

Abstract

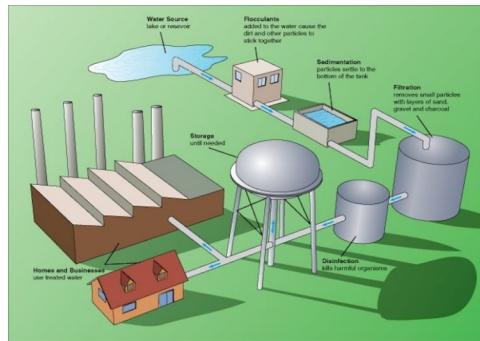
A sea lion goes to get food for itself, but mistakes plastic for a piece of krill. The sea lion may die. Over one million marine animals die each year because of water pollution. Fish, sea turtles, dolphins, and sea lions are some of the marine animals that suffer death from water pollution.

It is projected that, by 2050, there will be more plastic than fish in the ocean, rendering almost 75% of the earth toxic to humans. This will happen because manufacturing production will increase, causing more plastic to end up in the water, which renders the earth toxic to humans and marine animals. This cannot stay unresolved.

Our proposed invention, **The Water Pollution Resolution Fish**, will be an innovative way to reduce water pollution. Our invention will combine a number of clean technologies to effectively stop water pollution and save the marine animals from dying from water pollution.

Present Technology

Currently, solutions to address water pollution have focused on prevention and wastewater treatment. *However, there is limited technology used to address water pollution caused by other human actions (e.g. oil spills, littering etc.) because it is difficult to clean up mass pollution once it has occurred.*



Wastewater Treatment:

Wastewater treatment plants are set up to treat industrial sewage and wastewater before releasing it into the environment. In water treatment plants, sewage goes through different steps to separate dirt from the water, to filter and disinfect the water to make it clean for the environment.

Current Prevention Methods:

There are laws and regulations such as the Clean Water Act set by the Environmental Protection Agency (EPA) to establish standards and rules for companies to cause water pollution.

Other Current Ways to Address Water Pollution:

Volunteer groups, such as Project Clean Water, often help with clean up by organizing events to clean beaches and shorelines.



History

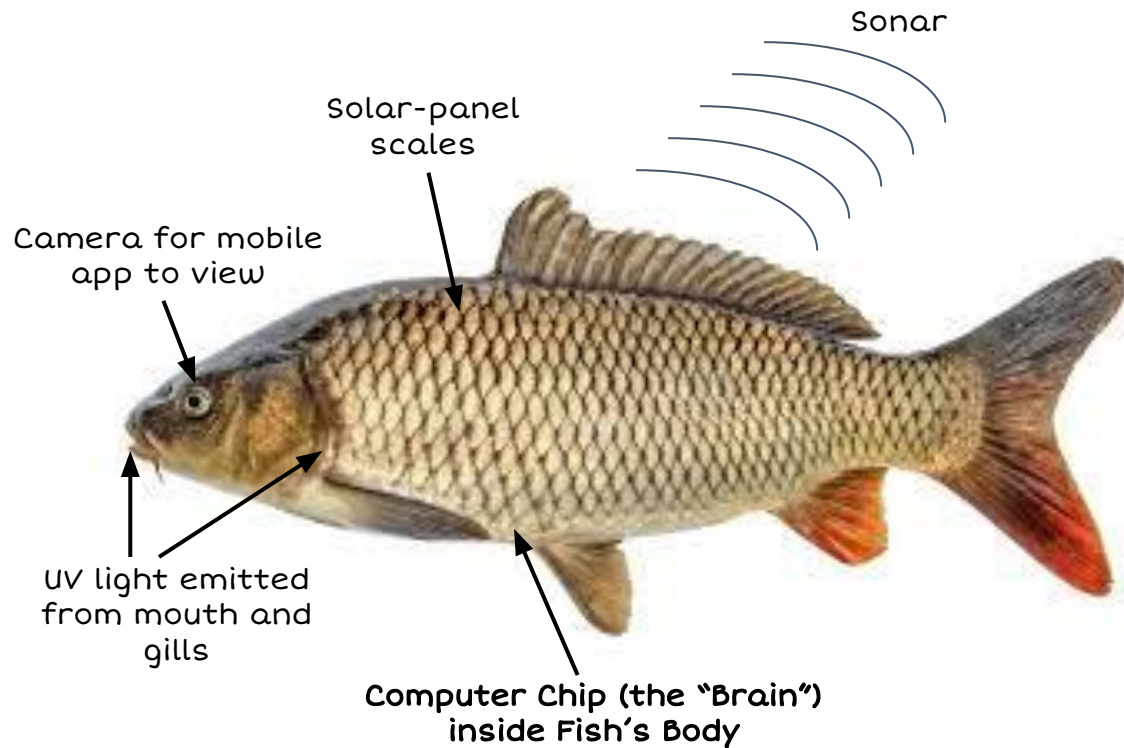


Water pollution has been a problem for centuries, starting with humans contaminating sources of drinking water with sewage to factories releasing chemicals directly into rivers and streams following the Industrial Revolution. In 1969, Ohio's Cuyahoga River went on fire from the chemical waste that was released into the river. The river became a symbol of how water pollution was destroying America's natural resources.

Since then, humans have taken actions to address water pollution, such as setting up the EPA to regulate water pollution and exploring technologies to address the problem. For example, in 2011, Boyan Slat, a Dutch inventor, invented a machine called the Interceptor that runs on solar power and drifts across the ocean to pick up trash across bodies of water.

However, currently, there have not been any inventions that can clean up ocean and address water pollution on a large scale.

Future Technology



The **Water Pollution Resolution Fish** will be a fish-shaped robot that runs on **solar energy** using solar panel scales and will go into the ocean or river and suck in the dirty, poisonous water and trash that got thrown in the water.

The Fish will have **Artificial Intelligence** to act like a real fish so it can blend in with other marine animals. It will rely on **automatic pilot** to swim around. A **sonar** would allow the fish to track predators and avoid them, and also allows the fish to track areas of plastic and dirty water.

When the fish detects garbage with the **sonar**, it will use nanotechnology to shrink the trash and make it easier and faster to transport and cleanse the trash received.

This Fish will then spray **UV light** all over the trash and the water, purifying and cleaning the water.

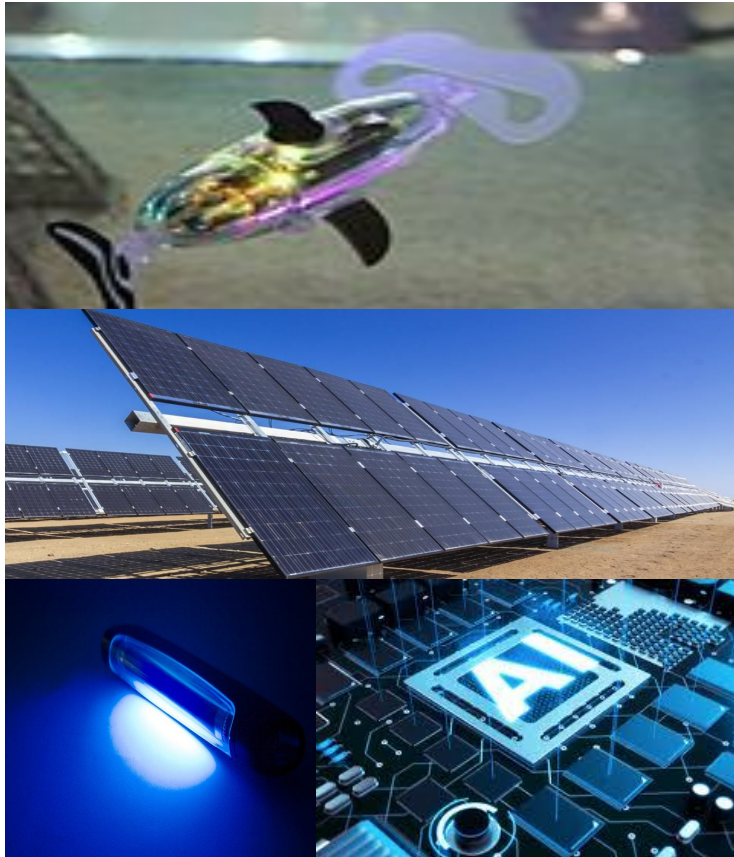
Using **automatic pilot**, the Fish will transport the water to a treatment facility to turn it into drinking water. The Fish will also transport the trash to a separate factory to recycle the trash into household items for reuse.

This process will repeat over and over again, which later will cause water pollution to stop/reduce. When the water pollution rates go down, we will have clean water for everyone on earth.

We will also install a chip in the Fish so humans can track it and detect its progress and water pollution level.

Future Technology - 2

We examined technologies that we can use to create and power **The Water Pollution Resolution Fish** to navigate and disinfect the ocean, and collect ocean waste for recycling.



Robotic fish can come in any size, color, and type of fish. In the world, there are only about 400 of them. We will build different variety of robotic fish to clean different areas of water.

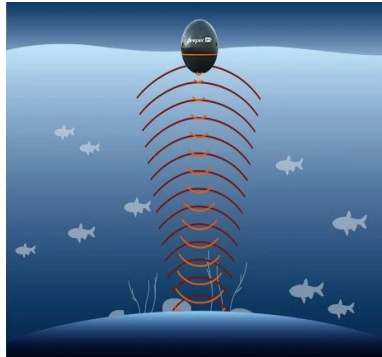
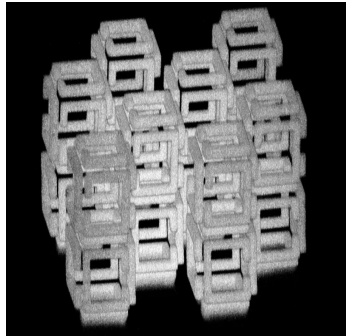
Solar energy is used to generate electricity with solar cells. The scales of the Fish will act as solar panels to power it using solar energy.

UV light is used to disinfect surfaces. The Fish will emit UV light to destroy dirty/harmful material.

Artificial Intelligence can be used for smart devices, such as computers or tablets. The AI will act as a “brain” of the Water Pollution Resolution Fish to make it act like a real fish.

Future Technology - 3

We examined technologies that we can use to create and power **The Water Pollution Resolution Fish** to navigate and disinfect the ocean, and collect ocean waste for recycling.



Nanotechnology Shrinking was developed by MIT researchers. MIT's method of Nanotechnology Shrinking only requires a laser and Absorbent Gel. The Fish will use Nanotechnology to shrink trash so it can transport the trash.

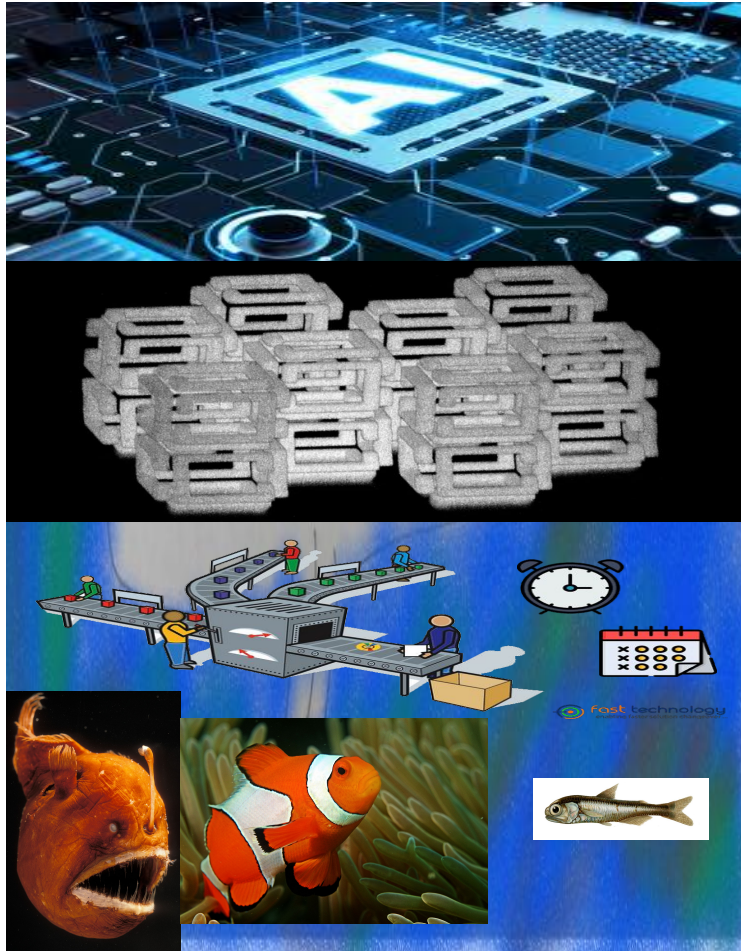
Sonars are used to track/detect objects in the water (whales, sharks, falcons, etc.). Sonars can help the Fish detect predators and trash.



Automatic Pilot is used to help drivers navigate the roads, but it is not very advanced yet. We will install automatic pilot in the Fish to allow it to navigate the ocean.

Mobile apps are being used for phones, Ipads, and Macbooks etc. for communications. A chip can be planted in the Fish to send signals that humans can track its progress and water pollution status in a mobile app.

Breakthroughs

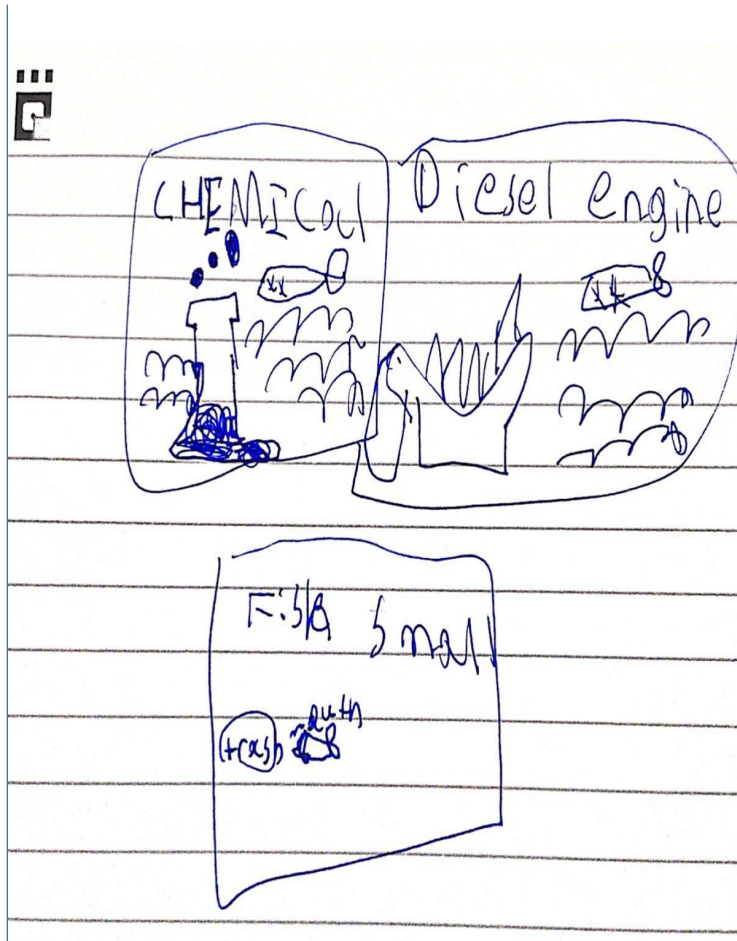


1. Our technology will need **AI technology** in order to make our tech to act like a fish. This could allow our Fish to fit in with schools of fish and not scare them, and help with filtrating the ocean where the fish swim.
2. In addition, our technology will need **Nanotechnology**, which is a very new technology, to shrink the trash. This could allow our Fish to swallow and transport the trash more easily and more quickly.
3. Another breakthrough our fish will need is faster production of them. We need this because the faster we produce these fish, the faster the ocean could be cleaned.
4. The last breakthrough our fish could use is different types of fish built for different bodies of water. For example, if the fish had to go to the twilight zone, we will need a clown fish that would fit in, but not an anglerfish, which would not fit in.

Breakthroughs - 2 (n/a)

Breakthroughs - 3 (n/a)

Design Process - 1



When deciding technologies for our fish, we made a list of criteria to decide. The following are our list of criteria:

- Fit in with marine lives and not scare them
- Able to navigate the ocean without intervention
- Able for humans to track it
- Sustainable technology that is not harmful to the environment

Our team discussed several different ideas for our technology. The following are a few of our ideas that we rejected:

- ✗ At first, the robot fish would put a chemical to clear the poison in the water. The team rejected this idea because chemical would hurt the environment, contradicting what the robot-fish is supposed to do.
- ✗ We also thought of the fish running on diesel engines. That would not work because diesel engines would also hurt the environment.
- ✗ We also thought of the fish being tiny so it could squeeze through schools of fish. That would not work because it would be too small to swallow any of the trash and water.

Design Process - 2 (n/a)

Design Process - 3 (n/a)

Consequences



Positive:

- ✓ Our invention will help clean the ocean and reduce the high levels of marine creatures dying.
- ✓ Our invention relies on technologies that already exist.
- ✓ Our invention uses clean technologies that do not hurt the environment.

Negative:

- × Having this technology could make people not have to clean up the earth when they have a machine to do it for them.
- × This technology could be very expensive.
- × Too many appliances used in the Fish could cause the robot fish to shut down.

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Bibliography - 2 (n/a)

Bibliography - 3 (n/a)

Sample Web Page - 1

Overview: The Water Pollution Resolution Fish

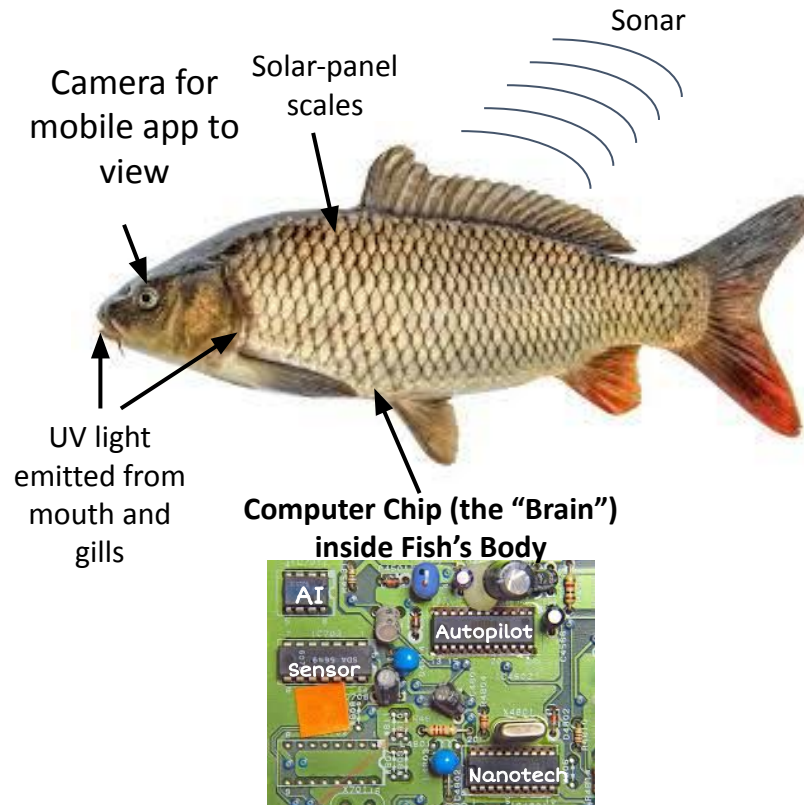
History / Technology

Design Process

Breakthroughs

Consequences / Future Vision

Water Pollution Resolution Fish



What is The Water Pollution Resolution Fish?

The Water Pollution Resolution Fish is an innovation that effectively combines a number of existing technologies to clean the ocean and address water pollution.

What technologies does the Water Pollution Resolution Fish use to address water pollution?

The Fish is equipped with:

- Solar panel scales to use solar energy to power itself and reduce more pollution
- Artificial intelligence for the Fish to act like a real fish to blend in with other marine lives
- UV light ray to destroy poison and other harmful materials in the water
- Nanotechnology to shrink and transport trash faster and easier
- Mobile app to track pollution in water, and amount of pollution cleaned
- High-tech auto-pilot to navigate the ocean and transport trash to a factory for recycling without getting lost
- Sonar to detect trash and predators

Sample Web Page - 2

Overview: The Water Pollution Resolution Fish

History / Technology

Design Process

Breakthroughs

Consequences / Future Vision

History / Technology

History:

- Water pollution has been a problem for centuries and has worsened since the Industrial Revolution. Chemical waste and other trash in the ocean are threatening the lives of marine animals
- Although wastewater treatment plants and laws are used to address water pollution, there is no major invention to clean up pollution that has occurred in the ocean
- In 2011, Boyan Slat, a Dutch inventor, invented the Interceptor, a machine that runs on solar power and drifts across the ocean to pick up trash across bodies of water, but it cannot solve water pollution on a large scale



The Interceptor
Invented in 2011

The Water Pollution Resolution Fish Will Use Existing Technologies to Create a New Invention to Clean the Ocean



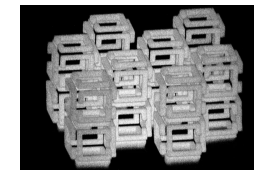
Solar Energy
to Power the
Fish.



UV Light to
Destroy
Harmful
Material.



**Artificial
Intelligence** to
act like a real
fish.



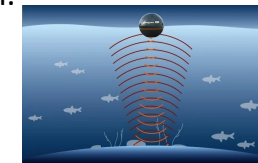
Nanotechnology to
Shrink Trash for
Transport.



Automatic Pilot for
the Fish to Navigate
the Ocean.



Mobile App to track
the Fish and detect
pollution level.



Sonar can be used to
detect predators and
trash.

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Overview: The Water Pollution
Resolution Fish

History / Technology

Design Process

Breakthroughs

Consequences / Future Vision

Design Process

Design Criteria:

- Fit in with marine lives and not scare them
- Able to navigate the ocean without intervention
- Able for humans to track it
- Sustainable technology that is not harmful to the environment

Approved

Rejected

- ✓ Fish-shaped robot and artificial intelligence for the Fish to blend in with other marine creatures
- ✓ Solar powered engine
- ✓ UV light to destroy harmful material
- ✓ Mobile app for humans to track pollution and progress
- ✓ High-tech auto-pilot for the Fish to navigate the ocean
- ✓ Sonar to detect trash and predators

- ✗ Using diesel engines to power the Fish
- ✗ Injecting chemicals into the Fish to disinfect the water
- ✗ Use of a tiny Fish

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Overview: The Water Pollution
Resolution Fish

History / Technology

Design Process

Breakthroughs

Consequences / Future Vision

Breakthroughs

What breakthroughs will Water Pollution Resolution Fish need?

1

Use of Artificial Intelligence for the Fish to act like a real fish and blend in with other marine lives

2

Nanotechnology to shrink trash, to make it easier for the fish to eat/cleanse and transport to the processing facility.

3

Strong connection between mobile app and the Fish to track the Fish when it goes deep into the water

4

Different types of Fish need to be built for it to fit in better depending on the bodies of water the Fish is in

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Overview: The Water Pollution
Resolution Fish

History / Technology

Design Process

Breakthroughs

Consequences / Future Vision

Consequences/Future Vision

- ✓ Help clean the ocean and reduce the high levels of marine creatures dying.
- ✓ Uses technologies that already exist
- ✓ Uses clean technologies that do not hurt the environment.

- ✗ People may not choose to prevent water pollution when they have a machine to do it for them.
- ✗ This technology could be very expensive.
- ✗ Too many appliances used in the Fish could cause the robot fish to shut down.

Future of The Water Pollution Resolution Fish

The Fish can be made in large quantities in order to reduce the price per Fish.

The Fish will be put in oceans, rivers and seas etc. to get rid of water pollution all over the world.

Remind people to prevent water pollution even though there is the Fish can clean up their mess in the ocean.