SHARKER

Design for a floating plastic collector
An innovation system design

Contents

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1.1 **ABSTRACT**

The process of human civilization development is getting faster and faster. From the previous manual single production, until now the mechanization of production. It greatly improved the rate of production and solved many difficult problems in daily lives. Not only enriches the diversity of products, but also enriches and meets more user's needs. However, the planet where we live now is bearing the increasing pressure. The whole world produces three billion tons of garbage every year, and we found it difficult to quickly disappear, it is a thrilling fact that facing us. Our earth, not only the land field, garbage pollution has spread to the sea area, while the main part of the Marine garbage pollution is the floating plastic trash, and grow at a rapid speed every year. By the influence of the ocean current, it gathers together and becomes ocean garbage patch, which forms up a worldwide tough problem.

Therefore, we must first find out a way to solve the problem of plastic waste in the water area. Through research, we found that plastic waste mainly enters the sea through rivers, while the Yangtze River and the Ganges River produce the main source of plastic waste. Then, the research of my thesis is mainly focused on the middle and lower reaches of the Yangtze River and coastal marina areas in China, designing an auxiliary device named SHARKER to collect plastic trash in the basin. Further alleviating the pressure of plastic pollution in the sea. This requires a complete system to complete, through the cooperation of the port, the ship, and the ship's staff to finish collecting floating garbage.

Keywords:

Floating Plastic Trash
Marine
System
Collector

Timeline

Check out the problems that are presenting rightnow and select one of it which I'm interested in to do the research. Gather existing knowledge, expose assumptions and unknown.

Make a schedule of the design details that I need to do and do sketches of the come out ideas. Design the appearance, size and functions of the product.

Develope the communication part which contains the user interface and user experience of the whole system.

Research

06/18

04/18

Design

08/18

07/18

Communication

12/18

10/18
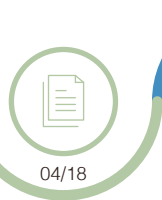
Idea

Developement

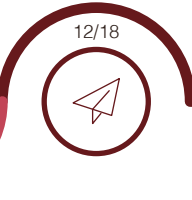**Present**

After brainstroming, I confirm the brief of the thesis that I want to study. Set the goal and find out the opportunities.

Use the 3D modeling to express the product in the project. Develope the shape, function and do research on the realting technics.

Integrate the whole project and upload the thesis to the polimi tesi wesite. Then present the project at the end.

1.2 INTRODUCTION
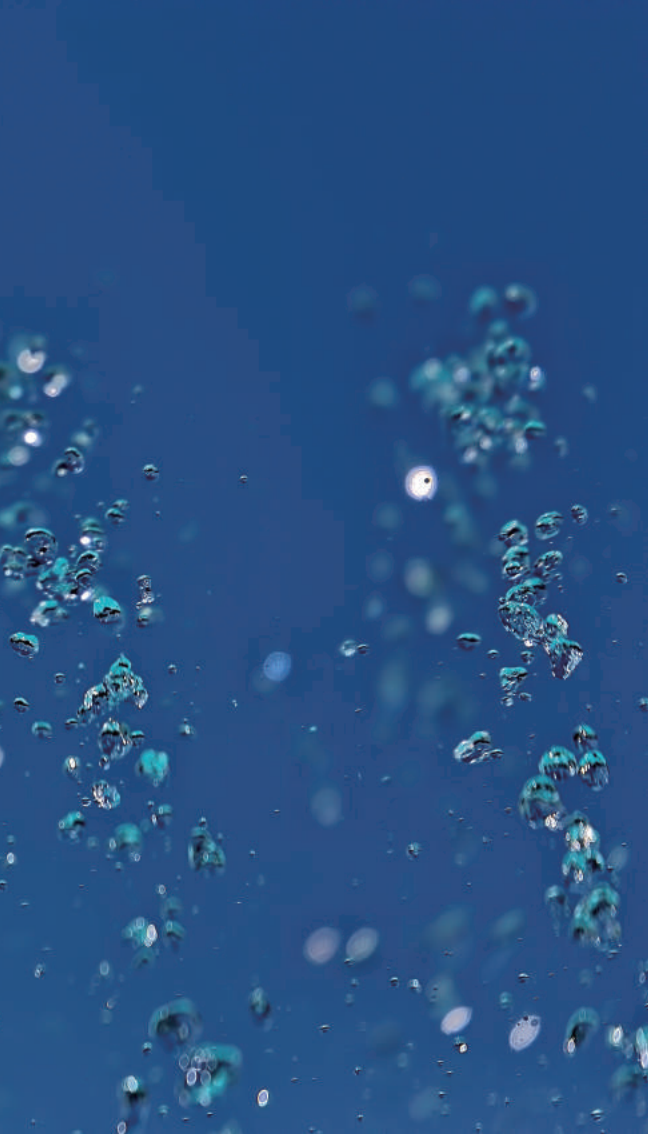
I choose 10 years later this time as the object of study. Ten years, it is a short time of the history. But with benefit of the rapid development of technology, we can have a small step for creating a better life. In this situation, using the existing science and technology, we can do a design which is can be achieve. Designers always choose the different science and technology. And using some ways to make their design come true.

We often say that technology creates the future. Technology is able to continuously improve the human life, people also from the scientific and technological progress to get a better survival experience.

Hunman urbanization

World Urbanization Prospects

• Globally, more people live in urban areas than in rural areas, with 55 % of the world's population residing in urban areas in 2018. In 1950, 30 % of the world's population was urban, and by 2050, 68 % of the world's population is projected to be urban.

• Today, the most urbanized regions include Northern America (with 82 % of its population living in urban areas in 2018), Latin America and the Caribbean (81 %), Europe (74 %) and Oceania (68%). The level of urbanization in Asia is now approximating 50 %. In contrast, Africa remains mostly rural, with 43 % of its population living in urban areas.

• The rural population of the world has grown slowly since 1950 and is expected to reach its peak in a few years. The global rural population is now close to 3.4 billion and is expected to rise slightly and then decline to around 3.1 billion in 2050. Africa and Asia are home to nearly 90 % of the world's rural population. India has the largest rural population (893 million), followed by China (578 million).

• The urban population of the world has grown rapidly since 1950, having increased from 751 million to 4.2 billion in 2018. Asia, despite being less urbanized than most other regions today, is home to 54 % of the world's urban population, followed by Europe and Africa (13 % each).

• Growth in the urban population is driven by overall population increase and by the upward shift in the percentage living in urban areas.

Together, these two factors are projected to add 2.5 billion to the world's urban population by 2050, with almost 90 % of this growth happening in Asia and Africa.

• Just three countries – India, China and Nigeria – together are expected to account for 35 % of the growth in the world's urban population between 2018 and 2050. India is projected to add 416 million urban dwellers, China 255 million and Nigeria 189 million.

• Close to half of the world's urban dwellers reside in settlements with fewer than 500,000 inhabitants, while around one in eight live in 33 megacities with more than 10 million inhabitants. By 2030, the world is projected to have 43 megacities, most of them in developing regions.

• Tokyo is the world's largest city with an agglomeration of 37 million inhabitants, followed by Delhi with 29 million, Shanghai with 26 million, and Mexico City and Sao Paulo, each with around 22 million inhabitants. Today, Cairo, Mumbai, Beijing and Dhaka all have close to 20 million inhabitants.

• Some cities have experienced population decline in recent years. Most of these are located in the low-fertility countries of Asia and Europe where overall population sizes are stagnant or declining. Economic contraction and natural disasters have contributed to population losses in some cities as well.

RUSSIA
STATI UNITI
CINA
GIAPPONE
INDIA
BRASILE
INDONESIA

1 9 8 0

RUSSIA
STATI UNITI
CINA
MESSICO
GIAPPONE
EGITTO
BANGLADESH
NIGERIA
ETIOPIA
INDIA
FILIPPINE
BRASILE
TANZANIA
INDONESIA
MADAGASCAR

2 0 2 5

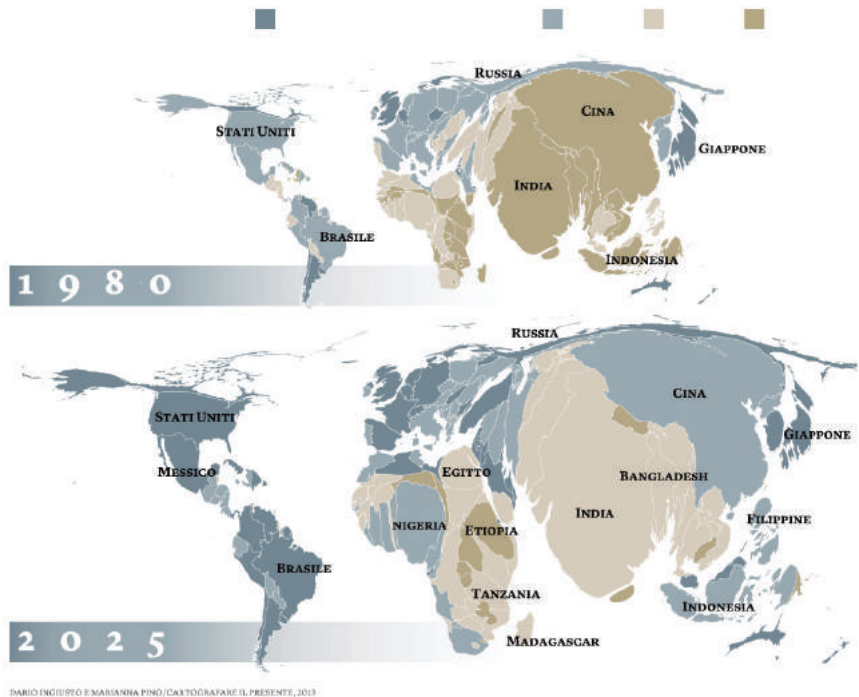DARIO INGIUSTO E MARIANNA PINO/CARTOGRAFARE IL PRESENTE, 2013

Figure1.2.1 Development of world urbanization

66% if the global population is projected to live in urban areas until 2050 and is equivalent to add approximately 2.5 billion urbanites, the majority of which will occur in Africa and Asia.

11.20

9.70

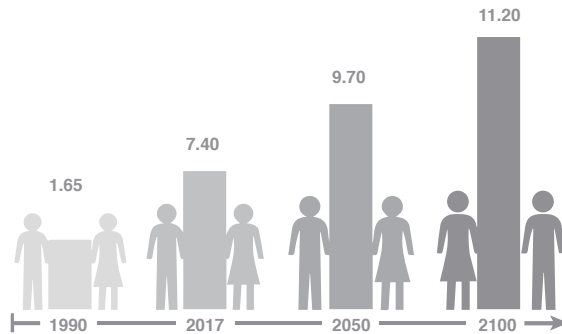7.40

1.65

1990   2017   2050   2100

Figure1.2.2 Growth of global population
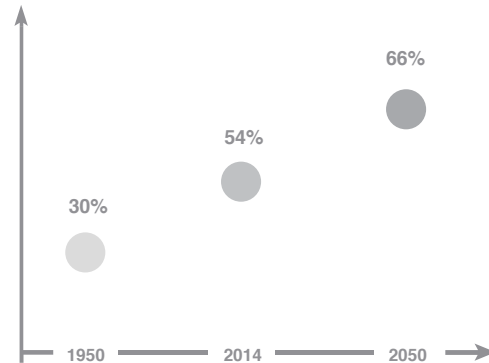
66%

54%

30%

1950   2014   2050

Figure1.2.3 Growth of global urban population rate

## Sustainable urbanization is key to successful development

• As the world continues to urbanize, sustainable development depends increasingly on the successful management of urban growth, especially in low-income and lower-middle-income countries where the most rapid urbanization is expected between now and 2050. Integrated policies to improve the lives of both urban and rural dwellers are needed, strengthening the linkages between urban and rural areas and building on their existing economic, social and environmental ties.
• Urban growth is closely related to the three dimensions of sustainable development: economic, social and environmental.

Well-managed urbanization, informed by an understanding of population trends over the long run, can help to maximize the benefits of agglomeration while minimizing environmental degradation and other potential adverse impacts of a growing number of city dwellers.
• To ensure that the benefits of urbanization are shared and that no one is left behind, policies to manage urban growth need to ensure access to infrastructure and social services for all, focusing on the needs of the urban poor and other vulnerable groups for housing, education, health care, decent work and a safe environment.

Internet of things

The Internet of things is the network of physical devices, home appliances, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to connect and exchange data.
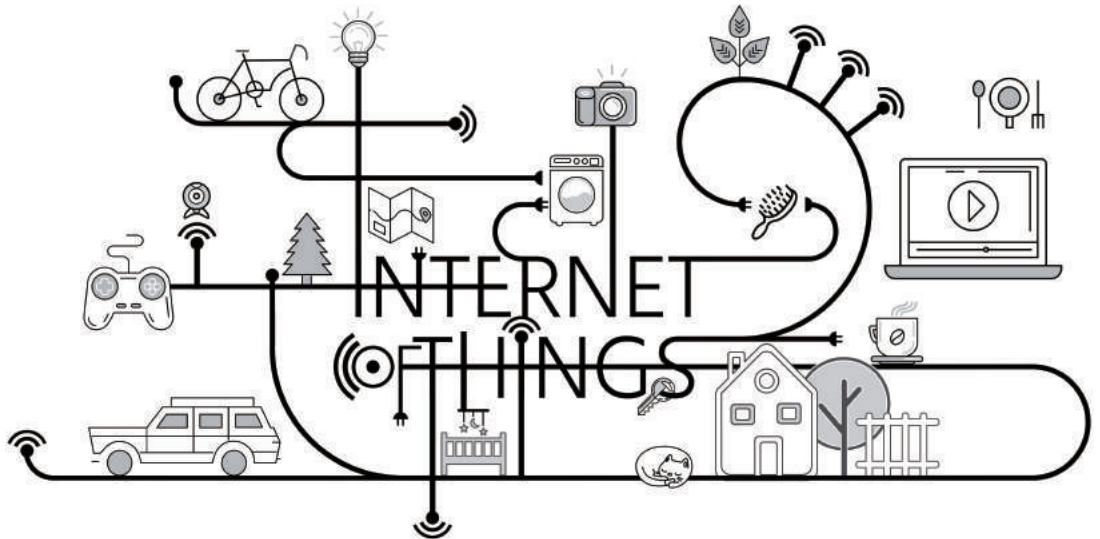
What is the Internet of Things?

You've likely heard the phrase "Internet of Things" — or IoT — at some point, but you might also be scratching your head figuring out what it is or what it means.

The Internet of Things, commonly abbreviated as IoT, refers to the connection of devices (other than typical fare such as computers and smartphones) to the Internet. Cars, kitchen appliances, and even heart monitors can all be connected through the IoT. And as the Internet of Things grows in the next few years, more devices will join that list.

We've compiled a beginner's guide of IoT terms and questions to help you navigate the increasingly connected world.

Simply put, this is the concept of basically connecting any device with an on and off switch to the Internet. This includes everything from cellphones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of. This also applies to components of machines, for example a jet engine of an airplane or the drill of an oil rig. As I mentioned, if it has an on and off switch then chances are it can be a part of the IoT.

By 2020, Gartner estimates there will be 25 billion of these smart devices, transmitting tiny amounts of data to us, to the cloud and to each other. Cisco's outgoing CEO, John Chambers, has boldly proclaimed that there will be 50 billion devices online within five years, with a total market worth $19 trillion. Another leader in this sphere, Siemens, has said these smart things are starting to power a fourth Industrial Revolution. That's a lot of connections. The IoT is a giant network of connected "things" (which also includes people). The relationship will be between people-people, people-things, and things-things.

"The IoT is a giant network of connected things".

Popular Internet of Things Forecast of 50 Billion Devices - ISEE Spectrum, 18 Aug,2016

How Does This Impact You?

The new rule for the future is going to be, "Anything that can be connected, will be connected." But why on earth would you want so many connected devices talking to each other? There are many examples for what this might look like or what the potential value might be. Say for example you are on your way to a meeting; your car could have access to your calendar and already know the best route to take. If the traffic is heavy your car might send a text to the other party notifying them that you will be late. What if your alarm clock wakes up you at 6 a.m. and then notifies your coffee maker to start brewing coffee for you? What if your office equipment knew when it was running low on supplies and automatically re-ordered more? What if the wearable device you used in the workplace could tell you when and where you were most active and productive and shared that information with other devices that you used while working?

More than half of the world's people now live in urban centres, and almost two-thirds of us will do so by 2050—which means 2.5 billion more city-dwellers to house, employ and transport. That's a nightmare scenario for today's cities, plagued, as so many are, by traffic, smog, crime, overflowing trash bins and inefficient lighting that gobbles between one-quarter and half of municipal electricity budgets. But technologies being tested right now will help the cities of the future better cope with the looming migration.

Stoplights with embedded video sensors can adjust their greens and reds according to where the cars are and the time of day. They're a double-win, reducing both congestion and smog, since vehicles idling at red lights burn up to 17% of the fuel consumed in urban areas.

Two-thirds of world will live in urban areas by 2050 - DailyNews, July 11 2014

CITY

Transportation

Quite simply, connected transportation involves outfitting vehicles with Wi-Fi or other sensors to enable Internet connectivity during travel. The connected car is probably the most prevalent example of this, but we'll get into that in a later section.

Many cities have begun smart transportation initiatives to optimize their public transportation routes, create safer roads, reduce infrastructure costs, and alleviate traffic congestion as more people move into cities. Paris, for example, launched an electric-car sharing program called Autolib in 2011 that uses sensors inside the connected vehicles to track them by GPS. And drivers can use the car's dashboard to reserve public parking spaces in the city.

Programs such as this make use of connected vehicles to gather valuable data on how drivers operate their cars and where they travel, and smart cities use this data to better plan their roads.

How the Internet of Things will transform private and public transportation, Business insider, Dec. 21, 2016

Smart Driver Advisory Systerms

Identify risky & hazardous driving behavior
In-vehicle advisory & coaching drivers

Smart Vehicle Technology

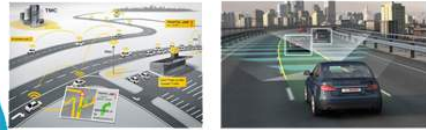Connected vehicles(CVIS, V2V, V2I, V2X)
Autnomous, driverles, self-driving cars

Smart traffic lights: safer & better mobility
Smart route chioces, incident management

Smart Traffic Management

Smart bridge inspection & monitoring
Smart road surface monitoring

Smart Infrastrusture Maintenance

Figure 1.2.4   Important applications of the IoT in intelligent transportation systems and smart cities.

Smart Driver Advisory Systems

The human factor continues to be one of the main contributing elements to road accidents. Reckless driving, distracted/fatigue driving and other unsafe driving habits increase the likelihood of road accidents. NHTSA conservatively estimates that approximately 25% of police-reported crashes involve some form of driver distraction and fatigue.

The smart IoT can play a proactive role in helping drivers to stay on track of safe driving habits. Through the Controller Area Network (CAN Bus) and using connected sensors, a huge amount of data about the vehicle and the driver, including measurable events such as over-correction, over-acceleration, speeding, seat belt usage, lane deviation, and drowsiness. The data can be analyzed to rate the driving quality. In-vehicle driver advisory systems can also be built to coach the driver for driving safer, and provide real-time warning notifications by detection and evaluating risks from the time series data.

The smart IoT is dramatically accelerating the pace of innovation and transforming the way of operations in transportation and infrastructure. The ubiquitous deployment of smart, connected sensors and things, combined with artificial intelligence (AI) and big data analytics, can enable us to gather insightful knowledge, make real-time and even predictive computing to help us reaching better decisions and developing better plans to improve the safety, efficiency, and reliability of smart transportation.

Key Applications of the Smart IoT to Transform Transportation, Wiomax, september, 20, 2016.

1.3 WATER AREA SITUATION
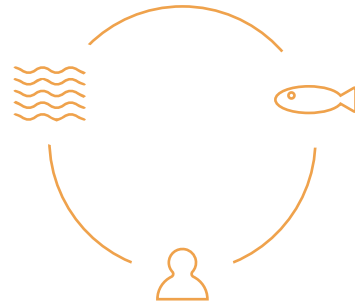
Through the study of the water area which included the river, lake, ocean and so on. I found out that the situation nowadays of them is affecting by many different kinds of factors. Because of the development of human urbanization and Industrial development, The Climate changes and sea water getting warmer. People produce more and more short term used products, and it will finially jion into to water areas, which occurs pollution of the biological system. Biodiversity is gradually decreasing. And will eventually affect back to humans.

Marine environment

About ocean

1 *Ocean is the source of life and livelihood of the world's growing population.*
Fish provides 20% of the protein to the body for 2.9 billion people globally.The earth's climate is influenced by the interactions between the atmosphere and oceans. And we can't live without ocean.

2 The ocean is facing great pressures because of various factors. Cause this is not a single problem, but a collection of all kinds of problems. *We are facing the crisis of ocean!*

3 Oceans cover 71% surface of the global. *Climate change leads to the Marine problems.* Ocean acidification, warming and sea level rise which has changed some of the habitat. Over the past 100 years, global sea level rise 20 centimeters. By the end of the century rise could reach 1 meter.

4 *Our request is over the scope of the Marine can bear.*
In short, we are in excessive developing of the ocean. For example: overfishing, 90% of the world's fish stocks are being maximum development or already over-fishing. This results the decline of biodiversity which is the things we need to concern.

5 *We put the ocean as a garbage dump.*
Ocean accepted a lot of things -- over its capacity: Greenhouse gases, Manure and chemical fertilizer, plastic, oil pollution and so on. Results: Marine ecosystems are destroyed.

6 *Our contact with the ocean is always invisible.*
The food we eat, toothpaste we used to brush the teeth, travel destination, clothes - these will all affect the ocean.

Figure1.3.1 Plastics in the marine environment
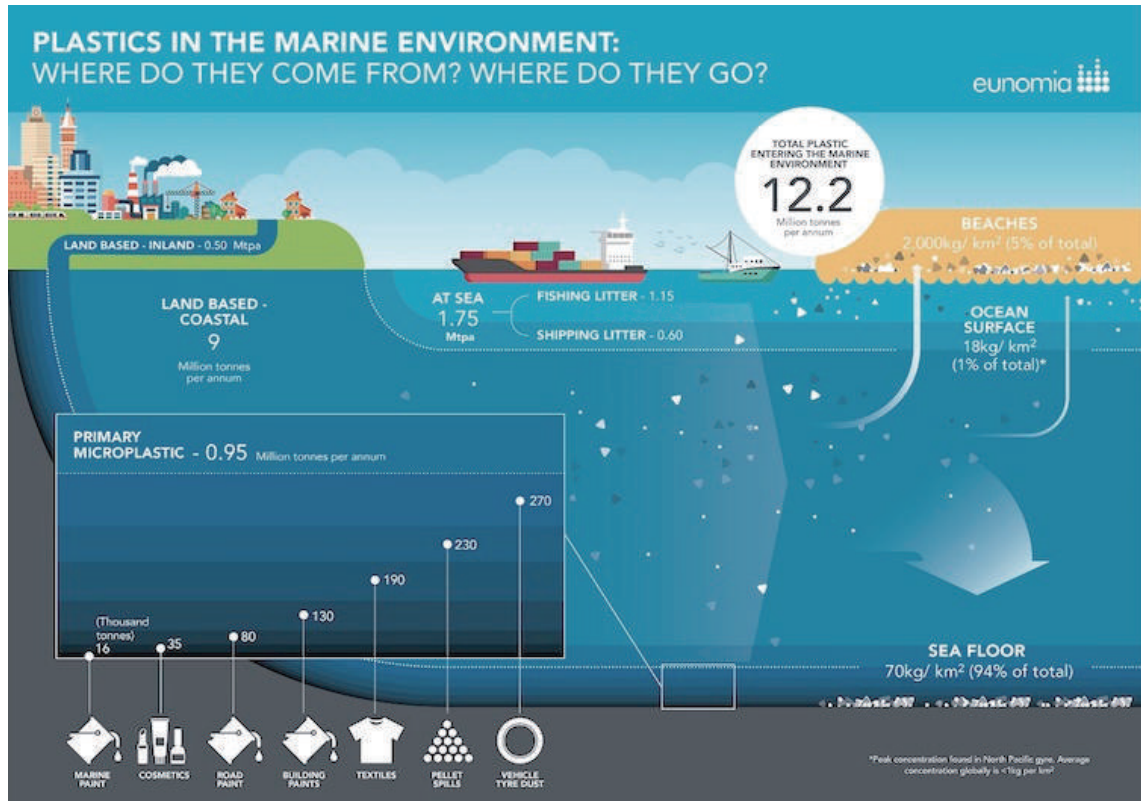
On the surface of the lake or the sea, often floating stars of garbage, it affects the cityscape and ecological environment. In the past, water surface cleaning was conducted only by people's inspection, and the cleaning ships were dispatched for manual fishing and recycling. This not only took a lot of manpower and resources, but also did not make any significant effect.

Five Trillion Pieces Of Plastic Are Floating In An Ocean Near You
And even more lurks below the surface

Ocean currents gather together the garbage

Estimated density of plastic, in grams per square kilometer

1   10   100   1,000   10,000   100,000   1 million

Annual plastic loss by country, 50 kilometers in from coast

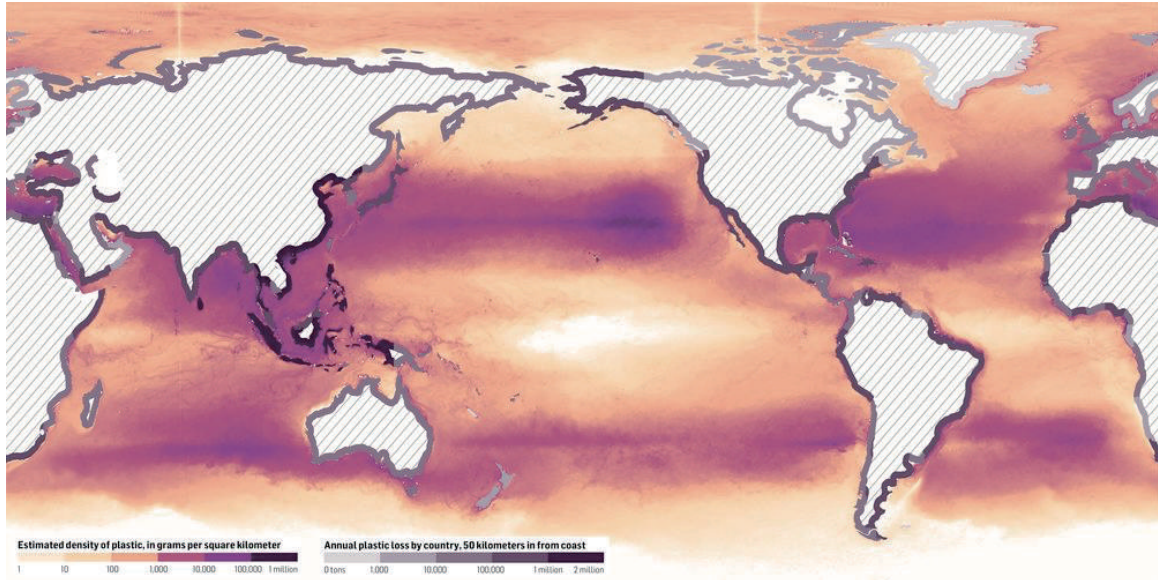0 tons   1,000   10,000   100,000   1 million   2 million

Figure1.3.2 Map of the Plastics garbage patches

The ocean is becoming the world's largest garbage dump. Various kinds of garbage from all over the world, from small pieces to large garbage groups, are gathered here. In 2014, the search team of more than 10 countries, in the process of finding the Malaysia Airlines MH370 lost passenger aircraft, people repeatedly heard the news of suspected passenger aircraft wreckage floating on the surface of the Indian Ocean, but in the end these floating objects were only a variety of marine debris.In the Indian Ocean, far from the shoreline, the largest drifters found by rescuers are more than 20 meters long, and huge plastic garbage and fishing equipment, ect.
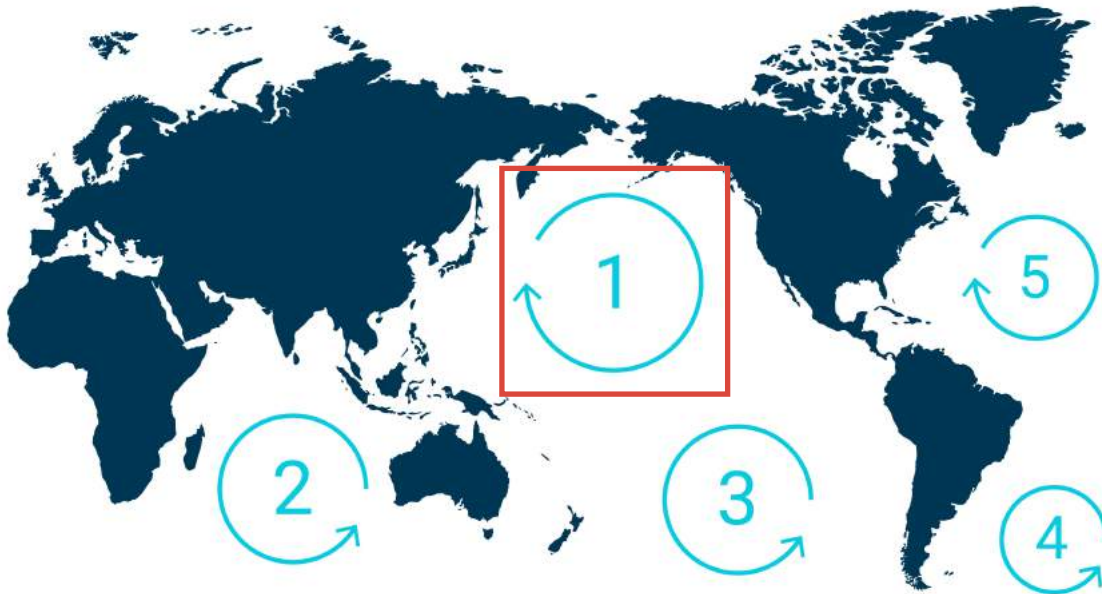
Figure1.3.2 Area of Plastics garbage patches

Ocean garbage patches are vast and dispersed

Ocean currents concentrate plastic in five areas in the world: the subtropical gyres, also known as the world's "ocean garbage patches". Once in these patches, the plastic will not go away by itself. The challenge of cleaning up the gyres is the plastic pollution spreads across millions of square kilometers and travels in all directions.

The Great Pacific garbage patch located between Hawaii and California is the one covers the most area, the area is equivalent to Central Europe.

www.theoceancleanup.com/great-pacif-ic-garbage-patch/

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Risk of the marine animals

Old fisherman memory of the gulf of California (1940 s)

Middle-aged fisherman memory of the gulf of California (1970 s)

The young fisherman memory of the gulf of California (1990 s)

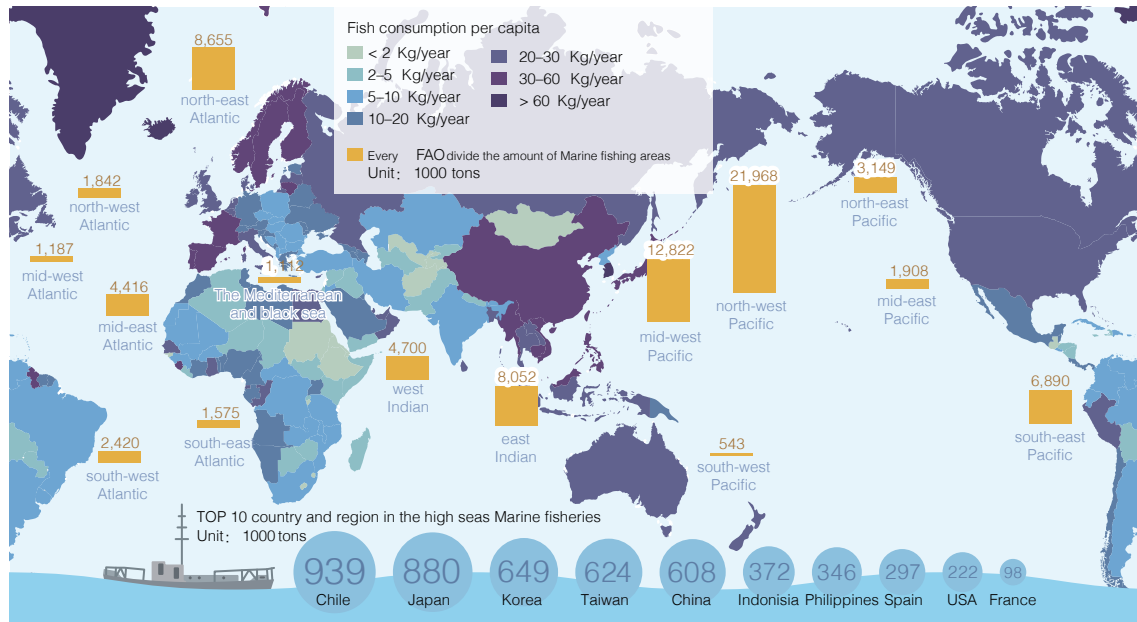# who fishing, who eat fish?

The number of fish is decreasing

Thousands of years ago, our ancestors have depend on fishing to support himself.On land, hunting and gathering were eventually replaced without migration also more sustainable agriculture.But for people who lives by the sea, fishing, whether in the past or now, all point to one thing - hunting.Fish don't sow, they only harvest.

Percent

| | Over fishing | Highly fishing | Not been developed |
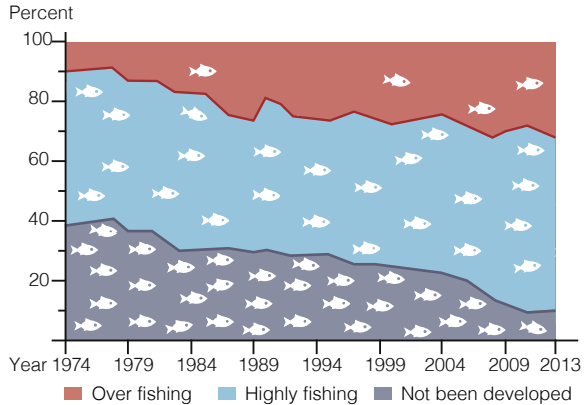
58% of the world's ocean fish populations are highly fishing, 31% over fishing, only 10% not been developed

Figure1.3.5 fishing developed rate

Figure1.3.4 Map of the fish consumption

Fish consumption per capita

< 2 Kg/year
2–5 Kg/year
5–10 Kg/year
10–20 Kg/year
20–30 Kg/year
30–60 Kg/year
> 60 Kg/year

Every FAO divide the amount of Marine fishing areas
Unit：1000 tons

8,655 north-east Atlantic

1,842 north-west Atlantic

1,187 mid-west Atlantic

4,416 mid-east Atlantic

1,575 south-east Atlantic

2,420 south-west Atlantic

The Mediterranean and black sea

4,700 west Indian

8,052 east Indian

543 south-west Pacific

21,968 north-west Pacific

12,822 mid-west Pacific

3,149 north-east Pacific

1,908 mid-east Pacific

6,890 south-east Pacific

TOP 10 country and region in the high seas Marine fisheries
Unit：1000 tons

| 939 | 880 | 649 | 624 | 608 | 372 | 346 | 297 | 222 | 98 |
| Chile | Japan | Korea | Taiwan | China | Indonisia | Philippines | Spain | USA | France |

24

This hunting behavior, coupled with the rising global population increasing requirements in fish, has led to the global fish populations.According to the UN's food and agriculture organization statistics, about 30% of the fish because of unsustainable fishing methods have been excessive catch, fishing, even has dried up, and another 58% have near unsustainable.This means that the fish population about 90% of global commercial fishing has dried up, can't catch further.But we are not devoid of hope.Using intelligent fisheries management, most of the fish can recover within a couple of years to decades.These concepts in the United States, New Zealand, Australia, Norway and the eu have successful example, where a lot of fish has been restored.In 2009, the European overfish the sea at a rate of 90% - is now the number has dropped to only 50%, partly because of tighter constraints and limits on catches.

But even adopted sustainable fishing method, also not all the fish can quickly recover.Marlin and swordfish, shark, cod and other large food fish population declines as high as 90%.As deputy catches the dolphins and sea turtles to some extent on the brink of extinction.They are unable to recover quickly.There are many kinds of tuna, as long as the fishing, the number of them will not recover.The tuna's

market value is extremely high, even can capture the few in number, fishing they remain profitable. Red tuna's value is very high, high to often in the Japanese market.In 2013, a Japanese sushi chain paid 1.3 million euros for the a very rare red tuna.Mediterranean harvested a total of 85% of red tuna, two thirds of global catches, are exported to Japan.

Especially in many developing countries depend on fishing, especially in fishing as the main economic activity in the country.It is estimated that about 12 million small-scale fishermen family around the world.Industrialized fish farms, on the other hand, employees only 500000 people.But the per capita terms, fishery catches each is in the midst of the sea fishing with a fishing net small individual fishermen family many times.Industrial fishing boat equipped with echolocation, reconnaissance aircraft, large fishing nets and other modern technology, basically can get empty the whole traditional fishing grounds.These large fishing operations around the world, looking for the most lucrative fishing grounds, such as west coast almost no government controls, could easily so is better than a local fishing area.

“**Fish is cornerstone of global food security and the world's most traded natural products.**”

Acidification

PH Value: what is acidic what is alkaline?

The acidity of the ocean is getting stronger. This change is almost imperceptible to humans and is deadly to many creatures in the ocean.

The difference seems small, but the decline of PH value means that the water acidity of the sea between 1870 and 2100 are increased by 170%. The changes Even smaller than this has caused problems for many Marine organisms.

Why is this happening?

The rising deep sea water in the coastal areas has changed. The researchers found a significant drop in the pH of coastal waters in California. Deep seawater has changed from a nutrient source to a life-threatening environment. When the acid concentration in seawater is too high, oysters will die. The researchers found that part of the reason for the strengthening of acidification is the release of carbon dioxide into the air by human activities. At different times, the concentration of carbon dioxide on Earth will always change, but today our oceans are acidifying at an unprecedented rate, surpassing any period in history. It is estimated that the ocean has absorbed one-third of the carbon dioxide that we have emitted into the atmosphere since the Industrial Revolution, with the result that the acid concentration in the ocean has increased by 26%.
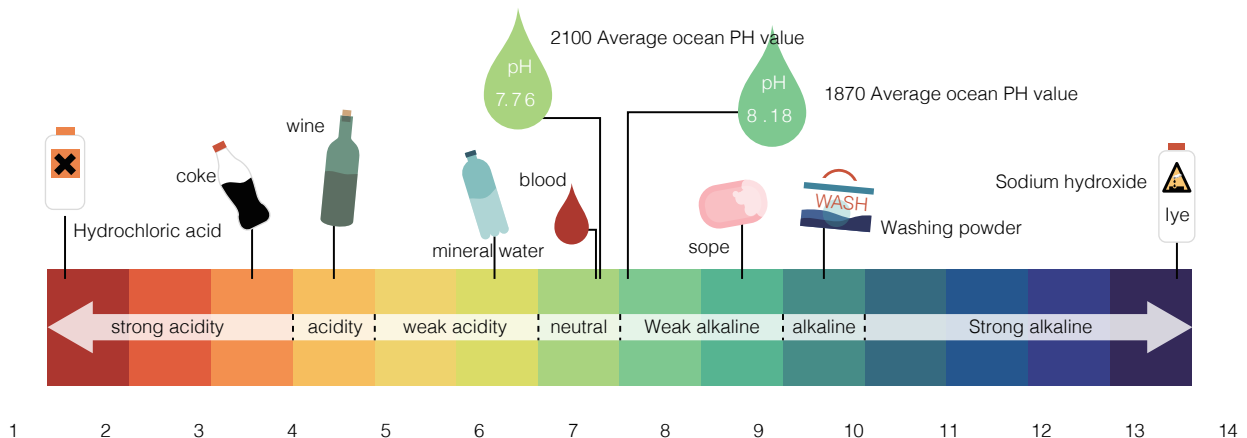
2100 Average ocean PH value

pH 7.76

1870 Average ocean PH value

pH 8.18

wine

coke

blood

Hydrochloric acid

mineral water

sope

Sodium hydroxide

WASH

Washing powder

lye

strong acidity	acidity	weak acidity	neutral	Weak alkaline	alkaline	Strong alkaline	

1   2   3   4   5   6   7   8   9   10   11   12   13   14

Figure1.3.6 Average ocean PH Value

What is the specific impact of acidification?

First, the carbon dioxide in the water is converted to carbonic acid, and the saturation of the carbonate is lowered. This is a big problem for animals such as mussels, snails, corals, and sea urchins that use marine carbonate as a shell. The less carbonate in the water, the less likely they are to grow a suitable shell. Foraminifera is an important plankton, and we have been able to see the effect of reduced carbonate saturation from this tiny calcified organism: the thickness of the southern marine animal shell has decreased significantly compared to pre-industrial specimens. . The effects of oysters are slightly different: it has been observed that the thickness of their shells has not decreased, but only because they have spent too much strength and long

shells, hindering overall growth, and the results are more easily captured by carnivores such as snails. In areas where carbonate saturation has fallen dramatically, calcified species are particularly harsh: seawater even begins to extract carbonate from their shells and corrode them. This has happened in some parts of Antarctica and the northern part of the Atlantic Ocean. The cold-water corals that live there cannot maintain the white skeleton and will eventually collapse. But other species that do not produce white peony, such as fish, are also threatened. For example, the survival rate of salmon eggs is generally very small - 95% will die. If the seawater becomes acidic, 97% of the salmon eggs will die. This 2% decline is enough to jeopardize the future of the salmon population.

Fish, snails and many other animals are subject to the negative effects of acidification, only a few animals has benefit from acidification.
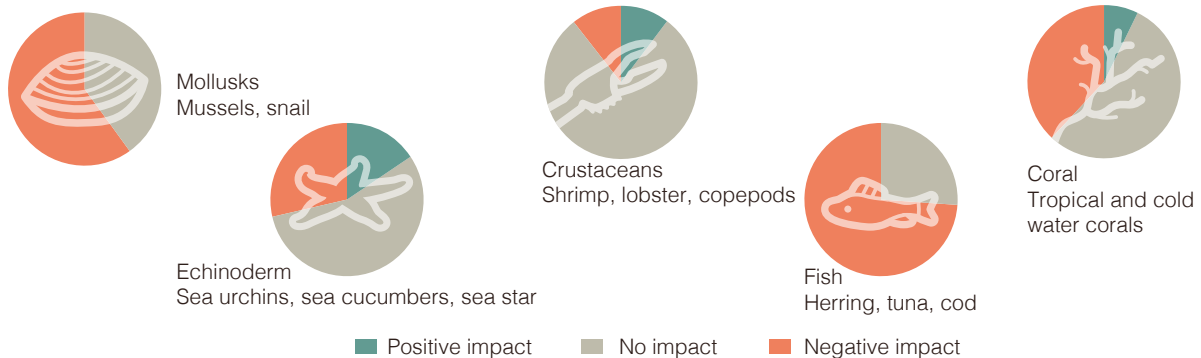

Mollusks
Mussels, snail

Echinoderm
Sea urchins, sea cucumbers, sea star

Crustaceans
Shrimp, lobster, copepods

Fish
Herring, tuna, cod

Coral
Tropical and cold water corals

■ Positive impact   ■ No impact   ■ Negative impact

Figure1.3.7 Acidification affects animals

SHARK

PLANKTON

28

what they eat?

I love to eat Plankonts

BUT They looks the same for me

Plankton

Microplastic

Whale sharks migrate in search of food. This sometimes brings hundreds of whale sharks to the same food source. They seek out plankton, and this is their favorite meal. Whale shark's mouth contains more than 300 row of small teeth, and the total number of teeth for at least 3000. However, these small tooth is not used to bite is not used to chew food.In fact these tender fish although large, is filter feeders. Whale sharks feed on small plankton, the tiny plankton, including krill, jellyfish and crab larvae.These kittens with water into the whale shark's mouth, have been refined grid on the whale shark gill raker filter, which is left in the whale shark's mouth.

With similar sizes and appearances to natural food items, these small microplastic fragments pose potential risks to many marine organisms including zooplankton and zooplanktivores.

"In the past 10 years, the death of the water animals have increased by 40% due to garbage, and "plastic" is the most deadly type."

Once these beach wastes are blown by the wind and are driven to sea, most of them cannot be easily degraded in the sea. The plastic bag looks like a jellyfish, a fragmented and broken piece of colored plastic or a fragment of Polyolon. Like a group of small fish, transparent plastic pieces or glass fragments reflect sunlight and make seabirds mistaken for food. For sea animals that do not know human waste, all man-made objects drifting at sea are dangerous things to them.

YOU SEE THE DIFFERENCE.
A TURTLE DOES NOT.

https://www.thenewslens.com/article/29928

HOW LONG TIL THEY'RE GONE?

Estimated time taken taken to biodegrade

600				600 years
500		450 years	450 years	
400	200 years			
300				
200				
100				
50years				
0				
Stryroforam cup	Aluminium can	Nappy	Plastic bottle	Fishing line
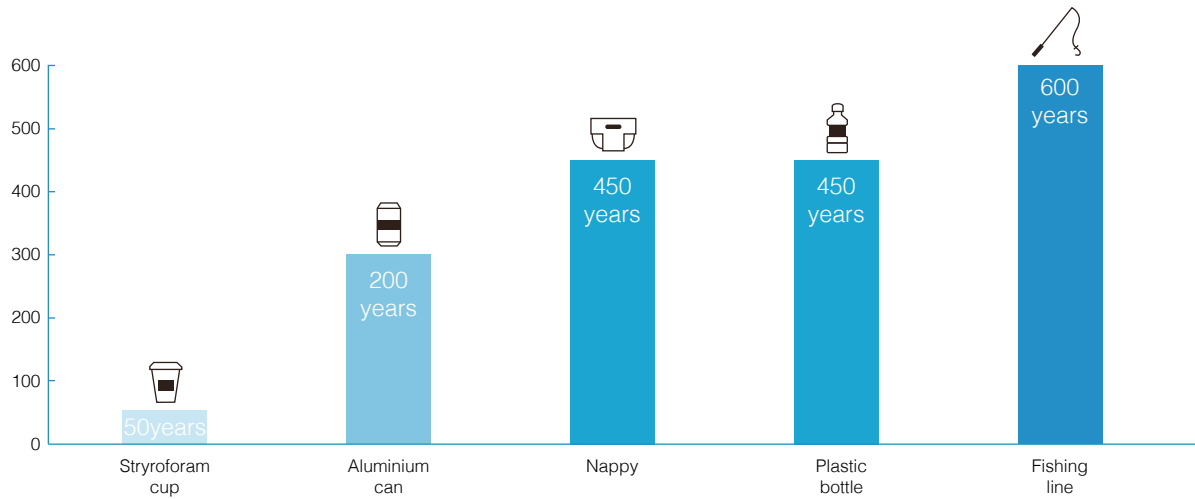
Exact time will vary by product type and environment conditions

Figure1.3.8 The time of biodegrade. source:NOAA/Woods Hole Sea Grant, BBC

1.4 PLASTIC

Plastic is material consisting of any of a wide range of synthetic or semi-synthetic organic compounds that are malleable and so can be molded into solid objects.

What is plastic

▼

A word that we can always hear and see. It do many benefits to the human lives, and applicates on different kinds of manufature, while it also has the potential hazards.

A synthetic material made from a wide range of organic polymers such as polyethylene, PVC, nylon, etc., that can be moulded into shape while soft, and then set into a rigid or slightly elastic form.

Plastics is versatile, hygenic, lightweight, flexible and highly durable. It accounts for the largest usage of plastics world wide and is used in numerous packaging applications including containers, bottles, drums, trays, boxes, cups and vending packaging, baby products and protection packaging.

Pure plastics are generally insoluble in water and nontoxic. However, many of the additives in plastics are toxic and may leach into the environmental. Examples of toxic additives include phthalates. Nontoxic polymers may also degrade into chemicals when they are heated.

What Is Plastic? Definition in Chemistry, 20, May, 2018, ThoughtCo.

The influance of plastic

Accumulation of plastic debris in the environment and the associated consequences are largely avoidable. Considerable immediate reductions in the quantity of waste entering natural environments, as opposed to landfill, could be achieved by better waste disposal and material handling. Littering is a behavioural issue and some have suggested that it has increased in parallel with our use of disposable products and packaging. Perhaps increasing the capacity to recycle will help to reverse this trend such that we start to regard end-of-life materials as valuable feedstocks for new production rather than waste.

1950:

50 million
tons of plastic

2014:

311 million
tons of plastic

We have produced more plastic in the last **10 years** than we did in the whole of last century.

Almost 1/2 of the plastic we use is used **just once** and then thrown away.

shoppers worldwide use approximately
500,000,000,000
single-use plastic bags annually

That's about **1 million bags every minute** across the globle or **150 bags every year** for every person on earth

×60

If you jioned them end to end, the bags would circumnavigate the globe **4,200 times**

It takes just 4 family shopping trips to accumulate **60 shopping bags**

A plastic bag has an average working life of **15 minutes.**

Only **1 in 5** plastic water bottles are recycled

Americans thow away **35 billion** plastic water bottles every year

Artificial factors

"ALL THE HARMS WE DO TO THE OCEAN, IT BRINGS BACK TO US!"

HOW
Typhoon Mangkhut
return to us?
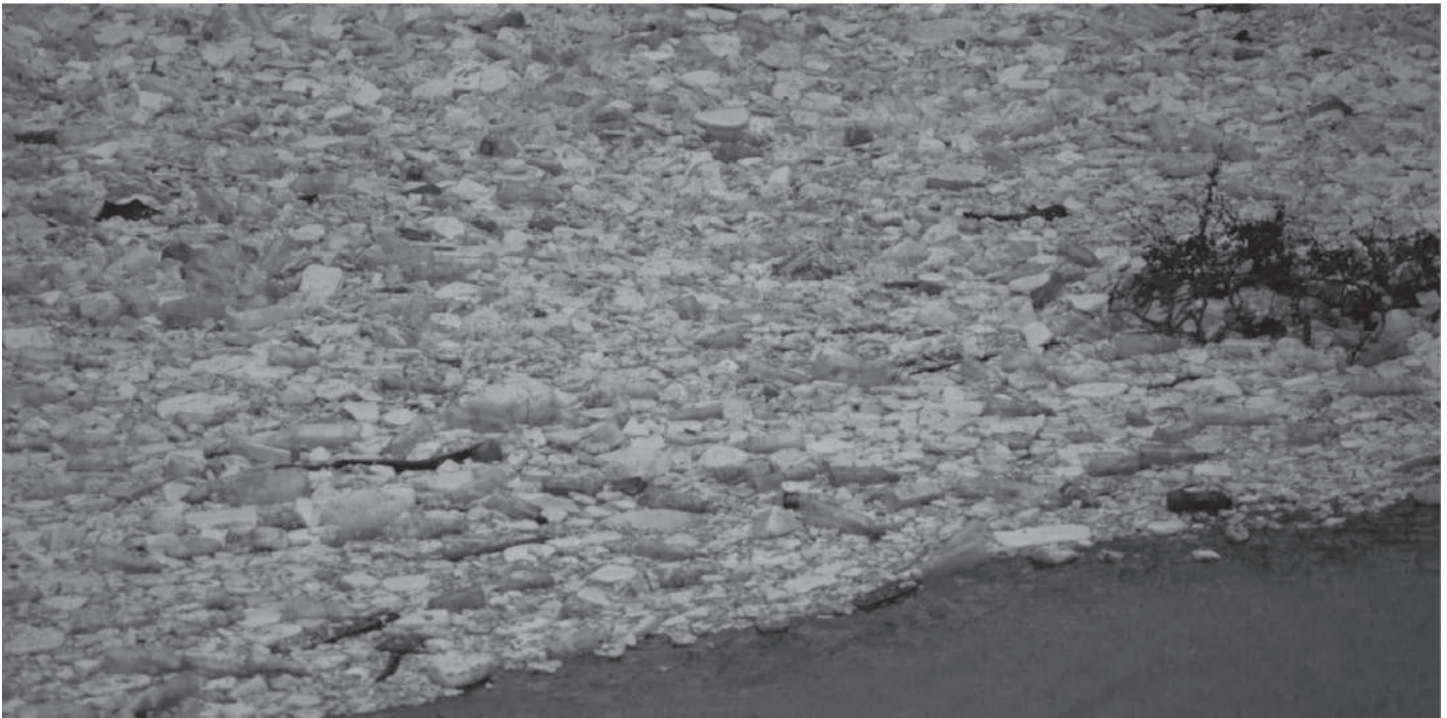
In September 2018, it was known as "the strongest super typhoon of this century." Mangkhut landed in southern China. Despite of the destruction, the typhoon completely exposed the evils humans have committed against the ocean.

In Hong Kong, the typhoon infested seawater recharged, and a lot of garbage rushed in from the ocean into the city. Many low-lying places became the garbage kingdoms.

What Happens to the Plastic We Throw Out?

Henderson Island

How a piece of trash can travel from land to Henderson Island, an uninhabited, remote island in the middle of the South Pacific Ocean.

The uninhabited island that's home to 37 million pieces of trash.

Henderson Island is a tiny, uninhabited island in the middle of the Pacific Ocean, 3,000 miles from major population centers. Though it is half the size of Manhattan, more than 19 tons of trash litter its white, sandy beaches.

Researchers estimate that it has the highest concentration of debris of any place in the world, for a total of over 37 million pieces on the entirety of the small island. For every square meter you walk, on average you'll find 672 pieces of trash. For each visible piece of debris on the beach in the video above, two pieces are buried in the sand. How does so much trash wash ashore on Henderson Island?

What Happens to the Plastic We Throw Out, National Geographic, 2018

Microplastic

What are microplastics?

Microplastics are small plastic pieces less than five millimeters long which can be harmful to our ocean and aquatic life.
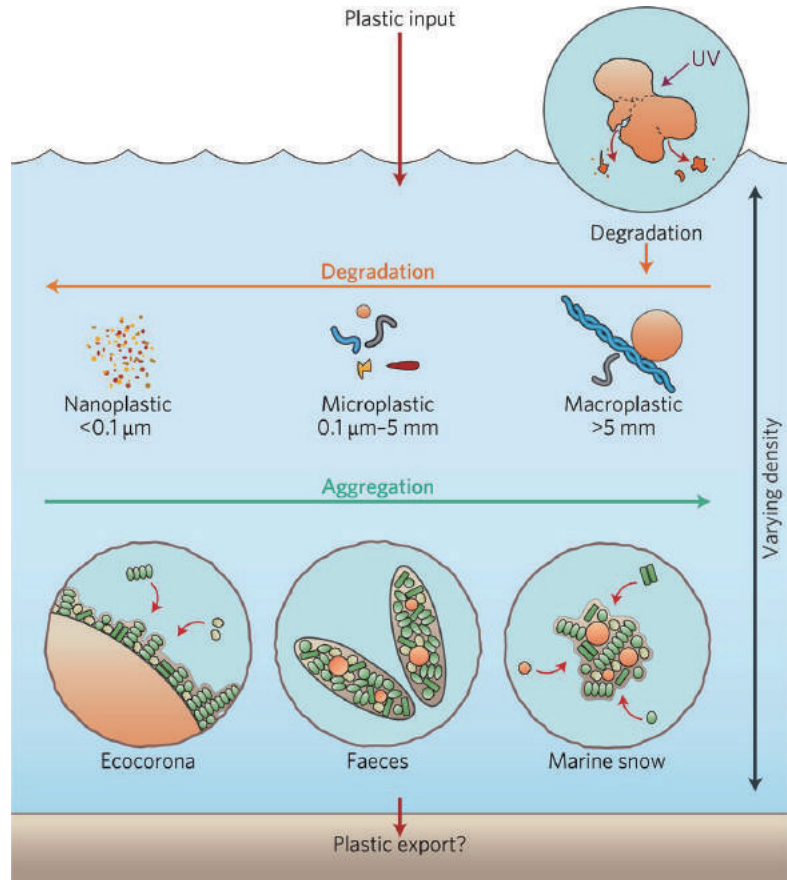
Microplastics are small pieces of plastic that pollute the environment. While there is some contention over their size, the U.S. National Oceanic and Atmospheric Administration (NOAA) classifies microplastics as less than 5 mm in diameter. They come from a variety of sources, including cosmetics, clothing, and industrial processes.

Two classifications of microplastics currently exist: primary microplastics are manufactured and are a direct result of human material and product use, and secondary microplastics are derived from the breakdown of larger plastic debris like the macroscopic parts that make up the bulk of the Great Pacific Garbage Patch.

Both types are recognized to persist in the environment at high levels, particularly in aquatic and marine ecosystems. Plastic pellets created for use by manufacturers are sometimes referred to as nurdles.

Because plastics do not break down for many years, they can be ingested and incorporated into, and accumulated in, the bodies and tissues of many organisms. The entire cycle and movement of microplastics in the environment is not yet known, but research is currently underway to investigate this issue.

What are microplastics? - NOAA's
National Ocean Service, 25, jun, 2018

Concentration of Microplastic, Great Pacific Garbage Patch

From the table, with the increasing rate of the concentration of microplastic, the ocean plastic could triple in the near decades if we don't make an effort to stop it from increasing.

In 2050, the amount weight of the plastic will exceed the amount weight of the fish in the ocean.
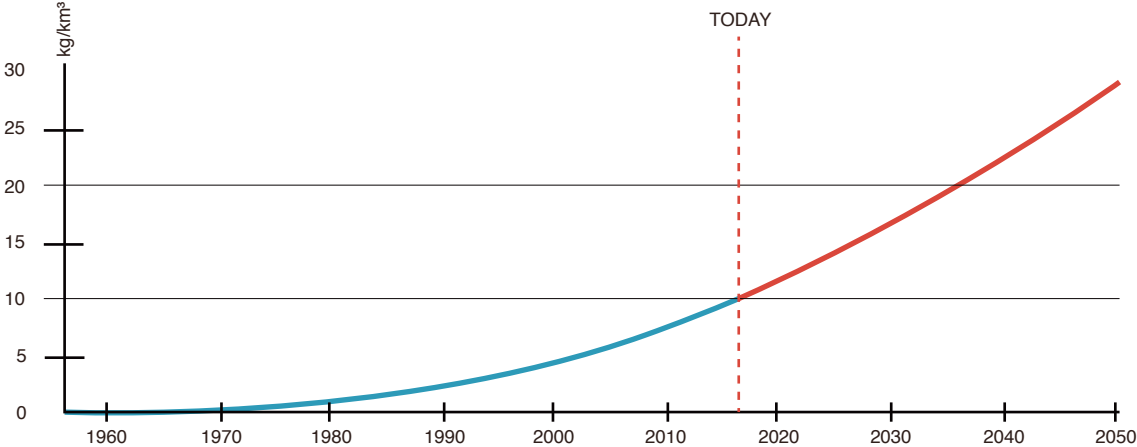
Figure1.4.1 microplastic grown up value

The Great Pacific Garbage Patch | The Ocean Cleanup

Golden bream from the oresund - yodogawa technique

The Japanese art unit Yodogawa Technique in collaboration with Yukari Art, created the giant fish that will be traveling around the Oresund region, on either side of the Sound between Denmark and Sweden, throughout 2015. Along with a group of volunteers, the unit built this giant fish out of worthless discarded garbage. If you look closely, you'll see hubcaps, jerry cans, garden furniture, a ski, a Christmas tree holder and lots of discarded plastic toys - some of them even still make noises. We create art out of what people don't want. When you see the garbage you think of the story it tells and its store of reminiscences and background, say Hideaki Shibata, Kazuya Matsunaga and Yuragi Wakiya of Yodogawa Technique.
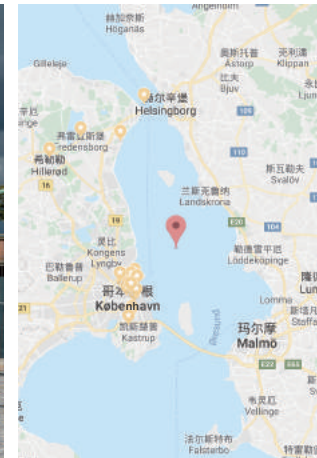
Risk of human bodies

Microplastics in Food

Microplastics are increasingly found in many different environments, and food is no exception. One recent study examined 15 different brands of sea salt and found up to 273 microplastic particles per pound (600 particles per kilogram) of salt. Other studies have found up to 300 microplastic fibers per pound (660 fibers per kilogram) of honey and up to about 109 microplastic fragments per quart (109 fragments per liter) of beer. However, the most common source of microplastics in food is seafood. Because microplastics are particularly common in seawater, they are commonly consumed by fish and other marine organisms. Recent studies have shown that certain fish mistake plastic for food, which can lead to toxic chemicals accumulating inside fish liver.

SUMMARY
Microplastics are commonly found in food sources, particularly seafood. This may result in humans consuming high levels.

A recent study found that microplastics were even present in deep-sea organisms, suggesting that microplastics are affecting even the most remote species. What's more, mussels and oysters are at a much higher risk of microplastic contamination than most other species. A recent study found that mussels and oysters harvested for human consumption had 0.36–0.47 particles of microplastic per gram, meaning that shellfish consumers could ingest up to 11,000 particles of microplastic per year.

Figure1.4.2 microplastic in human body

Are Microplastics Affecting Your Health?

Although a number of studies have shown there are microplastics present in food, it is still unclear what effect they may have on your health. Thus far, very few studies have examined how microplastics affect human health and disease. Phthalates, a type of chemical used to make plastic flexible, have been shown to increase the growth of breast cancer cells. However, this research was carried out in a petri dish, so the results can't be generalized to humans. A recent study examined the effects of microplastics in laboratory mice. When fed to mice, the microplastics accumulated in the liver, kidneys and intestines, and increased levels of oxidative stress molecules in the liver.

They also increased the level of a molecule that may be toxic to the brain . Microparticles including microplastics have been shown to pass from the intestines into the blood and potentially into other organs. Plastics have also been found in humans. One study found that plastic fibers were present in 87% of the human lungs studied. The researchers proposed this may be due to microplastics present in the air. Some studies have shown that microplastics in the air may cause lung cells to produce inflammatory chemicals. However, this has only been shown in test-tube studies. Bisphenol A (BPA) is one of the best studied chemicals found in plastic. It is usually found in plastic packaging or food storage containers and can leak out into food. Some evidence has shown that BPA can interfere with reproductive hormones, especially in women.

SUMMARY
Evidence from test-tube and animal studies suggests that microplastics may be bad for health. However, very few studies examining the effects of microplastics in humans currently exist.

2.1 FOCUS

Water area plastic pollution is a big problem, so the study needs to foucus on the exact point. And from the statistic, the most serious one occurs in Aisa.

Plastic density

To know about the how serious the plastic gradually affect us, we need to list out the statistic that how many plastics are in the place which are not in the place they should stay.
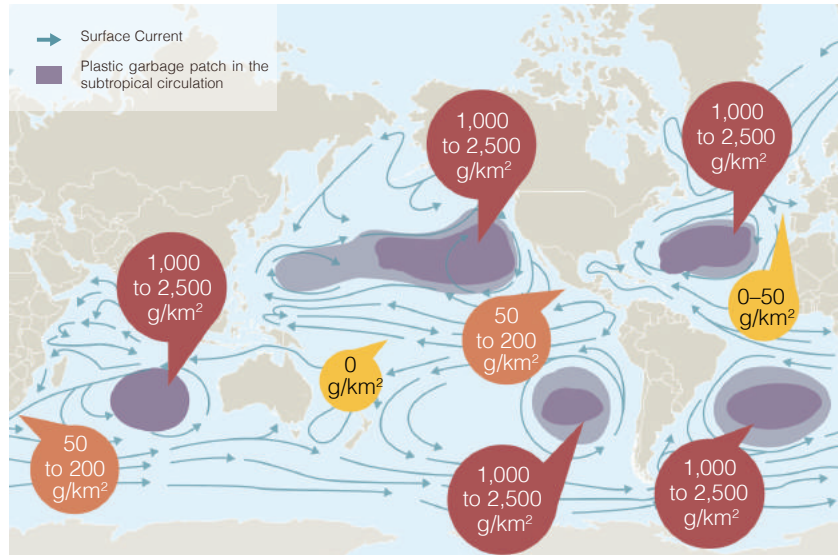

Surface Current

Plastic garbage patch in the subtropical circulation

1,000 to 2,500 g/km²

1,000 to 2,500 g/km²

1,000 to 2,500 g/km²

0–50 g/km²

50 to 200 g/km²

0 g/km²

50 to 200 g/km²

1,000 to 2,500 g/km²

1,000 to 2,500 g/km²

Figure2.1.1 marine plastic density

And from this map, we can found that the plastic garbage are gather together because of the ocean current which we have already said before. While the density of the garbage patch is up to 1,000 to 2,500 g/km². The costal area ranks the second place, which is 500 to 200 g/km², it is also the place where the most plastic resource come into the ocean. What's more, at the ocean currents swirl edge position, there are no plastics. So in short, it provides the direction where we should make the effort to form up a system to clean it up.

Tap water microplastic density

The tap water situation of the world

Rank 1: North America, The Middle East
Rank 2: Asia, Africa
Rank 3: North Asia, North America

US
94.4% of tap water samples contained plastic fibres
4.8

Europe
72.2
1.9

Lebanon ▮▮▮▮▮ 4.5

93.8

India
82.4
4.0

Indonesia
76.2
1.9

Ecuador
79.2
2.2

Average number of fibres per 500ml

Uganda
80.8
2.2
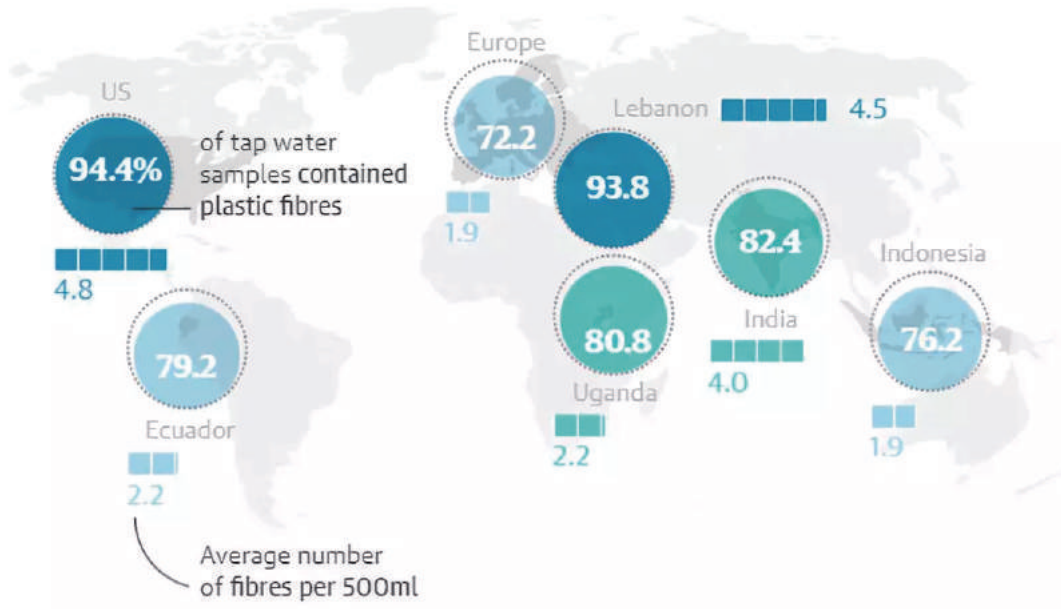
Figure2.1.2 The pollution of plastics is common in the tap water of the countries that are surveyed./ Orb Media

Plastic trash content in our planet (density)

The situation of the freshwater (river)
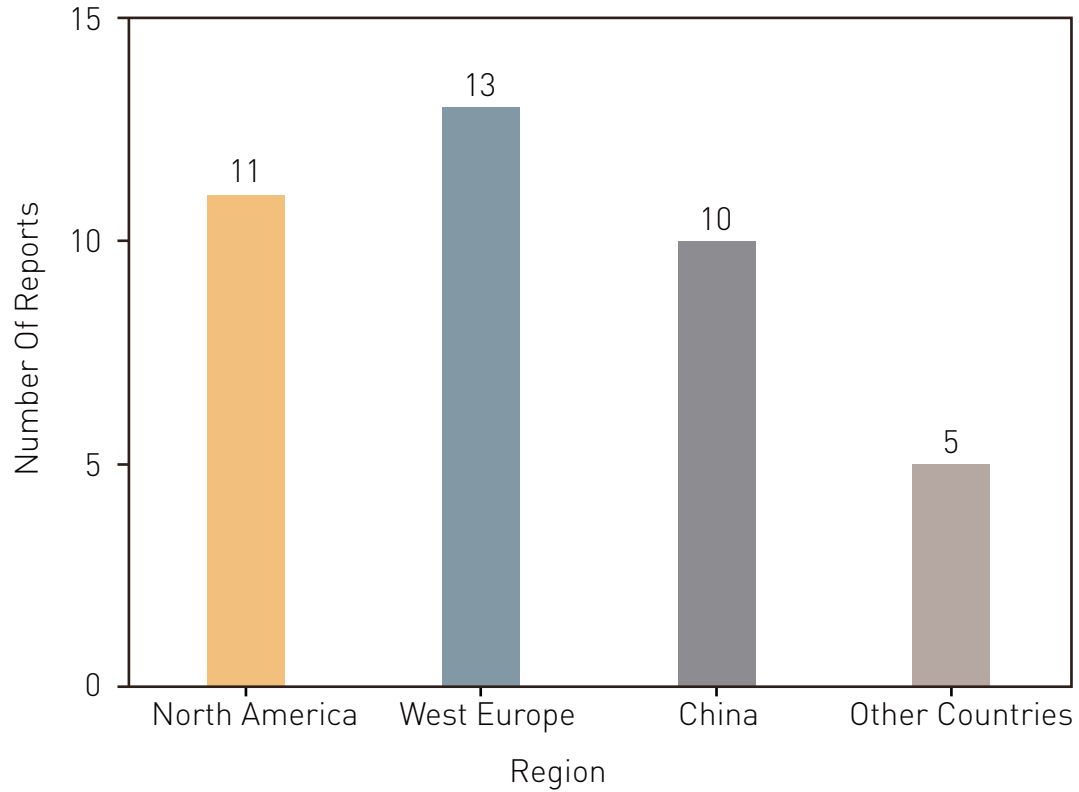
Figure2.1.5 The number of reports for occurrente of microplastics in the freshwater environment among different countries or regions (till June, 2017)

According to England "daily mail" reported that after the study scientists found out in recent years the world's oceans and rivers pollution are mostly plastic pollution and about nearly 95% from 10 rivers, including 6 in China or flows through China. So China needs to take a big part of responsibility in sloving the plastic pollution. And we can not destory the environment for economic development.

Due to improper disposal of pollutants, many rivers, not only added a large amount of waste to the ocean, and seriously affect the life of residents in river basins and safety, and caused the deaths of a large number of aquatic organisms.In Asia, the situation is more serious, in the ten of the most plastic polluted rivers, Asia owned for eight. China's Yangtze river Ganges with India pollutants together, only accounted for almost half of global water plastic pollution.
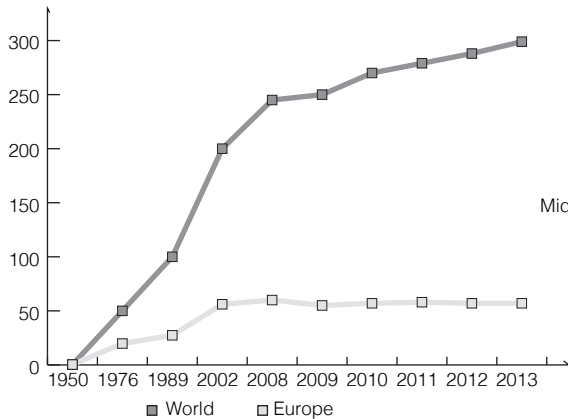
Figure2.1.3 Profuction of plastics worldwide from 1950 to 2013 (in million metric tons)
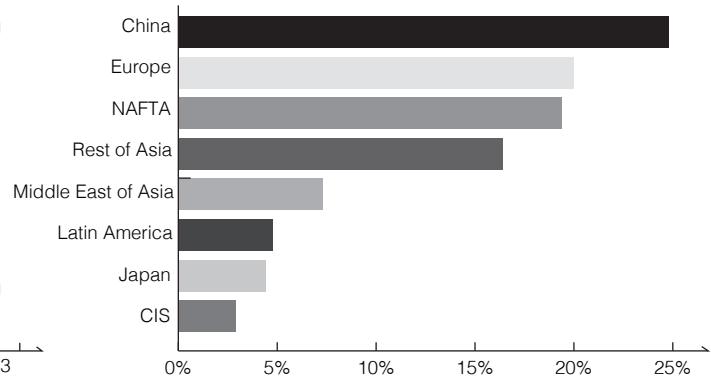
Distribution of global plastics production in 2013, by region

Figure2.1.3 Distribution of global plastics production in 2013, by region

PLASTIC WASTE ENTERING THE OCEAN FROM RIVERS PER YEAR FROM THE TOP 3,000 WASTE-PRODUCING RIVERS, METRIC TONS

● Asia   ● Everywhere else

5,000   50,000   100,000
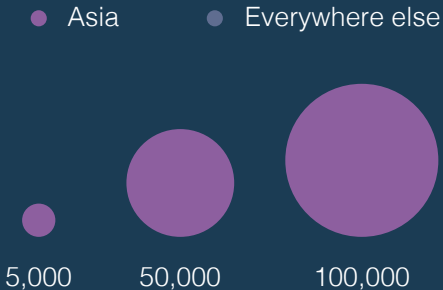
The 20 most polluted rivers account for two-thirds of the total amount of plastic entering the ocean from rivers. Fifteen are in Asia, in areas with frequent heavy rainfall and dense coastal populations. Rivers in Asia are responsible for 86 percent of input from rivers. The top 122 rivers account for more than 90 percent of plastic input from rivers into the ocean and are fed by land that houses 36 percent of the global population. Relatively little plastic waste enters the ocean from North America and Europe because of their more robust waste- management systems

Xi, China

Pasig, Philippines

Imo, Nigeria

Cross, Nigeria and Cameroon

Brantas, Indonesia

Yangtze River, China
333,000

Amazon, Brazil, Peru, Colombia and Ecuador

Ganges, India and Bangladesh

Huangpu, China
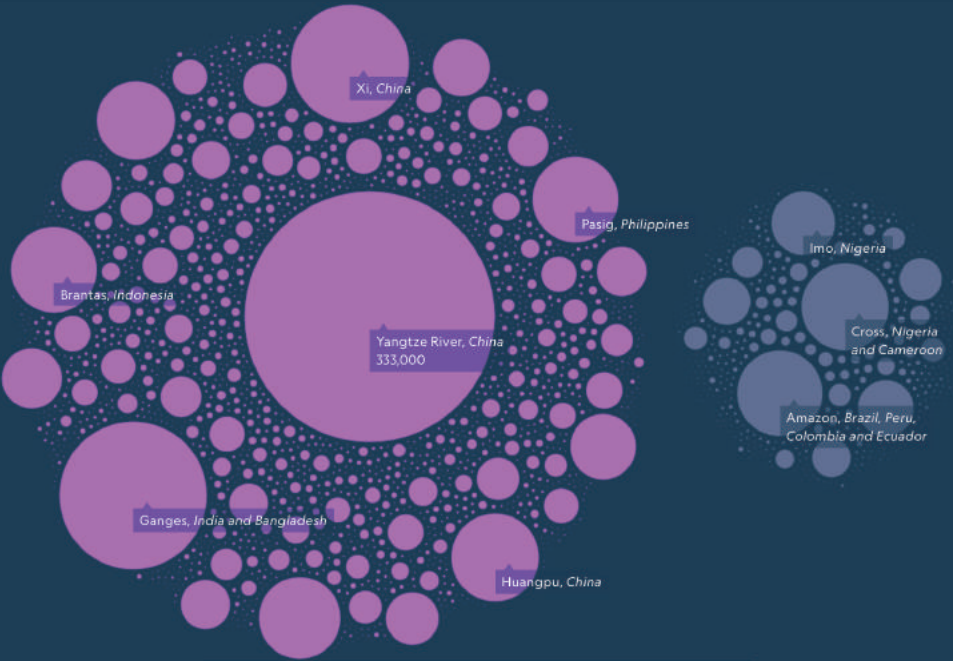
MISMANAGED MUNICIPAL PLASTIC WASTE, TONS PER YEAR

- City with more than 2000,000 people

Fewer than 10

10 - 99

100 - 999

1,000 - 10,000

More than 10,000

- More than one million people

China's Yangtze River is the most polluted river on Farth. Hundreds of waterways within its watershed feed into the Yangtze River from thousands of miles inland, shuttling faroff waste into the giant waterway. A portion of the mismanaged waste from heavily populated cities within the Yangtze River watershed eventually empties into the Pacific Ocean by way of the East China Sea.

China's river and costal area

Yangtze River

The Yangtze （长江）, which is 6,380 km (3,964 mi) long, is the longest river in Asia and the third-longest in the world. The river is the longest in the world to flow entirely within one country. It drains one-fifth of the land area of the People's Republic of China (PRC) and its river basin is home to nearly one-third of the country's population. The Yangtze is the sixth-largest river by discharge volume in the world.

Population

The Yangtze River Basin has a population of about 400 million people, accounting for one-third of the country, of which the agricultural population is about 320 million. About 94% of the total population of the basin is Han; the Yangtze River Basin is densely populated, with an average population density of more than 220 people/km2, especially in the Yangtze River Delta, Chengdu Plain and the middle and lower reaches of the Yangtze River. The population density is 600-900 people/km2. Shanghai has a population of 4,600 people/km2 and is the most densely populated area in China.

Part of the 'Ten Thousand Miles of the Yangtze River, a Ming Dynasty landscape painting'.

Yangtze, Wikipedia

Topography

The topography varies greatly in China, a vast land of lofty plateau, large plains, rolling land and big and small basins surrounded by lofty mountains. All the five basic topographic types in the world exist in China to create the conditions for developing industry and agriculture.

With highlands in the west and plains in the east, China has a varied topography. The lie of the land may be divided into three tiers. The Qinghai-Tibet Plateau that rises more than 4, 000m above sea-level forms the highest tier. It is a land of peaks and valleys studded with innumerable lakes. Along the plateau's southwestern fringe is the Himalayan Range, on the eastern section of which looms the 8, 848. 13 meter-high Mt. Qomolangma, the world's loftiest peak. The vast area north and east of the Qinghai-Tibet Plateau that drops to an elevation below 1, 100-2, 000m forms the second tier-a land interspersed with extensive basins and highlands. Here the Turpan Basin in Xinjiang is 154m below sea-level-the lowest depression in China.

Water area WE focused in the floating plastic collection project.

The third tier is a vast area of rolling hills and plains with an elevation below 500m lying east of the line running from the Greater Hinggan and Taihang ranges in the north to the foothills of the Wushan Mountains and the Yunnan-Guizhou Highlands in the south. Though some peaks in this area are as high as 2, 000m, the plains along the coast have an elevation of less than 50m. Off the Chinese coast is an extensive continental shelf richly endowed with petroleum, natural gas and marine resources.

1 level   2 level   3 level
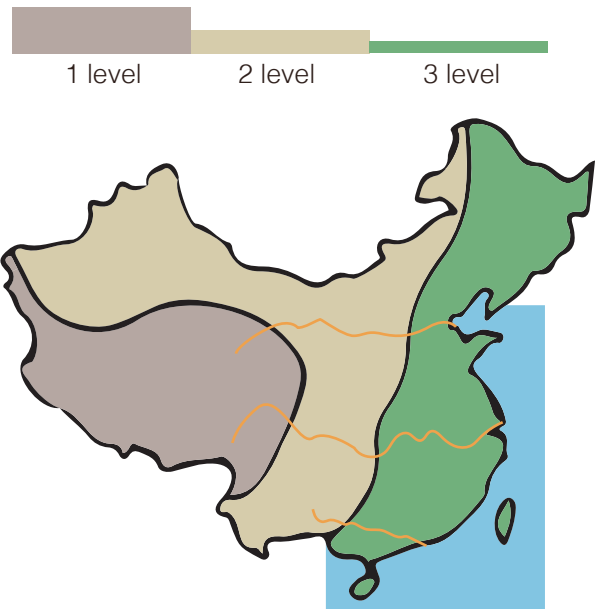
Figure2.1.4 Three levels of China topography

Topography, People.

Yangtze River water plastic
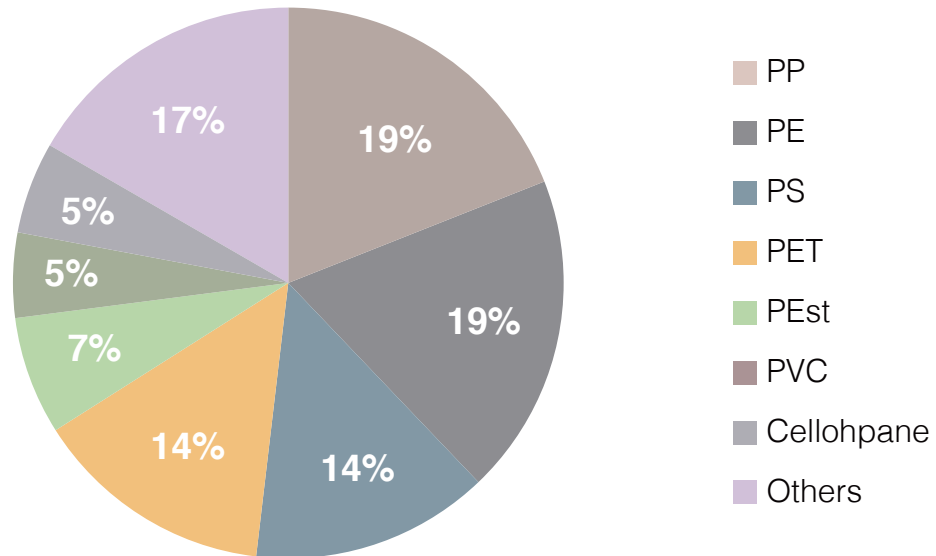
Figure2.1.6 The rates of various microplastics classes detected in the freshwater environment of China (till June, 2017)

Wang Wenfeng and the study group through visiting the lake group in wuhan and the Three Gorges reservoir area and doing the research of micro plastic pollution situation, they give the main reference data for the world to understand micro plastic pollution in the freshwater system.

What's more, they monitor the dongting lake, honghu, poyang lake and the danjiangkou reservoir, to check the micro plastic pollution situation, further proves the universality that micro plastic has in the water area.
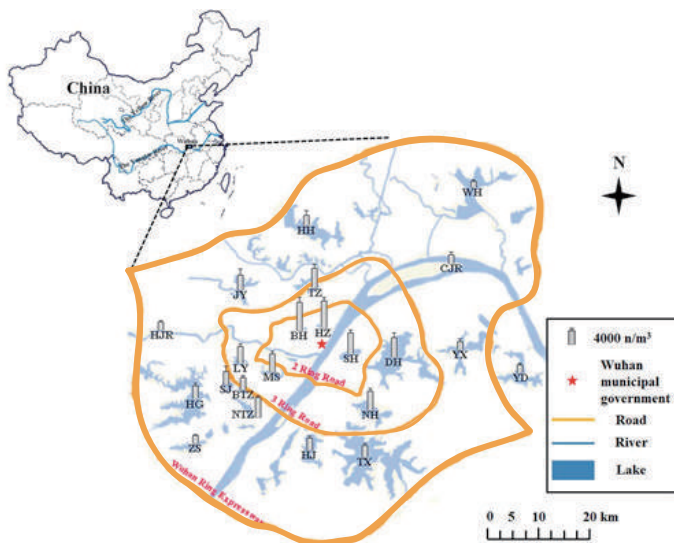
Figure2.1.7 Spatial distribution of micro-plastics in surface water in Wuhan and geographical location of sampling points
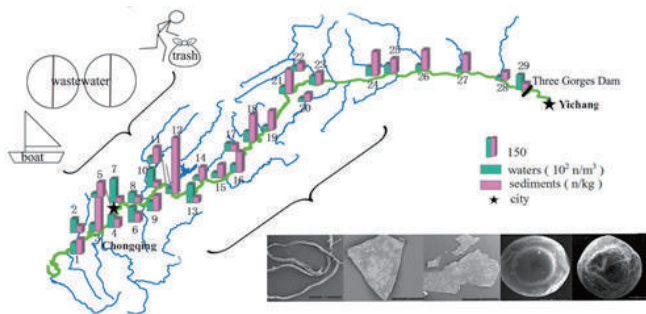
Figure2.1.8 Spatial distribution of micro-plastics in the Three Gorges reservoir area and geographical location of sampling points

2.2 VESSEL TRACK TECHNOLOGY
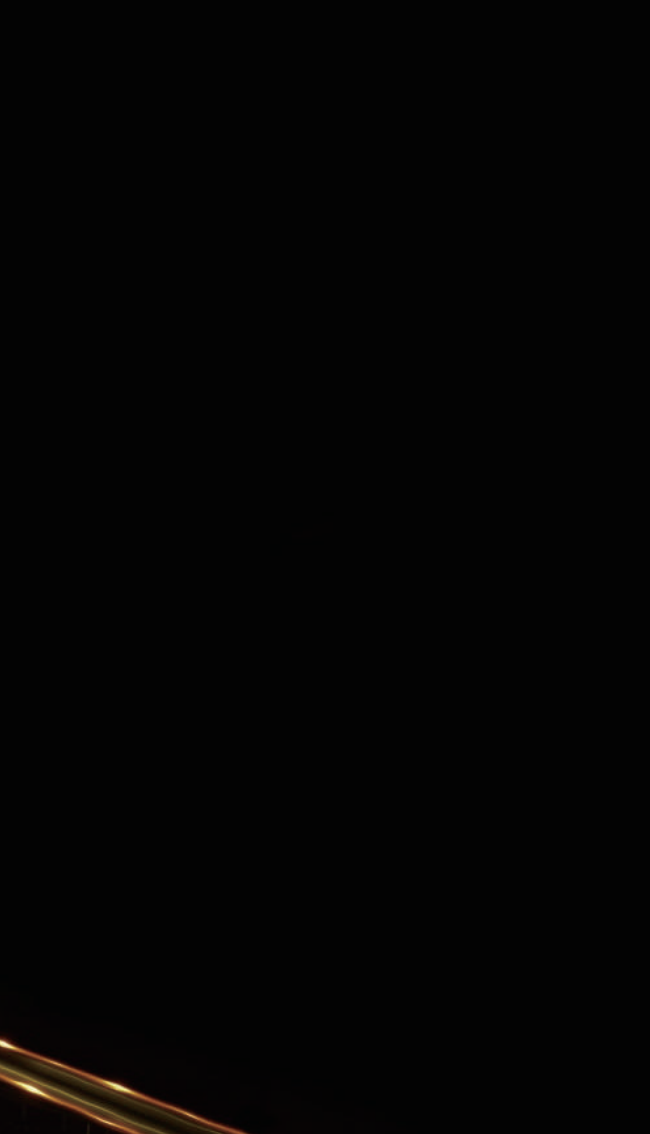
Satellite AIS
GPS vessel tracker
NemaStudio
Real time data

Satellite AIS - space-based vessel tracking

FleetMon combines terrestrial and satellite AIS

The international AIS system, originally developed as a collision avoidance technology, has proven to be an indispensable tool and information source of unrivaled quality for the maritime world.

With its land-based AIS receiver station network, FleetMon provides undelayed signals with superior resolution for vessel tracking and monitoring. Today, FleetMon's antennas offer live coverage of all major waterways and ports, with about 40,000 vessels detected in every single moment.

The FleetMon Explorer software allows its users to watch marine traffic and operations live, wherever they are, right in their browser.

Additionally, FleetMon has teamed up with partner exactEarth, enabling you to track and follow ships sailing the open seas through satellite AIS technology. Combining high-resolution terrestrial and global space-based tracking in a unique seamless fashion, FleetMon brings you the best in today's AIS tracking!
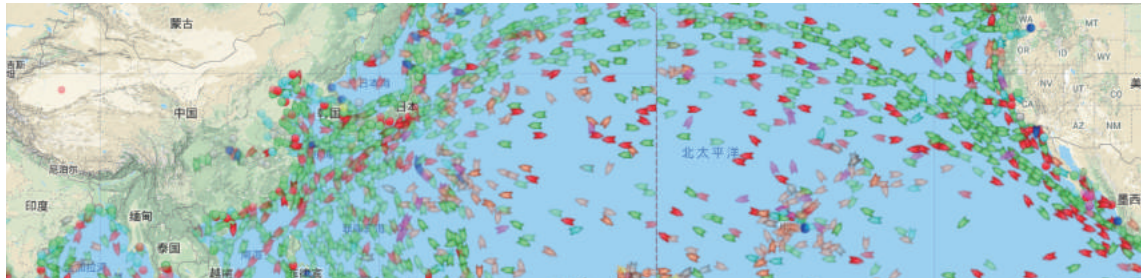
https://www.marinetraffic.com/
https://www.fleetmon.com/
https://www.vesselfinder.com/

Finally! Satellite tracking data fully visualized – Global vessel movements at a single glance
April 16th, 2014 in FleetMon News, Site Updates by FleetMon HQ

GPS vessel tracker

Advanced fleet monitoring with desktop and mobile access.
Intelligently designed for the management of fixed and mobile assets, the weatherproof FleetMon S1-C GPS Vessel Tracker device is a practical solution for boat and vessel tracking. With its extremely compact size, the S1-C tracker can be easily installed out of view, allowing owners to keep track of their vessel at all times.

Improve your security and operating efficiency
Many insurance companies offer discounts to owners who install GPS trackers onboard their vessels.

In the event of theft, priacy or power outages, the battery powered S1-C is an invaluable security asset, even for large commercial fleet owners and chartering companies that require redundancy in their tracking systems.

Not your ordinary GPS web platform
FleetMon's innovative GPS vessel tracking web-platform seamlessly utilizes the reliability of AIS tracking for FleetMon's global AIS network. With a comprehensive vessel monitoring solution, users have access to powerful reporting tools, weather data, convenient smartphone apps and alerting options.
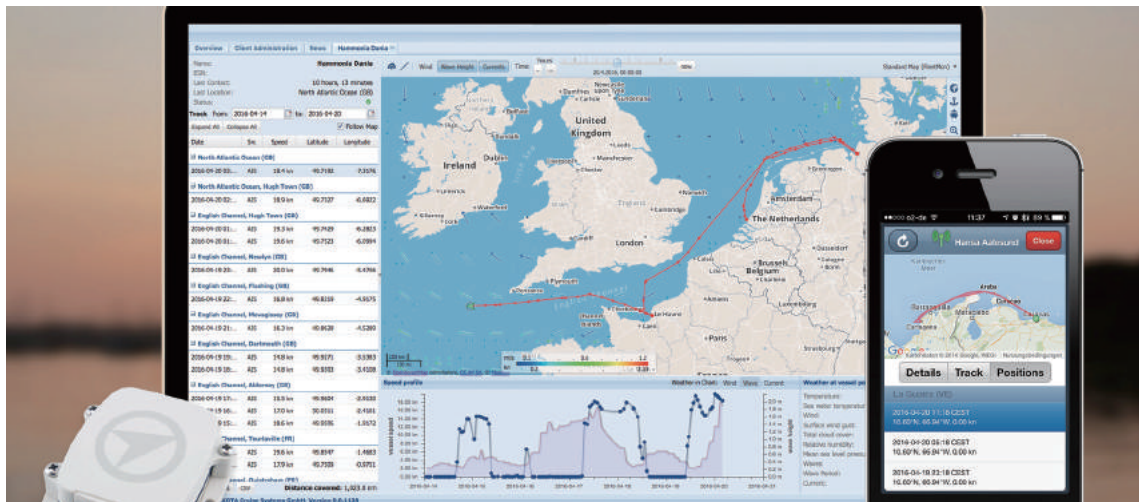
NemaStudio

NemaStudio provides the professional developer of NMEA products with a very powerful development and testing tool by simulating the output of various nautical instruments and target objects including GPS, AIS and Radar.

All instruments, targets and ports can be matched and mixed, meaning you can have multiple instances of several objects transmitting over the same or over different ports simultaneously. This makes this navigation sensors simulation software program also very suitable for e.g. ECDIS training and simulations.

Examples of test and simulation configurations with NemaStudio
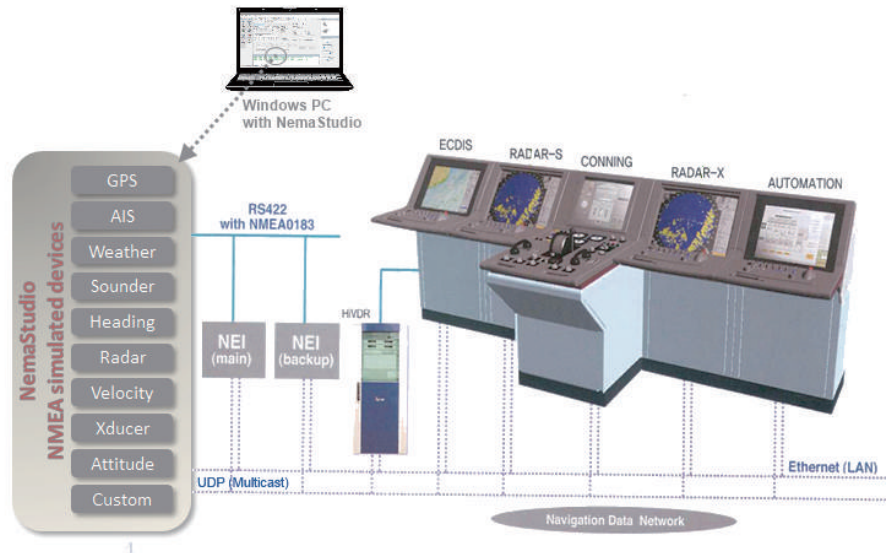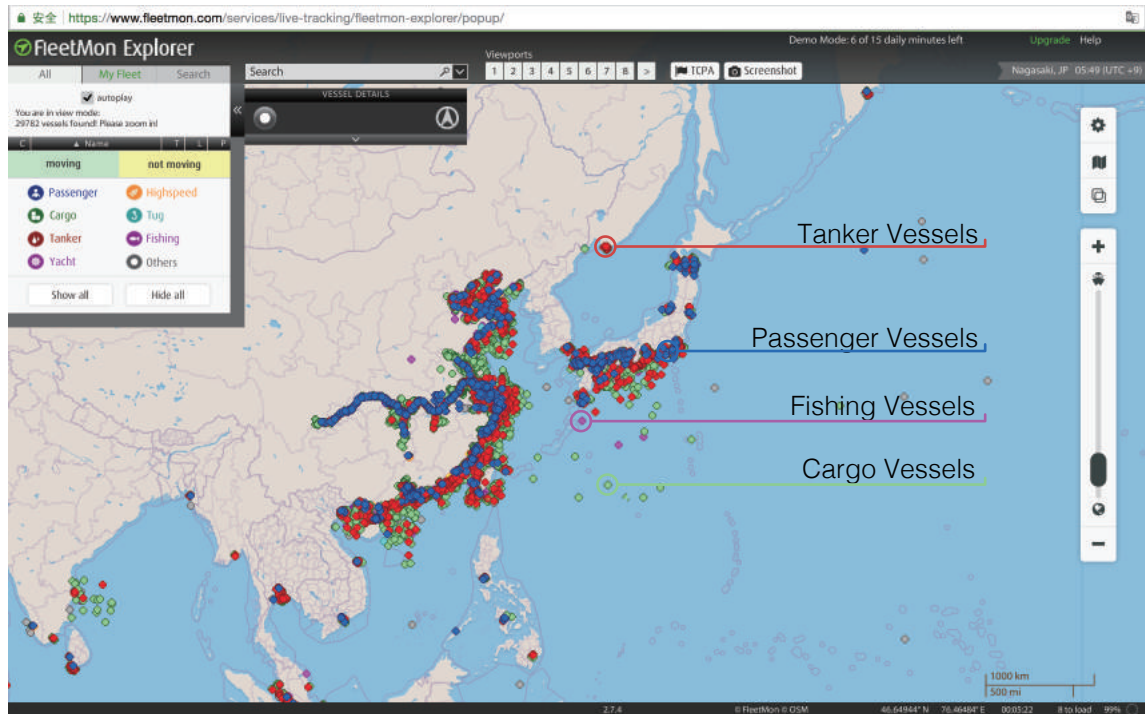
From the vessels moving datas on the website,we can easily find out that the cargo, tanker and fishing vessels are more often to sailing in the deep sea, while the passenger, highspeed vessels and yacht sail in the river and coastal area.

And from the research, multi-day deep sea operating vessels (MDOVs) vary in length from 28-60 ft. According to a questionnaire survey conducted, all MDOVs had average trip duration of 9-22 days and 5-10 fishing days.

Real time data
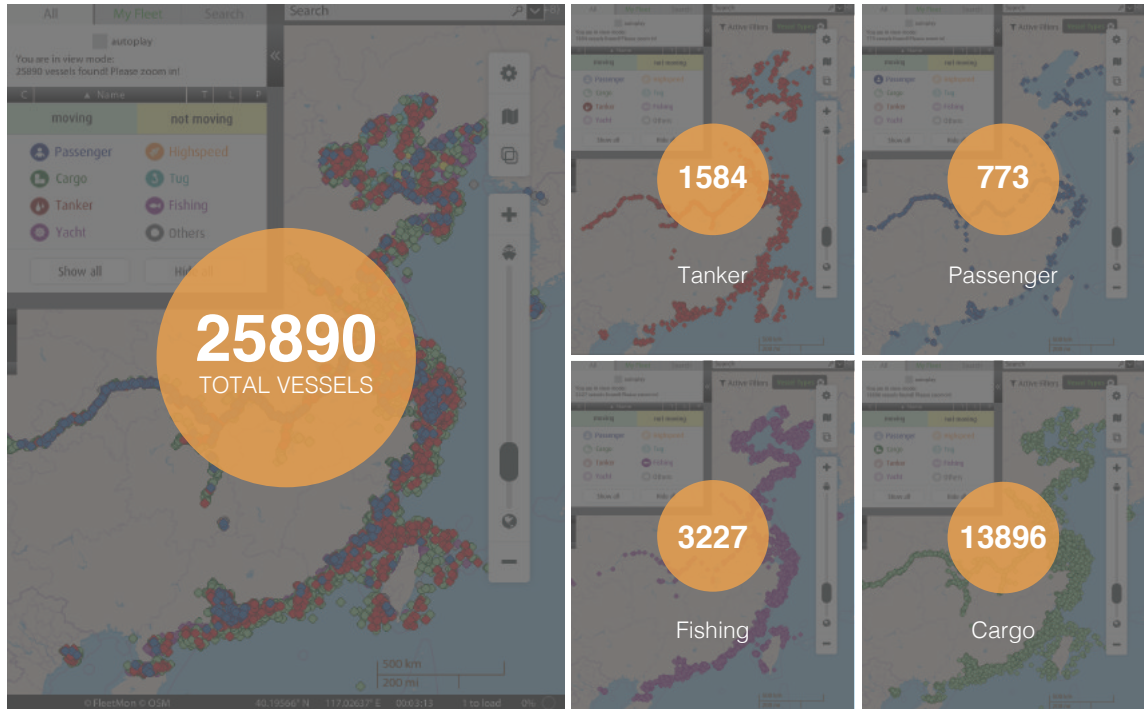
Figure2.2.1 Data of the real time vessels

The area selected from the map - that is, the coastal part of China and the middle and lower reaches of China's rivers. We can get real-time information from the website to get an approximate daily traffic data for the vessel in this range.

And selected out the four of the most common vessels sail on the area and it is the one which will be the most possible part of the water area cleaning project.

Fleetmon vessel track

68

2.3　COLLECT FLOATING PLASTIC

Cases studies
Private or sharing economy
Opportunities

Cases study

Trash Skimmer Vessels

Trash Cats are the most durable floating debris removal systems in the world. They were featured The Learning Channel's (TLC) "Mega Machines":The Trash Cat trash skimmer vessel system can be used for removing floating debris from rivers, reservoirs, canals, ports and other waterways. The Trash Cat can easily remove the following man-made and organic floating debris: logs, tires, shopping carts, refrigerators, bowling balls, leaves, bottles, cans, ropes, fish, and plastics. The Trash Cat has removed billions of tons of debris from New York to Dubai to Malaysia.

Trash Cats have unique features that make them more durable than other trash skimmers including the high density rub rail system which can prolong the life of the Trash Cat 2:1 over other skimmers. The Trash Cat is built to last 30-50 years and is selected by governments, port operators, and other entities for its reputation as the leader. The Trash Cat is available in several sizes and has the following available accessories: shore conveyors, tilt-deck trailers, and trailer conveyors. The Trash Cat can also be customized with high speed propulsion and stainless steel hulls.

Traditional net collect vessel
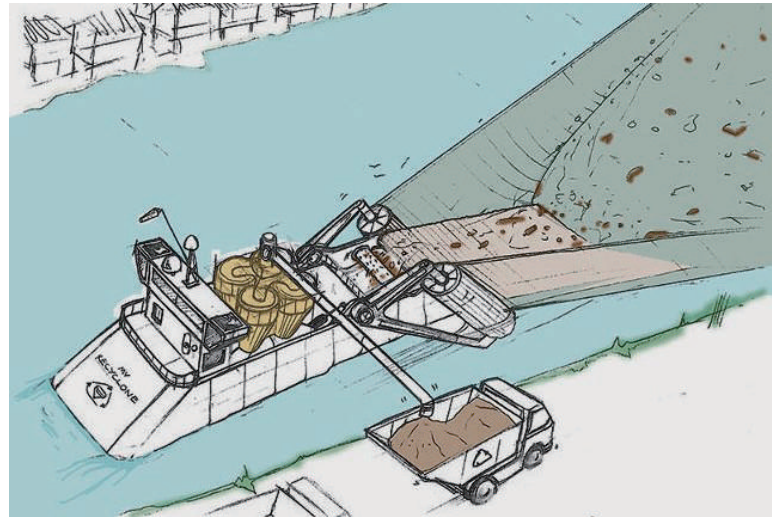
1500 Series System
Pick Up Capacity: 8 ft wide x 1-1/2 ft deep
Storage Capacity: 1,500 lbs or 120 cu ft

12000 Series System
Pick Up Capacity: 16 ft wide x 2-1/2 ft deep
Storage Capacity: 12000 lbs or 700 cu ft

Advantage:
1. It can takes a large amount of trash
2. Can go to the water area where gather together the trash.
3. Can clean up the small water area.

Disadvantage:
1. It needs a lot of specifi man powers to support
2. Not easy to clean up the vesslels
3. Don't have the classification system.
4. Not easy to operate.

Mud Cat Trash Skimmer Vessel Dredge Systems, Photos & Videos

2

Seabin Project

The Seabin is a floating rubbish bin that is located in the water at marinas, docks, yacht clubs and commercial ports.

Fixed appliance

The Seabin moves up and down with the range of tide collecting all floating rubbish. Water is sucked in from the surface and passes through a catch bag inside the Seabin, with a submersible water pump capable of displacing 25.000 LPH (litres per hour), plugged directly into 110/220 V outlet. The water is then pumped back into the marina leaving litter and debris trapped in the catch bag to be disposed of properly.

The Seabin also has the potential to collect a percentage of oils and pollutants floating on the water surface.

Advantage:
1. It has a whole system to collect the trash
2. No need of man power when the equipment is working
3. It is set up in the specifi place of the harbour, so is easy to control

Disadvantage:
1. It can just collect a small amount of trash
2. Not easy to do the classification
3. Need of staffs to go to each corner to check the situation of the equipments (whether the seabin is full or have something in trouble)
4. The trush is not only in the ports, it can not collect the trushs which is far away from the land.

Seabin Project

The Ocean Clean Up

Take advantage of natural oceanic forces

Independent appliance

The Ocean Cleanup is developing a passive system, using the natural oceanic forces to catch and concentrate the plastic. Both the plastic and system are being carried by the current.

However, wind and waves propel only the system, as the floater sits just above the water surface, while the plastic is primarily just beneath it. The system thus moves faster than the plastic, allowing the plastic to be captured.
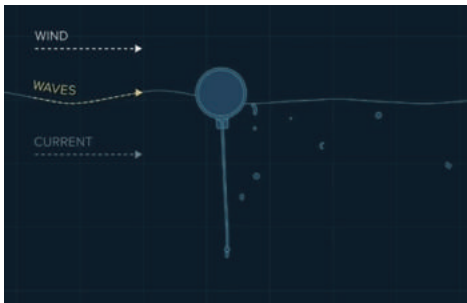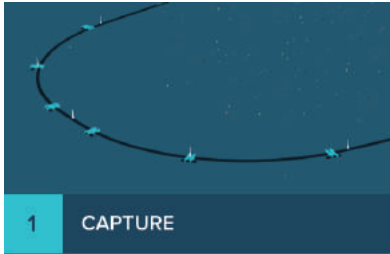
1 CAPTURE

Natural forces move the system faster than the plastic which allows the plastic to be captured in the center of the system.

2 ACCUMULATION

Due to its U-shape and the screen below, the plastic will collect in the center of the system.

3 EXTRACTION

A vessel acting as a garbage truck of the seas will remove the collected plastic every few months.

4 LANDING
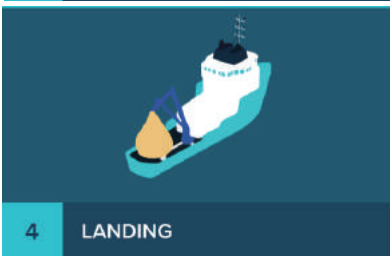
Plastic will be processed on land and sorted for recycling.

Advantage:
1. It has a whole system to collect the trash
2. No need of man power when the equipment is working
3. Can clean up the ocean garbage patch, which gathers the most garbage
4. Using the natural ocean current as the clean up force, saving energe and effecent.
5. Module floating pieces design, can scale up the collecting volum.

Disadvantage:
1. Not easy to do the classification
2. Need a lot of money to support

The Ocean Clean Up

Product position

Collect large volum

Save energy

Man power resourse

Easy to operate

Clean the big water area

Clean the small water area

Plastic size classification

Movable

High production cost

Automated

Systemized

Vessel assist

Absorb oil
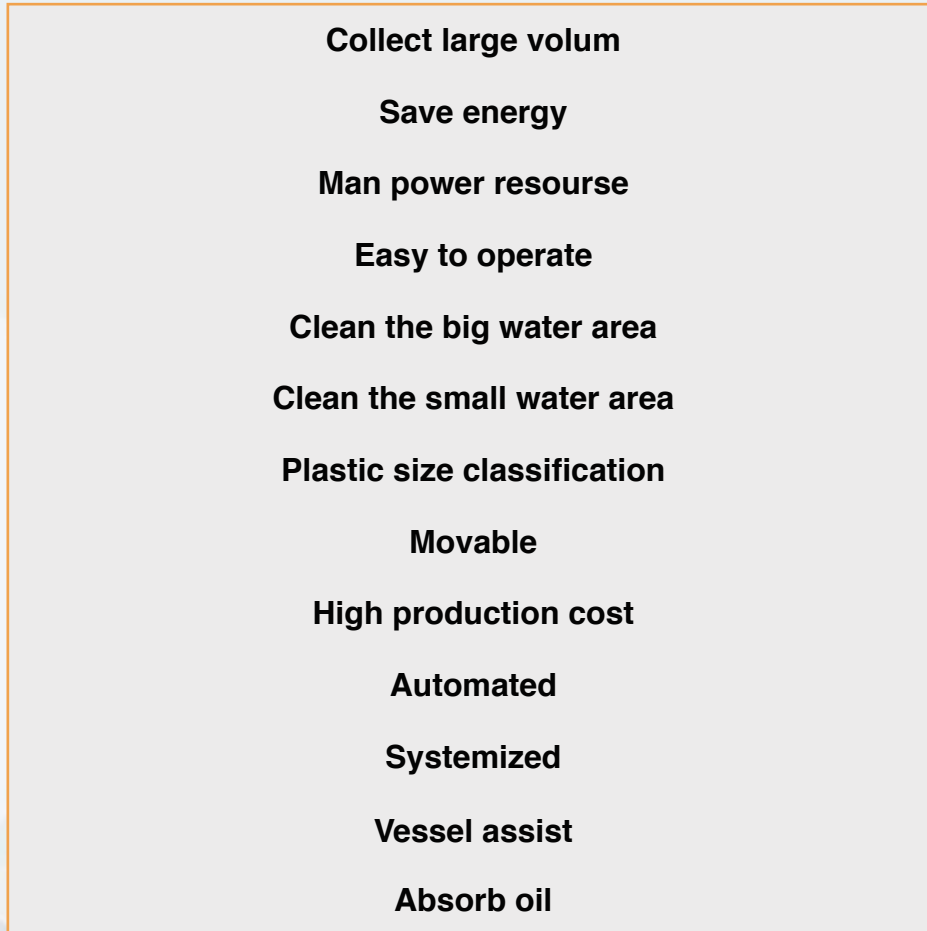
Figure2.3.1 comparison of exist functions in the projects.

Private or sharing economy

Sharing economy

Sharing economy is an umbrella term with a range of meanings, often used to describe economic and social activity involving online transactions. Originally growing out of the opensource community to refer to peer-to-peer based sharing of access to goods and services, the term is now sometimes used in a broader sense to describe any sales transactions that are done via online market places, even ones that are business to consumer, rather than peer-to-peer. For this reason, the term sharing economy has been criticised as misleading, some arguing that even services that enable peer-to-peer exchange can be primarily profit-driven. However, many commentators assert that the term is still valid as a means of describing a generally more democratized marketplace, even when it's applied to a broader spectrum of services.

Vehicle sharing system

Nowadays, there are many vehicles sharing system, Such as ''Uber''. Uber Technologies Inc. is an American worldwide online transportation network company headquartered in San Francisco, California. It develops, markets and operates the Uber app, which allows consumers with smartphones to submit a trip request, which the software program then automatically sends to the Uber driver nearest to the consumer, alerting the driver to the location of the customer. Uber drivers use their own personal cars. As of August 2016, the service was available in over 66 countries and 545 cities worldwide. The Uber app automatically calculates the fare and transfers the payment to the driver. Since Uber's launch, several other companies have replicated its business model, a trend that has come to be referred to as "Uberification". Uber successfully to personal traffic resources to share and achieve profitability.
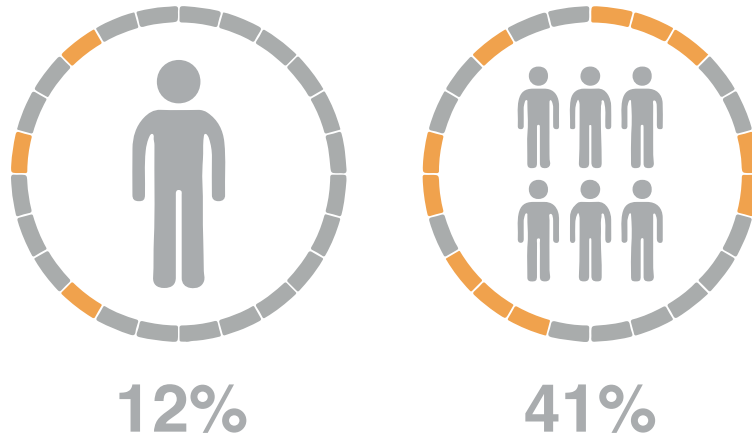
Figure2.3.2 Privte and vehicle sharing usage per day

Ride On! Mobility Business Models for the Sharing
Economy, Cohen, Boyd; Kietzmann, Jan, 2014.

Opportunities

Collect large scale

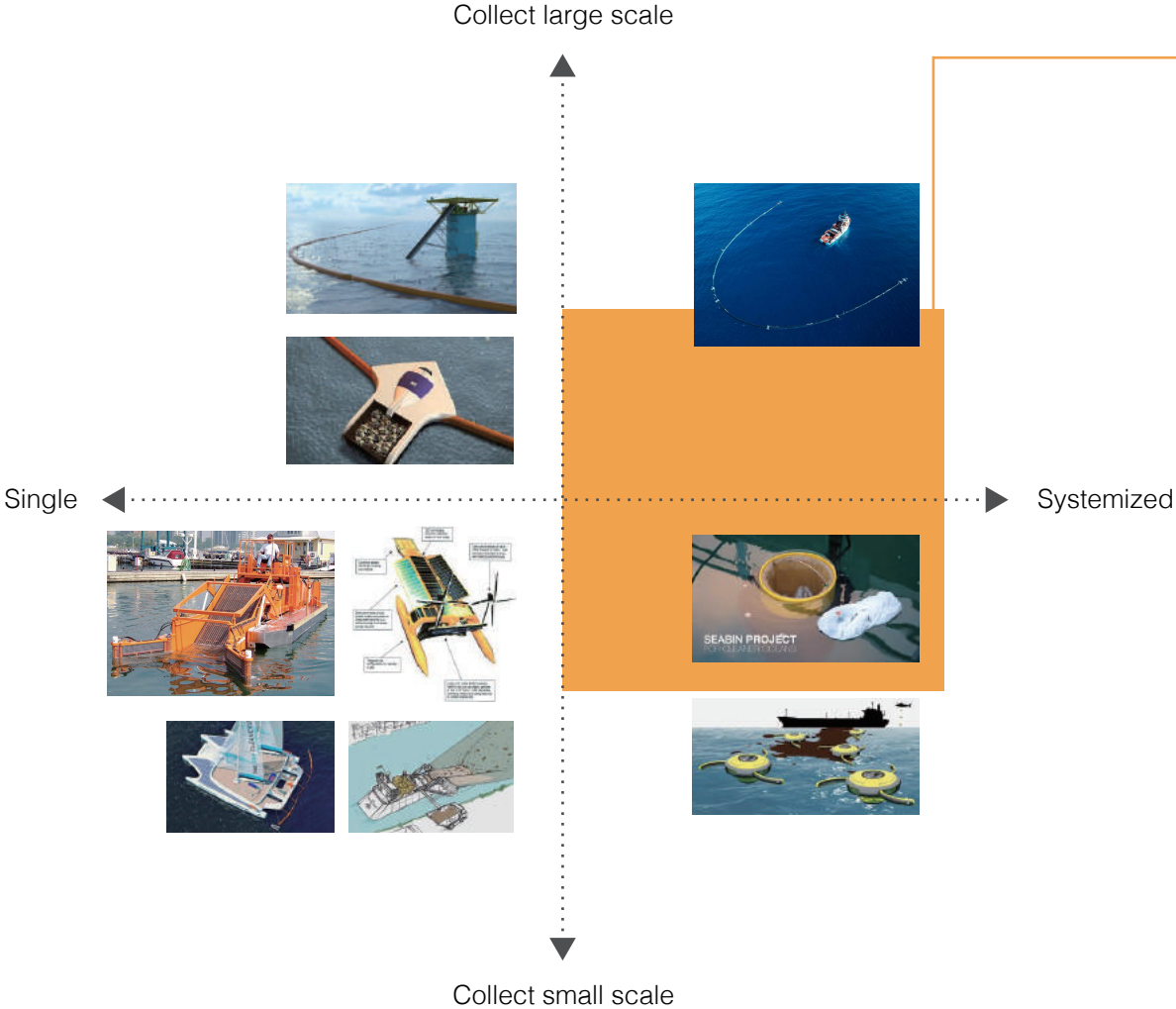Single

Systemized

Collect small scale

Figure2.3.3 Analyze of the developing opportunities

Developing opportunities and direction
(A medium scale collecting system)

The orange square is the direction that this water area floating plastic project headed to. A Chinese common saying that "A single wood is difficult to built the roof, A single brick is difficult to built the wall. (孤木难做梁孤砖难做墙)".

How about using the sharing system not only on the land but also on the water area? We can have the thinking of attracting more people to jion our cleaning project, which means not only the government take the responsibility on this environment problem, but also the normal people. An easy way to take part in it, that is one of the direction for this project.

And as the mention before, smart driver advisory systems has grudually been form up in the vehicle field. In the future, it must be possibile also apply on the vessel field, such as the semi - automatic and fully - automatic system.

● **Near Future**

● **2025**

● **City**

● **River, Lake, Costal Area**

3.1 CONCEPT

Scenario
Personas
Moodboard
Sketches
SHARKER

Description

Scenarios are based on social conditions, groups of people, and economic conditions. Because this project is aimed at the future 2025. So we need to estimate the future. And by looking at the current situation, it's a very good way to extrapolate future developments.

In this project, I chose China as the site of the project implementation. China's population has been very large for a long time, despite of the land transport, the water transport is ranked the second place of China. Passenger transpotation, cargo transportation and also the fishing are the most type in the water transport. China is a fishery-rich country. Due to the continuous efforts and support of the government, more and more fishmans have enjoyed the benefits of science and technology for doing fishing.

Therefore, Chinese fishmans are willing to accept the better scienceand technology. China's economy has sustained rapid and steady growth in recent years, sharing economy has a good mass base in China. After all, the goal of Chinese society is the Communist society.

Even so, we can also have a better way to let the people saling on the water area to be one part of the environment cleaning process and can reward them benifits. China's population is very large, but there are still a small number of fishman in poverty. I hope that through my design, and the system to help this part of the fishmans out of poverty, but also help all them increase their income while doing a good thing to the society.

Personas

(Fishman works according to the following time table)

Fishing Times

Thu, 8 November

☆ Excellent Day ★ ★ ★ ★

🕐 Major: 11:03 - 13:03

• Minor: 05:27 - 07:27

• Minor: 16:40 - 18:40

☀ Sunrise: 06:13

☀ Sunset: 16:59

🌙 Moonrise: 06:27

🌙 Moonset: 17:40

New Moon

Local Time: Thu, Nov 8, 2018 7:48 AM

Latitude: 31.3111 | Longitude: 121.8944

Solunar Clock

Current Weather

Light Rain

Temperature: 13 °C

Pressure: 1018

Wind Speed 15 Kmh

Wind Direction: W

Cloud Cover: 100 %

Humidity: 94
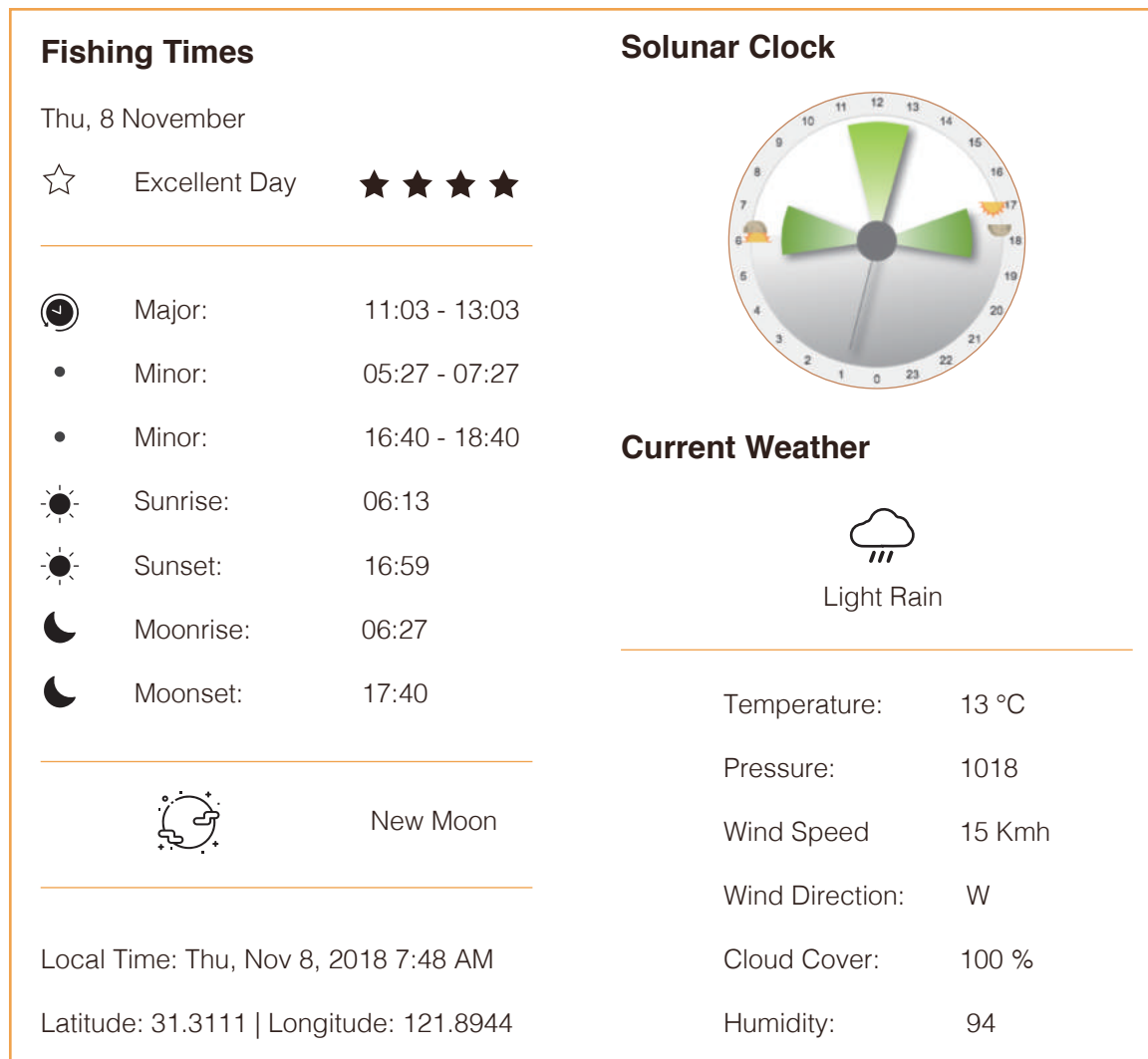
Figure3.1.1 Fishing time table
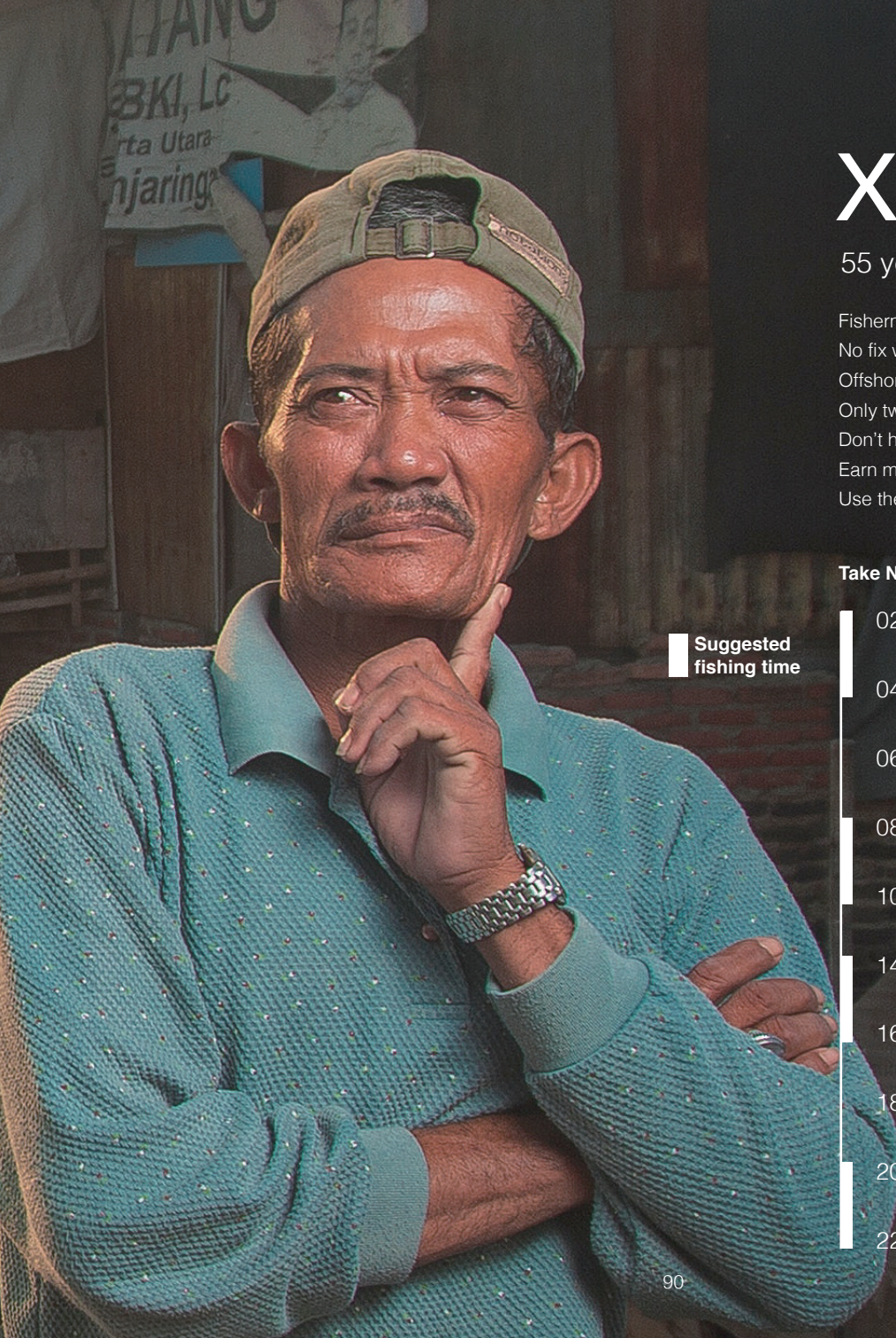
Xu Ming

55 years old   Chinese

Fisherman
No fix working time
Offshore fishing
Only two or three months at home(fishing ban)
Don't have strong internet
Earn money by himself for the whole family
Use the simply smart phone

Take November 2018 As Example

Suggested fishing time

02	wake up, prepare fishing
04	finish fishing
06	sunrise, have a rest
08:30	fishing time
10:30	finish fishing, have lunch
14:30	fishing time
16:30	finish fishing
18	sunset, have dinner
20	fishing or have a rest
22:30	sleep
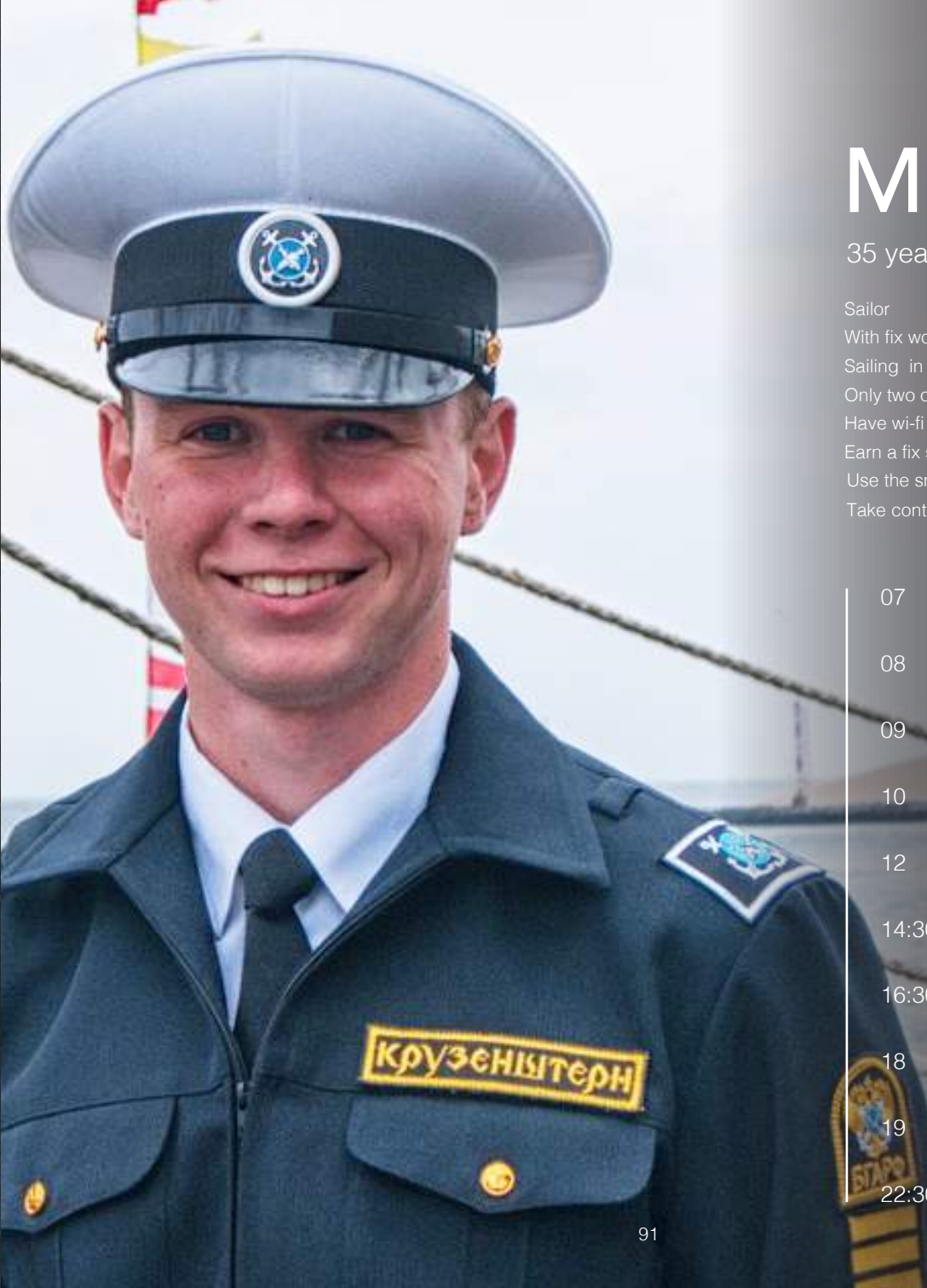
Martin

35 years old

Sailor
With fix working time for 8 hours
Sailing in the river or coastal area
Only two or three months at home(fishing ban)
Have wi-fi on the ship
Earn a fix salary
Use the smart phone
Take control of the

07	wake up
08	on duty
09	
10	
12	have lunch
14:30	on duty
16:30	
18	off duty
19	have dinner
22:30	sleep
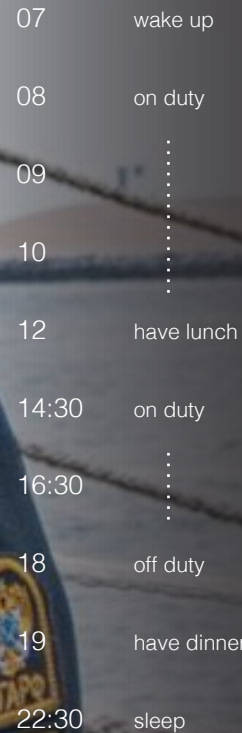
Moodboard

Sketches

The idea of SHARKER is a bionics design. Whale shark is the most huge animal in the world and it has a big mouth for eating. Simplified the outline of the whale shark.

3.2 PRODUCT

Design thinking

The SHARKER is a floating plastic collector that it can sail on the water area (river, lake or ocean)automatically under a distance control. Because it is an unmanned sailing appliance, it needs to connect with the vessel through the information docking. To let the vessel to the place where is more far away or not easy to reach by its own. And it can also let more private fishmans or sailing companys can jion this system to clean the water area and have rewards.

The main funtion of the SHARKER is to collect the plastic. So the interior part of the it has been thought to devide in to three parts to collect. Each one collect difference sizes of plastic, and because of the difference size of the three boxes, it can attach together to compress the plastic with the power inside, which can creates more spaces for collecting.

indicate full or not

Cover: semitransparent
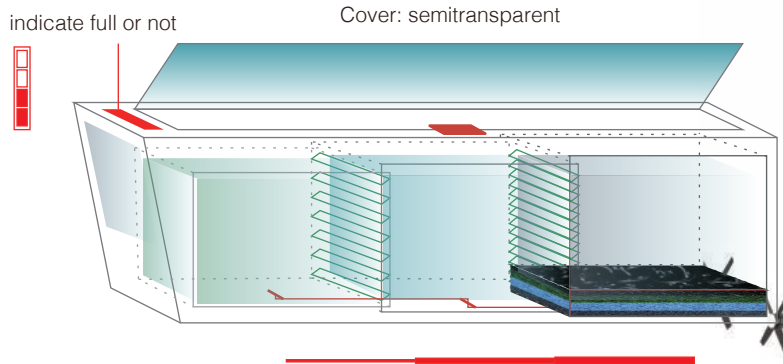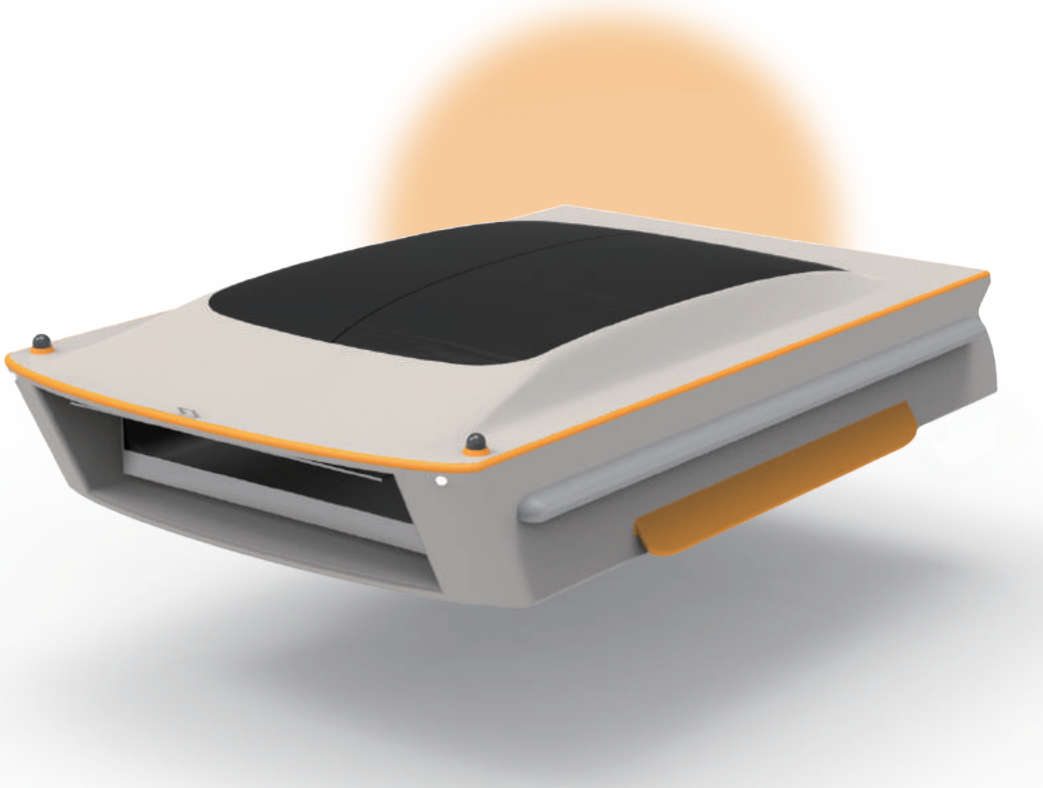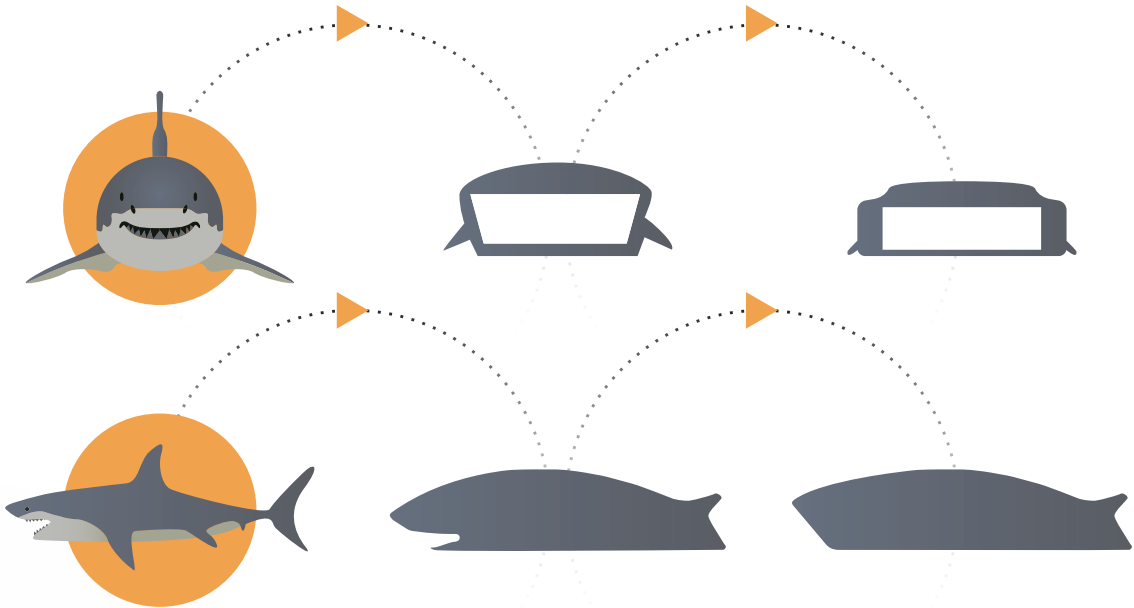
SHARKER

Bionics Design: Shark Outline

The SHARKER is using the outline of the shark and whale shark, which is the most biggest animal with a big mouth in the world and it is also the target animal in our research. They are affected seriously by the plastic in the sea, so I choose them as the target to start the appearance design. Its big mouth can helps to collect more floating plastics, like the fish is eating its foods.
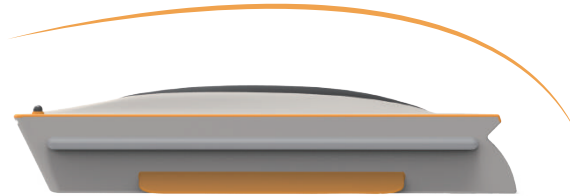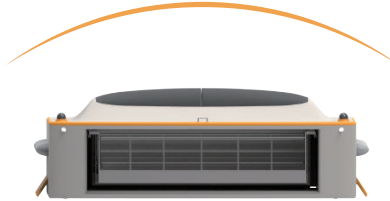
■ (orange)	C: 4 M:41 Y:80 K:0
■ (light grey)	C: 9 M:9 Y:12 K:0
■ (black)	C: 85 M:81 Y:80 K:68
■ (brass)	Brass
▓ (stainless steel)	Stainless Steel

Color use:

The main color I use Light grey and orange, to make the contrast to the sea and river color, and can arouse our awareness. The propellers using Brass color, the covers (solar panel, propelle rcover) are deep grey and the collecting box is stainless steel.

Dimension

Open mouth

What makes SHARKER particularly ingenious is that his 'shark' can be deployed 24/7. The device – which is the size of a regular passenger's car – has an 'open mouth' located 30 cm below the water surface, which can collect some 500 kg of the waste in the water.

100mm

165mm   924mm   165mm

10mm

11mm

902mm

1182mm

1152mm

47mm [

40mm [

230mm

1365mm

1450mm

110mm

56mm

56mm

11mm [

40mm [

97mm [

35mm]

246mm

330mm

440mm

163mm

1914mm

1166mm

2200mm

Explosive view

Cover / Solar Panel

Screem

Scanner System

360 Degree Camera

Pull-Ring

Light

Fender

Product Shell

Open Button

Battery

Rubber Belt

Vacuum Part

Sensor

Bilge Keel

Propeller

Propeller cover

Collect Net

Motor

Collect Box

Filter
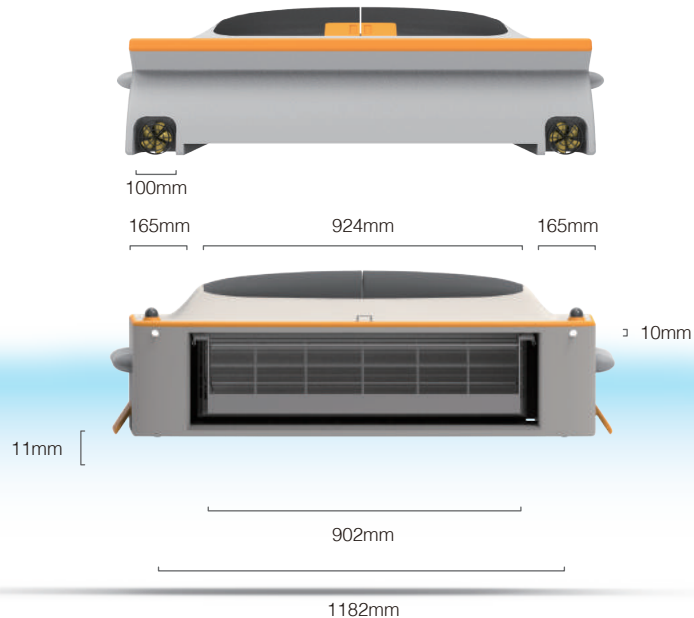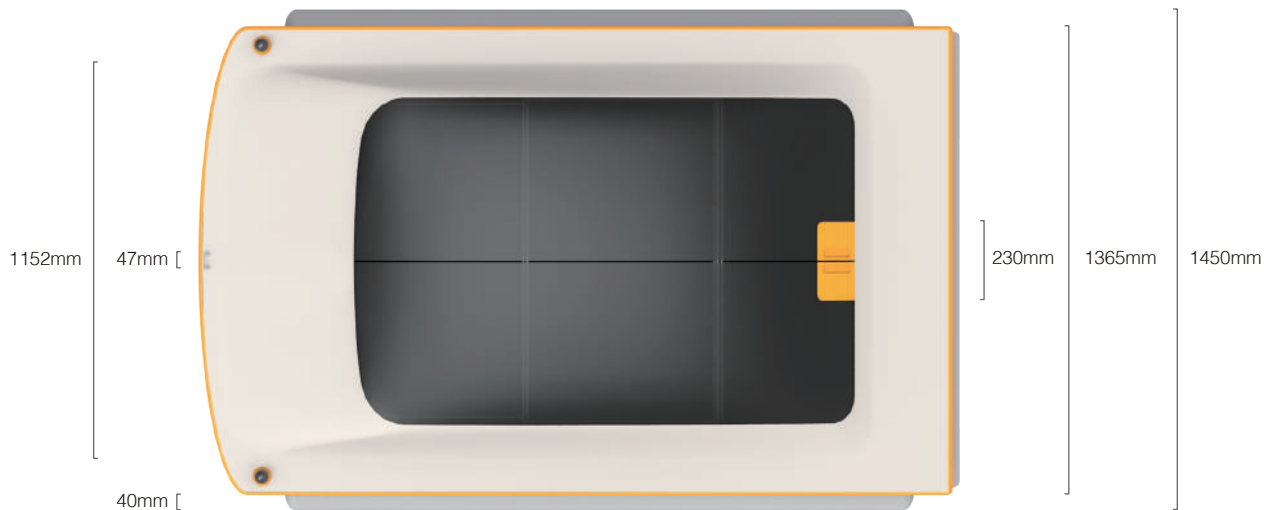
Functions:

1.   Camera: The wide angle camera can takes photo of the water area.
2..   360-degrees scanner system: It can monitoring the water area situation.
3   Sensor: Provide the data of the obstacles around.
4.   Light: Provide light during the night.
5.   The screem: The screen is used to give some important information to the user.
6.   Fender: Prevent the SHARKER from crush accidents.
7.   Bilge keel and vaccum part: Keep balance and floating.
8.   Wireless charging: It can use the wirless charging to provide the energy.
9.   Solar panel: It always expose to the sun, solar panel can provide also one part of the energy.
10.   Collect box, net and filter: The parts for collecting the plastics.
11.   Motor and propeller: Provide the power of the SHARKER forward.
12.   Pull-Ring: Vessel link SHARKER through rope when it is almost out of battery (only for emergency use).

Details and functions

Camera: The wide angle camera can takes photo of the water area.
360-degrees scanner system: It can monitoring the water area situation.

180°

180°

③
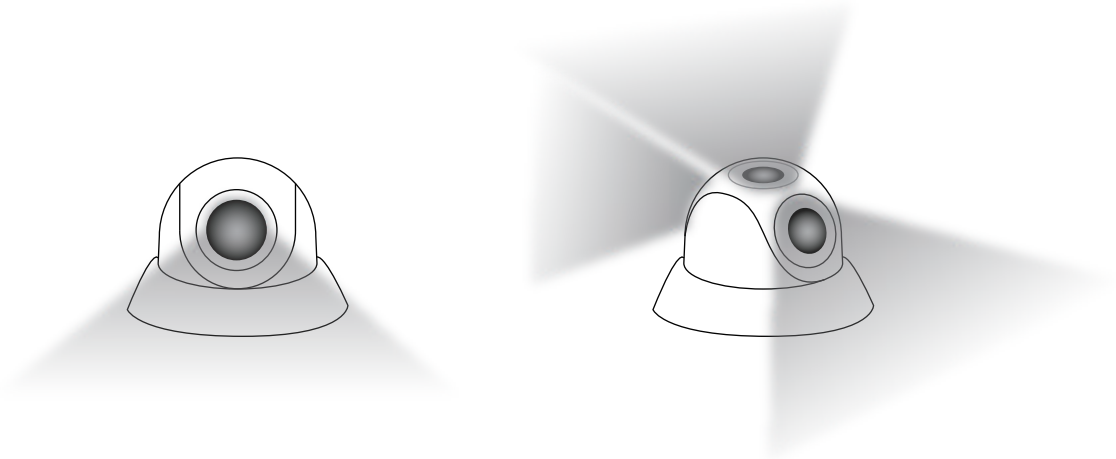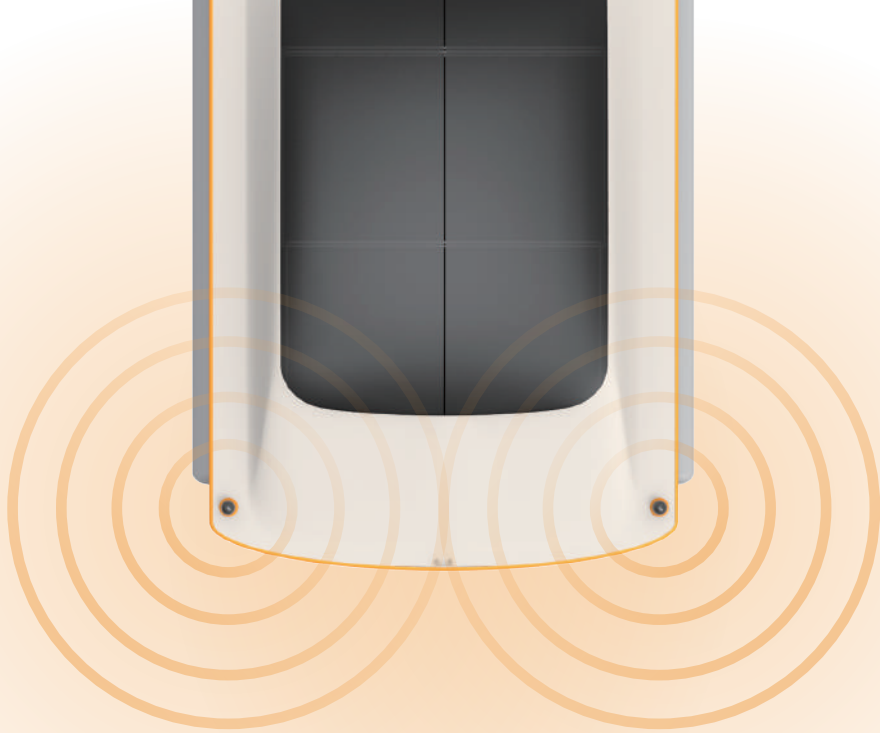
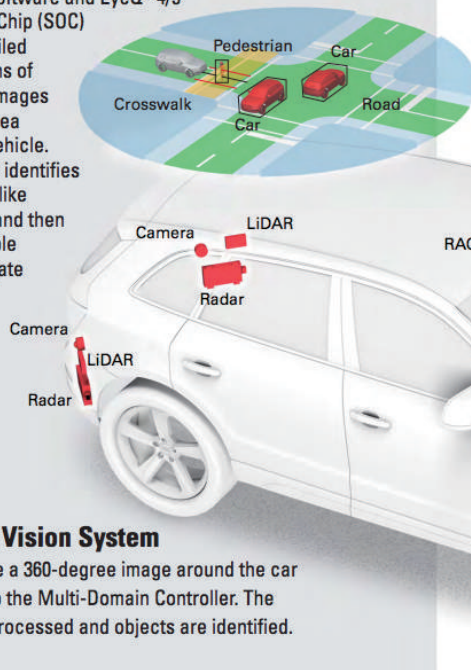**Sensor: Provide the data of the obstacles around.**

Despite of the camera, the 8 sensors in the each corner of the SHARKER is the anither eyes of it. Using the same technology system as CSLP provide by Mobileye and Dlephi.

1 2   3 4   56   78
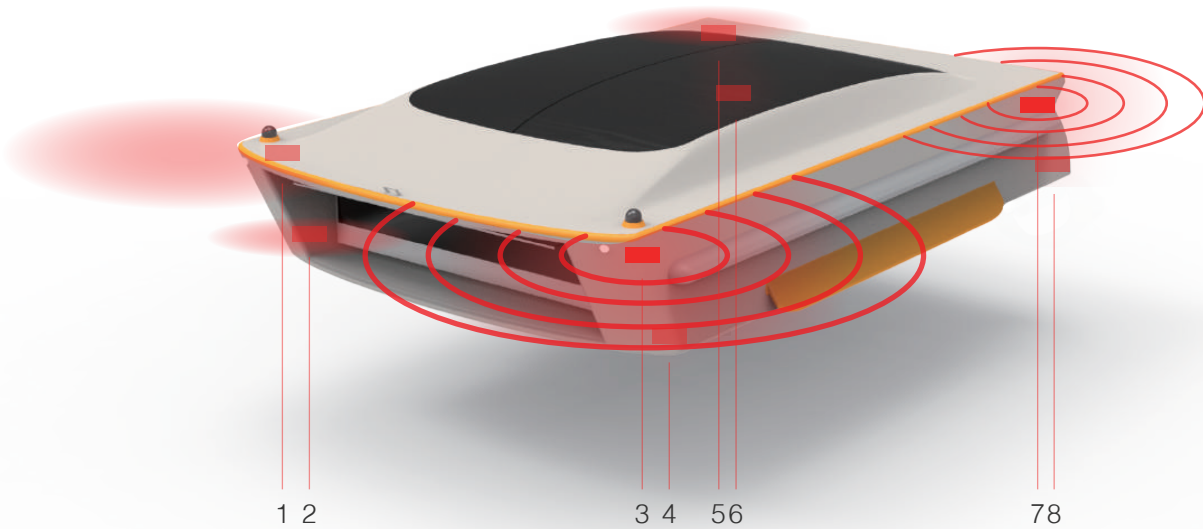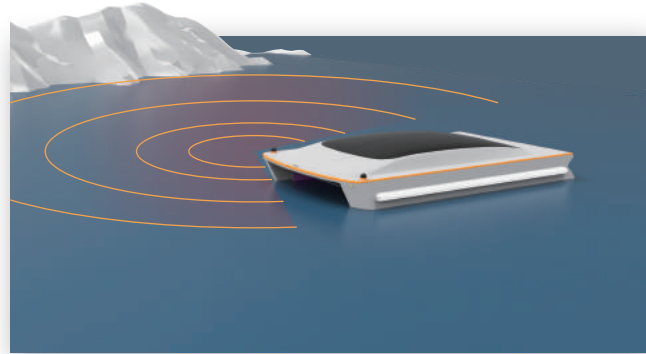
Mobileye's best-in-class vision (camera) systems and real-time mapping and vehicle location

Mobileye's real-time mapping and vehicle location (REM™)

Mobileye's software and EyeQ® 4/5 System on a Chip (SOC) perform detailed interpretations of the camera images to map the area around the vehicle. The software identifies road objects like pedestrians and then plots a drivable path to navigate the vehicle.

Delphi's Ottomatika Automated Driving software, sensor suite, and its computing platform called a Multi-Domain Controller

Delphi's Sensor Suite

Radars: Radio waves sent out and bounce off objects, like this pedestrian. The speed and distance of these objects is calculated in any weather, day or night.

LiDAR: Light pulses sent out and reflect off objects like this pedestrian. LiDAR identifies the object as a person and her distance from the car, day or night.

RACam: Combines a mid-range radar and a forward-facing camera that can see and identify objects like the pedestrian, plus sense objects further down the road.

Mobileye Vision System

Cameras take a 360-degree image around the car and send it to the Multi-Domain Controller. The images are processed and objects are identified.

Mobileye's Policy and Reinforcement Learning System

Helps negotiate with other human drivers and pedestrians in complex urban scenes.
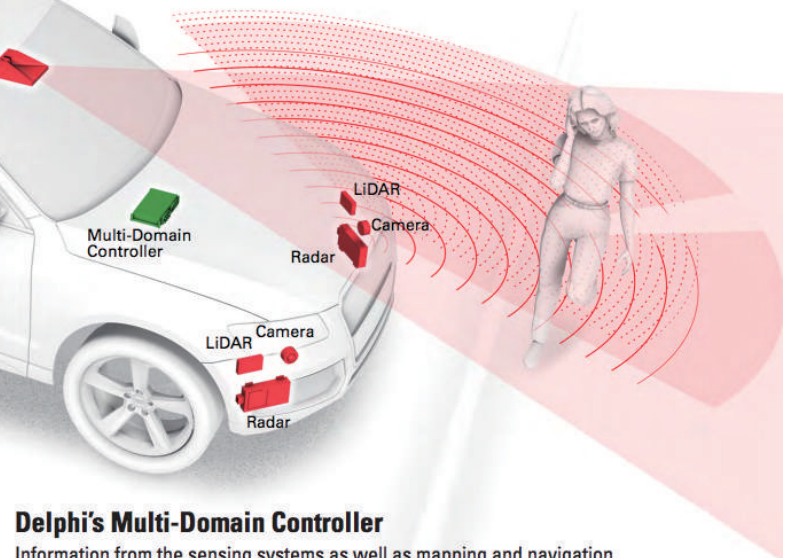
Delphi's Multi-Domain Controller

Information from the sensing systems as well as mapping and navigation data is fused to make driving decisions such as when to stop or go.
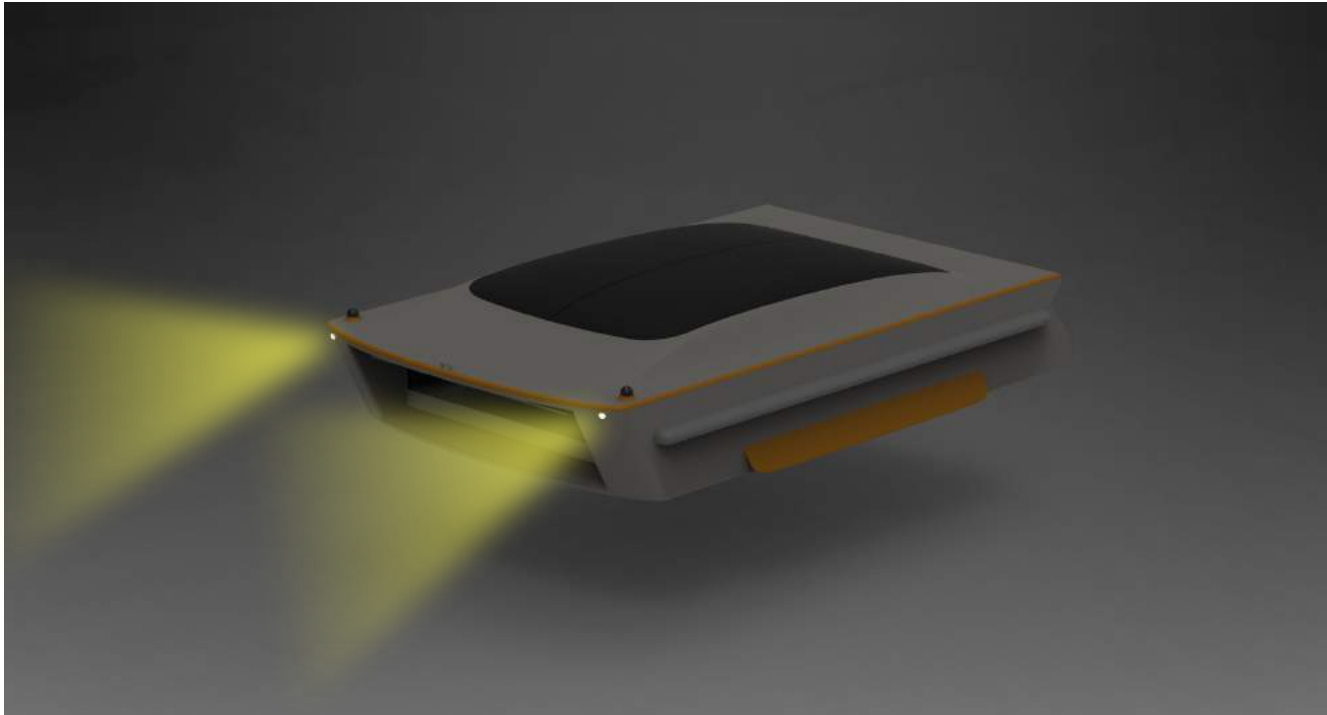
Delphi's Multi-Domain Controller

④

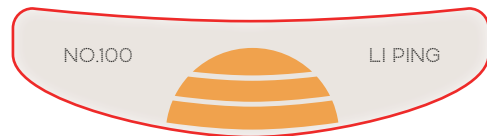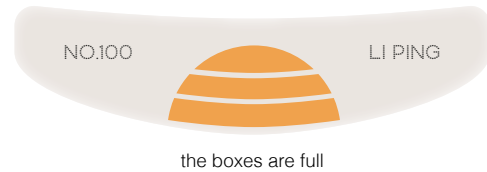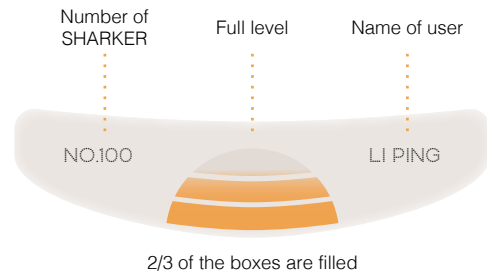**Light: Provide light during the night.**

The lights have two modes:
1. Straight light
2. Sparking light (S.O.S)

5

The screem: The screen is used to give some important information to the user.

1. The number of the SHARKER
2. Full level
3. Name of the user
4. Battery

Number of SHARKER   Full level   Name of user

NO.100   LI PING

2/3 of the boxes are filled

NO.100   LI PING

the boxes are full

NO.100   LI PING

red light indicates: lack of power

Fender: Prevent the SHARKER from crush accidents.

1. A craft's rub rail can be beautiful as well as practical.
2. Tessilmare patented fender profiles combine high-impact strength with elegance and good value.
3. Tessilmare's new products have changed the design of traditional rub rails.

Fender material : PVC
Fender height : 40 mm

112
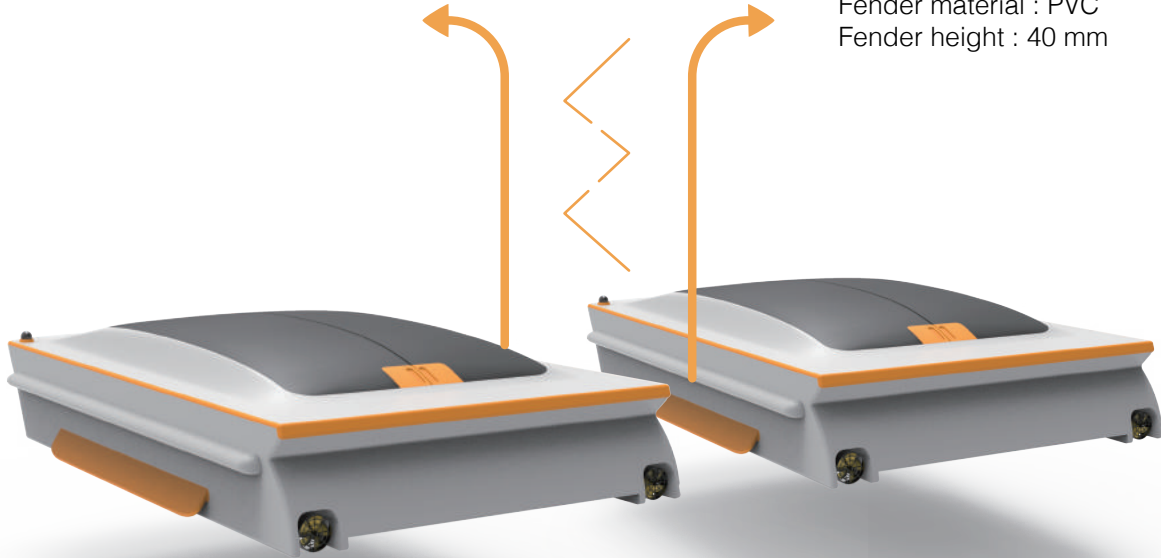
## Bilge keel and Vaccum part: Keep balance and floating.

HOW to face the wave in the water area?

On the both side of the SHARKER, has a bilge keel, this shape of bilge keel is suit for small vessels, so to have two of it is also used for better sailing. A bilge keel is used to reduce a ship's tendency to roll. Bilge keels are employed in pairs (one for each side of the ship). A ship may have more than one bilge keel per side, but this is rare. Bilge keels increase hydrodynamic resistance to rolling, making the ship roll less.

Enlarge the surface that attach the water.

Fin Stabilizer
(ship front view)

Center cut view

Fin Stabilizer
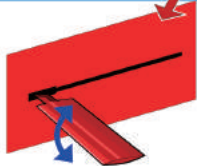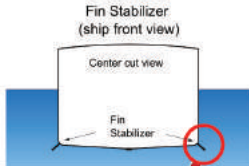
Bilge Keel

Vaccum parts
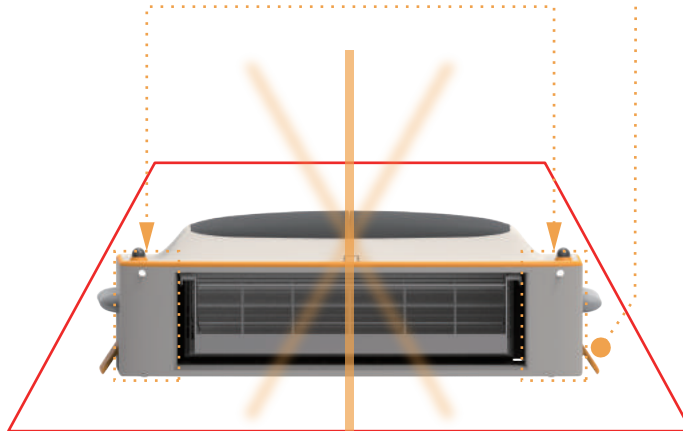
trapezoid shape: keeps stable

Bilge keel, wikipedia

Wireless charging: It can use the wirless charging to provide the energy.

The port has the stations for charging, when it following the vessel comes back to the port, it will automatically direct to the wireless charge station just like the clean robot for the house.
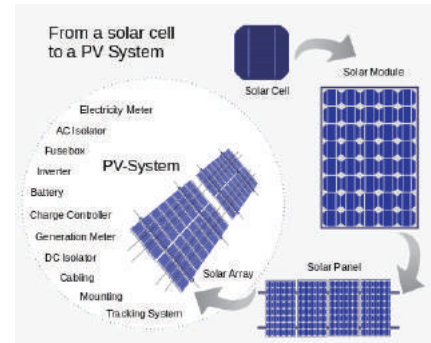
The battery is placed in the back

charging

not-charging

114
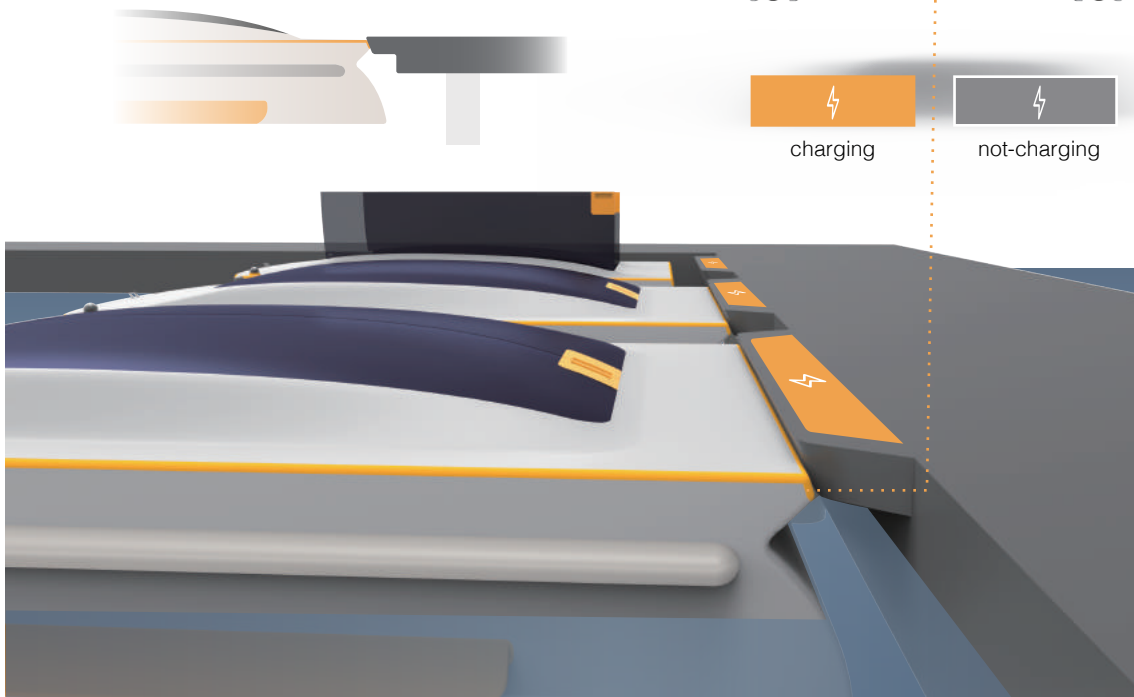
Solar panel: It always expose to the sun, solar panel can provide also one part of the energy.
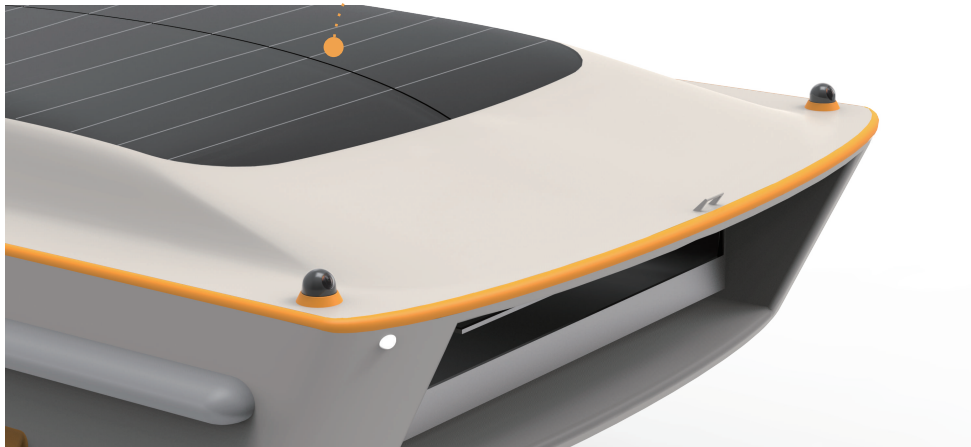
The whole working process of SHARKER is in outdoor, so the solar energy is better not to waste. It creates from the nature and stock it in the battery.

A typical solar panel produces about 150 - 200 watts of electricity per square meter.

One square meter of crystalline silicon solar panels is about 120-140W, if the 120 w a day, six hour of the direct sunlight, which is 120 * 6 = 720WH.

From a solar cell to a PV System

Solar Cell

Solar Module

Electricity Meter
AC Isolator
Fuse box
Inverter   PV-System
Battery
Charge Controller
Generation Meter
DC Isolator
Cabling   Solar Panel
Mounting
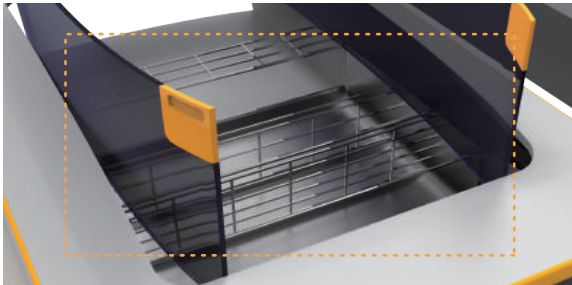Tracking System

Solar Array

Solar cell panel

Collect box and net: The parts for collecting the plastics.

There are three boxes are in the interior of SHARK-ER. each box has a net matched to it, and can take off by the staffs of the port.
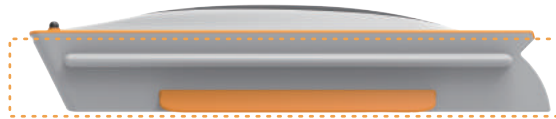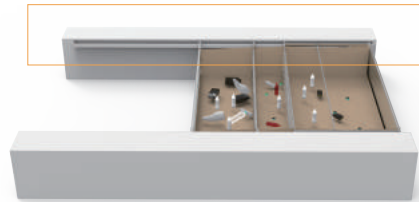
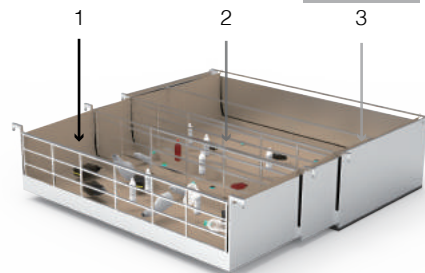**Cross section of the interior part**

Each side has the lane for overlapping the boxes, which can help to compress the plastic inside the box. With this function, the SHARKER can collect more volume of plastics.

Press-open the cover

PRESS

1 2 3

Collect piece size

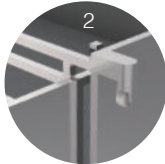| BIG	MEDIUM	SMALL
1	2	3

Structure of the collect boxes

rolling wheel

collect net fix ring

two box connect step

Filter is in the bottom postion of the third box, the water will crossing through the front mouth of SHARKER, then comes out through the bottom of the third box. The filter is consist of different types of polyme in different density, which can prevent the samll pieces plastic (even microplastics) from coming out.
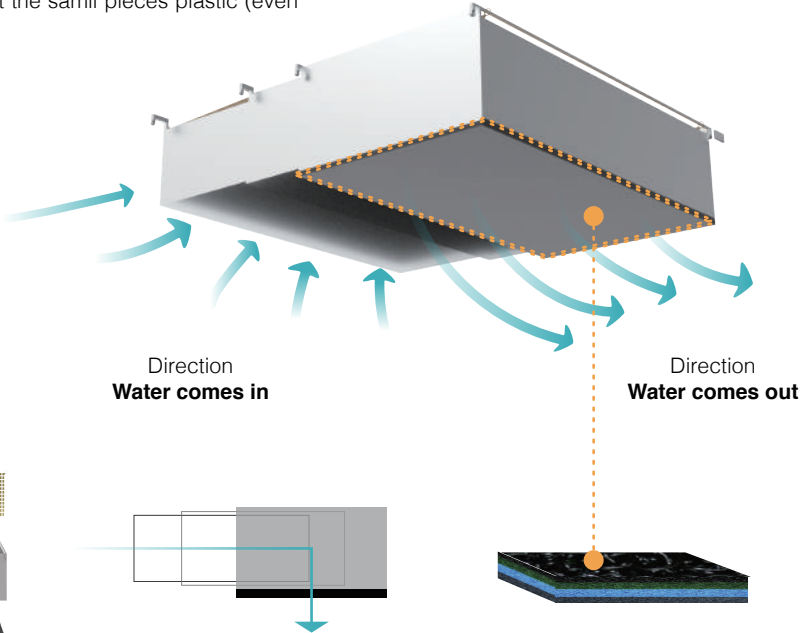

bottom view

Each net has 4 small magnet at the bottom, it will absorb together with the box, not easily moving.

explosive view

Direction
Water comes in
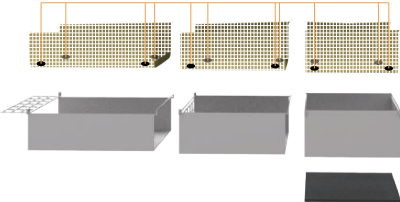
Direction
Water comes out

**Motor and propeller: Provide the power of the
SHARKER forward.**

Back View
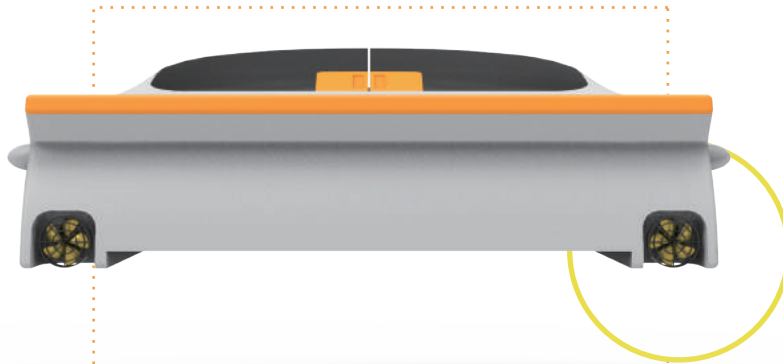
Left View

Operating principle

Velocity of SHARKER
Accelaration of SHARKER

Nozzle

Inlet →

Propeller

Outlet

NEMA 23 STEPPER MOTOR

Direction of thrust
fluid velocity
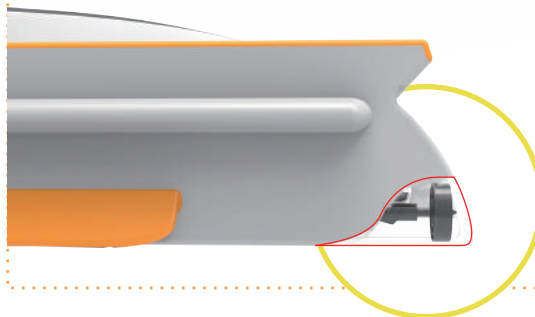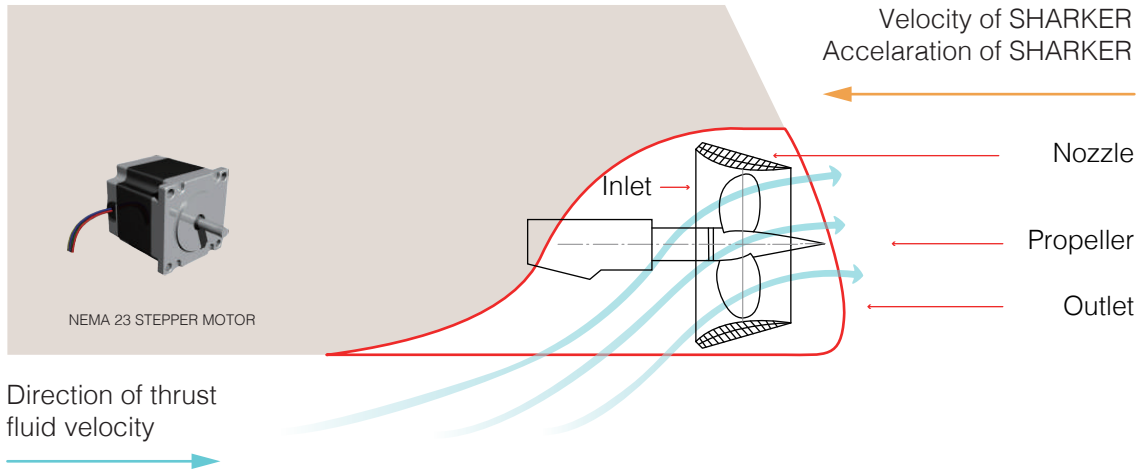
Change direction: control by the speed of the propellers.
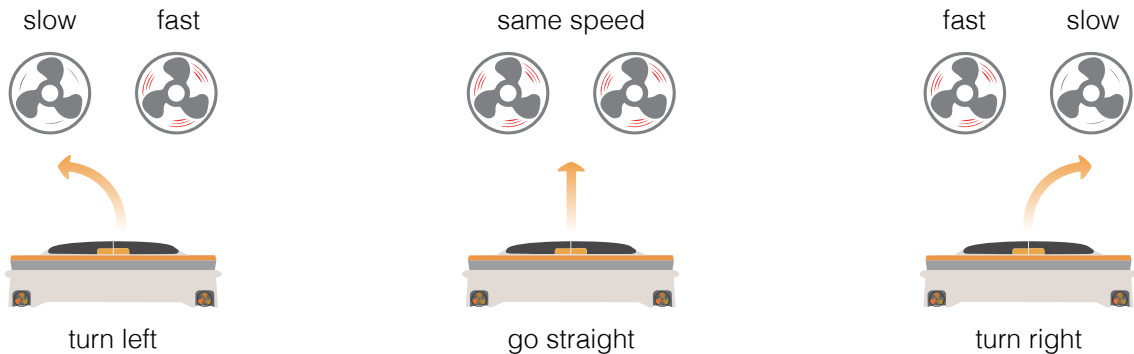
slow	fast	same speed	fast	slow

turn left

go straight

turn right

Pull-Ring: Vessel link SHARKER through rope when it is almost out of battery (only for emergency use).

This situation is seldomly happened, it is set up for emergency use. If SHARKER is lack of battery because of the bad weather without sunshine, or some technical errors happens. The screem will shows the situation of the battery, and the informations will be sent to the phone of user. In this case, the user can have the scalable rope to link together with the vessel.

linked

lack of battery

APP
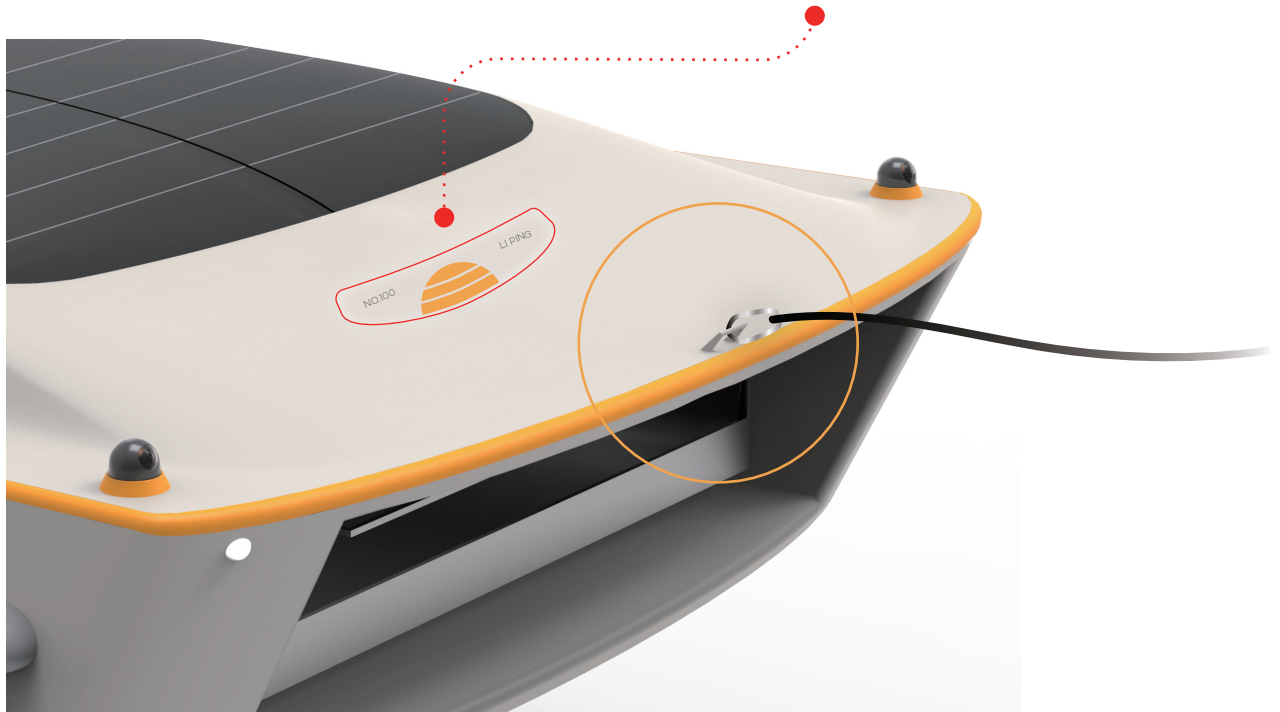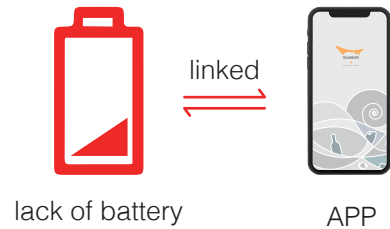
The used parts

Like the water entainment - water ski. When the situation happens, we can use the rope which is used in water ski to help the SHARKER come back to the ports.

Rope hook   Rope
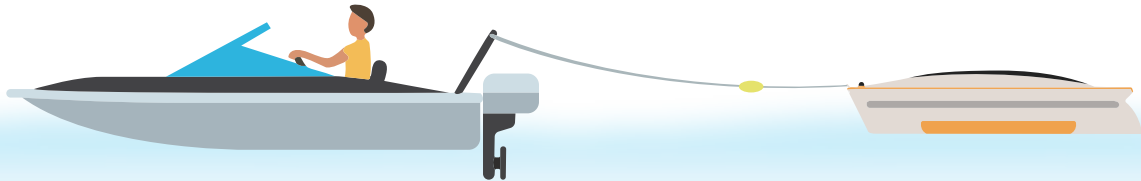
The working principle
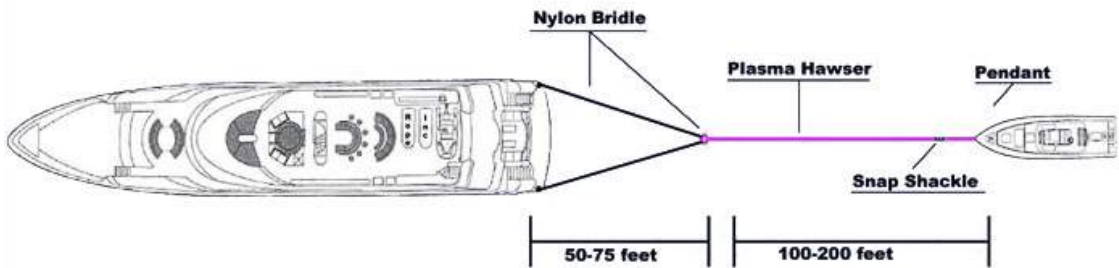
Scenario

In the ports along the CHINA's main river - Yantze river, Yellow river and the Pearl river, we setted up the stations for parking SHARKERS. And the SHARKERS are parking in the outside part of the parking branch. After register to our floating plastic clean system on the website or the APP, you are one part of us to jion the When the vessels are ready to leave the port, the user use the APP to link and have an information match, then the SHARKER will follow the vessel along the sailing route.
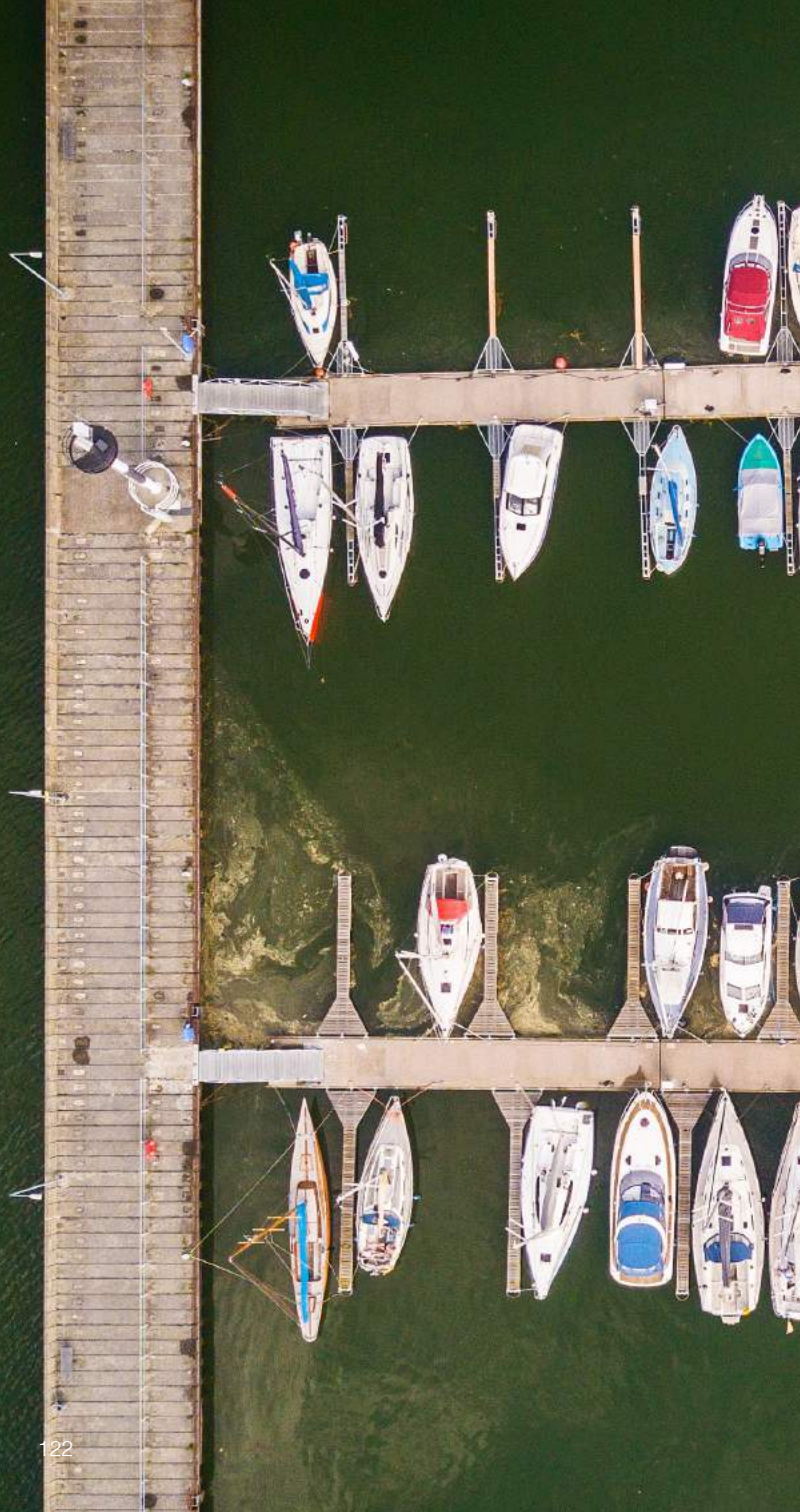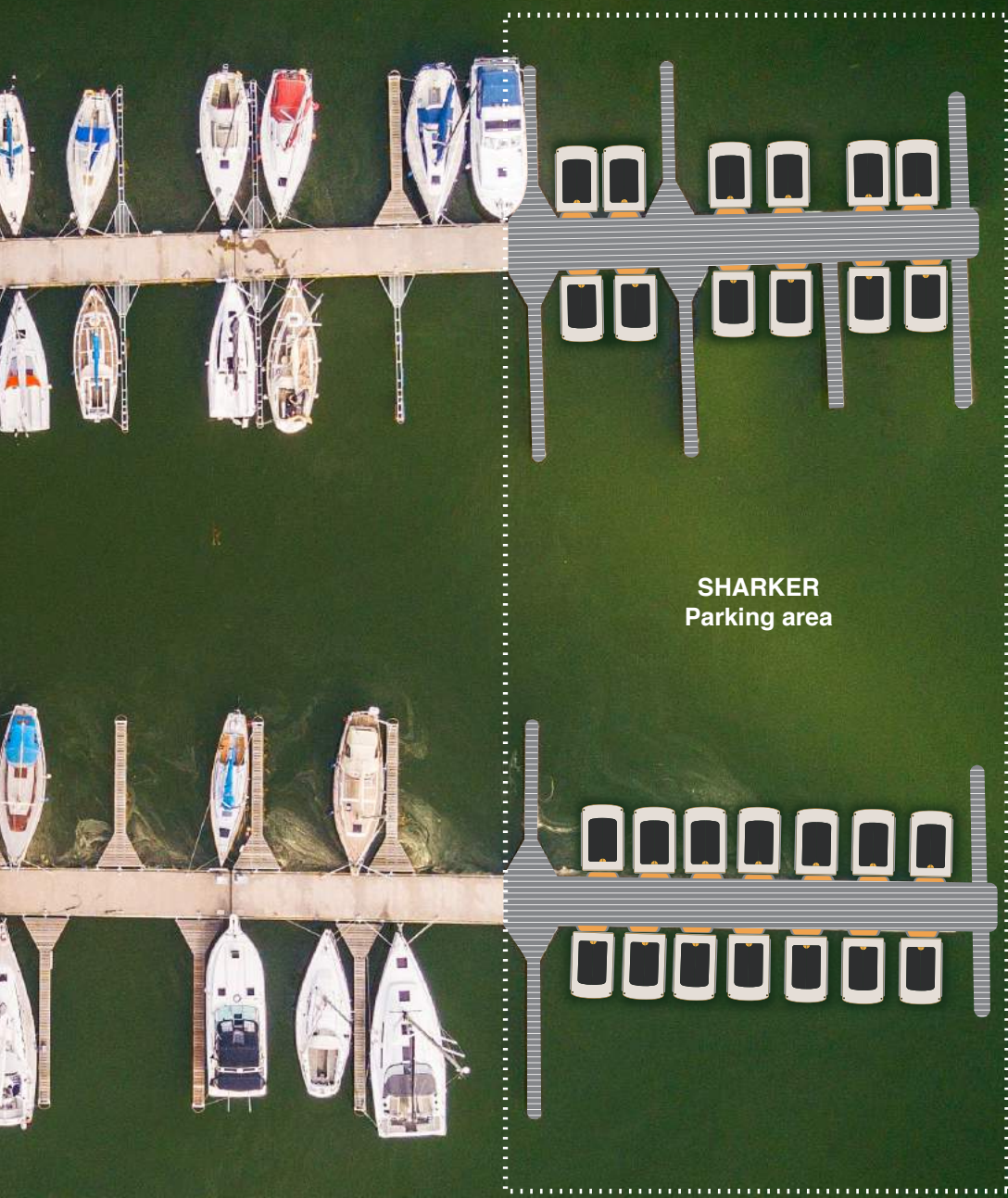
SHARKER
Parking area
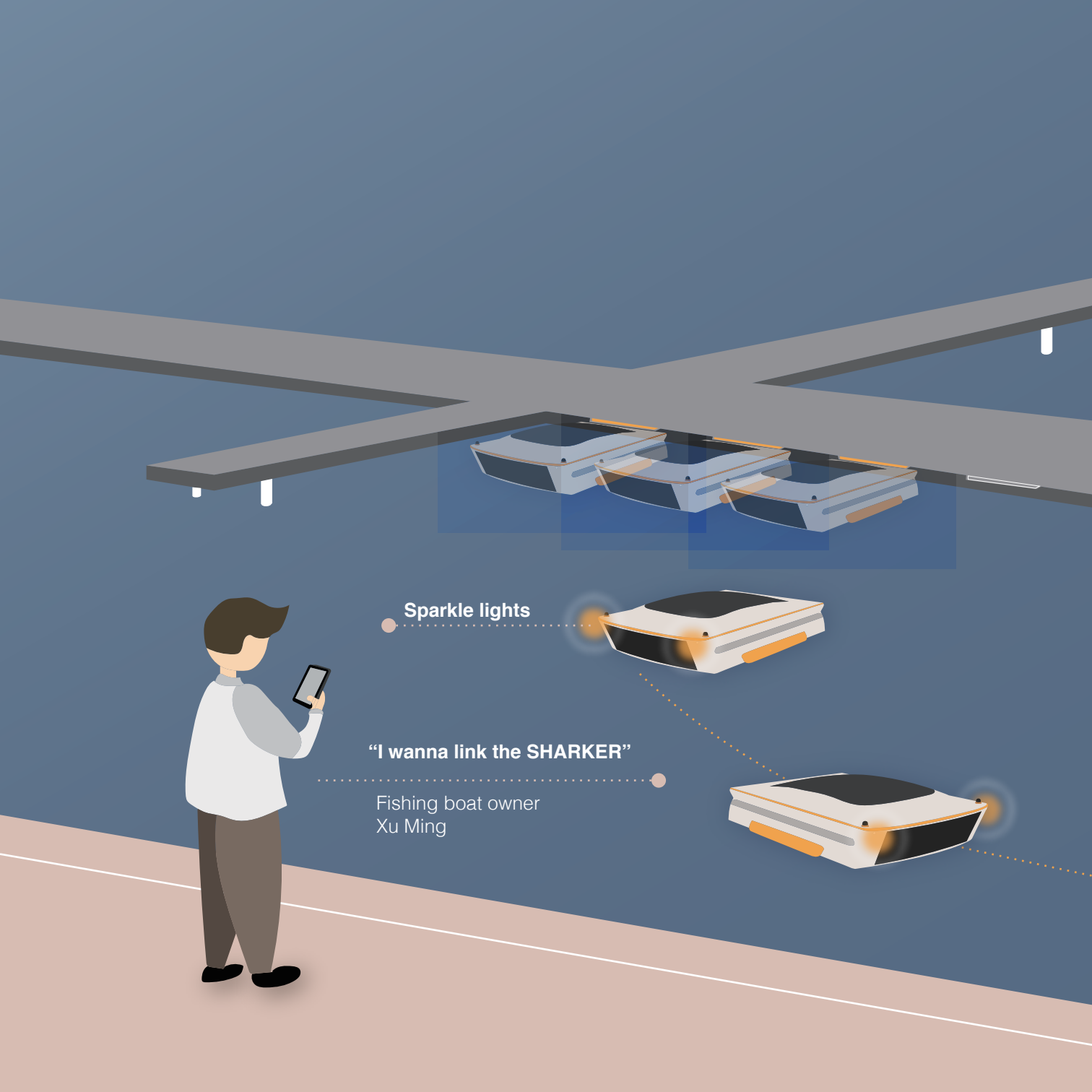
Sparkle lights

"I wanna link the SHARKER"

Fishing boat owner
Xu Ming
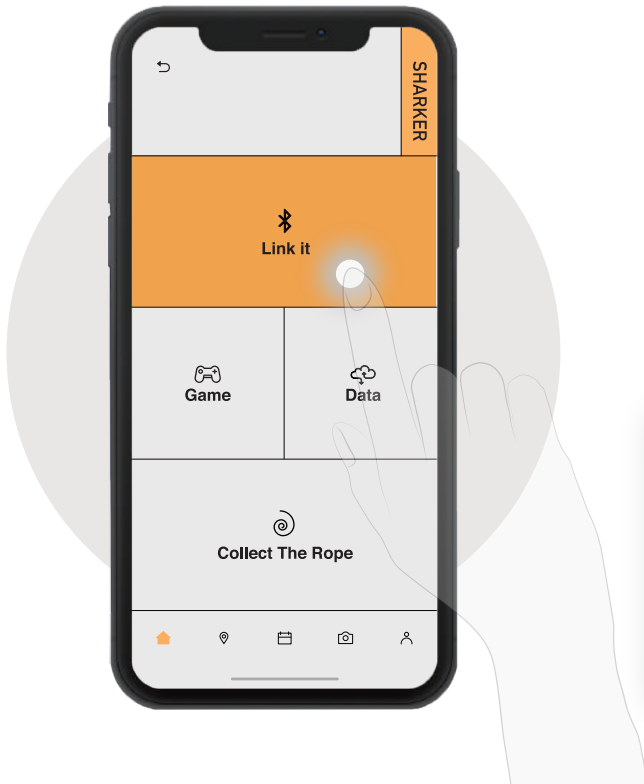
How to use?

1. The vessel owner or operator through using the " SHARKER" APP - LINK IT buttom.
2. One of the SHARKER in the parking lot will be linked to your phone and automatically come to your vessel with Sparkle lights shines to let you know which is the one will follows.
3. From this time collecting journey is started, and the system will start to automatically count the sailing distance.

2km

3km

Start point

4km

Finish point

Map of the sailing route

Figure1.3

Follow to the vessel's direction
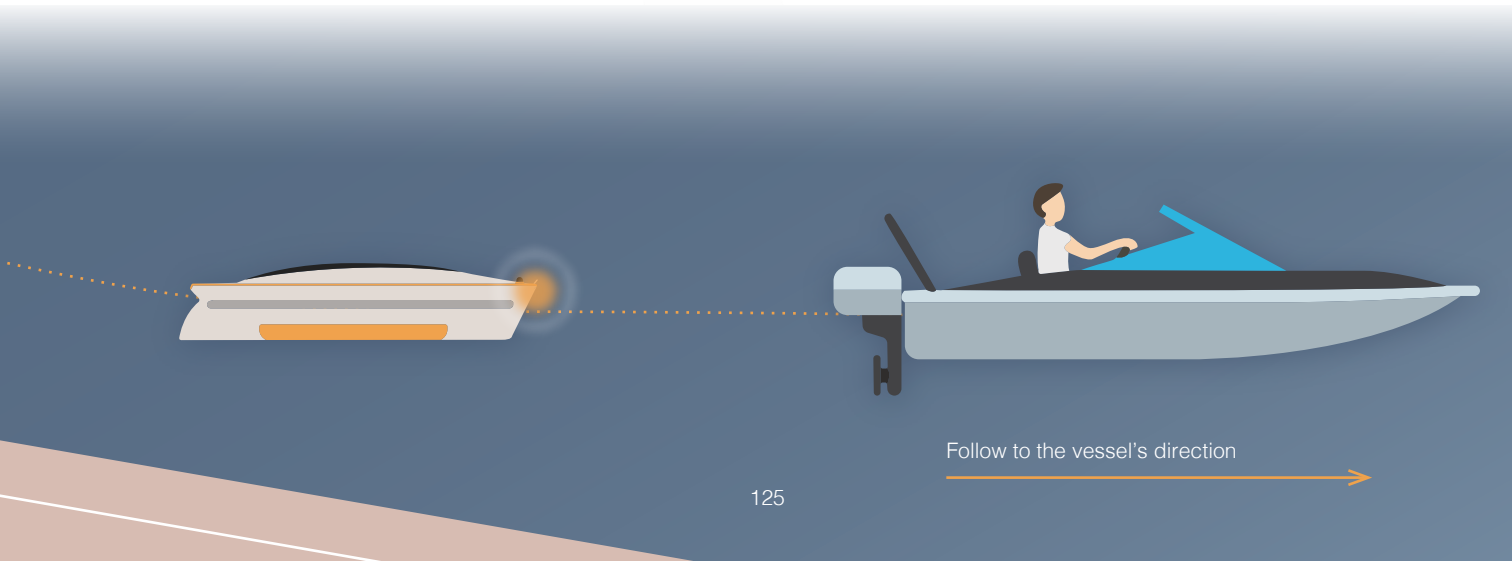
Two working mode:

1   **Following**

When the vessel is sailing, the sharker is **linked (informa-tion link)** with the vessel to collect the trushs on the water area. With the help of the sensor, SHARKER can monitor the water area situation and **track the route** that the vessel is sailing. What's more, the existing **Satellite AIS** vessel track-ing system, we can exactly know the position of the connected SHARKER, it also prevents it from missing.
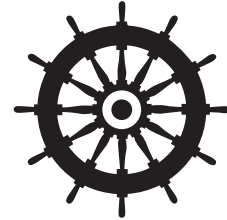
WHEN SAILING
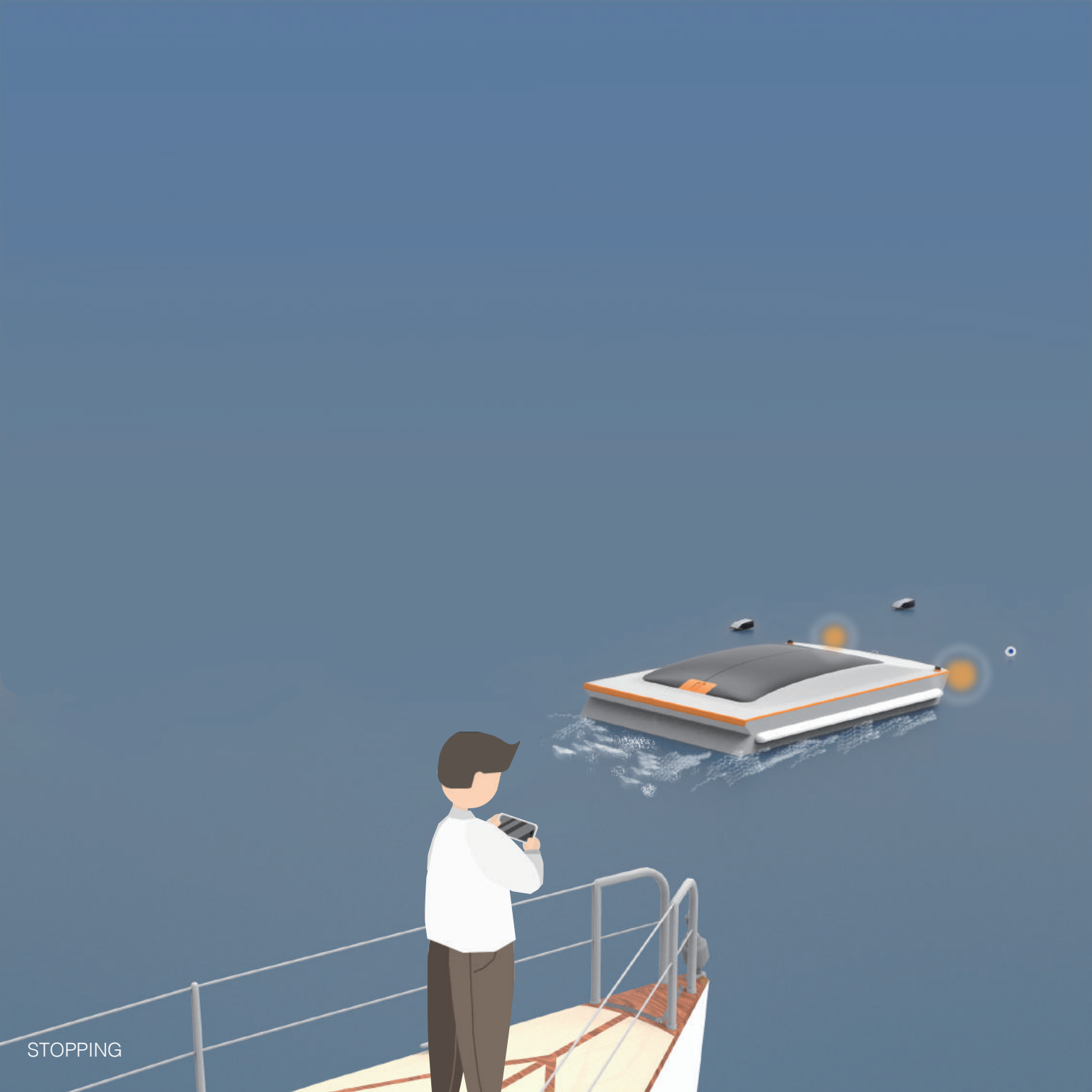
STOPPING

2 Automatic Collect

When the vessel stops (like fishing waiting or braking...), The sharker can work intelligently, sailing on its own automatically to collect the plastics through the scanner system and the feedback of the sensor in the area of 50 meters radius around the vessel. And when the vessel move again, sharker will sense it, and come back. Meanwhile, the user can use the Game mode to control and play it like the model boat sailing on the water area.

WHEN STOPPING

50M
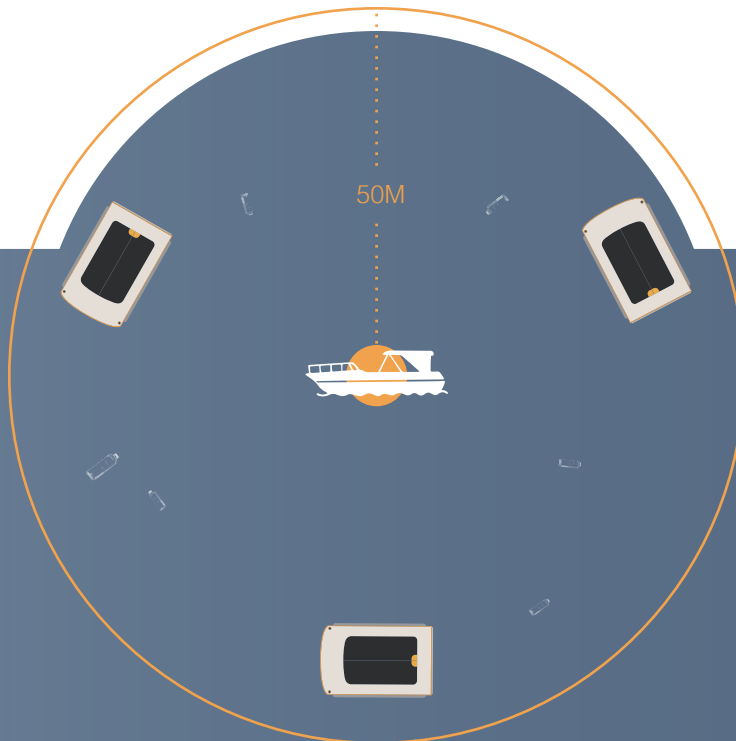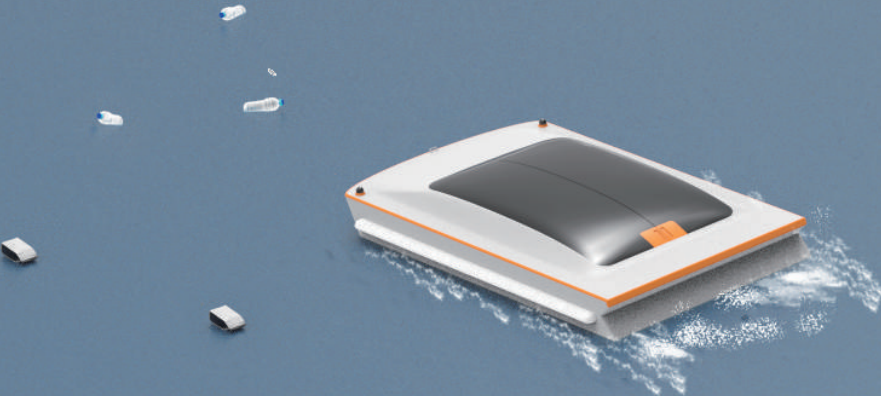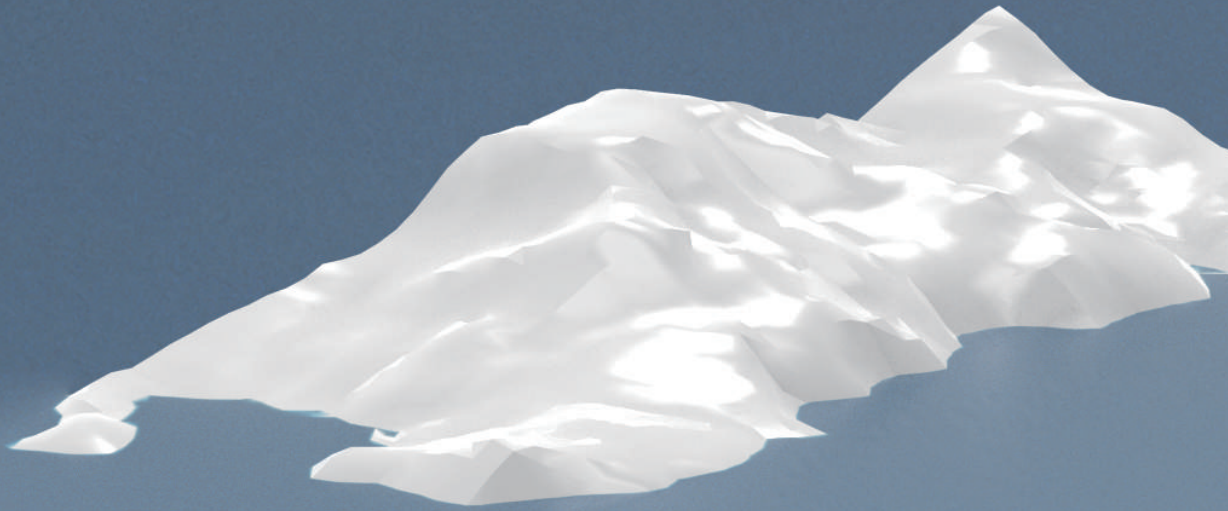
STOPPING

Subsequent disposal

After the the vessel come back to the port, the whole collecting jorney has finished. When the SHARKER approch the port, it will remind the user that it will automatically go to the charge parking place. The staffs who are on behalf of the SHARKER system will come to do the sbusequent disposal.

1 Press the buttom to open the SHARKER cover. Using the adapted stick to take off the collect net.

2 After take of the net, the plastics can be classify in the difference of the size (Large, Middium, Small). Puttng them into the wheeler, and send to the main Collection branch storehouse in every ports.
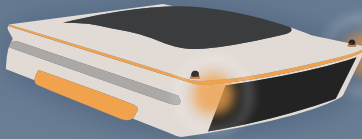
SHARKER go to the charge parking place
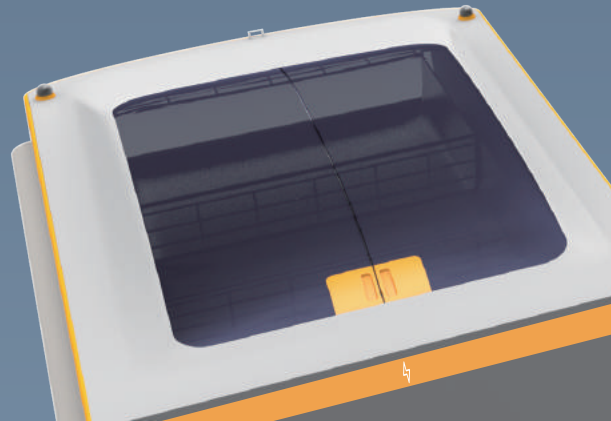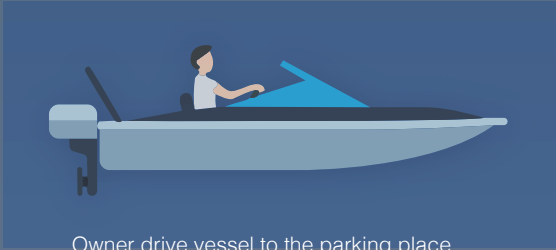
Owner drive vessel to the parking place

Press open

STAFF

STAFF

1

2

L M S
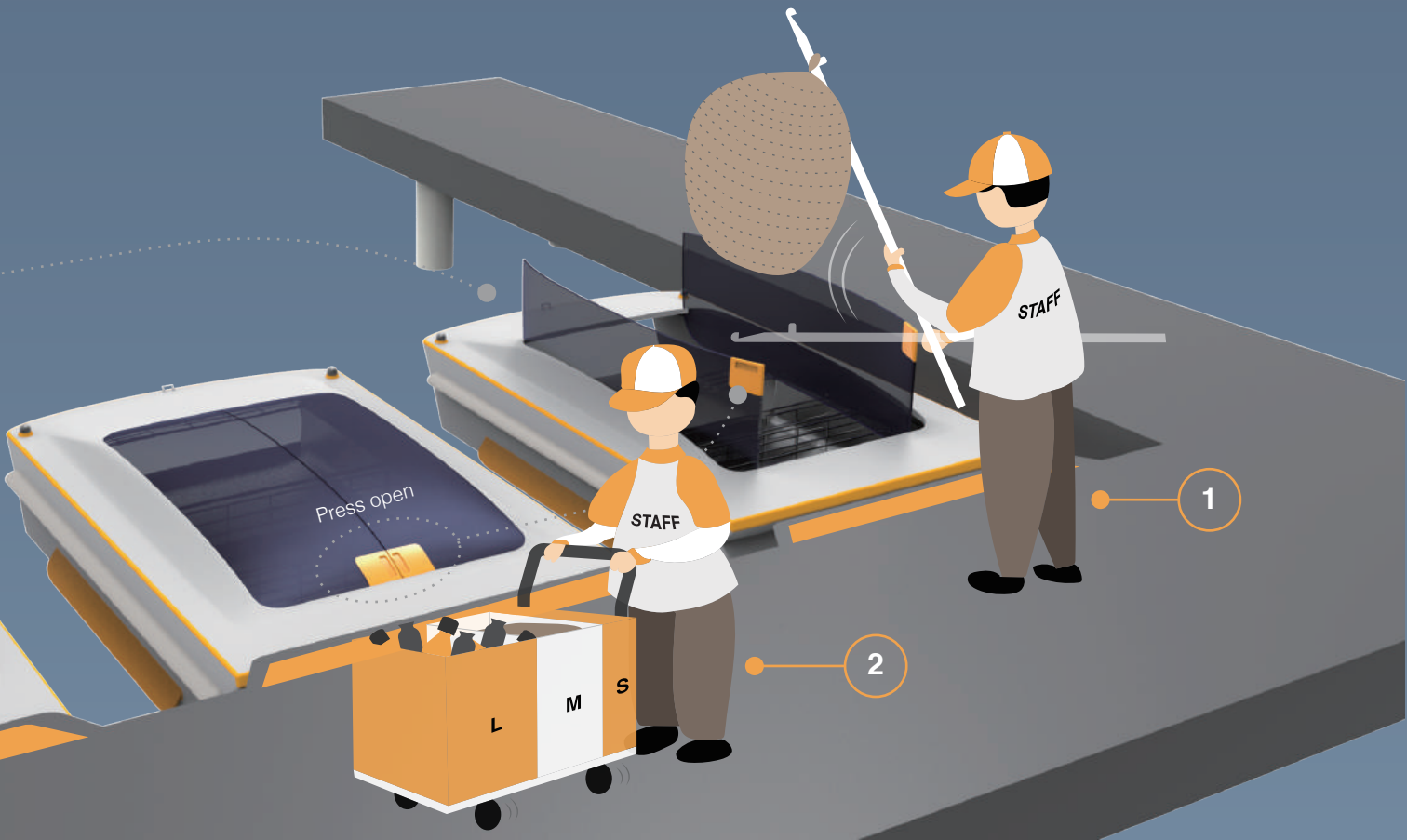
Technology support
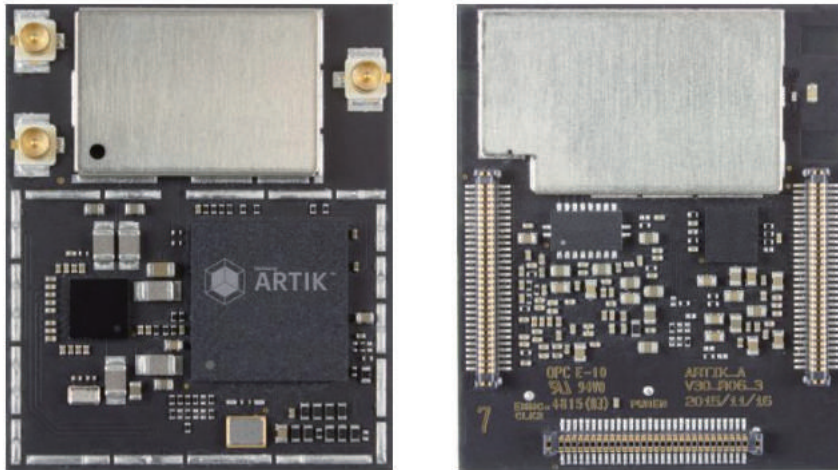
SAMSUNG ARTIK 520
30 x 25 mm

Artificial Audio Service

ARTIK 520 MODULE

100xGPIO	Audio 1xPCM	1xJTAG	2.5xUART	1xSD card

Secure Element	Real time Clock

Battery Notice

Power Management	Wifi 802.11a/b/g/n/ac

SYSTEM PROCESSORS
2x A7 @ 1GHz
32kb/32/kb per Core
1Mb L2 Cache

LPDDR3 512MB ePOP	Bluetooth 4.1+LE

Data Storage

Flash 4GB ePOP	802.15.4 ZIGBEE

2xSPI	2xAnalog	1xLCD	1xCamera	1xUSB

Time Recorder

AC connection

Information Match

Photo shoot   GPS input

SHARKER Main Feature Used

- Flashlight
- LEDs
- GPS positioning
- 360 degree camera

Votive Solar Kit 10W Photovoltaic Panel
AGM Battery 12Ah 12V Charge controller

Cost: 55€
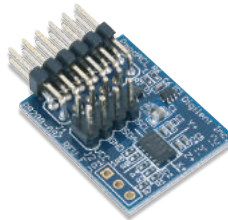
GY-291 ADXL345
Triaxial acceleration sensor
20×15.5×2.5 mm

Cost: 2€

Xiaomi Mijia smart IP Camera Pan-Tilt
Connection Versione 720P WiFi di
visione notturna vista a 360 gradi di
movimento - Bianco

Cost: 39€
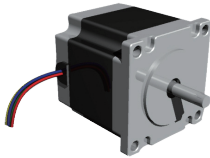
Nema 23 CNC Stepper Motor 2.8A
178.5oz.in/1.26Nm CNC Stepping
Motor DIY CNC Mil

Cost: 23€
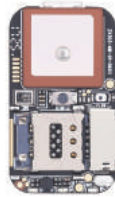
BeiDou GPS posioning chip
20×13×2.2 mm

Cost: 9€

Normal Multi-faceted LED

Cost: 1.1€/10pieces

3.3 COMMUNICATION

Logo
Phone App
Database and Reward systerm

Logo

Vessel

Shark

SHARKER
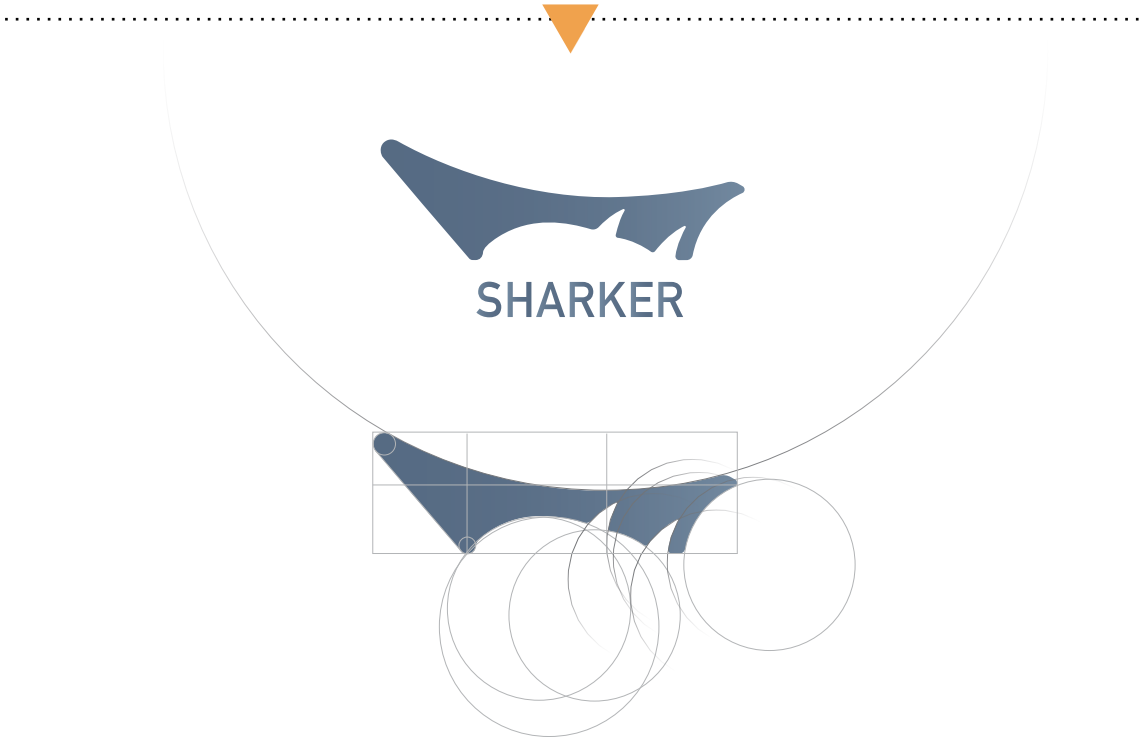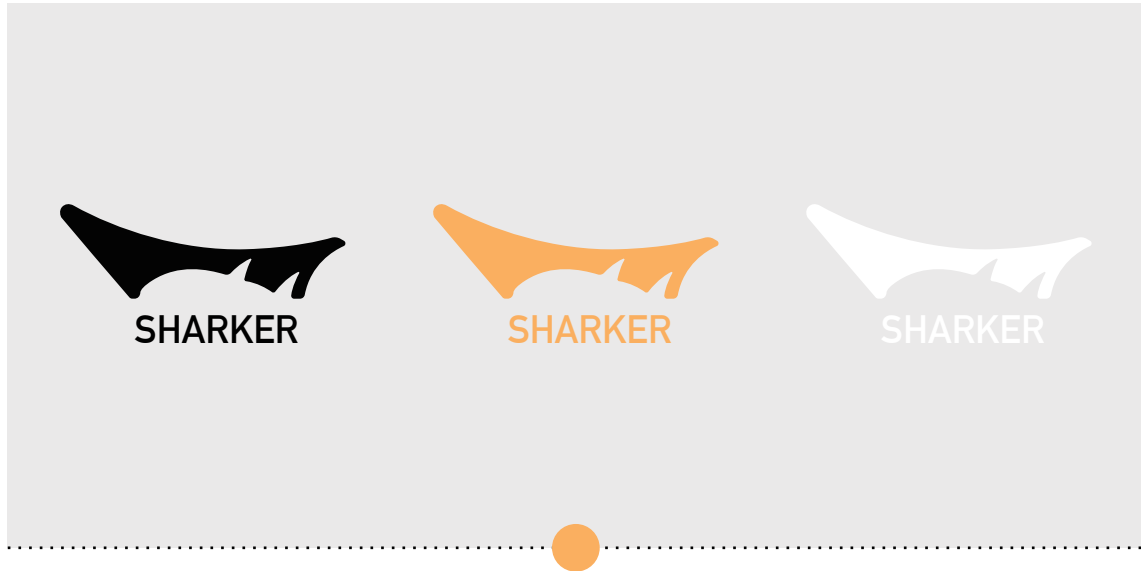
Font: DIN Alternate Bold

Color:
⬛	C:93	M:88	Y:89	K:80
🟧	C:0	M:36	Y:69	K:0
⬜	C:0	M:0	Y:0	K:0

To let the system more complete, the design of communication is necessary to form up to make a better recognition to the potential users.

The idea of the logo is come out with the outline of the vessel and whale shark. Because of the close relationship of them in this floating plastic clean system.

Phone APP

The phone APP is designed for the user who is jioning our floating plastic cleaning system, let them have a perfect control of the SHARKER, and have a nice user experience. From the system, they can also reward the bouns from the project which will be supported by the important companys and the government.

Home Page

SHARKER

floating plastic collector

SHARKER

⁕ Link it

🎮 Game

☁ Data

◎ Collect The Rope
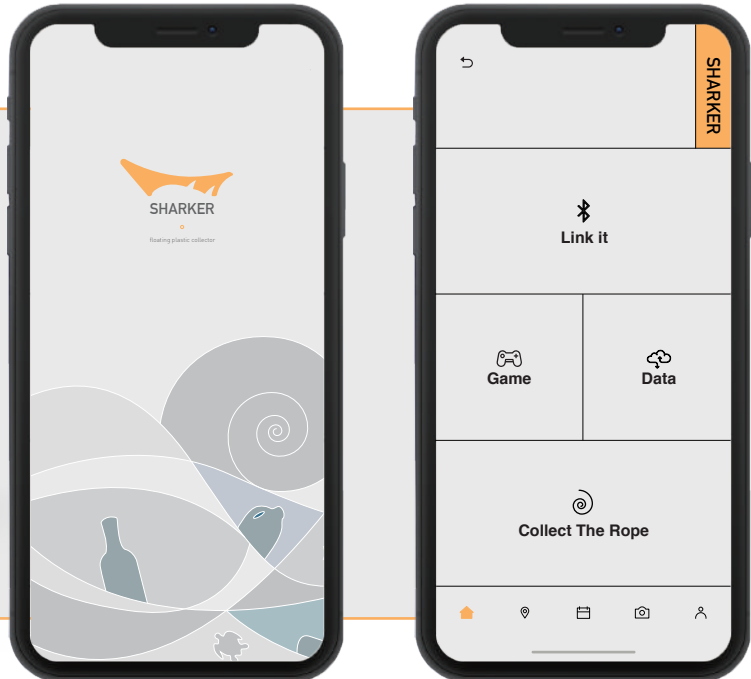
▶ **Home Page:**

Link it: link the vessel with SHARKER (Information link).
Game: User can treat the SHARKER as the model boat and play it when he stops sailing.

Cloud: How many kilometers the SHARKER has already sailed and how many trashs it has taken .
Collect the rope: Control the automatic rope system to collect the rope which linked to the SHARKER.

Trush Full Level

Speed Up

Left   Right

Go Forward

Go Back/ Break

SHARKER

Link it

Game

Data

Collect The Rope
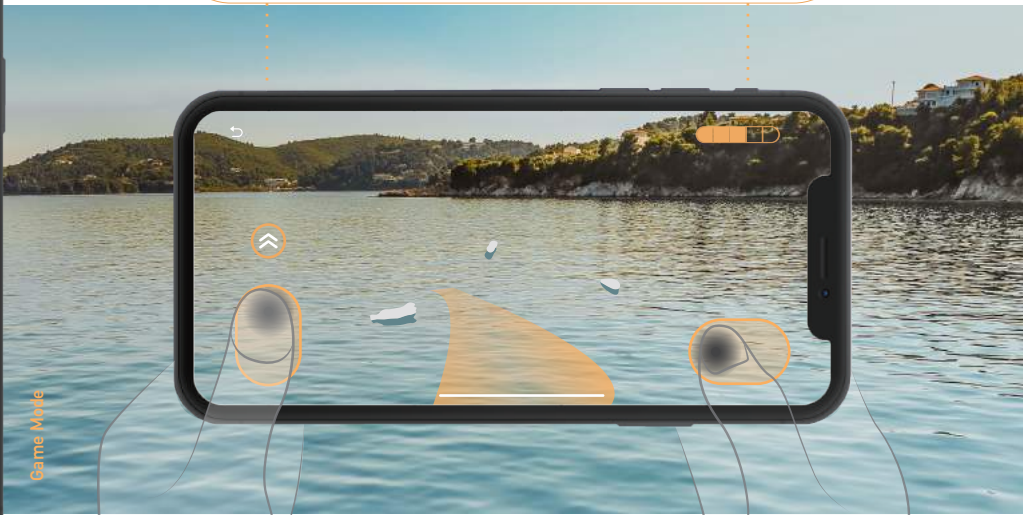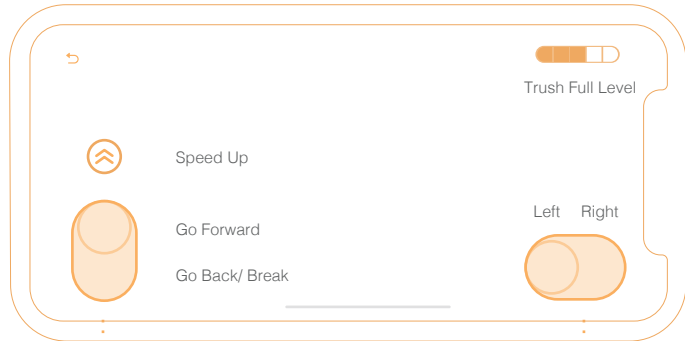
Game Mode

Game Mode:

User can treat the SHARKER as the model boat and play it when he stops sailing. This mode can add more interest to this system when the user is working under high pressure, it can be the real model control game through using the phone. They can have a real feeling of collecting the plastic and take part in the environmental protection process.

► **Locate Place:**

The second function shows the Main ports and the small docks where offers and can return the SHARKER. The users can find the point on the map to the one they want to go, and finish one collecting tour.

Database and Reward systerm

Location of cleanup

Choose a location from our database or enter a new one

| China | Easten China |
| Shanghai | Wusong port |

Your Contact Details

Contact name   Xu Ming

Phone or email   012345678

Organisation, school, agency or private

Private

Collection Details

Start date (yyyy-mm-dd)   2018-12-1

Start time (h:mm a/pm)

Duratino (hours)

Total nets filled

Number of people

Sail distance

Approx total weight (kg)

Reward

Start ●········▸
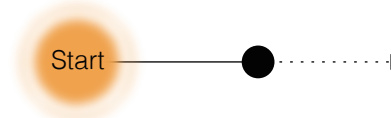
BOUNS   next bonus
NOW   collect 2kg

Choose one of the follow options

— ¥200 gasoline expense voucher.

— ¥200 gasoline expense voucher.

— ¥200 concert ticket.

— Donate ¥200 under your name to the primary school in the poor district.

— Choose a gift valued ¥200.

— ......

Confirmed

4.1 FOLLOW UP SOLUTION

Disposal of waste plastics
Reverse Vending Machines
Plastic Bank
Sustainable Children's Furniture
Biffa
The policy

Disposal of waste plastics

After collecting the plastic waste, it can be recycled, incinerated or discarded where it accumulates in landfills. But only 9% of them are recyced.

"Our estimates underscore the need to think critically about the materials we use and our waste management practices," said the study co-author and associate professor of engineering.Jenna Jambeck.

9%

Recycled

12%

Incinerated

79%

Accumulated In Landfills

El ser humano ha producido tanto plástico como el peso de 822.000 Torre Eiffel, 19, July, 2017, Pressdigital.

Reverse Vending Machines

- A Smart Future

How Smart Reverse Vending Machines Work?

These reverse vending machines are a smarter way of recycling. It is an innovation in the traditional recycling. Nowadays, people highly dependent on smart technology; the touch system interfaces and living life on the go with constant access to Wi-Fi. Therefore, people would love to trying recycling the smart way.

The machine requires a person to place a used bottle or can into the machine. The machine then rewards the person with money. This combination of smart technology and money is a suitable incentive for people to join hands towards a greener future.

Smart vending machines in promoting recycling by providing effective recycling solutions for brands. Not only these machines help make the brands support a green future but are great for marketing purposes as well. Businesses are ensuring that customers adopt recycling through reverse machines while increasing their credibility and brand popularity in the market as well. Businesses like retailers, distributors, municipalities and the beverage industry are increasingly getting involved with the use of smart reverse vending machines so that they can promote a greener future through their organisations.

Plastic Bank

**GATHER TOGETHER
REVEAL VALUE & LOVE PEOPLE.**

In 2013, an entrepreneur named David Katz came up with a way to get people to send waste plastics to a waste recycling station, so that the discarded plastics produced value. He wants to help people treat waste plastic as a banknote lying on the beach. I hope David can drive the realization of this paradigm shift.

Plastic Bank: Stop Ocean Plastic
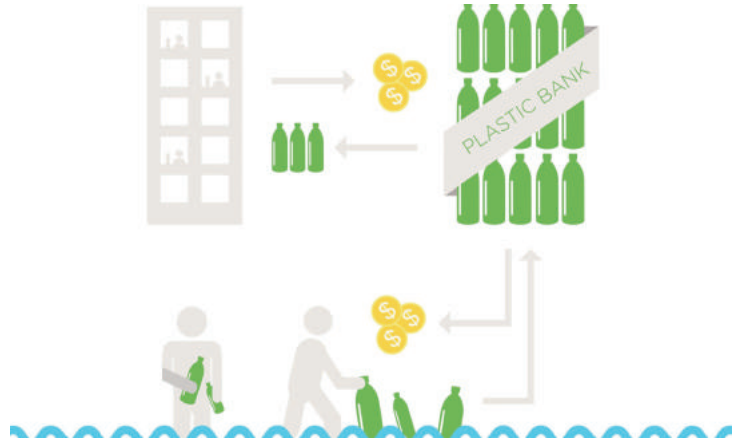
THE ONLY WAY TO STOP OCEAN PLASTIC IS TO REVEAL THE VALUE IN PLASTIC BY TRANSFERRING AS MUCH VALUE AS POSSIBLE INTO THE HANDS OF THE COLLECTORS.

DAVID KATZ, FOUNDER & CEO OF THE PLASTIC BANK

Sustainable Children's Furniture

Ecologic design

ecoBirdy is a new brand that creates ecological design furniture. The first collection of children's furniture is produced exclusively from recycled plastic waste from Europe. A "terrazzo" look created with small colored pieces of recycled plastic toys gives an original touch to the collection and makes each product a unique piece. The designers, based in Antwerp, Belgium, have not only designed the furniture, but an entire system that goes from the collection and recycling of plastic toys to design and furniture production. With the development of a book and a school programme, ecoBirdy wants to introduce young people to the idea of circular economy and arouse the will to contribute to a more sustainable future.

ecoBirdy

ecoBirdy

Designed   Upcycled   Recyclable

School programme
Interactive learning

ecothylene®
Clean + Safe + Sustainable

Upcycling
ecoBirdy kids collection

Biffa

polymers mixed plastics recycling facility

The Biffa Polymers mixed plastics recycling facility, built with support from WRAP, on behalf of the Government, was the first integrated washing and sorting facility in the UK specifically designed to recycle rigid mixed plastics packaging when it opened in March 2011.

Pictures courtesy of S+S

Biffa polymers mixed plastics recycling facility | WRAP UK

The policy

Ban On Free Plastic Bags

The ban on free plastic bags will complete three years on June 1. Recently National Development and Reform Commission officials said the use of plastic bags in supermarkets had dropped two-thirds, and the Ministry of Commerce said the ban should be expanded to facilities like restaurants and hospitals.

**1
REUSABLE BAG
=
22,000
PLASTIC BAGS
(OVER A PERSON'S LIFETIME)**

ONE PERSON USING REUSABLE BAGS OVER THEIR LIFETIME WOULD REMOVE MORE THAN

22,000

PLASTIC BAGS FROM THE ENVIRONMENT.

http://www.gov.cn/zhuanti/2015-06/13/-content_2879030.htm

4.2 SATISTICS

Sponsorship
Budget
Feedback

Feedback

According to the potential user (vessels passing through the China rivers and costal area everyday, and the whole volume of the collect box of the SHARKER. We can estimate the plastic collect satistic in the system.

25890
TOTAL VESSELS

1584
Tanker

773
Passenger

3227
Fishing

13896
Cargo

180,000 Plastic bags per year

70,700 Disposable per year

32,500 Plastic bottles per year

220,500 Plastic utensils per year

Sponsorship

The SHARKER floating plastic collect system is an non-profit system, which need the support by the government and the relating companies.

Tecnical support:

Port support:

Plastic disposal:

Budget

Notes	FIRSTread all notes before in alphabetical order then numerically. Studying the first sheet of the excel Budget Events, then the revenues, then the Personal Costs.												
Budegt Tool	note B1	note C1	note D1	note E1	note F1	note G1	note H1	note I1	note J1	note K1	note L1	note M1	note N1
note A1	**costs**	unit	costs for unit	number internal unit	number external unit	total internal costs	total external costs	TOTAL INT +EXT	gain factor	mathematic industrial price	mathematic industrial GROSS	commercial price	FINAL GROSS
1 concept and design	**DESIGN**												
note A2	meetings	h	€ 70.00	20		€ 1,400.00	€ 0.00	€ 1,400.00	0.80	€ 1,750.00	€ 350.00	€ 4,375.00	€ 2,975.00
	brief checking	forfait	€ 5.00	10		€ 50.00	€ 0.00	€ 50.00	0.80	€ 62.50	€ 12.50	€ 200.00	€ 150.00
	reserch and design	h	€ 40.00	60		€ 2,400.00	€ 0.00	€ 2,400.00	0.80	€ 3,000.00	€ 600.00	€ 7,500.00	€ 5,100.00
	traductions	pagine	€ 15.00	0	15	€ 0.00	€ 225.00	€ 225.00	0.80	€ 281.25	€ 56.25	€ 225.00	€ 0.00
	graphics	forfait	€ 500.00	1		€ 500.00	€ 0.00	€ 500.00	0.80	€ 625.00	€ 125.00	€ 1,900.00	€ 1,400.00
	printing	forfait	€ 500.00	0	1	€ 0.00	€ 500.00	€ 500.00	0.80	€ 625.00	€ 125.00	€ 625.00	€ 125.00
total section 1	**total design**					€ 4,350.00	€ 725.00	€ 5,075.00		€ 6,343.75	€ 1,268.75	€ 14,825.00	€ 9,750.00
2 production and management	**PRODUCTION**												
nota A3	coordination meeting	h	€ 40.00	25	0	€ 1,000.00	€ 0.00	€ 1,000.00	0.80	€ 1,250.00	€ 250.00	€ 1,500.00	€ 500.00
	staff meeting	h	€ 40.00	20	0	€ 800.00	€ 0.00	€ 800.00	0.80	€ 1,000.00	€ 200.00	€ 2,500.00	€ 1,700.00
	reserach 1	h	€ 40.00	5	0	€ 200.00	€ 0.00	€ 200.00	0.80	€ 250.00	€ 50.00	€ 3,000.00	€ 2,800.00
	research 2	h	€ 40.00	10	0	€ 400.00	€ 0.00	€ 400.00	0.80	€ 500.00	€ 100.00	€ 300.00	-€ 100.00
	visits	h	€ 40.00	4	0	€ 160.00	€ 0.00	€ 160.00	0.80	€ 200.00	€ 40.00	€ 3,000.00	€ 2,840.00
	design product 1	h	€ 40.00	2	0	€ 80.00	€ 0.00	€ 80.00	0.80	€ 100.00	€ 20.00	€ 200.00	€ 120.00
	meeting with partner sponsor	h	€ 40.00	18	0	€ 720.00	€ 0.00	€ 720.00	0.80	€ 900.00	€ 180.00	€ 600.00	-€ 120.00
	visits site specific	h	€ 40.00	4	0	€ 160.00	€ 0.00	€ 160.00	0.80	€ 200.00	€ 40.00	€ 200.00	€ 40.00
	human resources: senior coordinator	day	€ 100.00	0	1	€ 0.00	€ 100.00	€ 100.00	0.80	€ 125.00	€ 25.00	€ 3,000.00	€ 2,900.00
	human resources: event manager senior	day	€ 100.00	0	1	€ 0.00	€ 100.00	€ 100.00	0.80	€ 125.00	€ 25.00	€ 4,000.00	€ 3,900.00
	human resources: administration	day	€ 100.00	0	2	€ 0.00	€ 200.00	€ 200.00	0.80	€ 250.00	€ 50.00	€ 6,000.00	€ 5,800.00
	human resources: post-event	day	€ 34.00	0	1	€ 0.00	€ 34.00	€ 34.00	0.80	€ 42.50	€ 8.50	€ 1,500.00	€ 1,466.00
	management of newsletter	pagine	€ 30.00	0	10	€ 0.00	€ 300.00	€ 300.00	0.80	€ 375.00	€ 75.00	€ 1,500.00	€ 1,200.00
	AdWords campain	mesi	€ 300.00	0	1	€ 0.00	€ 300.00	€ 300.00	0.80	€ 375.00	€ 75.00	€ 2,500.00	€ 2,200.00
	graphics elements (postcards and leaflets)	forfait	€ 4,000.00	1	0	€ 4,000.00	€ 0.00	€ 4,000.00	0.80	€ 5,000.00	€ 1,000.00	€ 4,000.00	€ 0.00
	media planning and story telling	mesi	€ 600.00	0	1	€ 0.00	€ 600.00	€ 600.00	0.80	€ 750.00	€ 150.00	€ 2,500.00	€ 1,900.00
	operative activities	h	€ 40.00	0	10	€ 0.00	€ 400.00	€ 400.00	0.80	€ 500.00	€ 100.00	€ 6,000.00	€ 5,600.00
	photographer	forfait	€ 5,000.00	0	1	€ 0.00	€ 5,000.00	€ 5,000.00	0.80	€ 6,250.00	€ 1,250.00	€ 6,500.00	€ 1,500.00
	insurance	forfait	€ 1,000.00	0	1	€ 0.00	€ 1,000.00	€ 1,000.00	0.80	€ 1,250.00	€ 250.00	€ 1,300.00	€ 300.00
	technical stuff	forfait	€ 20.00	0	2	€ 0.00	€ 40.00	€ 40.00	0.80	€ 50.00	€ 10.00	€ 25.00	-€ 15.00
	exhibition	mq	€ 50.00	0	200	€ 0.00	€ 10,000.00	€ 10,000.00	0.80	€ 12,500.00	€ 2,500.00	€ 1,300.00	-€ 8,700.00
	products and decoration	forfait	€ 100.00	0	1	€ 0.00	€ 100.00	€ 100.00	0.80	€ 125.00	€ 25.00	€ 150.00	€ 50.00
	monitor	pezzi	€ 5,000.00	0	1	€ 0.00	€ 5,000.00	€ 5,000.00	0.80	€ 6,250.00	€ 1,250.00	€ 15,000.00	€ 10,000.00
	brochure	forfait	€ 200.00	0	1	€ 0.00	€ 200.00	€ 200.00	0.80	€ 250.00	€ 50.00	€ 300.00	€ 100.00
	paper	pezzi	€ 3.00	100	0	€ 300.00	€ 0.00	€ 300.00	0.80	€ 375.00	€ 75.00	€ 375.00	€ 75.00
	meintaince	forfait	€ 300.00	0	1	€ 0.00	€ 300.00	€ 300.00	0.80	€ 375.00	€ 75.00	€ 400.00	€ 100.00
	any other business	forfait	€ 1,000.00	1	0	€ 1,000.00	€ 0.00	€ 1,000.00	0.80	€ 1,250.00	€ 250.00	€ 1,500.00	€ 500.00
total section 2	**total production and management**					€ 5,300.00	€ 15,640.00	€ 16,940.00		€ 21,175.00	€ 4,235.00	€ 19,050.00	€ 2,110.00
3 REPORT	**feedback**												
notaeA4	receipt control	nota B3	h	€ 40.00	3	0	€ 120.00	€ 0.00	€ 120.00	0.80	€ 150.00	€ 30.00	€ 200.00	€ 80.00
	financial report	h	€ 40.00	5	0	€ 200.00	€ 0.00	€ 200.00	0.80	€ 250.00	€ 50.00	€ 300.00	€ 100.00
	final report	h	€ 40.00	3	0	€ 120.00	€ 0.00	€ 120.00	0.80	€ 150.00	€ 30.00	€ 150.00	€ 30.00
	analisys	h	€ 40.00	3	0	€ 120.00	€ 0.00	€ 120.00	0.80	€ 150.00	€ 30.00	€ 150.00	€ 30.00
	feedback report management	h	€ 40.00	4	0	€ 160.00	€ 0.00	€ 160.00	0.80	€ 200.00	€ 40.00	€ 300.00	€ 140.00
	meeting for feedback with client	h	€ 40.00	2	0	€ 80.00	€ 0.00	€ 80.00	0.80	€ 100.00	€ 20.00	€ 100.00	€ 20.00

	billing	nota B5		h	€ 40.00	3	0	€ 120.00	€ 0.00	€ 120.00	0.80	€ 150.00	€ 30.00	€ 150.00	€ 30.00	
								€ 0.00	€ 0.00	€ 0.00	0.80	€ 0.00	€ 0.00	€ 0.00	€ 0.00	
								€ 0.00	€ 0.00	€ 0.00	0.80	€ 0.00	€ 0.00	€ 0.00	€ 0.00	
								€ 0.00	€ 0.00	€ 0.00	0.80	€ 0.00	€ 0.00	€ 0.00	€ 0.00	
total section 3	total report							€ 920.00	€ 0.00	€ 920.00		€ 1,150.00	€ 230.00	€ 1,350.00	€ 430.00	
FINAL TOTALS	FINAL							€ 10,570.00	€ 16,365.00	€ 22,935.00		€ 28,668.75	€ 5,733.75	€ 35,225.00	€ 12,290.00	
															nota M2	

Note A1	Tipologia	voci	unit	n. of units	value for unit	exchange agreement	gross revenue	commissions	notes for commissions	commission calculation	net revenue	notes
								nota I1				
	Sponsorship	Xiaomi	camera	2000	€ 29.00	communication	€ 58,000.00	15.0%	PR Bianchi	€ 8,700.00	€ 49,300.00	Technical service included
	Sponsorship	Mobileye	sensor	8000	€ 2.00	communication	€ 16,000.00	15.0%	PR Bianchi	€ 2,400.00	€ 13,600.00	Technical service included
	Sponsorship	Samsung	monitors	1000	€ 80.00	teck sponsor	€ 80,000.00	0.0%	no	€ 0.00	€ 80,000.00	Technical service included
	Sponsorship	SIPG	port	200	€ 0.00	teck sponsor	€ 0.00	0.0%	no	€ 0.00	€ 0.00	excluding transport
	Sponsorship	COSCO SHIPP	port	500	€ 0.00	teck sponsor	€ 0.00	0.0%	no	€ 0.00	€ 0.00	excluding transport
	Sponsorship	KUUSAKOSKI	Plastic disposal	10	€ 10.00	teck sponsor	€ 100.00	0.0%	no	€ 0.00	€ 100.00	excluding transport
	Sponsorship	CSPA	Plastic disposal	100	€ 2.00	teck sponsor	€ 200.00	0.0%	no	€ 0.00	€ 200.00	excluding transport
	Sponsorship	IEREC	Plastic disposal	100	€ 2.00	teck sponsor	€ 200.00		no			excluding transport
							TOTAL			TOTAL	Balance Total	
nb	The numbers are indicative						€ 154,500.00					
attenzione	Non scrivere nelle caselle gialle											
					nota F1	Event costs	€ 22,935.00					
						Event price	€ 35,225.00					
						Net revenues						
						Balance Price						
						Balance Costs						

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