# Underwater ROV: A Solution to Dirty Oceans


## Liopleurodons

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## Abstract

About 11 million tons of waste is dumped into our oceans every day, and only 1 to 2 percent of this amount is recycled. And today, more than 1.5 billion face masks are polluting our oceans. The ROV is a very simple and easy solution to all of this, but it needs something to pick up and collect the trash. So we designed and built a motorized clamp that could be used to pick up the trash in the ocean. Most of the clamp is 3D printed, and turns using a small motor. The motor would be covered in MarineWeld to waterproof it, and it would be in a 3D printed box. This motor would connected to the 4th wire (the brown one) in the CAT-5 cable. We would add another switch to the controller and use that switch to open and close the clamp. You could also add a wireless camera on the ROV so that you could see the trash under the water, and so you could grab it.


## Background & Motivation

We already had past experience using a SeaPerch ROV, so we had experience and many ideas for real world problems like this. The SeaPerch challenge already had many parts like this, and made us make many things to assist us in it. Trash in the oceans is a very common and large problem in the world, and this gripper that we designed could be useful in many ways.

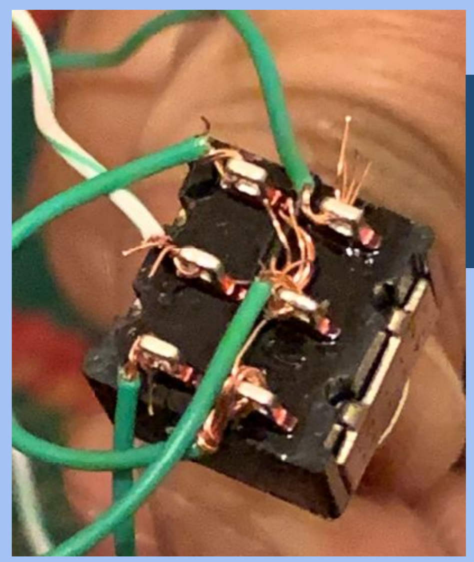
## Design Approach

The first thing we did when making the clamp was designing it using 3D software. Our plan was to have a motor control one of the claws, and use a gear mechanism to allow the other claw the turn. We also wanted the claw to have a curve so it could wrap around the garbage and pick it up easier. Designing it and printing was pretty straight forward after knowing how we wanted the design to be.

Next, we found a small motor and chose to use it for the clamp. The main thing we had to do for the motor was to waterproof it. We couldn't use the regular film canisters because the motor was not fit for it. So we found 2 captions, which were MarineWeld and PlastiDip. Both materials are waterproof and can cover the entire motor. When we tested it, we found that PlastiDip tends to peel off overtime, so we chose to use MarineWeld, which was much more sturdy. We 3D printed a container for the motor, and then attached it all together.

We super glued the shaft of the motor to the claw. We left a hole in the claw so that the shaft could fit through. When we connected the wire and switch to the controller, and tested it for the first time, it worked fine. But later on, it would sometimes get jammed, and we would have to fix it. We tried our best to fix this problem, but it still happens. We were able to put it in the water with no problems, but when we tried to pick up a water bottle, it wasn't strong enough. We took it out of the water, and it wrapped around it perfectly, but it wasn't able to lift it.

## Design Experiments



connect the switch to motor

Model Claw design

Waterproof motor

## Methodology

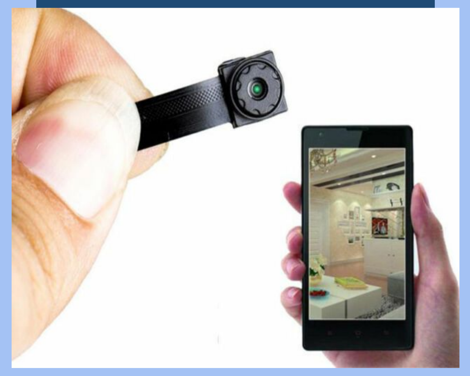
When we were brainstorming the idea of building a robotic gripper, we had some goals and specifications in mind:

1. First, we wanted to make that the gripper could move back and forth freely, without getting stuck. If the gripper were to stop working in the water, we could have no way of fixing it.
2. Second, we wanted to keep it simple and easy to build, and not make it too complicated. We have never built anything like this before, so this was new to us.
3. Third, we wanted to 3D print the frame and the clamp, and use a motor to control the clamp. We had experience designing items for 3D printing, and we were good with motors.
4. Lastly, we kept the idea that we could add a camera onto the ROV for better visibility when the ROV is submerged.

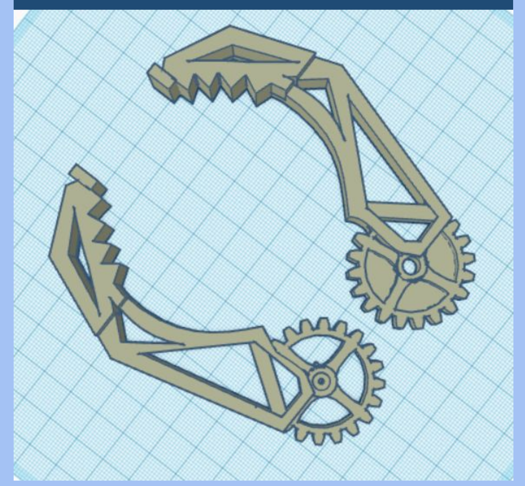
## Design Specifications/Models

### ROV

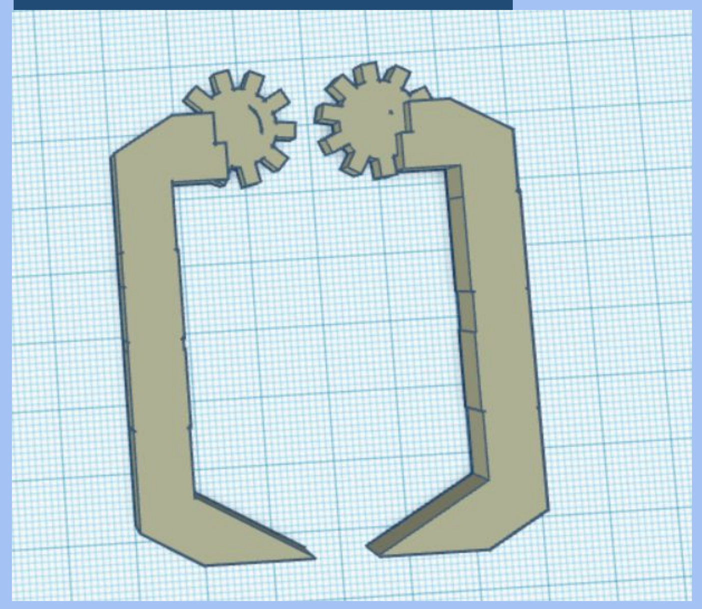
### Camera



### CLAW - Model 1



### CLAW - Model 2



## Results & Discussion

The results of us building the clamp was actually pretty successful. The clamp operated as it was intended, being able to open and close from the switch on the controller. One problem we faced was the clamp did get stuck every once and awhile, but we were able to fix it. But the main problem we faced was the strength of the clamp. When we tested picking up a water bottle, it wrapped around it just fine, but it didn't have the strength to lift it. We figured this was a motor problem, and that the motor didn't have enough power to lift it.

## Lio- Features

- ROV
- Motorized Claw
- Wireless Camera-view/analyze and record data
- Frame net to hold stuff from floating
- Controlled by additional switch to open/close the claw

## Conclusion

We believe we designed a functional clamp, with a little bit of problems. We enjoyed working on this clamp and solving the problems that came along in the process. We wish to grow this idea to be bigger and better.

## Engineering Design Process

The engineering design process is the steps we followed when solving a problem. By following the steps we would, identify the problem, look for solutions, test the solutions and see which one is the best, and use the best design. It keeps repeating over and over again.

## Next Steps

The next thing we want to focus on is making the clamp more efficient. We could replace the motor with a stronger motor that way it could pick up heavier items. We could also add some design modification to prevent the clamp from jamming and make it more efficient. We would use all the things we learned so far to make these future solutions possible.


## Acknowledgements

Add your text, graphics, and charts here. Consider the following:

- Who helped conduct this project?
- Are there organizations or individuals you want to recognize?
- Include any references in this section.