Career Readiness:

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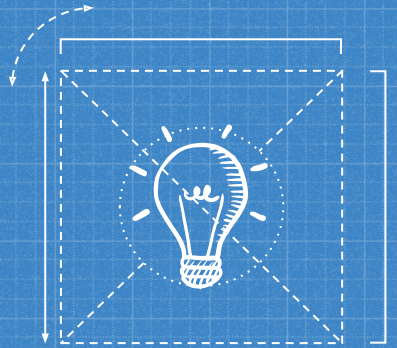
BIG QUESTIONS

1.How do engineers use the Engineering Design Process in their jobs?



2.How does it compare to us?

3.How does participating in Vex Robotics prepare us for a future career?

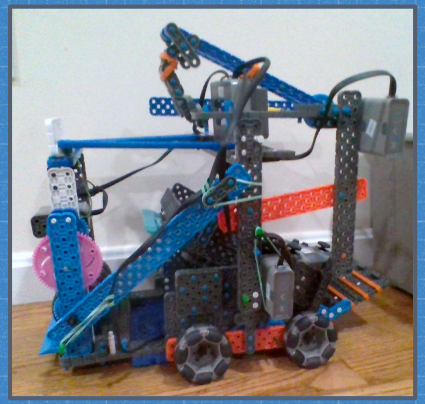
The career we chose to research is **Software Engineering**. Software engineers find and implement solutions to technical problems. They use coding languages like Java or Python and must use the EDP to plan and facilitate their coding.

We chose to research Software engineers because their jobs are crucial for today's tech-oriented life. All of our technology, like smartphones, computers, and more, wouldn't have been created without software engineers for the code. Learning about this career could give us insight into our implementation of the design process for our programming, and because it's not one of our strengths, this research could greatly help us with it as well.

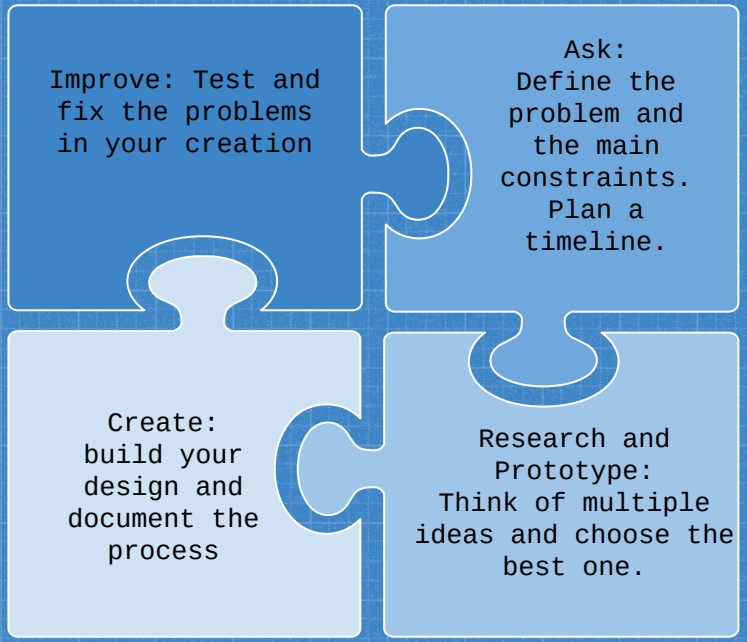
To choose this career, we used Indeed to find descriptions of different jobs that use the EDP, and then Coursera for more detail on the one we chose. Additionally, some input is from interviews with real-life software engineers.

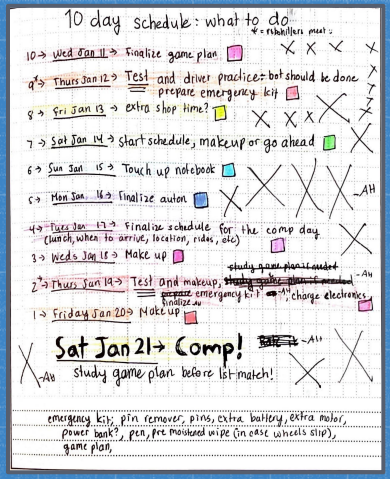
The Engineering Design Process:

There are many versions available, and this is the one that we follow.



Create: Building Perseverance, our robot

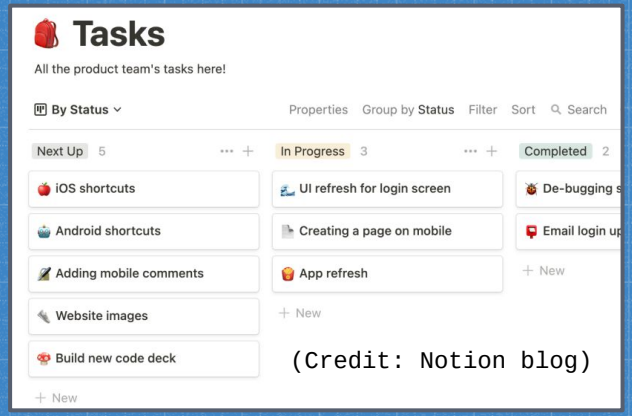




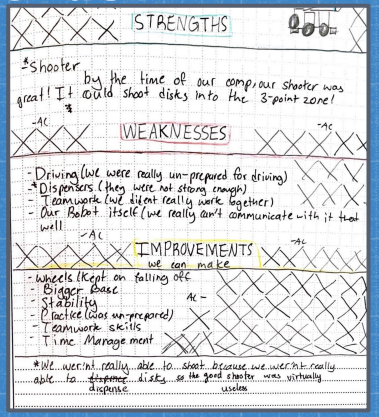
Ask: A timeline for the last 10 days before our competition to help us prepare.

How do Software Engineers utilize the Ask step in their jobs, and how does it compare to us?

Ask:
Define the problem and the main constraints.
Plan a timeline.



(Credit: Notion blog)



Our team's reflection from our last competition.

Most of the time, software engineers work for companies that specialize in different types of products. These companies task them with things to do. The task is the "problem" that they must "fix." Software engineers are given a general timeline along with the task, and the deadline is their main constraint.

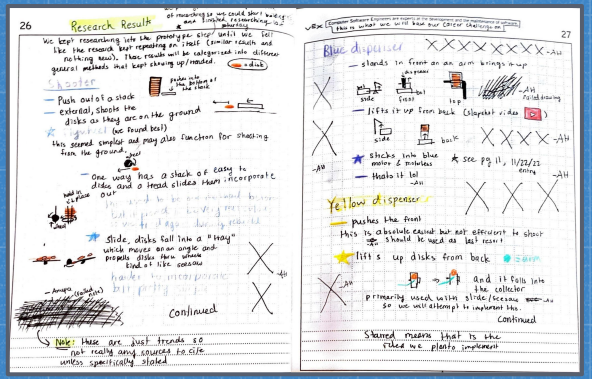
For this step, we as a team complete a reflection on our last competition, and the "weaknesses" and "improvement" sections are now our "problems". We think of the rules in the game manual as the main constraints. Additionally, we create an online countdown for our next competition, which helps us keep track of time, another constraint.

How do Software Engineers utilize the Research and Prototype Step in their jobs, and how does it compare to us?

Research and Prototype: Think of multiple ideas and choose the best one.

We start by looking at designs for robots that already exist today. We then categorize them into groups, like “puncher shooter” and “flywheel shooter” After that, we decide what type of mechanisms we would like and create plans. Finally, we compare and contrast the plans and select a design.

As research, software engineers often use their previous experiences. To create an outline for their code, they look at *design patterns*, which are general solutions given for any task. They bounce off of these ideas to create a more specific solution. When planning ideas, they use flowcharts, which contain multiple scenarios and outputs.



Part of our research results

How do Software Engineers utilize the Create Step in their jobs, and how does it compare to us?

Create: build your design and document the process

For software engineers, their “build” step is to code. While coding, software engineers have a set of rules called *best practices*. These are the most efficient ways to do a task, paired with the best outcome. Alongside that, software engineers need to make the code easy to understand for an outsider, as their code goes through multiple people while testing.

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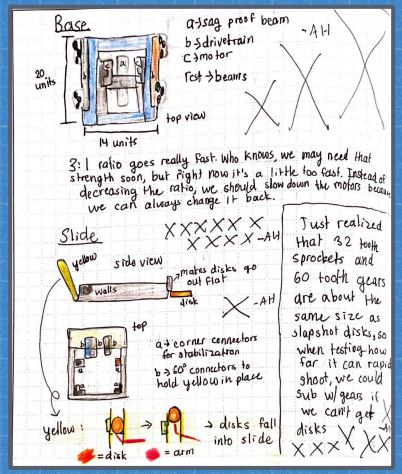
some of our building notes



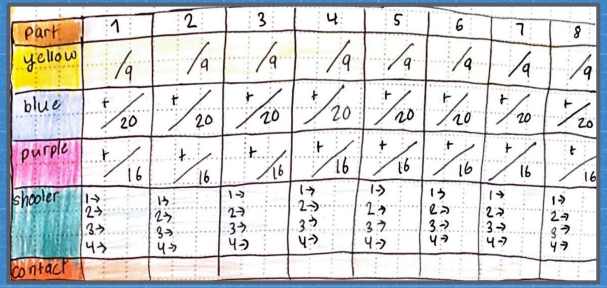
We build with minor references from our research for guidance. (This is where citations come in handy) After we combine the parts that we have built, we add some final touches that will add on to the overall functionality of the robot, like stabilizers. The process is documented in our Engineering Notebook.

How do Software Engineers utilize the Improve Step in their jobs, and how does it compare to us?

Improve: Test and fix the problems in your creation

After Software engineers finish their code, they run multiple tests and fix mistakes, making sure everything is going well. Sometimes, they think of mock scenarios to ensure that their products run smoothly and that if a given scenario happens in real life, their code won't fail.

Similar to their mock scenarios, we do practice matches. Practice matches help us prepare for the real competition, and similarly, it helps us make sure that our robot won't fail in the match.



A template we created for organizing results

What are some of the differences/similarities between software engineers' and our use of the Design Process?

Software engineers focus just on programming whereas we focus on both programming and building our robot. Another difference is that unlike us performing our whole "ask" step from scratch, part of their "ask" step is given along with the problem. Lastly, software engineers have some rules on how to build, but we get to create our own rules.

DIFFERENCES

Although, as much as we have our differences we have similarities. We both bounce off of general ideas to specify to to our product. Also, software engineers produce mock scenarios to make sure their product works, similar to our practices. Furthermore, both us and software engineers need to make our work easy for an outsider to understand.

SIMILARITIES

How does participating in VEX Robotics prepare us for a future career?

Even if our career plans don't include STEM, participating in VEX robotics has taught us many bits of advice that will be helpful in any career.

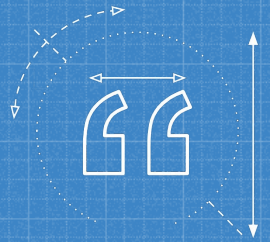
Firstly, being a part of VEX Robotics taught us the importance of teamwork. If we work as a team, we can get most things done, and as a result, we can have a well-functioning robot to bring to the competition. Likewise, in the future, collaboration on big projects or tasks is crucial for its success.

Additionally, we have learned that planning projects out beforehand is really important, because it helps us use our time efficiently until the competition. Similarly, in a future job, we have to plan time accordingly so we can meet our deadline.

We have learned many things related to STEM as well, such as how gear trains work, momentum, weight distribution, sketching, use of the EDP, and more.

Other credits

- Our parents who helpfully explained their usage of the EDP when we “interviewed” them.
- The science teachers who taught us about the engineering design process.
- Our coach, Ms. Allen, for her help and for giving us the opportunity for this learning experience through VIQC.
- Slideshow template and graphic icons by SlidesCarnival.
- Image credits are appended



“As engineers, we are going to be in a position to change the world, not just study it”

- Henry Petroski