A Future In Boston Dynamics

Team 80J: *Time-shadow, Chester Springs, PA*

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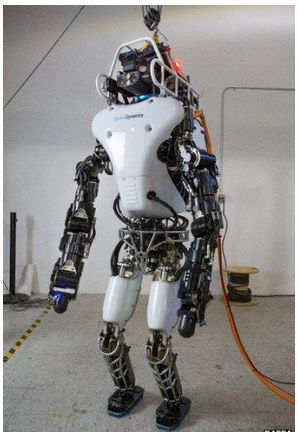
Boston Dynamics

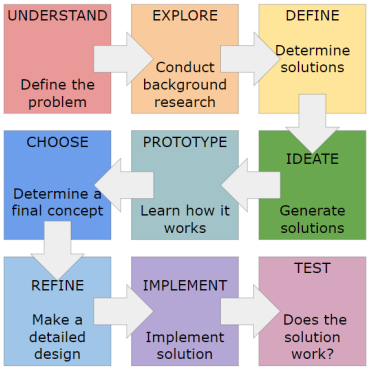
Boston Dynamics is one of the most innovative robotics companies in the world. They have created some of the world's most advanced robots, including Atlas and Spot. We have always been interested in this company, after seeing the amazing parkour by the Atlas robot. The groundbreaking capability of this robot is that it can adapt to its environment in real-time, to teach itself how to navigate, just like in a parkour course. Our team would like to be the next generation of innovators to push the limits of robotics, just like the engineers and roboticists at Boston Dynamics.

Atlas: The Most Dynamic Humanoid Robot

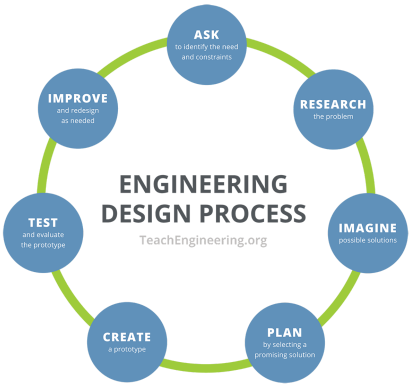


The Engineering Design Process

There are many variations of the engineering design process, but most of them have underlying concepts.



Engineering Design Process Our Team Used



Engineering Design Process At Boston Dynamics As We Understand

1.Understanding the problem

Engineers must define the problem that they wish to solve and get a general idea of what they want to build to solve the problem. They determine the criteria and constraints of the problem. When Boston Dynamics designed the Atlas robot, they had to create a robot for the DARPA challenge, which puts robots through a series of obstacles to simulate disaster areas.

What our team, 80J, does during this step of the engineering design is we watch the current game, which in this year's case, is Spin Up.

2. Explore, Define, and Ideate Possible Solutions

In this portion, engineers will brainstorm ideas, do research for ideas, and then come up with multiple ideas. The roboticists at Boston Dynamics came up with motor and cognitive intelligence to make the Atlas robot work as it was intended. Motor intelligence allows them to control the body of the robot and cognitive intelligence will recognize an obstacle and use their intelligence to solve the problem. They then combined the two concepts so the robot can analyze its surroundings in real time while also moving and navigating obstacles. It takes the pros of both motor and cognitive intelligence into one robot that uses its whole body to move around and navigate obstacles.

How our team uses this step of the engineering design process is we try to think up good ideas for the current game. While engineers might search for ideas online or look at designs created by other companies, we search for other teams online on sources such as VexForum and YouTube. We knew that we had to build a robot that could shoot, and from our research, we knew that there were two main options for our shooting mechanisms: catapult and flywheel. All that was left to do was to utilize step four of the engineering design process, develop ideas. We laid out our options on the table; all the variations of catapult and flywheel, and all of the other designs by teams all over the internet.

3. Prototype Models And Choose A Solution

This is where engineers choose the best idea out of the ideas gathered from above steps. In the case of Boston Dynamics, they had multiple models prepared, and in the end, they chose Atlas.

In our team we developed two models. A flywheel mechanism and a mechanism with a catapult and tried the shooting capacity of each.

4. Implement

This is the step of the engineering design process where engineers build the first model. In the case of Atlas at Boston Dynamics, they built the first model at this step.

For our robot, we started from the H-Base and worked our way up to the shooting mechanism, which was the catapult, and simply built the first model of our robot.

5. Test And Refine

These are the steps where designers test out their robots and make improvements to their robots. The roboticists at Boston Dynamics tested Atlas in a variety of ways, like pushing it to make sure it can maintain stability, and putting it through a parkour course to test its full body functionality and balance through a series of obstacles. They also improved all of their robots with multiple models with various modifications. The Atlas robot originally started as a chunky PetProto model and transformed into one of the most advanced humanoid robots of its time. They made multiple major improvements, such as adding arms to maintain balance.

Our team tested our catapult, and it didn't work well at all, so we changed our entire robot's shooting mechanism. We took apart the catapult and built a flywheel shooting mechanism and attached it to our previous working six-motor base.

How VEX Robotics Has Prepared Us For Our Future Career

Vex Robotics has prepared us for our future careers in many ways. We learned how to use the engineering design process to build a robot to meet our needs, which in this case, was for the VEX Robotics competitions. We also learned about team collaboration, how to resolve team conflicts and work with the timeline of projects. This will help us tremendously in our career.

In conclusion, the engineering design process is a very important concept in the world of research projects. The roboticists at Boston Dynamics use this technique as well, and we learn this concept in VEX Robotics, which not only helps us build a good robot, but also prepares us for a future STEM career, possibly in robotics.

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