THE DESIGN PROCESS OF AN AMAZON ALEXA

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Introduction

This project shows how engineers at Amazon used the design process to create Alexa, one of the first voice recognition AI. We are comparing their process to our design process, and also how VEX helps prepare for future STEM careers.



Why Amazon?

For this online challenge, we decided to research a company's engineering design process to see if it can help improve our own procces. We chose Amazon, because their Alexa and AI technology has brought many changes to households around the world creating a more connected society.

Engineering Design Process



The engineering design process are steps that engineers follow when they need to solve a problem. There is no specific design proccess and most people have their own variation of it. The simplest version is (1) an idea is created, (2) the idea is put into action, (3) it is tested and/or the result is evaluated. During steps 2 & 3, more ideas can be generated, and the process starts all over again, like a cycle of trial and error.

Vex Design Process

- 1. identify design challenges and goals
- 2. brainstorm solution, create prototypes
- 3. select best solution, create plan
- 4. build and program
- 5. test
- 6. repeat the design process till desired outcome





The way my team applies this is understanding the challenges and goal, then brainstorming and researching for probable solutions. We look at other teams ideas, documentations, online links and add our own improvements and ideas to make it better. That's our version of research.

We then see if it functions as intended on our robot. If it doesn't, then we go back to the drawing board, until we're able to reach our goal.

While doing that, we may think of other ideas for other parts of the robot, and implement those ideas too. It is an iterative process, and we keep working on it till we reach a desired outcome for an event. We also document our ideas and plans, to look back and review our design against our goal.

Alexa Design Process

- 1. establish the purpose
- 2. write scripts
- 3. develop the flow of speech
- 4. build
- 5. test
- 6. identify utterances



This design process is specifically for creating alexa and its program.

Comparison

How does the engineering design process compare between VEX and Amazon?

We both have a specific goal in mind, no matter how different they are. Putting it simply, our goal is to make a robot that can trigger all 5 dispensers, shoot the discs, and get a contact zone bonus. Amazon's goal for alexa is to get an AI that can perform a requested task instantly and accurately, and have interacting with her be as natural as interacting with another human being.

When we research and design, it's like Amazon writing their scripts for Alexa. Scripts show the conversation between a user and Alexa, to determine the flow of the conversation. My team researches and designs, by thinking about what is needed in order to get to the goal, and how they can plan that out. We need lots of different ideas in order to get this part of the process flowing and going.

Amazon develops the flow of how conversations might go in real life, because a script can only do so much. They have to outline all the possibilities of how conversations will/could go. For my team, this is more of step 3 (design). The next part is the same for the both of us; to build. Taking all the ideas and plans till now, and making them into something that will work to solve the problem or goal at hand.

This step is also the same, we have to test what we built. My team does this by putting the robot on the field and seeing if it can trigger dispensers, shoot, etc. Amazon does the same thing with Alexa, seeing if it can achieve their goal.

The last part of this process is identifying utterances, which is seeing if Alexa said the correct things, or responded to the user correctly. In our case, we evaluate our robot and see how we can improve it. We need to see what went wrong so we fix it, but if nothing goes wrong, we keep it as is. Then, the whole process repeats.



How does VEX IQ prepare you for a future career?

Teamwork

It prepares you to work with a group of people from diverse backgrounds, and focuses on each individual's skill. We also work efficiently to achieve the goal of designing and building a robot. This also teaches time management, problem solving, and communication skills.

STEM

It teaches you project planning, how to meet a schedule, along with the engineering design process. It also teaches programming the robot for autonomous driving. This can help you to get a job in the stem and technical field.

Notebook / Documentation

We have to write down and document everything we do, so we can look back and fix our past mistakes, while also staying organized. This is key in STEM projects in future career.

Project Management

We were able to work with the team to achieve all of the project goals within the limitations (time bound for qualifiers, and with the limited parts we had). We also borrowed some parts from local teams to meet the goal for some competitions which relates to delivery of product by a certain date with proper resource management.



Vex Robotics Curriculum: Engineering Design Process, 2002-2015.

<u>https://curriculum.vexrobotics.com/curriculum/intro-to-</u> <u>engineering/what-is-the-engineering-design-process.html</u>

Engineering Notebook Rubric

<u>https://www.roboticseducation.org/documents/2022/03/engineering-</u> <u>notebook-rubric.pdf</u>

Amazon, 2010-2023.

<u>https://developer.amazon.com/fr/designing-for-voice/design-</u> <u>process/</u>

All Images:

https://www.pexels.com/search/amazon%20 alexa/

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