator programmed differently, I realised that an engineer needs to be innovative.

I was also involved in a remote internship at STAR Insights, a space education and research-based startup. During this, we worked in teams designing a static test pad for a model rocket. This was my first opportunity to apply my knowledge to something more practical. One problem we faced involved thrust-induced stresses, as the test pad could not withstand a 500N force. As a result, we changed the test pad material to steel and altered its foundation by making the clamps thicker. This proved a novel solution to this problem. To verify our predictions, we simulated the new design's deformation using Fusion360. This could be supported by practical experimentation, an essential skill for engineers. One such instance where I learned this was determining  $g$  by freefall in school. This experiment drew my attention because it incorporated basic engineering knowledge, such as the ability to graph and minimise errors.

Out of school, I enjoy CrossFit workouts three or more times a week. Since they are

timed workouts, they enable me to improve my mental toughness and ability to work under pressure. Developing an interest in human factors engineering, I wrote an article about the benefits of CrossFit for astronaut training, including cardio, weightlifting and gymnastics.

With all my experiences learning about the field, I aim to make effective participation in progressing aerospace projects by furthering my knowledge of Aerospace Engineering. Furthermore, by applying my critical thinking and teamwork, I aim to participate in advancing the exploration of space and other planets for everyone's benefit.