OCE★N ENGINEER

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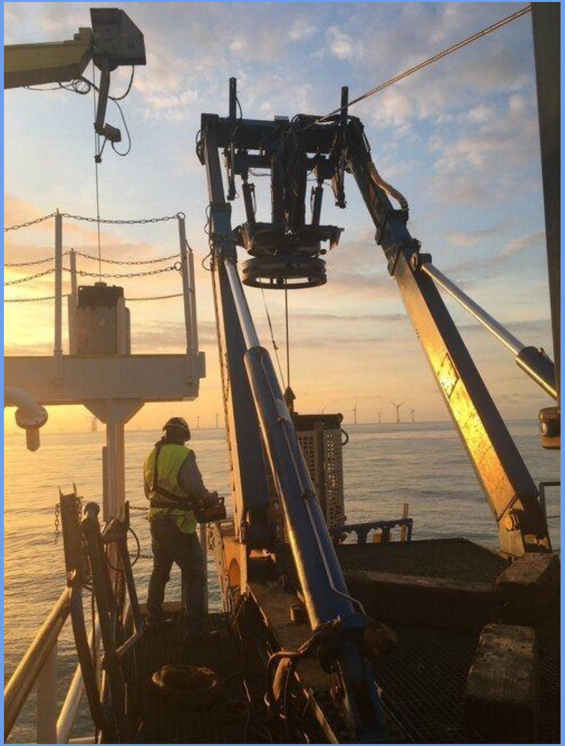
Introduction to Ocean Engineers

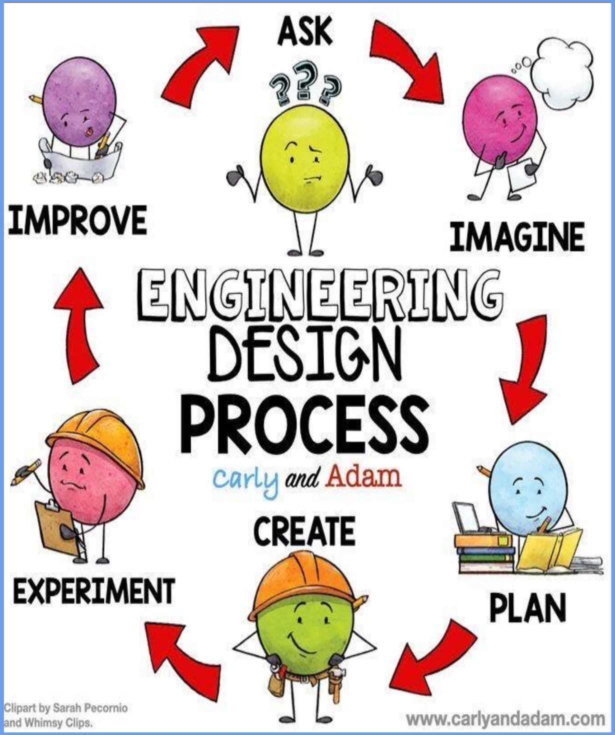


The field of ocean engineering is not just about our oceans, but also about marine technology. Ocean engineers build systems that monitor and control ocean systems. Discoveries such as hydrothermal vents, ocean volcanoes, and other phenomena would never have been possible without ocean engineers. The world of ocean engineering connects our world to the marine society of the world.

Why We Chose This Field

Beach Blossom Bots chose this field because the ocean is important in our daily lives. We have the privilege of waking up and seeing this stunning wonder everyday. The ocean impacts the lives of everyone. The ocean is responsible for the oxygen we breathe with algae producing 50-80% of oxygen. It is also a major source of food, 10-12% of the world's population consumes seafood. The health of the ocean is crucial to our health.

The Design Process

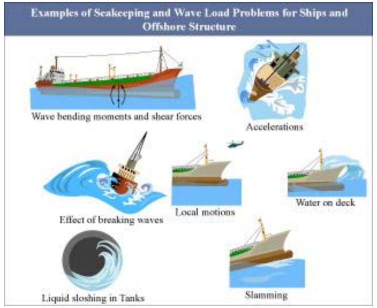


All STEM careers follow the engineering design process. The engineering design process is where you follow a series of actions to achieve your end goal. For ocean engineers, the design process is to define the objective and requirements, choose the right tools and methods, follow a systematic design process, elaborate and communicate effectively, test and validate your design, and review and improve your design process. We follow a similar process when building in robotics.

Ask

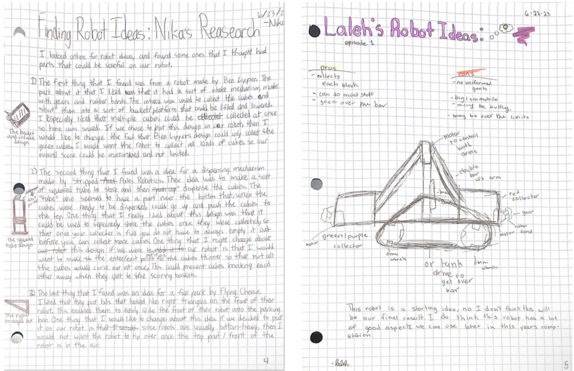
All the technology you see in this world came from a question. When we build a robot, we make a set of questions to know what we want out of the design. Similarly to robotics, ocean engineers have to define a problem, although these problems may differ. In robotics we try to design a robot that achieves our goals of qualifying for each new level. Ocean engineers try and build undersea vehicles that can change marine society.

How can we get here?

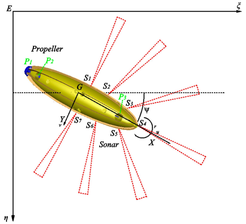


How can we work with these conditions?

Imagine



Examples of our imagining process.



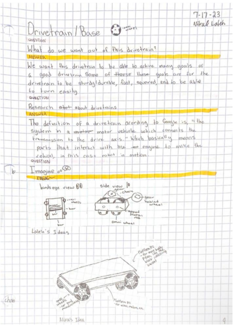
3D model of Ocean Engineers imagining process.

"If you can imagine it, you can achieve it. If you can dream it, you can become it." -William Arthur Ward.

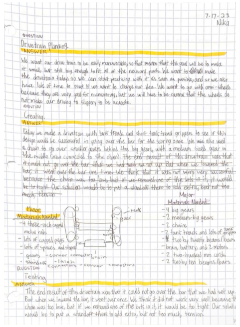
This quote inspires us to work to our fullest. We always come up with models before building. For us this process really allows us to stay organized and work efficiently. For ocean engineers, they usually "imagine" using 3D softwares. 3D models provide more realistic views that can help engineers by including the smallest details, while 2D models cannot.

Planning

When you don't have a plan walking into a situation it's like going into a place you've never stepped foot in. You're setting yourself up for failure by not creating a plan. When we plan, we keep track of everything in our engineering design notebook. We set goals to keep our heads straight and come up with 3 different designs to get the best of each world. For ocean engineers, they have to think of all the ocean properties, such as the water being able to rot certain materials, marine wildlife, and the pressure of water. Then they come up with their prototypes based on these factors.



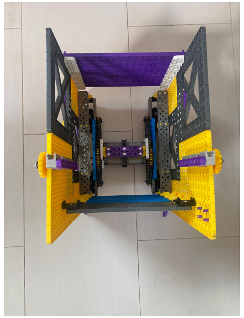
Examples of our notebook.



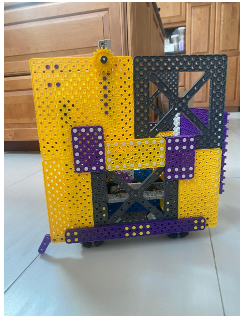
This is how we plan for each mod.

Do you guys think we can build a undersea vehicle that can pick up trash?

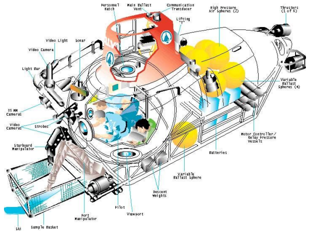
Create



One of our robot frames



September 25, 2023



To the left is a submersible frame, ocean engineers are planning to create.

When we build a new robot, we always start with the drivetrain. We think about the maneuverability, torque, and speed of our drivetrain. Ocean engineers have a similar process, they need to build a design that will best fit a particular purpose. For example, if they wanted to explore the deepest parts of the ocean, they would build a submersible, which is a machine that can go between 2,000 to 11,000 meters underwater and can therefore withstand great pressure.

Experiment/Testing

When it comes to the testing phase, robotics and ocean engineering have the same principle: all the tests that are performed are designed to see if the machines various functions work and are performing as expected. In robotics, we drive the robot around the field and experiment with its functions, alongside how the robot ultimately interacts with the field and its components. Ocean engineers observe how their machine interacts with the marine environment and if the machine will work under these conditions.

Does it work how we wanted it too?

How does this interact with the environment?

Improve

We can use chain gears for example to have more flexibility with the space on our robot.

How can we enhance the quality of our design so it can achieve more?

If the robot does not perform as expected, then it's time for improvements! Improvements can be anything from changing a gear, to redesigning the collecting system. How big the improvement entirely depends on how major the issue is. For ocean engineers, improvements include refining the model's structure, like making sure it is completely leak-proof and that the material that is being used can stand the water pressure. When you improve, you fine tune the design until it is exactly as you need it to be.

Real-World Applications

VEX Robotics competitions have given us many tools for STEM careers in the future. Using the design process while building our robot can help us understand how thing are designed, tested, and built. An overlooked aspect of robotics is the teamwork challenges where we learn how to communicate, collaborate, and compromise with others which can lead to successful projects. One of my favorite aspects is the interviewing process. Usually the interviewing skill isn't developed until an older age, but we get exposed to interviewing at a young age which will prepare us for job opportunities in the STEM world. VEX Robotics gives us many skill sets for our future careers.

Credits

https://pin.it/7tgk9kK

https://engineering.tamu.edu/ocean/academics/degrees/undergraduate/index.html#:~:text=Ocean%20engineering%20prepares%20people%20to,forces%2C%20waves%2C%20and%20currents.

https://www.marinecareers.net/career-fields/ocean-engineering#:~:text=Because%20of%20ocean%20engineers%2C%20major,phenomena%20%2D%2D%20have%20been%20made

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Credits

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