

Biomedical Engineering

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Introduction



Biomedical engineering utilizes the science of engineering to upgrade the medical field for healthcare. They use the principles of problem-solving techniques to overcome challenges in their research. Also, by managing the the current medical equipment in hospitals, biomedical engineers make procurement, routine testing, and preventative maintenance known as a Biomedical Equipment Technician.



Ask



General: When something seems wrong, you will have to find out where and how to fix it. But, figuring out what is wrong is the first step. Write down why it seems out of place and why it seems broken, before starting your plan to connect your thoughts.

Biomedical Engineer: They come across many problems during their job such as coordinating service schedules for equipment, obtaining manufacturer support, locating parts to repair failing equipment, and separating accessories for different equipment models. The career and VEX Robotics differ here. Biomedical engineers would research the issues themselves. In VEX, the teams would build a robot specific to the game not an issue.



Research



General: After one identify the issues and parameters, they research the issue. One can research the issue by either going out and learn by observing or gathering credible information from various accounts. After researching, people come up with ideas to solve the issue.

Biomedical Engineer: They focus on modern technology and medicine to help brainstorm new devices and equipment for improving health. They work in research facilities to be able to discuss issues and research materials with their colleges. In VEX Robotics, the game developers would research current issues and design a game for teams to solve.



Brainstorm



General: One would brainstorm ideas and solutions to the issue researched. Brainstorming is developing various solutions. People should share ideas to promote more inspiration and cooperation. After that, one would plan to create a prototype.

Biomedical Engineer: Biomedical engineers would be creative and curious to come up with new and innovative designs. They have to consider empathy and cost of the project when coming up with ideas. Dr. Katherine Raymond, professor of Tulane School of Science and Engineering developed a class on design thinking. She implemented sticky notes and prompts to encourage students to be creative and share their thoughts and ideas.



Plan

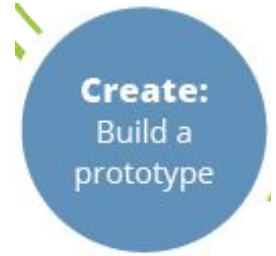


General: A prototype can be defined as an early model of a product used to test a concept or process. In robotics, a prototype can refer to the first design built, which you improve by using problem solving abilities to enhance the robots skills. You have to plan the first prototype by brainstorming ideas about how you want to accomplish the goal of the game.

Biomedical Engineer: In biomedical engineering, you may have to create a prototype of a prosthetic limb to be able to determine if there are any issues you need to fix. One issue you might encounter while making the prosthetic is it not fully connecting to the body movement. Another part of the planning process is determining what parts you might need and figuring out where to get them.



Create Prototype



General: To begin creating the prototype, you have to have gone through the planning stage first so that you know what your original design will be. In robotics, we begin creating our prototype and make many changes throughout the design process. Whenever you begin creating a prototype, you have to plan and gather the necessary materials while having a general idea of your design.

Biomedical Engineer: In biomedical engineering, you may have to create prototypes of a possible design before you are able to finalize and complete it. You might also have to edit a previous prototype design to customize it for a specific person.



Test and Evaluate



General: Once we have a prototype, it is time to test and evaluate it. We will first have to set our prototype in motion and experiment it. Then, we need to examine the results and see if/how to make it better. The results are evaluated to assess progress of design and performance.

Biomedical Engineer: Biomedical engineers have to test their prototypes and then evaluate them. They test new equipment and devices for improving human health. They test the machines they create to diagnose and treat medical complications. Then, they evaluate and analyze these machines.



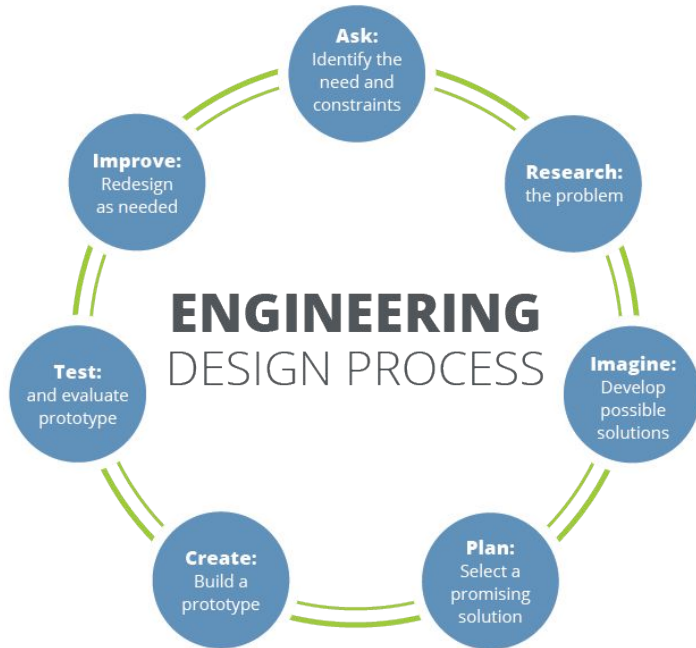
Improve



General: After testing and evaluating, we improve our prototype. Because evaluating gets us started on thinking of improvements, this stage is putting our ideas of improvement into action. After brainstorming different ways of refinement, we develop our prototype into something better and more efficient.

Biomedical Engineer: Biomedical engineers constantly try to improve their machines and equipment. Equipments such as limb replacements, artificial organs, cardiac devices can be improved in a variety of ways.

Cycle



The engineering cycle is used constantly throughout every type of engineering. Biomedical engineers use this on a daily basis, as the first step, ask, always has new problems and limitations coming up for the engineers to solve. Problem solving is a major aspect of biomedical engineering because the human body is very complex and there are many different problems that need to be solved.



Us

We use the engineering process all the time in robotics; from our first impressions on the game, to designing individual subsystems, we are always thinking about how we can efficiently solve the problems presented. One of the first pages of our notebook is a drawing of the engineering cycle. We also use sticky notes in our notebooks to give extra detail on things we are talking about in the entry. The sticky notes are very helpful when looking back into our notebook to see what our thought process was when designing different parts of the robot and making key decisions. VEX has adequately prepared us for a future career by teaching us about problem solving and encouraging new ideas.



Citations

<https://www.bls.gov/ooh/architecture-and-engineering/biomedical-engineers.htm>

<https://taylor.tulane.edu/2020/09/design-thinking-in-biomedical-engineering/>

<https://www.livescience.com/48001-biomedical-engineering.html>

<https://bme.umich.edu/tag/prosthetics/>