

Coding VEX Robotics from the Perspective of a Google

Software Engineer

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In VEX IQ, we have achieved top 4 in programming skills and joined the National Finals this year as our first year.

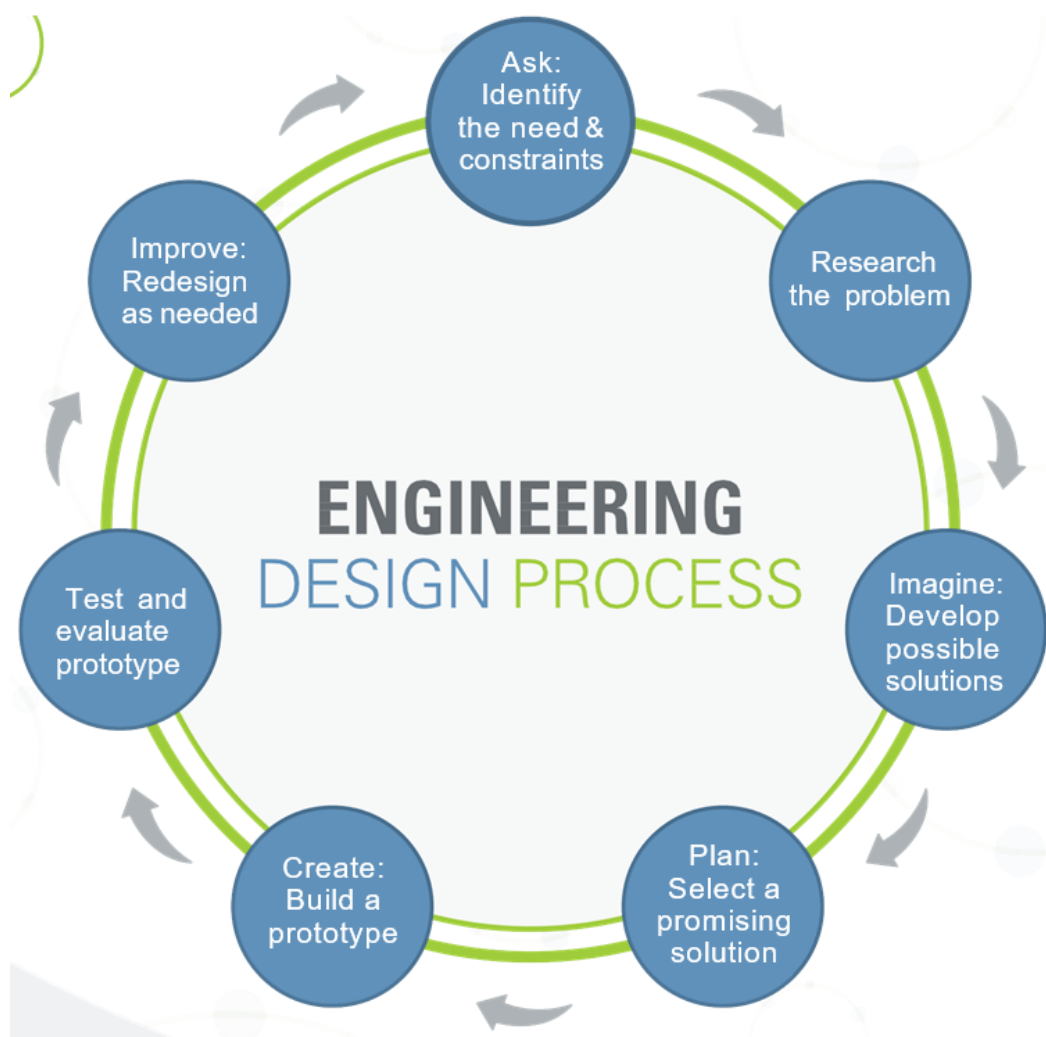


December 3rd and 4th at Quay Centre, Sydney Olympic Park

I am Muyao, and the other authors are Jake, Jesse and Anson. Sadly, I was not able to attend finals because of my music concert.

It is rare for a team to get higher score in programming than in driving, but we were one of them. For programming, we got top 4.

As a team, we chose Google as our company and our STEM career is a software engineer. This is because Google is a leader in the tech industry and has a record of producing innovative and high-quality products. This is often attributed to the talent and expertise of its software engineers.



Picture from TeachEngineering.org

The engineering design process is a systematic approach to solving problems and creating new products or systems. It usually involves some of these steps.

We realised that we have similar engineering process design for the VEX competition.



1. Ask questions: What should we do to control the robot and collect discs from the dispensers?
2. Research problem: Most of the time, certain part of building will conflict with each other, meaning we need to research what different parts can do, letting us know which parts we really need and what things we don't need.
3. Imagine: Develop possible solutions.
4. Plan or select: Choose the most suitable robot design.
5. Create robot: Build the robot, as a team, asking questions along the way about how to improve.
6. Test the robot: Testing the robot is a major part of the cycle. When testing, it will improve the experience and knowledge for the future competitions.
7. Improve: Think and gather all about better methods before choosing the best and making the improvements.

Throughout this ongoing process, professionals in this field will use their expertise in science, technology, engineering, and mathematics to develop and test the solution, and may also collaborate with other team members or specialists to ensure that the solution is effective and meets the needs of the users.

For example, we are required to solve another problem: shoot the discs after we have completed movement and collecting discs.

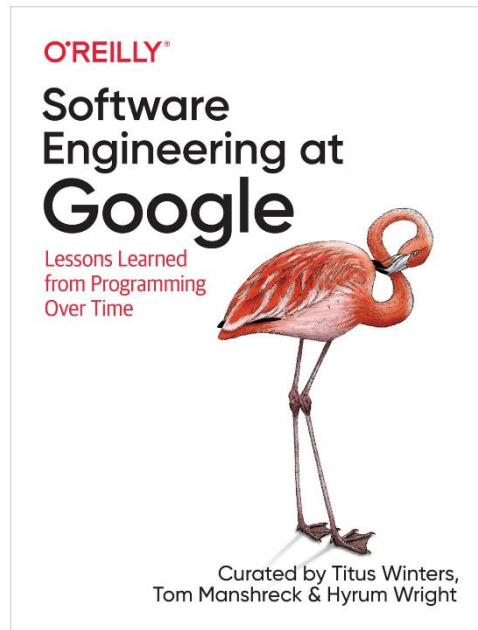
There are many companies that are known for their strong focus on the engineering design process and for developing innovative products and systems using this approach. One of these companies is Google. Google is a multinational technology company that is known for its strong focus on innovation and the engineering design process. The company has developed a range of products and services, including search, cloud computing, and advertising technologies.

Right now, our team is reading a book called “Software Engineering at Google” by Titus Winters, which is regarding Google’s practices, tools, values and culture. We found this on

<https://www.infoq.com/articles/software-engineering-google/>.

This book was published by O'Reilly Media, Inc.

Book by Titus Winters



In “Chapter 9: Code Review Flow”, we learnt that Google has 3 different aspects of review that require “approval” for any potential “evolution” at Google.

There are three aspects of review that require “approval” for any given change at Google and we call this “triple check”.

Firstly, the engineer asks his/her counterparts for feedback and suggestions regarding improvements. This is their first step of “triple check”.

Secondly, the “maker” checks with the initiator of the project to see if what he/she did is what the latter wants. This is their second step of “triple check”.

Lastly, the engineer publishes his/her project on the Internet and asks for feedback from online users, which represents an even wider audience.

That is the reason why, for example, in the middle of browsing a website, you are sometimes invited to provide suggestions for improvements. This is their last step of “triple-check”.

Furthermore, we also learnt about “The Importance of Maintainability” and “Preventing Brittle Tests” from “Chapter 12. Unit Testing”. This can help us save quite a lot of time, therefore having much more efficiency.

The difference between us and the Google engineers is that we do not even use “double check”. We tried using this idea in testing our code and so far, we have reached more than one hundred points in programming skills only.