

My Passion To Become An Aerospace Engineer By Ameya Shukla

As a child, I had a huge fascination with space and the aircraft as well as the technology involved in getting us to space. I could name every major event in the space race, how a Soyuz spacecraft works, and how a space shuttle manages to stay in space and return to earth safely. After joining robotics my interest in this field has only increased and I have also developed many useful skills needed in this field. My name is Ameya Shukla, and I will be talking about my ambition to pursue Aerospace (Astronautical) Engineering as a career and my story behind it.

A big part of my personality is my curiosity. As a young child and even today I always wonder these questions:

- Are we alone in the universe?
- Is there another planet just like Earth billions of light-years away?
- Can we develop technology to travel billions of light-years in one day or even less?
- Can we travel to other galaxies?
- Do alternate realities exist in other galaxies?



Aerospace Engineering is the engineering field that develops technology or vehicles that travel above ground. There are two types of Aeronautical Engineers: Aeronautical and Astronautical. Aeronautical Engineers who develop Aircraft that fly within our atmospheres such as airplanes and helicopters. While Astronautical Engineers develop Spacecraft that fly beyond our atmosphere and in space such as Space Shuttles and rockets. Although these Engineers design different vehicles for a different purpose, the design process and concepts remain the same in both fields, some Aerospace Engineers work on-site building the aircraft while some work in the office designing the aircraft.

I had a huge fascination with building Lego and Space. I would build model rockets, launch pads, and model space stations out of Lego. I would also watch a lot of videos about famous space missions such as Apollo 11, and how Spacecraft are built. In order to pursue my passion for Astronautical Engineering, Space, and learn more about how our vehicles are built, I joined the Vex IQ Challenge. Ever since I joined the Vex IQ Challenge, I got the opportunity to learn

many building concepts and learned the Design Process used in designing and building many vehicles including Spacecraft. The Vex IQ Challenge has taught me to use the Engineering Process to prototype, design, build, and code a robot that can effectively carry out the task the Vex IQ game requires. Every field of Engineering revolves around the Design Process and you will need a good understanding of the Design Process to be successful in any STEM field. Aside from that, the Vex IQ challenge teaches me many building concepts used in Astronautical Engineering such as system integration, torque and speed relationship, and the effective use of propulsion. In a recent Q & A, SpaceX engineers were asked what coding language was used in their new Dragon Capsule they said they use C++. Coincidentally we learn a coding language called RobotC which is also a C-based coding language. Knowing a C based language will make a good point on my resume and will give me a good idea of how a Spacecraft is coded. The Vex IQ challenge has also helped me develop teamwork skills, which is essential for any STEM field.



Now that we've talked about how robotics is preparing me for this field, let's return to my story. From a young age, I idolized Neil Armstrong and as I grew up more, started to idolize Elon Musk. Both of these Aerospace Engineers have inspired me heavily, one took us to the moon and back, while the other has contributed to multiple milestones in the field of aeronautical engineering such as the development of reusable rocket engines and is playing a part in taking humans to Mars and colonizing it. They have inspired me to go down this field because of

multiple reasons. I idolized Neil Armstrong because he accomplished what others thought was impossible and turned the dream of many into a reality.

He inspires me because of his dedication to his work, his positive mindset, not to mention his courageous heart and actions.

I idolize Elon Musk because of his problem solving and risk-taking mindset as well as his intention to revolutionize and make use of technology to benefit humanity. I try to use Mr.Musk's "three-step" problem-solving method:

- Step 1: Identify and Define your assumptions
- Step 2: Break down the problem
- Step 3: Create solutions from scratch

Mr.Musk has revolutionized the field of Astronautical Engineering. One example is the Astronaut's spacesuits and the ships that carry them to Space and back. During the Space Shuttle era and even today Astronaut Spacesuits are extremely big, heavy and don't allow for much room to move around in. When traveling back to Earth or the ISS, the Astronauts are forced to wear bulky spacesuits, which craps them inside an already small Soyuz capsule. On March 7th,2020 Elon Musk and his company SpaceX launched Astronauts into space wearing lighter and more minimalistic spacesuits. Before Mr.Musk revolutionized spacesuits, astronauts had to wear spacesuits like this:



But now astronauts wear spacesuits similar to something out of a sci-fi movie:

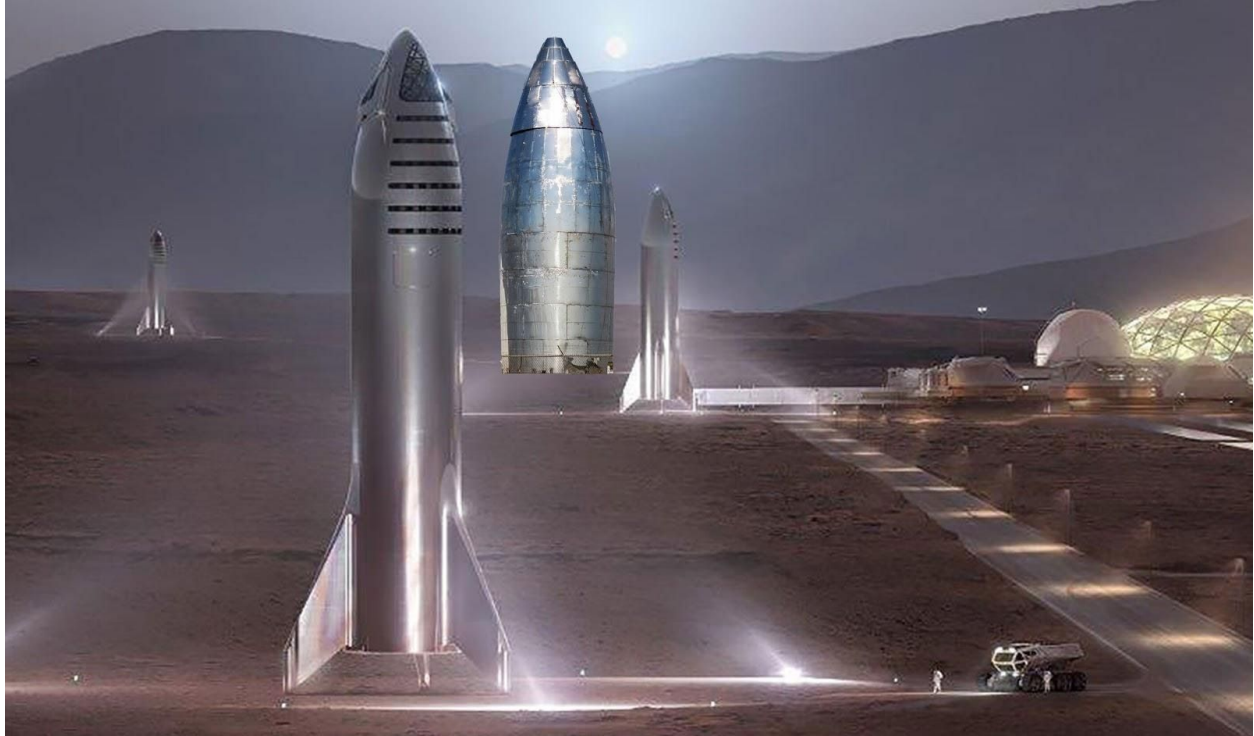


Aside from Space-suits, Mr.Musk and his SpaceX have also launched the world's first (partially) reusable rocket, and the second reusable crewed spacecraft. The boosters of his falcon 9 rocket are reusable, and once the rocket is launched the boosters detach and land on a retrieving ship.

<i>Programs</i>	<i>Grade range (%)</i>	<i>Probability of receiving an offer</i>
Architecture	N/A	Subject to an interview process
Biomedical and Software	95+	40%
	90-94	12%
	85-89	1%
Computer, Electrical, Mechanical, Mechatronics, and Systems Design	95+	70%
	90-94	45%
	85-89	10%
Architectural, Chemical, Civil, Environmental, Geological, Management, and Nanotechnology	95+	85%
	90-94	75%
	85-89	50%

- All courses and grades are normalized to Ontario Secondary

I have a huge passion to become an Aerospace Engineer, however, becoming one is no easy task. If I want to accomplish my goal I need to start now. Most Aeronautical Engineers hold a Bachelor's Degree (59%), while a good minority of Aeronautical Engineers hold a Master's Degree (33%), and a small minority holds a college diploma or an Associate Degree (8%). Most Aerospace Engineers hold degrees in Aerospace Engineering, Mechanical Engineering, or Electrical Engineering. These degrees are highly competitive, and to get admission into these programs many universities require an average of 95% or higher, among other requirements such as extracurriculars, and volunteer hours. I want to attend the University of Waterloo for Mechanical Engineering, in the photo above is a screenshot of their admissions probability. If I want to get into my desired program, I will need a 95% or higher to have a good chance of getting in.



The field of Astronautical Engineering will evolve, significantly over the next 10 years. First off, under NASA's Project Artemis, a manned crew (including the first women) will return to the Lunar surface by 2024. As well as the launch of the first Lunar Space-station called the "Lunar Gateway" the same year. In Project Artemis, NASA has awarded SpaceX with a Gateway Logistics Services contract. To supply the Lunar Space-station with experiments and equipment needed to maintain a long-term presence on the moon. Nasa plans to establish a permanent base on the Lunar surface by 2028. Project Artemis's goal of setting up permanent moon operations, will give the opportunity to test new tools and equipment that can be used on Mars, during the first-ever human landing in the early 2030s. NASA plans to send a number of rovers onto the Lunar surface, along with the manned mission. In order to scout for potential water, and natural resources on the Moon, that can be mined. Aside from the Human return to the Moon, and the establishment of a base. The next 10 years will see the introduction of reusable rockets/space craft and "Space Tourism". Recently, SpaceX has developed reusable rocket boosters on the Falcon 9 rocket. Once the rocket is launched the Falcon 9 rocket boosters return to Earth, and land smoothly on a SpaceX "drone ship". Although they can only be reused 10 times and, it's only partially reusable. It is a huge step forward in the development of more environmentally spacecraft. In the next 10 years, we will also see NASA start to use solar energy in their rockets and space craft, under their "Solar Electric Propulsion" system that is under development. Recently Airbus tested a prototype solar-powered aircraft that flew in the air for 28 days! And are in the process of developing a passenger version of the aircraft. Many companies such as Virgin Galactic and Blue Origin, are in the process of developing suborbital space tourism vehicles that would send "Space Tourists" around Earth's orbit for a fixed amount of time.

There are many reasons I want to pursue Aerospace Engineering as a career. Mostly for my desire to help the world colonize other planets and curiosity to explore the never-ending universe. Questions: Are we alone in the universe or are there other intelligent life on other planets? Is there another planet just like Earth? Are there alternate realities?

An urge of exploring, getting to know space and everything that exists beyond our planet, fuel my passion to become an Astronautical Engineer.

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