VIQC MIDDLE SCHOOL – CAREER READINESS CHALLENGE

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For this challenge we decided to choose SpaceX. SpaceX is a STEM company founded by multibillionaire Elon Musk, that focuses on areas beyond our own planet, ranging from renewable and cost-efficient space travel to the future survival of the human race.

WHY SPACEX ?

With Elon Musk's ambition to save humanity through discovering another suitable host planet for our species, SpaceX has been a hub for spacecraft manufacturing, launching, and designing for nearly a decade.

Elon Musk saw that the expenses of space travel were heavily increased due the rockets not being reusable, and he sought out to resolve this, and did so successfully with SpaceX's first reusable rocket, Falcon 9, launching and landing flawlessly on March 20th, 2017.

We were curious as to how SpaceX's engineering design processes aided them in achieving their numerous feats, and wanted to learn more on how we could implement these processes into our own application.

We chose SpaceX specifically in light of its recent success, and also because we were eager to know how they dealt with their past mistakes and failures.

SpaceX's Falcon at NASA's Kennedy Space Centre in Florida during ground testing. (SpaceX Photo)

HOW DO THEY USE THE ENGINEERING DESIGN PROCESS?

SpaceX have several systems and processes that they employ to ensure reliability and consistency in their work. One of these systems is what they call the 'triple redundancy system.' This system is used to provide the cost-effectiveness and stability needed, as well to address and respond to some of the key challenges faced in the environment in which the rockets work in, such as radiation. This 'triple redundancy system' gives SpaceX's system radiation tolerance without the requirements for costly radiation-hardened components.

For endurance, a majority of flight control systems are triple redundant (triplex).

A suborbital flight control system, like the one used on Falcon rockets, does not require the usage of radiation-hardened components because it is not exposed to enough radiation over an extended period of time to cause a malfunction in the processor.

Systems used for deep space control would generally use radiation-hardened silicon on insulator or silicon on sapphire processors, such as the radiation-hardened PowerPC.

SpaceX launch most powerful computer ever sent to space station

The professionals at SpaceX apply the steps of the engineering design process with continuous testing in software development. At SpaceX there are 4 main software teams: flight software, ground software, avionics test and enterprise information systems. SpaceX uses a table rocket to test all of its flight software. They arrange all of the Falcon 9's computers and flight controllers on a table and connect them just as they would on the real rocket. They conduct an entire simulated flight on the components for integration testing while keeping an eye on performance and potential issues. Engineers "cut the strings" during stress testing, which involves abruptly turning off a flight computer in the middle of a simulation to observe how it reacts.

HOW DOES OUR TEAM'S APPROACH TO ENGINEERING DESIGN DIFFER FROM A PROFESSIONAL'S APPROACH?

One way our team's approach to the engineering design process of a professional company is the amount of testing that we undertake on our designs and ideas. SpaceX are largely successful company, and this is partly due to the extensive testing they undergo in every possible sector within their company. This ensures for minimal room for error, aiding a successful product, or in our case, a successful robot.

Here at Habs_Sciclones we are beginning to implement many of SpaceX's and other stem research companies engineering design processes, such as the extensive testing, to make sure we are overall more successful.

VEX Robotics has prepared us for a future career through achieving an environment in which we are able to experiment with design processes, teamwork, planning and more, whilst adding an element of competitiveness, all of which can be found in the workplace.

These are the elements that will prepare us for future careers, and regardless of where we decide to go for our careers these elements will all be present.

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