Ways of The Architect

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STEM is a huge part of engineering, and jobs related to it are going unfilled. The engineering design process is an approach to solve problems used by many engineers throughout the world. It is a series of steps that engineers follow to find a solution to a problem. Since the world is advancing and becoming more and more technical, we are starting to need the engineering design process more. We are Boyz Bot and this is the Career Readiness Online Challenge from the VEX IQ Challenge where we are answering the question, “How does a professional’s use of the design process match ours?”

For our submission, we chose the job of a civil engineer/architect. We first chose the job of a CAD designer, since it needed the engineering design process a lot, but that was very broad so we narrowed it to an architect/ civil engineer. To find out more about this job we first researched the jobs and summarized them. Civil engineers design, build as well as supervise infrastructure projects and systems. Architects plan and design houses, factories, office buildings, and other structures. These jobs are very similar and have similar uses in the engineering design process.

Research cannot give everything about the job and every single detail. To cover these details, we would need someone who worked in the field. So, we decided to interview some people who worked as architects and civil engineers. This would give us a good idea of how people worked in the field and an upper hand in this competition. We interviewed four people with a set of 20 questions that were written by us. The same questions were asked to every person. Two of these people worked as architects. The other two worked as civil engineers. We asked them, “Do you need the engineering design process? If so, how do you use it?” Here are their responses:

Kaushal Shah	Meeta Shah	Rajesh Mantri	Naveen Veramishti
The engineering design is built on trial and error. We use it in all aspects of my job and life.	Architects collaborate with all engineers. They must work together and build designs.	When building a road to connect towns, we must find a suitable path. A short, economically cheap path should be found.	When designing intersections we must come up with alternatives. We consider 10 alternatives and choose 3. We take these three and choose one. It gets reviewed and then we build it.

All four of these people have worked on many projects throughout their careers, over 15 years. A few projects that they have worked on can be seen today in the Las Vegas Strip. As a structural engineer, Kaushal Shah worked on the bridge connecting the casinos Pallazo and Venetian as well as working on the I-15 beltway.

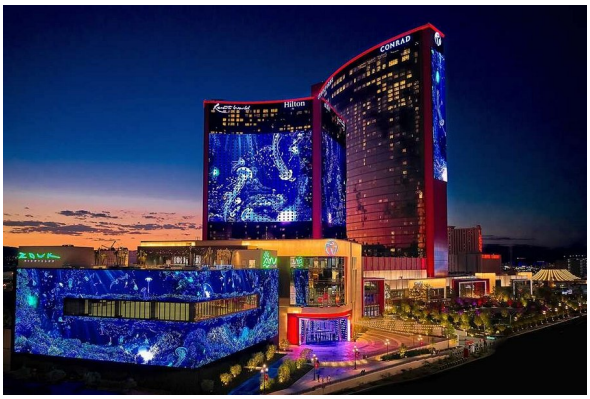
Venetian

Image Credit: Intercontinental Hotels and Resorts

I-15 Beltway Las Vegas

Image Credit: Mick Akers/Las Vegas Review-Journal,

Meetha Shah has worked as an architect for over 25 years. She worked on many buildings such as hospitals, schools, and others. One major project that she has worked on was the Resort World Casino in Las Vegas.



Resort World Image Credit: Tripadvisor

Rajesh Mantri worked as a civil engineer for 17 years. He worked on 25 - 30 projects, 5 of which were vast. Mantri worked on the flyover coming about from the Harry Reid International Airport in Las Vegas and is working on the I-15 beltway.

Highway to Harry Reid Int'l Airport Image Credit: Las Vegas Sun

Naveen worked as a transportation engineer for 14 years, and worked on almost one hundred projects. Recently he has worked on Reimagine Boulder Highway.

Boulder Highway

Image Credit: Fox 5 News Vegas

The Highway spanned a long way but was risky for pedestrians; however, this project changed that risk.

All of these projects used the engineering design process. They had to think of what to build, make blueprints, design (3D rendering), iterate designs, and finally build. All of these structures had to be optimized for safety and comfort. For example, the Boulder Highway was redesigned to make it safer for people. Without the engineering design process, these buildings would have no meaning. They wouldn't have stability and would probably fail. Building something can be prone to so many unknown risks which no one can take. The engineering design process takes care of these.

To answer our question, we have chosen the profession of civil engineer/architect. Their uses of the engineering design process are quite different from ours. We, Boyz Bot, are building a robot that is optimal for taking and launching balls. To do this, we first looked at several designs and then found one and elaborated upon them. That design was the Fling bot and we elaborated lots of parts. We then tested this bot, found its weaknesses, and made it better.

While building the original bot we found out that we did not have the right parts. When we tried to use other smaller parts the gear ratio did not work. To solve this, we came up with another catapult, a third catapult, a flywheel system that didn't work, and then a catapult with a different intake system. We actually took apart the bot two times and made a new bot. We remade the intake to a conveyer belt. In the end, our bot was fully made from our creativity and ingenuity.

All the engineers used similar steps, but their actual processes were very different. For example, we built our robot and then added parts; however, they had to use 3D imaging to make simulations of their buildings. They made all the add-ons in the software. After building the whole thing they wouldn't be able to "add" anything. When planning their designs they could look at previous designs, but based on what they need to do they might have to make their design.

This challenge has taught us a lot throughout this year's VEX IQ Challenge Season. We have learned about many jobs and their applications in the world. In the future, we might have our interests set in the area of engineering since we now have a good graph of this area. VEX has helped us open up to our future and new careers.