



PROTECTING OUR OCEANS WITH OTC

FLL TEAM  
#3249 CAPTIBYTES

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# OUR TEAM:



# Limited Data Collected for Ocean Exploration & Preservation

Numerous factors influence ocean exploration, lack of data impedes future ocean research. Data is needed to identify invasive or endangered species of fish and dying coral reefs.



# Our Solution



THE OTC (OCEAN TRACKING CRAFT)

# Cost of the OTC

Equipment and Cost:

PH Meter: 7\$

TDS, EC, and Temperature Sensors: 5\$

Multibeam Sonar: 4,000\$

Starlink: 1,500\$ 250-5,000\$ per month depending on data plan

6 Cameras: 429\$

4 Sample Pumps: 8,551.96\$

Solar Panels: 3,218\$

2 Battery Supplies: 4,098\$

Aluminium 3000 ft^2: 218,500\$

About 100,000\$ for two. To get it made you need to inquire about the production.

The Robotic Cartridge Sampling Instrument: 3500\$

Carbon Sensor: 300\$

Labor: 15,000\$

Wires: 5,000\$

Small Materiels: 10,000\$

Navigation Lights: 120\$

2 Underwater Lights: 1,600\$

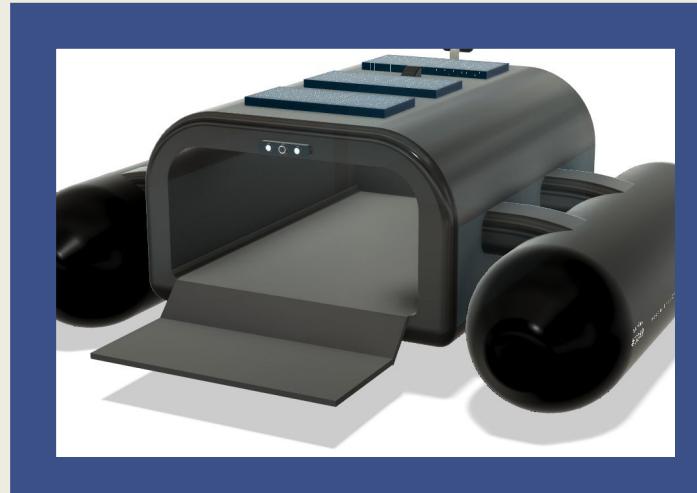
Server: 2,923\$

Storage: 2,000\$

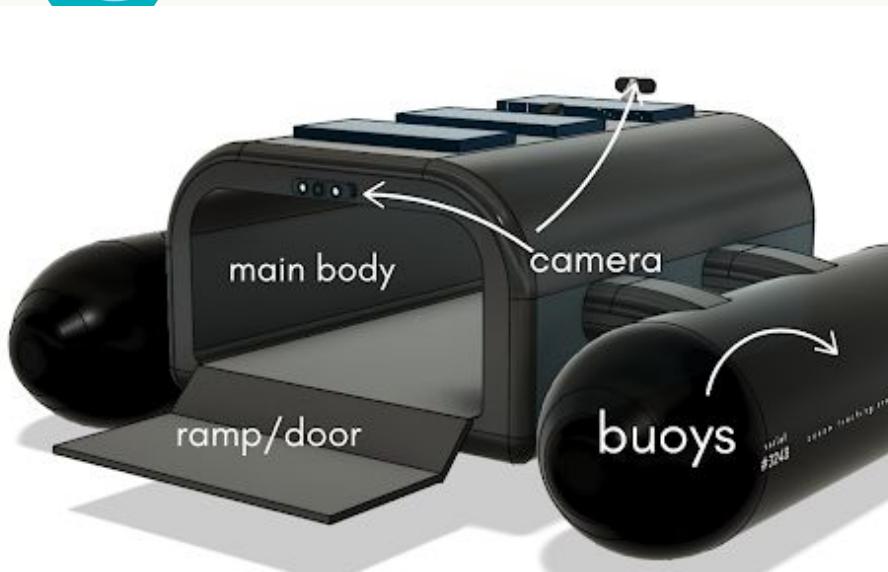
PC: 2,000\$

Jet Propulsion 2: 30,000\$

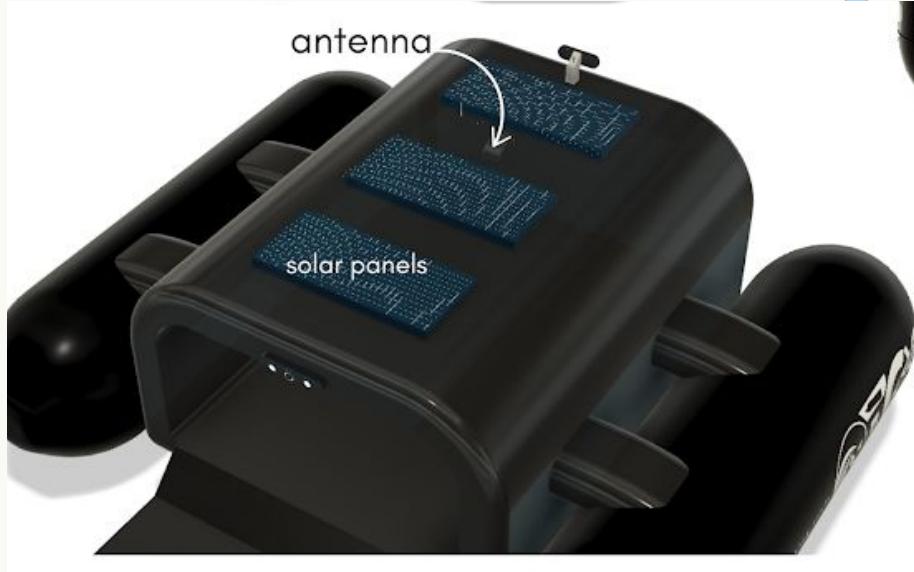
**Final cost is about: 412,852.96\$**



# Features of the OTC



# Features of the OTC



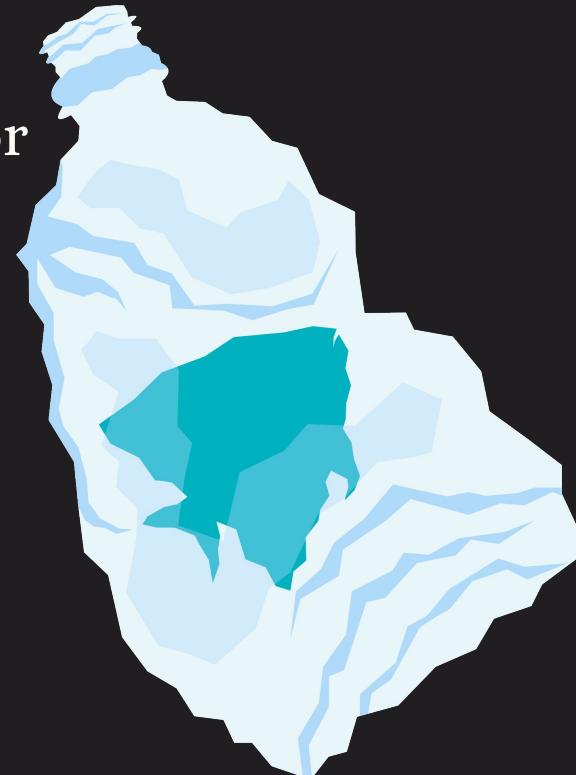
# -THE OTC'S PARTS-

- Two buoys on the side for buoyancy
- Multiple cameras on the front, back ,and underneath (AI VIAME)
- A device for collecting water samples
- Solar panels to energy power the AUV and the onboard technology
- Sonar for identifying reefs and large objects
- Sensor for temperature, TDS, EC, and PH
- Lights on the bottom for better images
- A drain in the back so that water is not trapped in the OTC
- Marine navigation lights



## Data from the OTC will:

- Assist researchers in gathering information.
- Cameras capture images used by VIAME for identifying things like fish and garbage.
- Water sample for intensive testing by labs
- Sensors for measuring
  - Water temperature
  - Water salinity
  - Sonar for identifying large objects or mapping the ocean floor
  - TDS - - dissolved solids like salt and microplastics,
  - Carbon to measure PH
  - Electrical Conductivity measures how well and quickly the electricity



# **WHO CAN USE IT?...**

## **Government**

to clean harbors or  
garbage near their  
city or country

Such as NOAA (National  
Oceanic and Atmospheric  
Administration) and

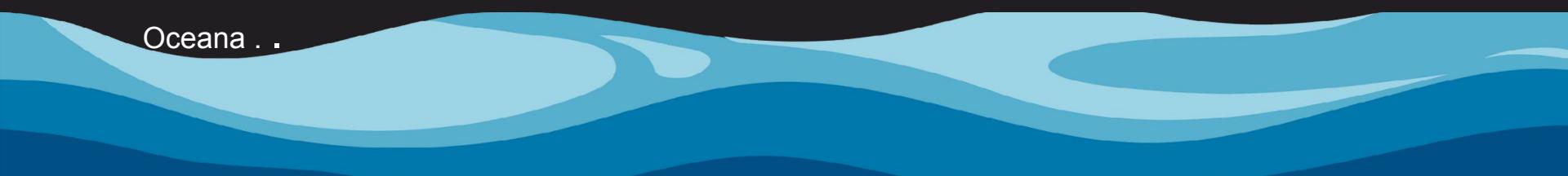
Oceana . . .

## **Hotels/Resorts**

because they make  
money because of  
their blue, beautiful  
ocean, so if it's gross,  
less money.

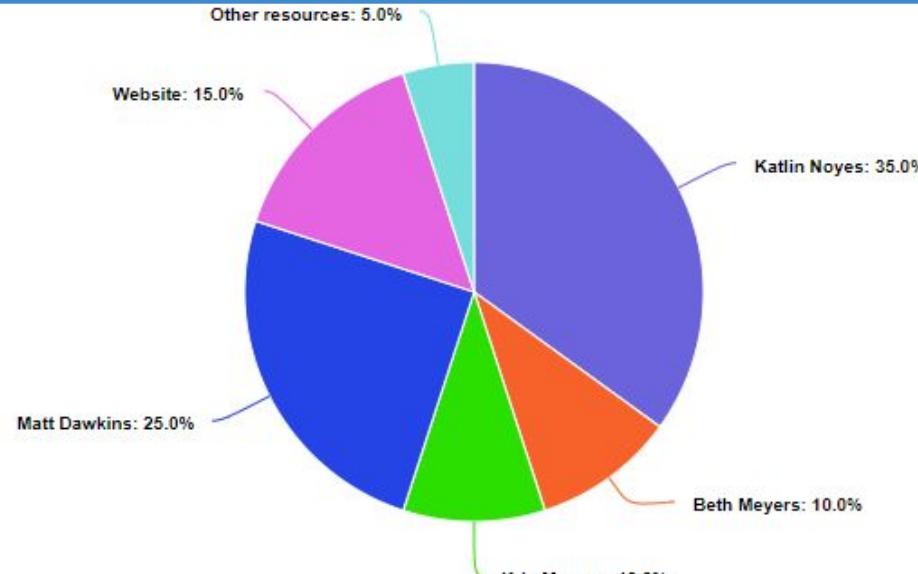
## **Non-profit organization**

like The Ocean Cleanup  
might use it to further their  
goals of cleaning the  
ocean.



Similar Solution Name	How it's similar to our solution	How it's different from our solution
<b>Slocum Glider</b>	Is an automated craft that dives underwater and can stay there for weeks or months. It is equipped with several sensors for water measurement like oxygen, etc.	<b>Slocum Glider</b> cannot take large samples and collections like the OTC. The OTC is also on the surface and does other things as well like identify fish.
<b>Sail Drone</b>	It is unmanned and surveys the water.	It is used for military purposes, specifically for the water borders, and is used to track illegal activities.
<b>Oceanus</b>	It streams videos	It is much smaller, and it doesn't collect water samples

# Most Helpful Contributors to the OTC



Legend: Katlin Noyes (purple), Beth Meyers (orange), Kris Moreau (green), Matt Dawkins (blue), Website (pink), Other resources (cyan)



Kitware  
Matt Dawkins



SkyTruth  
Kris Moreau



Beth Meyers  
Dive Instructor  
Sweet Bottom Dive University

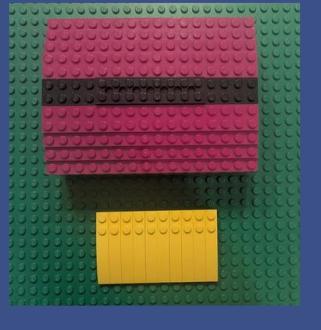


Kaitlin Noyes  
Arizona State  
Sweet Bottom Dive University

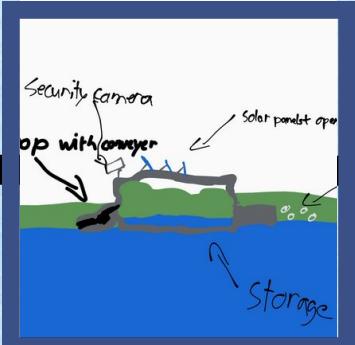
We met with several experts and asked them to give us feedback on ways to implement our solution.



# - THE EVOLUTION OF THE - OTC



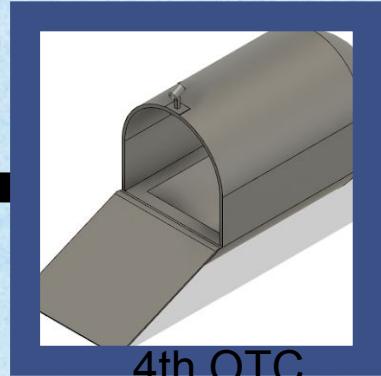
1st OTC



2nd OTC



3rd OTC



4th OTC



5th OTC



6th OTC



# Resources Used for Research

★ =Used most

★ National Geographic article on the Pacific Garbage Patch

- International Finance Corporation

★ National Oceanic and Atmospheric Association (NOAA)

- Ted Talk - The Great Pacific Garbage Patch

★ Team Seas fundraising project, Mark Rober

- Natural Resources Defense Council
- The Marine Mammal Center
- Center for Biological Diversity



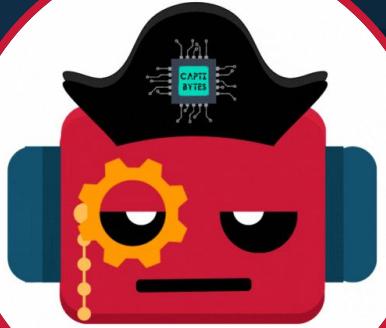
# **Challenge the team worked through....**

Challenge	Solution
<b>Finding Experts</b>	<ul style="list-style-type: none"><li>- Reviewing FIRST videos and links</li><li>- Talking to teachers, family, friends</li><li>- Frequently following up with experts</li></ul>
<b>Designing Prototype</b>	We started with a drawing that we then made with legos. We wanted to design the prototype with Fusion and because it took time to learn we used AI for the qualifier. Our latest model was designed with Fusion.
<b>Testing Prototype</b>	It's challenging building our prototype to scale. Our focus at this stage of design in the function of sensors.



**Innovation  
Solution - OTC**





There are about 2 million cigarette butts, the largest of any trash item in the ocean. Don't smoke or vape!

It has been estimated that it would take 67 ships one year to clean under 1% of the oceans trash! That's a lot!

The garbage patches have 250 pieces of trash for every one human.

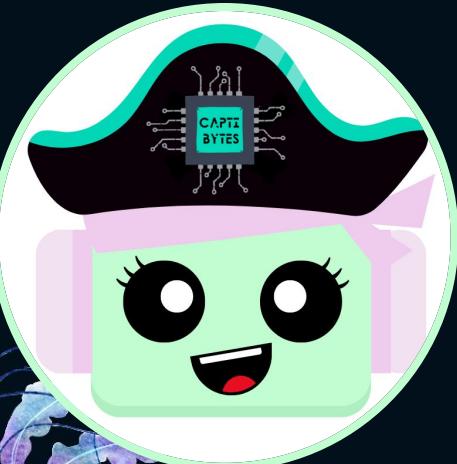


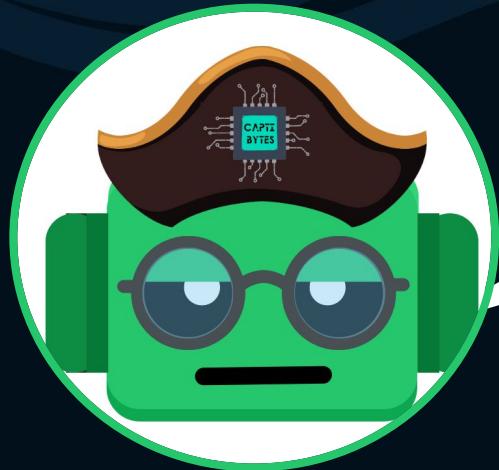


The GPGP (Great Pacific Garbage Patch) is nearly twice the size of Texas. That's huge!

Some of the trash dates back to 1960. That's super old!

With all the trash, it makes it hard for things like algae and plankton to grow, which can disrupt the food web.





Different animals like albatrosses might mistake trash for food and feed it to their young. It's not very healthy.



Ghost fishing is when abandoned fishing nets still catch and suffocate different sea animals like dolphins or fish.



The garbage islands looks like a lot of cloudy soup because of all the microplastics in it

