VEX IQ
Career Readiness Online Challenge

2023

By: 1715C (Corrupted Gladiators)

Hopkinton, MA

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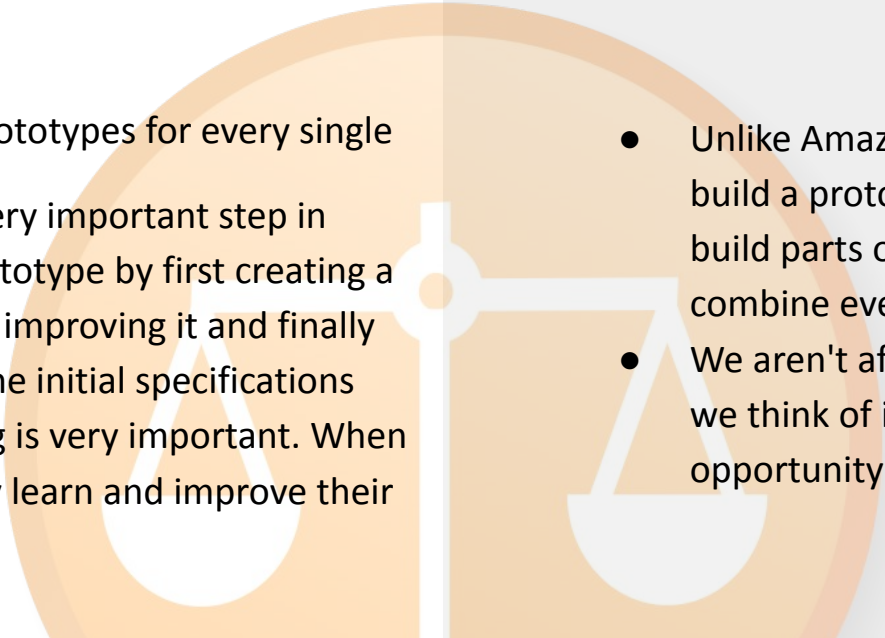- Sahaj

WHY AMAZON ROBOTICS?

Have you ever wondered how Amazon is so quick in delivering many products compared to other companies? Well, we did. The answer is mainly because of Amazon Robotics. Amazon Robotics moves packages around the Amazon warehouses in a matter of seconds instead of a person walking around the warehouses trying to find their package. Throughout this slideshow, our robotics team, 1715C from Hopkinton, MA will highlight the following:

- *How Amazon engineers utilize rapid iterative design processes to help it become one of the best companies in the world*
- *How our team's design process compares to Amazon Robotics' design process*
- *How VEX lays a foundation for our future STEM careers*

Ideation

- Identify a reasonable budget that will be effective
- Identify a problem in current robots
- Brainstorm the best possible solutions

- Identify what the robot has to do and its goal
- Identify restrictions and limits
- Use at least two aspects to brainstorm a solution for what the robot does.

Ideation without execution is delusion

— Robin Sharma —
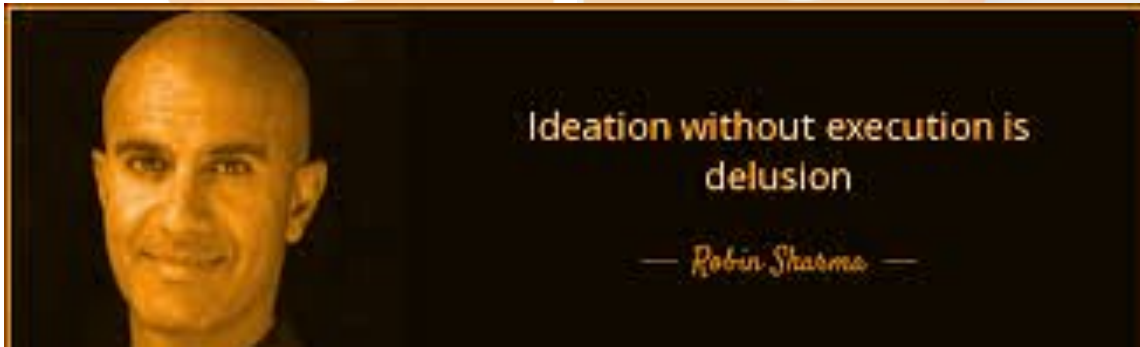
PROTOTYPE

- Amazon makes prototypes for every single of their robots
- Prototyping is a very important step in Amazon. They prototype by first creating a basic model, then improving it and finally making it as per the initial specifications
- For Amazon failing is very important. When Amazon fails, they learn and improve their robot.

- Unlike Amazon, we don't need to build a prototype, instead we build parts of our robot and then combine everything
- We aren't afraid to fail because we think of it as a learning opportunity

"Sometimes when you innovate, you make mistakes. It is best to admit them quickly, and get on with improving your other innovations."

Steve Jobs

QA/TESTING

- Run experiments and trials to test hypothesis
- See how they can change the robot to be more effective so that they can achieve their goal efficiently and as soon as possible

- Test parts of robot to make sure that they work properly
- Check and double-check the code (especially when the bot is driving autonomously)
- Have meetings to test robot

Testing a product is a learning process.

Brian Marick

- Make sure the idea makes sense, as Amazon rejects bad ideas
- Makes sure Prototype works so that scaling is possible
- Assemble robots and test to see if they works.
- Reflect on what went well and what went bad
- Tries to fix and improve the previous iterations
- Amazon Robotics' budgets, like many other companies, have to do with money

- Make sure we don't surpass certain limitations or restrictions of part amounts
- Take our designs and work on bringing them to reality using VEX IQ pieces
- Discuss what worked and what didn't
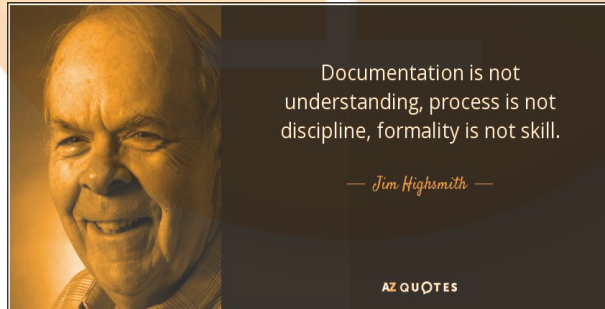- Budgets in VEX IQ are constrained by # of parts

Winners take time to relish their work, knowing that scaling the mountain is what makes the view from the top so exhilarating.

Denis Waitley

DOCUMENTATION

- Documentation is a key part of Amazon Robotics design process
- Engineers at Amazon Robotics document and then learn from what they could've done better
- Amazon Robotics is constantly improving because of their documentation

- Documents ideas and plans in an engineering notebook and Google Docs
- Provides information on how something was built
- This can help us find how we built stuff in the past for reference
- Help us find out if we did something wrong so that we can correct that mistake in the future

Documentation is not understanding, process is not discipline, formality is not skill.

— Jim Highsmith —

AZ QUOTES

HOW WILL VEX BENEFIT OUR FUTURE?

- Helping us learn technical skills
  - Builders on our team got experience with building robots using which they may specialize in careers such as construction, engineering, etc.
  - Coders on our team got experience in building software increasing their chances of becoming S/W developers, testers, etc.
- Teaching us how to thrive under pressure and to deal with competition
- Practicing design process
  - VEX IQ encourages us to use the design process which gives us an ordered way to do things.
- Working together as a team and cooperating
  - This is a useful skill in life as we will have to work with our colleagues in our future jobs.
- Understanding that mistakes happen
  - Our team used to blame each other. But after our first competition, we learned that blaming each other for something that went wrong would get us nowhere.
  - Without this skill, it is hard to make friends, get help, and do lots of other day-to-day things.
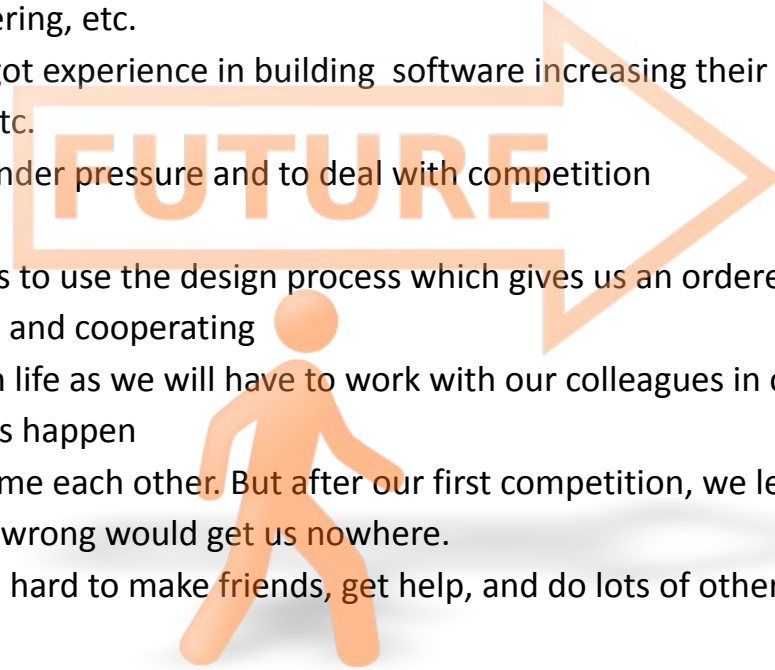
"We must use time as a tool, not as a couch."

-   JFK

It is quality rather than quantity that matters.

Lucius Annaeus Seneca

Quality is over quantity. If you hurry on something but do more things it is likely to be worse than one thing that has been made awesome.

"You have to be willing to be misunderstood if you're going to innovate."

Jeff Bezos

This basically is saying that if you are willing to innovate, you are going to understand that people are probably not going to listen to you at first.

1715C TEAM

RESOURCES

- The Future of Robotics: Everything You Need to Know in 2022

- Biggest Companies in the World by Market Cap - Investopedia'

- 70 Inspirational Jeff Bezos Quotes — Your roadmap to success

- SpaceX Rapid Iterative Design Process2 (pdf)

- How Competition Affects Your Brain | Cleverism

- Introduction to Automatic Testing of Robotics Application

- The Amazon engineer we interviewed

- Our teammates for collaborating on this project