Dumpster Dive with STEM

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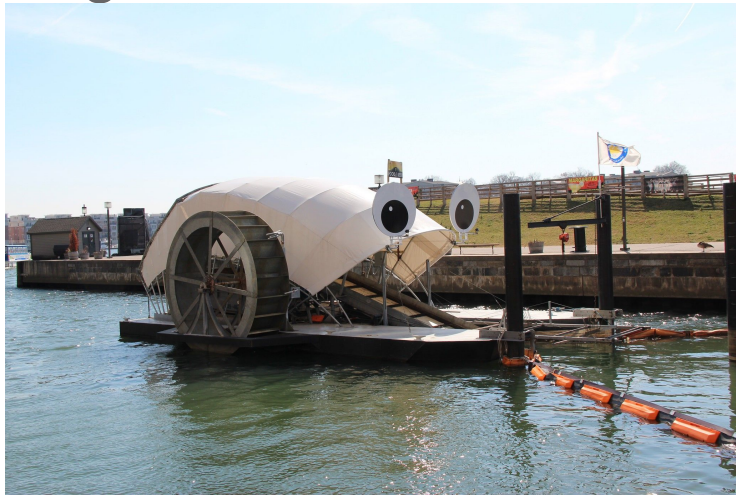
Mr. Trash Wheel: What is it and what does it do?

- Mr. Trash Wheel and friends use the **water currents** and **solar power** to clean waterways leading to the Baltimore Harbor and the Chesapeake Bay.
- Invented by John Kellett of ClearWater Mills in 2007 after noticing the amount of trash floating in the water on his way to work.
- Mr. Trash Wheel was officially launched in 2014 and has picked up as much as **38,000 lbs of trash in a single day**!

Owned and Maintained by Waterfront Partnership

Mr. Trash Wheel

STEM Project - NGSS alignment



http://baltimorewaterfront.com/healthy-harbor/water-wheel/

Science & Engineering Practices:

- Asking Questions and Defining Problems
- Developing and Using Models
- Obtaining, Evaluating, and Communicating Data
- Constructing Explanations and Designing Solutions

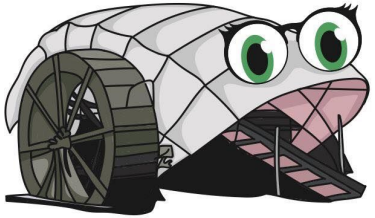
Disciplinary Core Ideas:

- ESS3.C - Human Impacts on Earth Systems
- LS2.C - Ecosystem Dynamics, Functioning, and Resilience
- LS4.D - Biodiversity and Humans
- ETS1- Developing Possible Solutions

Cross-Cutting Concepts:

- Cause and Effect
- System and System Models
- Stability and Change

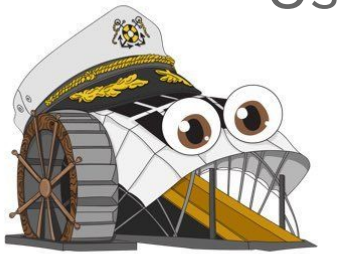
@MrTrashWheel



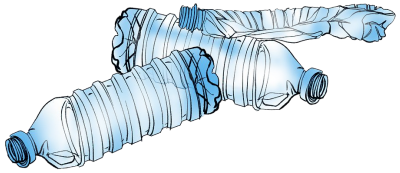
@ProfTrashWheel

Trash Wheels

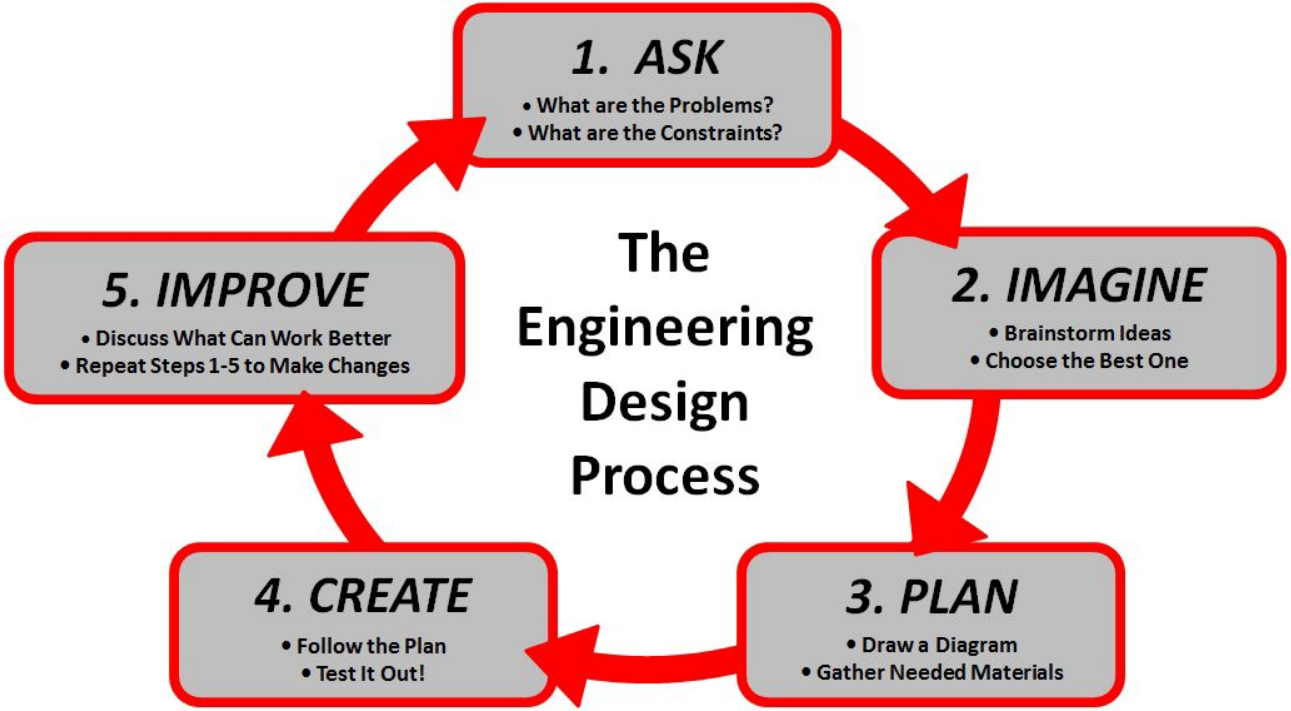
Using STEM to connect to real-world problems



@CaptTrashWheel



The Engineering Design Process



Bringing Awareness - What is the Problem?

What students were learning:

- The human impact of plastics in their environment
- Individual student tracking of their single-use plastics consumption over five days
- Participated in a campus clean up and tallied the type of trash and quantity, then they graphed the data

Engineering Design & Coding Connection

<u>Problem</u>: How do we reduce the amount of trash that gets into our oceans?

<u>Requirements:</u>

1. Build a model of a trash interceptor that will remove waste from a waterway.
2. The model must be made of upcycled single-use plastics
3. The model must move a piece of trash (ping pong ball) from a water source to a seperate container outside of the water.
4. The model must include splash resistant protections for the sensors and electronics used.
5. Create a 60 second PSA video to showcase your model and bring awareness of the effects of single-use plastics on local waterways and wildlife.
6. **Bonus:** Create a way to automatically activate your trash interceptor when trash is present and turn off when trash is not present.

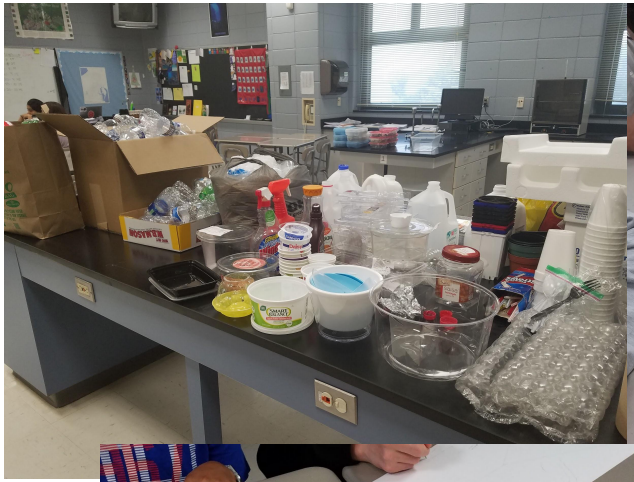
Group Roles for both Right/Left Brains

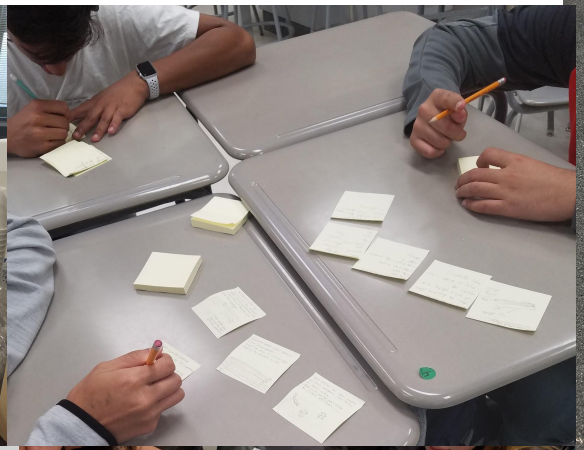
Project Manager:	• Organize and motivate your team to stay on task • Controlling time management • Document all progress of your project by submitting daily reports and submitting a end-of-project portfolio showing progress of development. • Complete performance evaluations of your team
Software Engineer:	• Designs a program to control motors and sensors to automate the project. • Troubleshoot and test programs in TI-Basic • Communicate with other team member to ensure all aspects work together • Submit a review of the Project Manager
Mechanical Engineer:	• Design and build a project using single-use plastics • Troubleshoot and test materials to achieve the goal of the project • Communicate with other team member to ensure all aspects work together • Submit a review of the Project Manager
Marketing/ Design:	• Develop a creative aesthetic to your project to make it marketable • Create a 60 video PSA on the effect of single-use plastics on the environment using your project • Communicate with other team member to ensure all aspects work together

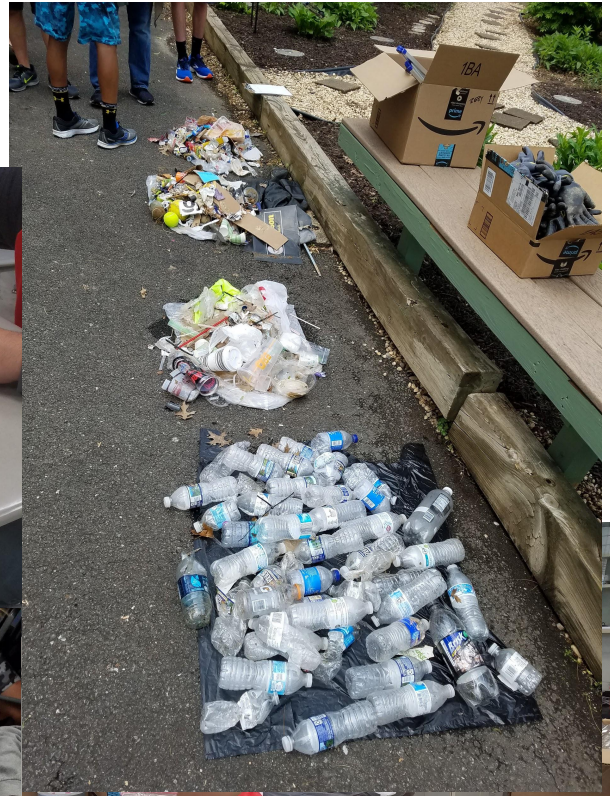
Timeline:

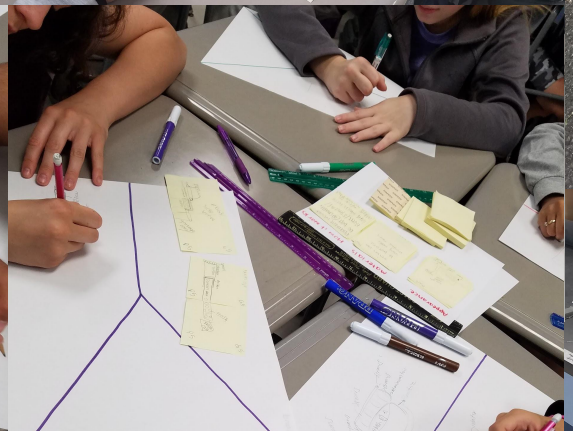
Day 1	Introduction to Trash Wheel & Post-It note brainstorming
Day 2	Share out ideas and sort into categories. Discuss possibilities/problems
Day 3	Concept Sketch: Draw out ideas. What do you want to? How can you get this to work? Share out ideas
Day 4	Peer-Review sketches & Introduce group roles
Day 5-8	Build and test
Day 9	Gallery Walk/Peer Review

Student Progress

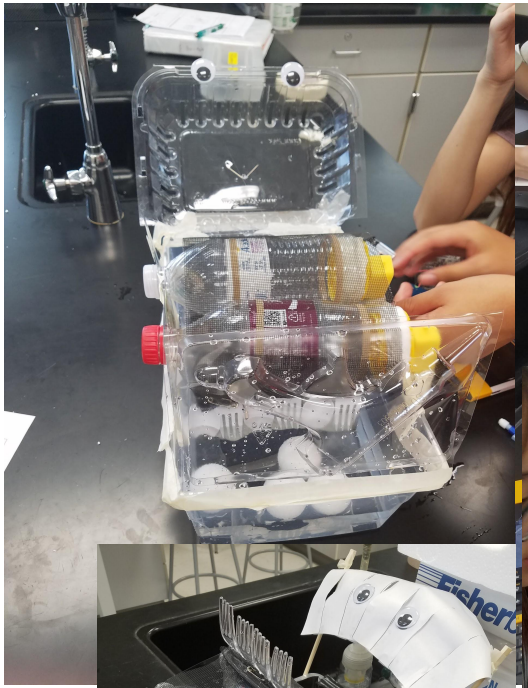


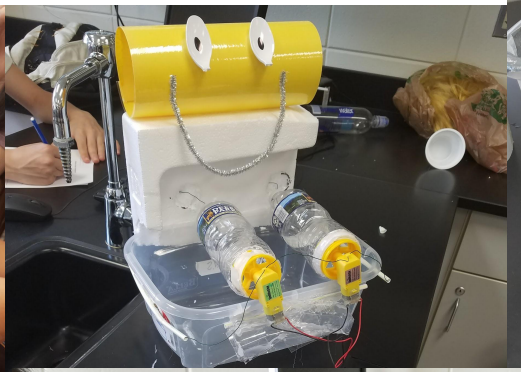


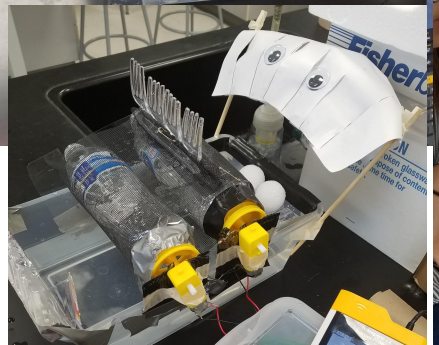


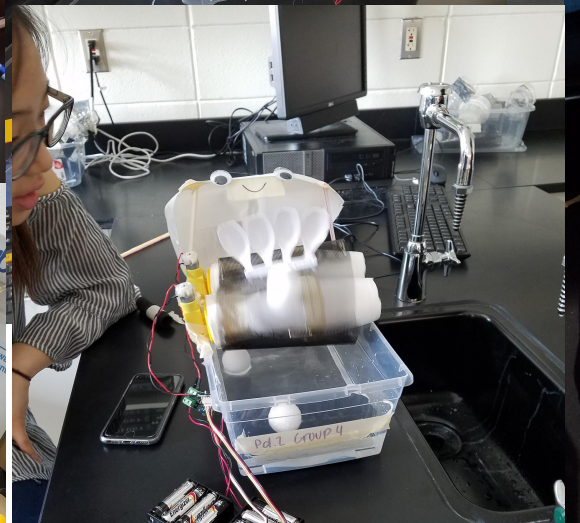


Student Work









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Contact Information & Links

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Participant Resources: http://bit.ly/STEM_TW