CEN100 - Personal Design Notebook

September 13, 2024 7:23 PM

Sept 13 2024

Whirlpool Device that collects Ocean Debris

Problems of litter in the ocean

- Contributes to Climate Change

Garbage in the bodies of water contributes to climate change. This is because the degradation of the litter releases greenhouse gasses like methane to the atmosphere.

- Pollutants in the water

Toxins and chemicals are released in the water from the litter and can affect the whole ecosystem

- Habitat loss

Due to the substances being released into the water, this can interfere with ecosystems like coral reefs. The living conditions for these affected habitats are terrible.

- Endangering marine life

Habitat loss and chemicals can cause many marine life to parish and even if they live they could suffer long term effects. They could also eventually develop mutations.

- Economic impact

Eventually marine life effected by pollution cannot be sold and traded which would affect the economic state of countries that rely on these types of transactions. The clean up fee is also a large sum.

- Contaminated seafood

Food that does make it on our table could be contaminated and if ingested, it could cause harm to humans and other animals who hunt marine life to survive.

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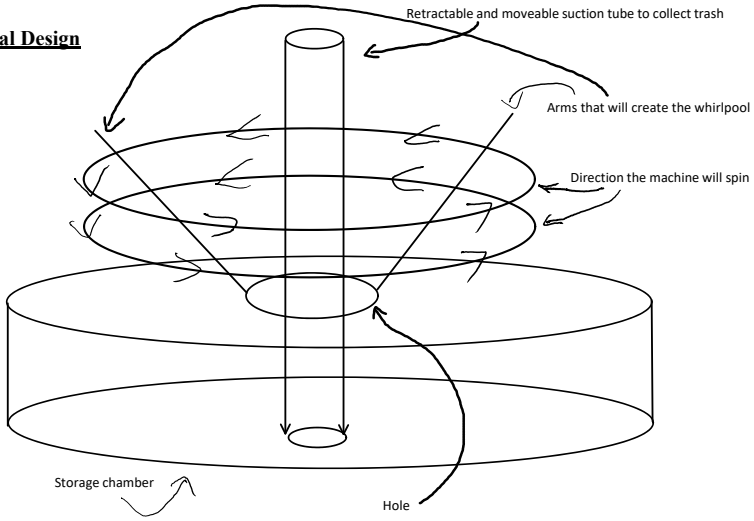
Initial Design



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Why I want to solve it

- Biodiversity

Animals in bodies of water are the oldest species. Losing them would be losing a glimpse into the past. Things such as evolution trends help us study how humans came to be and could help in future research to create breakthrough technology. Also losing these animals could deal a great blow towards genetic diversity. These information could also fuel future research.

- Food chain

Losing marine life could also damage the food chain. Animals that eat fish could lose their only source of food and eventually go extinct if they don't adapt. They could also get affected with the chemicals and toxins the marine life they carry. So not only do animals in water get affected, but all animals in the land and air as well.

- Less food options

As humans we eat many things. Losing marine life would mean no fish, crab, lobsters and more. Our food source gets significantly smaller and we have to eat other things. The food that we substitute it with will need more production. In a growing population we would run out of space to produce these good eventually so keeping seafood in our diet also benefits us greatly.

- Global economy

As mentioned before, many countries rely on marine life for trades and goods. Without these, countries will have to find alternate sources to help boost their economy. Not only would they lose things to trade but also jobs. Life in those countries will be hard to live which would also not help a growing population since we need more space to live.

- Cutting down on the pollution

Since many bodies of water are connected to land, these chemicals and toxins coming from trash in the ocean will eventually be absorbed by the ground. This in turn will ruin many areas of land close to bodies of water and can quickly spread. This would make growing crops and plants impossible which also cuts down on our and other animal' food sources and habitats.

- Tourism

Another thing pollution does it turn beautiful scenery into ugly ones. Many travelers would be less likely to visit these countries which in turn will not help the economy and also hurt the airlines and job that these tourist sites create.

Sept 22 2024

Slow Moving Current

- The frequency at which the arms will spin will be slow

Each arm will make 1 revolution per second

- The reason is to minimize the number of fish caught in the current

It allows the fish to be able to swim away since the current will be weaker the strength of the fish swimming can overcome it

- It preserves the fish's life

Allowing the fish to swim away leads to preservation of it. It can later reproduce and keep the population constant.

- It doesn't interfere with the food chain and biodiversity

Keeping the marine life untouched allows it continue its natural life cycle and keep the other species at normal levels.

- It won't cause any interference with the natural state of the water

A low current will not create large waves or huge disturbance to underwater habitats like coral reefs and ocean floors. This allows the marine life to carry out their daily activities.

Sept 27 2024

Gradual Slopes

- Steep vortex vs gradual vortex

Having a steep vortex makes it stronger and covers less area. This means less garbage can get collected. It also would require more energy to maintain since it would spin more often which makes it not efficient. A gradual one would be wider and cover more area as well as spin less often. The vortex will be weaker but the garbage will be pulled in over time which is the main function and goal.

- Marine life

It also allows marine life to escape if they get caught inside these vortex's. A stronger and more violent one which the steep slope one creates would be harder for them to escape and could endanger their lives. A weaker and less violent one with a gradual slope allows them to escape the vortex.

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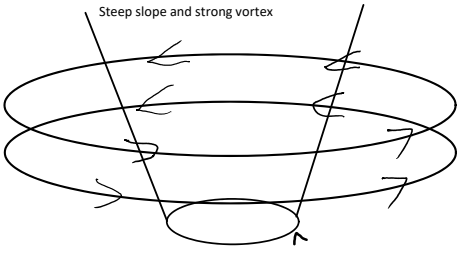
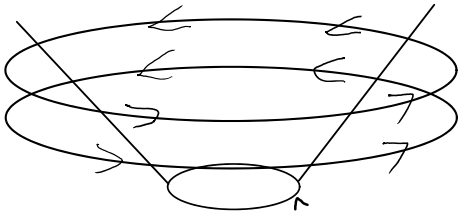
Gradual Slopes - Sketch



Gradual slope and weak vortex



Oct 3 2024

Acoustic Deterrents

- Plays sounds marine life don't like

Sounds such as sonars and other sounds that cause vibrations to deter the fish away can be used. They can be played at low frequencies and periods so as not

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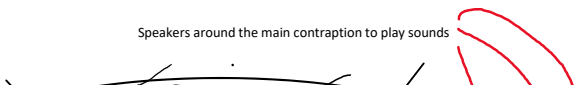
Acoustic Deterrents - Sketch



Acoustic Deterrents

- Plays sounds marine life don't like

Sounds such as sonars and other sounds that cause vibrations to deter the fish away can be used. They can be played at low frequencies and periods so as not to affect marine life using vibrations in the ocean as a means of communication.

- Reduces the chance of an animal getting caught in this contraption

This, in turn, leaves the marine life unaffected while the contraption can collect the garbage without having to deal with animals possibly entering the system

- Overall, it helps the ecosystem

An automated system removing garbage from the ocean without affecting marine life will boost the overall health of the ecosystem. When the trash reaches an amount which won't affect aquatic life, then the contraption can be removed to give their habitat back.

Oct 7 2024

Strobe/UV Lights

- Periodic uses of strobe lights

Periodic uses of strobe lights can act as a deterrent and can act as another level of protection for aquatic life. Since fish are sensitive to light, having these deterrents in dark water will be highly effective in steering fish away from this contraption

- Periodic use of UV lights

Periodic uses of UV lights can also be used as a deterrent. This can be a cheaper option but a less reliable one. However, when flashing, it can be a great substitute for strobe lights as it is cheaper and can last longer than strobe lights.

- Safe way to deter aquatic life

Other deterrents talked about such as acoustic ones can harm some communication methods between aquatic life with their vibrations. Using lights can offer a cheaper way to deter these animals as well as having less of an impact on the daily lives of the animals that will be around these contraptions.

Oct 13 2024

Bubble Curtains and/or Fishnets

- A machine that creates bubbles around the main whirlpool device

A ring around the whirlpool contraption that can create bubbles. It can be turned on and off at will to reduce power consumption and can also have a motion sensor to trigger it

- A fishnet put around the machine

Instead of a bubble machine, we can just use a fish net surrounding the contraption which wont use any power but fish wont be able to see it and can run into it and get caught. There will also be more frequent maintenance needed if out in areas with many fishes.

- Helps create a barrier that fish will avoid

These things will act as another layer of protection for both the fish and the contraption. However, using a fishnet may cause marine life to get caught regularly and need to be set free. Because of this, regular surveillance of the net has to be done

- Reduces the chance of fish getting caught in the whirlpool

Doing all of this reduces the number of interference of the machine and can protect the area around the machine as well as the wild life around it. It can also create more job opportunities to maintain these things.

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Periodic uses of this machine

- Turned on during the day

Hours for this machine could be working through Sunrise-Sunset. This is because marine life is most active during the dark and doing this minimizes the marines interactions with this machine

- Turned on for only 1-2 hours at a time with a 1-2 hour break

Being turned on for only a couples hours at most allows the machine to save power and reduce the chances of fish being caught in this machine. There also wont be any trash to collect constantly so having the machine run and collect nothing is redundant

- Deterrents will either be AI monitored or turned on through motion sensors

For the deterrents to be activated, the marine life will either be setting off motion sensors and the machine will turn on deterrents based on the position the motion was captured. Or AI can use cameras to turn on these deterrents at will.

- Can be picked up as a whole system to be transported or charged

This whole contraption can be picked up and lowered through a crane or similar machines. This reduces the amount of materials needed to build many of these machines and instead they can be reused to clean other bodies of water when finished with the most recent one

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Underwater Cameras or Sensors

- Can be used to detect or catch movement

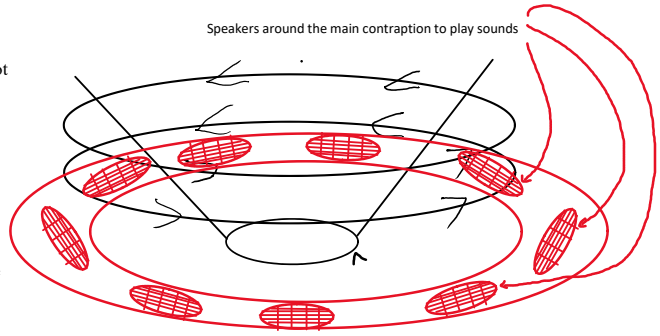
If budget allows, cameras or sensors can be used to gather information on the surroundings, instead of turning the machine on at set times

- Based on the information gathered can turn on specific functions of the machine

Using these equipment, if motion or a large organism is detected, different functions can turn on based on what information was gathered. For example if movement is detected within 15 meters, the net will be put up and the bubble machine will turn on

- 180 camera and/or sensor

Acoustic Deterrents - Sketch



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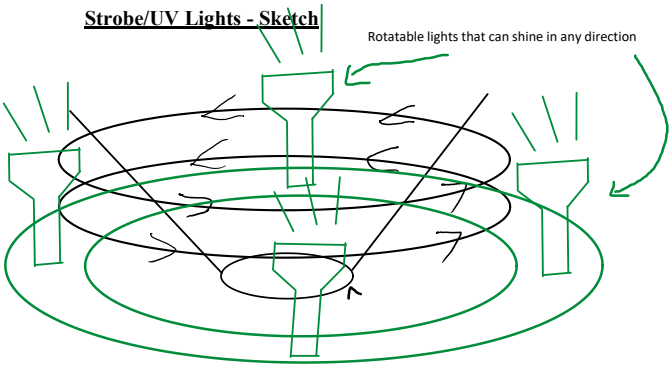
Strobe/UV Lights - Sketch



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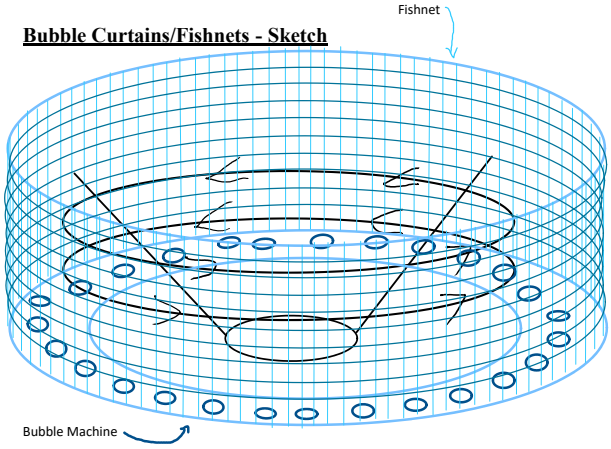
Bubble Curtains/Fishnets - Sketch



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Time and Materials Needed

- 1 month of continuous work
- Metal
- Strobe lights
- UV lights
- Fishing nets
- Electrical circuit's/wiring
- Pistons
- Speakers
- Screws
- Nails
- Welding machines
- Sensors

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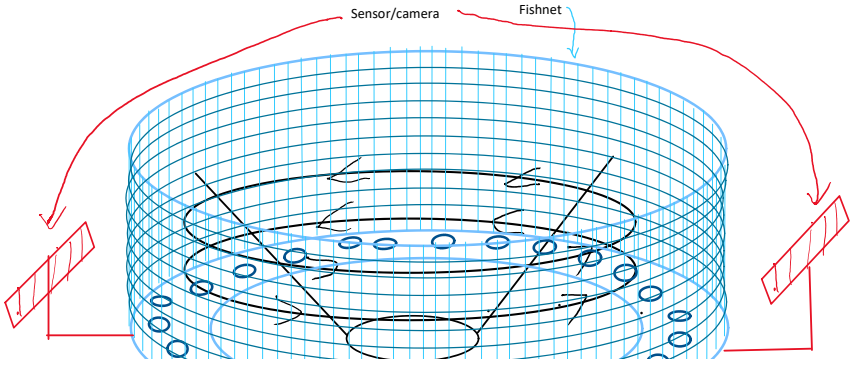
Underwater sensors plus cameras - Sketch



the machine

Using these equipment, if motion or a large organism is detected, different functions can turn on based on what information was gathered. For example if movement is detected within 15 meters, the net will be put up and the bubble machine will turn on

- 180 camera and/or sensor

To help with the budget, instead of multiple cameras, only 2 sensors or cameras will be installed on opposite sides seeing the whole area surrounding the machine

- Sensors will be infrared

Instead of capturing movement which can be other particles, infrared vision can be used to more accurately capture living organisms. This is to prevent the machine from turning on without anything nearby. If they surroundings is clear, the machines deterrents will turn off.

Nov 4 2024

AI Recognition

- AI will make choices based on the information gathered from the sensors and cameras

An AI will act as the brain of the system and will make choices based on the information gathered from the sensors and cameras. For example if a fish is seen swimming by, the AI will analyze what kind of fish it is and which deterrent is best to deter the fish away without causing much harm.

- Reduces the amount of times the deterrents are activated

This in turn reduces the amount of false alarms to happen. Since particles can trigger the motion sensor, having an AI to sort through the information can be helpful to avoid these situations. Once the coast around the system is clear, the AI can turn these deterrents off as well.

- Saves power consumption

This will lead to a less amount of time the deterrents are turned on, which limits the amount of energy consumed. This makes the machine as a whole more energy efficient as well as environmentally friendly.

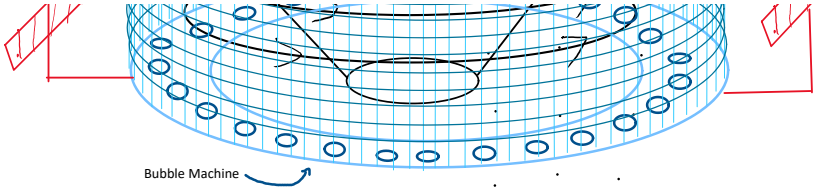
- Can also recognize movement of captured organisms

The AI can also recognize movement in the initial capturing of the garbage. If detected the machine will send an alert to trained personal to come and free the fish while the machine shuts down until then

Nov 11 2024

Additional Information

- The system will first be tested in shallow lakes and ponds
- The depth of this machine can go up to 50 metres under water
- Will be placed in polluted water bodies
- Will use a net system to collect the garbage



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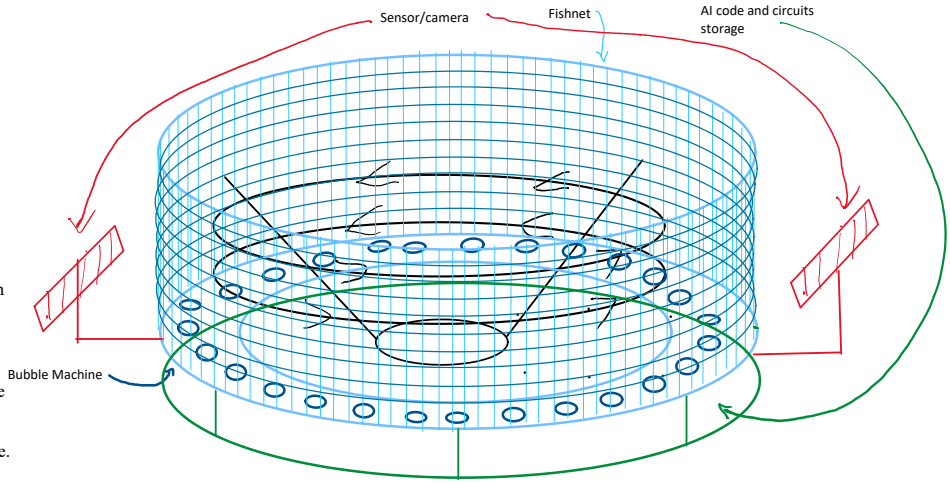
AI Recognition - Sketch



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Final Sketch