



IOT BASED AUTOMATED FLOATING WATER WASTE COLLECTOR BY SEABIN MECHANISM

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Abstract— As the name implies, "SEABIN" is a floating bin with a number of ingenious characteristics. This campaign's main objective is to clean up all of the nation's waterways of floating trash and other debris. Around marinas, docks, yacht clubs, and commercial ports, you can find the Seabin, a floating trash container. A pumping device, a catch bag made of jute material, and steel pipes are the three main parts utilized to clean the ocean. The Seabin collects any floating rubbish as it moves with the tide. Water from the surface is pulled in and flows into the catch bag of the Seabin. The water is then pumped back into the marina after that. The biggest issue for both people and aquatic life is the disposal of floating wastes from all different sources, including plastic, polythene, and thermacol, in water bodies including rivers, streams, and lakes. This has become a common occurrence in recent years. To address this significant issue, we develop a new Internet of Things (IoT) based autonomous floating water waste collector by Sea bin mechanism and to assess the factors governing the water quality in bodies of water. India should put this creative idea into practice so that we may help to preserve and clean the water bodies and also help to maintain the security of the restricted pure water source, which is underground pure water. The project is successfully reproduced in a virtual pond, and the outcomes are satisfactory. The container is made to gather floating trash. The concern operator or personnel will receive a notification with the bin collection report in%. We created a system that can be started or stopped depending on the situation, and we added further security by having the system automatically shut off if the bin is 75% full.

Two Australian surfers came up with the original concept of using floating trash cans to gather waste in 2015. The prototype consisted only of a net, a pump, and a bin. Only water and small particles were allowed to escape the bin thanks to the net and the pump, which brought waste and water together in the bin. The state of technology has not significantly improved since then. In the past five years, the prototype has undergone two

improvements. The first was a filter that could take in liquids other than water. The second improvement, which is still being tested, is a second bin that also catches fibres and microplastic inside the system.

With a submersible water pump that can move 25,000 litres of water per hour and is directly plugged into a 110/220 volt outlet, water is drawn in from the surface and flows through a catch bag inside the Seabin.



Figure 1 Seabin

Keywords— aquatic life, disposal of floating wastes, Sea bin mechanism, automatically shut off

I. INTRODUCTION

The The Seabin is nothing more than a bin floating above water that collects all the floating trash in that body of water.

The Seabin is essentially a water filtration system created for enclosed spaces like ports and marinas. It can work on pollution in locations that are clearly visible and where there is a lot of human activity because it is protected from strong currents and ocean storms. The Seabin is a bin-like device that is attached to a dock and has a powered water pump. The pump circulates water throughout the system, drawing up any floating garbage and debris and sucking it into a bag made of natural fibres. After that, the water is brought back to the water source. Depending on the quality, Seabin can partially or completely remove oil from water.

For humans and all living creatures, access to water is essential; without it, life cannot be thought of in any way. Due to the requirement for water to survive, historically significant and well-developed towns grew close to river catchments. Water degradation is now seriously threatening to cast doubt on the very nature of life. Water is absolutely necessary for human activity in many different ways. Globalization and industrialization have increased the need for water for human activity and have also increased the pollution of both surface and ground water. Almost all water bodies, including ground water, are polluted.

Polluted water easily mixes with clean water and degrades the purity of the latter. Drinking water via a hand pump or a piped water delivery system depends heavily on ground water resources. Urban and rural communities use many types of water supply systems to meet their high demand for ground water resources. Water quality is decreased when home and industrial waste are dumped in rivers. Due to dumping of effluents in river gradually deteriorate ground water.

Once ground water is polluted, the damage is done and it is impossible to treat.

Water sources such as lakes, rivers, oceans, aquifers, and even small ponds can all be contaminated. The water becomes unfit for use by people, animals, and plants as a result of the entry of hazardous materials, chemicals, or biological agents.

Water contamination can have both natural and man-made causes. Natural sources of water pollution include volcanic eruptions, soil erosion, and mineral deposits, but the main human-caused causes are the discharge of industrial waste, agricultural runoff, sewage disposal, and oil spills. The environment, human health, and aquatic life are all negatively impacted by water pollution. It can result in degradation, the spread of waterborne infections, the demise of aquatic life, and a reduction in the supply of clean drinking water.

The water quality of lakes, rivers, oceans, groundwater, and even small ponds is impacted by water pollution, which is a huge environmental concern. Water contamination can have both natural and man-made causes. Natural sources of water pollution include volcanic eruptions, soil erosion, and mineral deposits, but the main human-caused causes are the discharge of industrial waste, agricultural runoff, sewage disposal, and oil spills.

Large amounts of industrial waste, sewage, and other pollutants have been dumped into water bodies as a result of the industrialization and urbanization of society, harming the environment and endangering human health. The use of pesticides and fertilizers in agriculture has also contributed to water pollution, which has caused the spread of diseases that are transmitted through the water and the extinction of aquatic life.

As a result, it is crucial to take action to reduce and avoid water contamination. In order to limit the number of toxic compounds released into water bodies, governments, businesses, and individuals must collaborate. This can be done by implementing sustainable practises, using eco-friendly products, and managing garbage responsibly. Creating a

culture of responsible water use and pollution control also requires the promotion of public awareness and education.

II. OBJECTIVE OF AUTOMATED SEA BIN

- I. A To find a solution for the problem of water logging due to plastic, thermacoal, paper and other floating debris etc.
- II. To treat problems like malaria, typhoid, etc. caused due to water accumulation. And also, aquatic animals.
- III. The development of a reliable and effective floating rubbish collector is the project's primary goal. The prototype must be designed, constructed, and tested to achieve this goal.
- IV. Our primary worries throughout the designing stage will be with the sensors, power source, and collecting system. During the construction phase, our goals will be to create a list of the materials required, purchase those items, and put each component together while taking the design into account. Finally, it's crucial to test the product. The goal of this phase is to have a functioning prototype and, if necessary, to improve it.



Figure 2 Floating wastages in water bodies

III. COMPONENT OF SEABIN

A. Seabin

The Seabin is a cutting-edge new method for clearing our oceans and seas of plastic, oil, and other trash. The Seabin is made to be placed in ports, marinas, and other coastal places, where it can be used to collect rubbish that comes into the region as the tide travels up and down.

At marinas, docks, yacht clubs, and commercial ports, you can find the Sea bin, a floating trash container. A pumping device, a catch bag made of jhute material, and steel pipes are the three main parts utilised to clean the ocean.



Figure 3 Seabin

B. Catch bag

The Seabin catch bag is made from hessian fiber, also referred to as burlap. Jute, a plant in the genus *Corchorus* that is largely produced in Asia, is used to make hessian fiber. Our catch bags are produced using a crop and material that is environmentally benign and sustainable. The availability of jute, the second-most significant vegetable fiber after cotton, makes it an easy and affordable material to deal with. Because to its low reliance on fertilizers and pesticides, jute is a crop that is environmentally friendly, sustainable, and suitable for use in our catch bags. 100% biodegradable, recyclable, and compostable materials include burlap. Because it allows water to travel through the mesh pores and trap plastics as small as 5mm and smaller, the fabric is perfect for the Seabin catch bag.



Figure 4 Catch bag

C. IR Sensor

A sensor that detects infrared radiation in the surroundings is an IR sensor, also referred to as an infrared sensor. Applications for IR sensors are numerous, ranging from temperature measurement to motion detection. Objects in their field of view generate infrared light, which IR sensors detect. They typically consist of an infrared detector, such as a photodiode or a thermopile, and an infrared source, like an LED. A beam of infrared radiation is emitted by the infrared source and is reflected or absorbed by nearby objects. The change in infrared radiation is detected by the infrared detector, which then transforms it into an electrical signal.

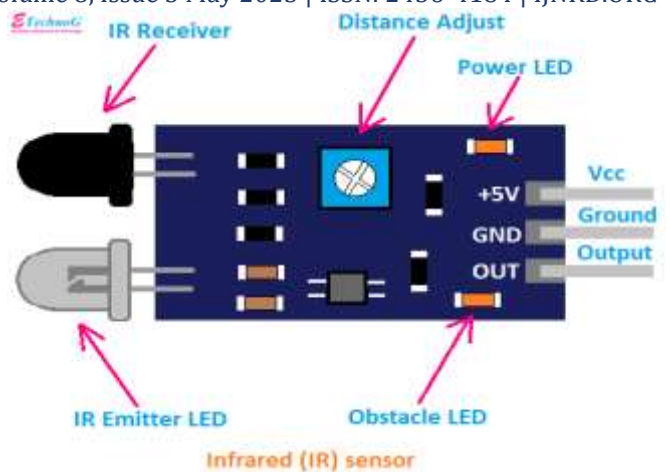


Figure 5 IR Sensor

D. Node MCU

The ESP8266 Wi-Fi module is used by the open-source development board NodeMCU to connect to the internet and control devices. The NodeMCU board was created to make it simple for developers to create internet of things (IoT) applications. It is based on the Lua scripting language.

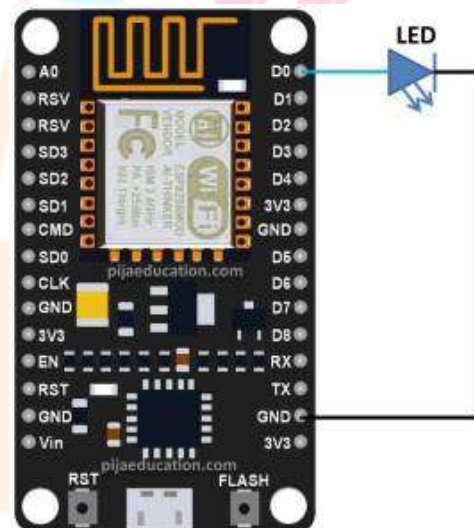


Figure 6 Node MCU

E. Circuit Connections

NodeMCU board is a potent and adaptable platform for IoT applications since it comprises an MCU (microcontroller unit) and a Wi-Fi module. It may be programmed using the Arduino IDE or the Lua programming language, making it available to a variety of developers.

There is a simple connection takes place for the NodeMCU and IR sensor to complete the IOT based mechanism .

Node MCU is used to store and compile the programs and IR sensor responsible for object detection . IOT circuit connection refers to the result in the form of network based notification system.

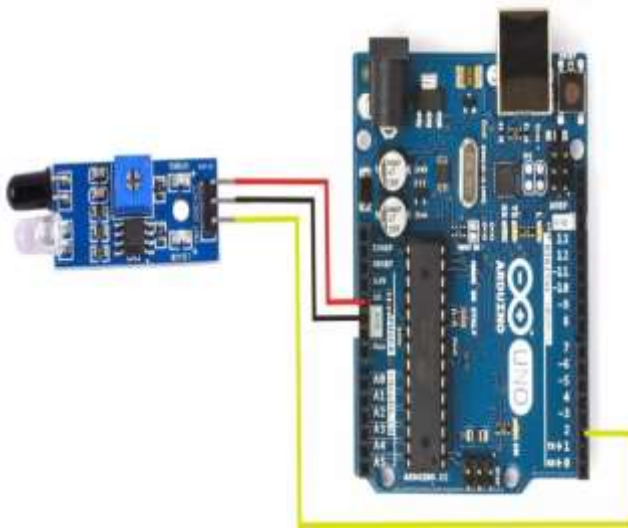


Figure 7 Circuit Connections

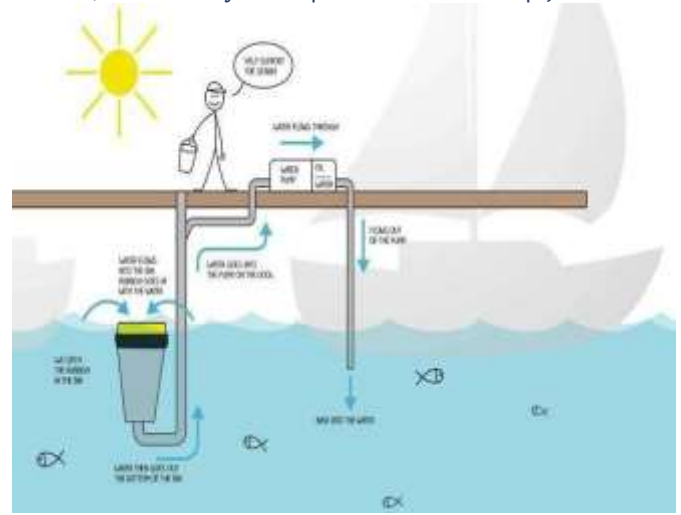


Figure 8 Whole working process of seabin

IV. METHODOLOGY

I. Water having various floating wastages, plastic is pumped into sea bin from the free water surface.

I. All floating plastic wastages and rubbish get trapped inside the catch bag.

II. Then water passes through the catch bag which is free from floating matter and rubbish.

III. The systematic arrangement of IoT set up provide the notification on the mobile after filling the catch bag to the floating wastes.

IV. Then the water which relies passes through another filter where it gets purified

V. After that, the purified water gets discharges in the pond again.

WORKING PROCESS OF IOT BASED SEABIN

Step 1:- Water having various floating wastages, plastic is pumped into sea bin from the free surface of water.

Step 2:- All wastages and rubbish get trapped inside the catch bag and IoT based Notification Generated to the authorized person.

Step 3:- Then water passes through the catch bag which is free from floating matter and rubbish.

Step 4:- Then the water which release passes through another filter where it get purified automatically.

Step 5:- After that , the purified water gets discharges in the pond by aeration process so that total dissolved oxygen would be maintain in the water bodies.

Step 6:- Pure filter water by sea bin can be supply in the near colony and villages for the purpose of washing clothes, washing vehicle and bathing animals as well as used for irrigation purpose.

Step 7:-In a simple manner ,this IOT based Automated sea bin help to reduces the human effort as well as money and time also for saving the water bodies.

V. RESULT ANALYSIS

A. Table 1 Comparison of the three categories of floating trash collectors

Sr. No.	Parameter	Seabin	Water Robot	Barrier with Collector
1.	Type of water body	Static and Dynamic Water	Dynamic Water	Dynamic Water
2.	Capacity	5 Kg/bag	500 Kg/day	50000 Kg/day
3.	Preferred for	Small Water bodies (ex: pond, lake, ditches, springs)	Moderate water bodies (ex: city canal, pool, ports)	Large water bodies (ex: River and Ocean clean up)
4.	Power Supply	110V/220V with a consumption of 2.5A, rated at 500W.	12V feed by 4 X lithium iron phosphate	Solar Capacity of 5.6 kWp & battery capacity of 20Kwh lithium
5.	Source of Electricity	Solar Energy and AC energy	Only DC from battery	Tidal and Solar energy both
6.	Collecting trash efficiency	3	2	4
7.	Maintenance	Very Low	High	Very High
8.	Price Range	Rs. 5000-8000 depending upon size	Rs. 15-20 lakh depending upon model	Rs. 90 lakh – 1 crore
9.	Impact on environment	Less visible, does not interfere with marine life and boats	Small Impact	Large but non-invasive
10.	Installation	Very Easy	Difficult	Difficult
11.	Man Power	1-2 Person only	Group or Team	Organization and

				Management
12.	Method of cleaning	Continuous Cleaning	Intermittent Cleaning	Intermittent Cleaning
13.	Design	Very Simple	Difficult	Very Difficult
14.	Used Material	Recyclable Component	Non-Recyclable	Non-Recyclable

B. Data Collection

The Seabin, a floating natural fibre rubbish bin that can suck in pollutants in docks, marinas, yacht clubs, or any other water body with a calm environment and leave the water pristine, was invented by two surfers from Perth, Australia, for an Australian company to deal with marine litter, one port at a time. In essence, it can prevent trash from leaving harbours and marinas. The Seabin can catch anything floating in the water, including plastic bottles, paper, oil, petrol, and detergent, and it can do it around-the-clock, every day of the year. Additionally, with a slight modification to the conventional Seabin filter, it can store up to **5 kg to 6 kg** of floating debris every day (depending on weather and debris volumes). This amount includes micro plastics up to **2 mm in size** and microfibers as well.

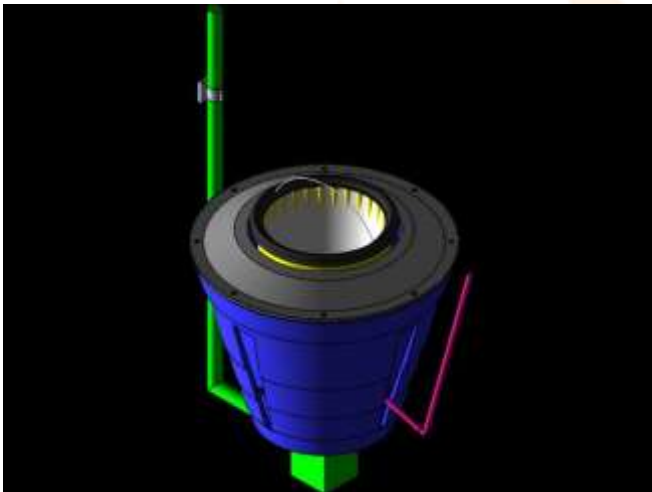


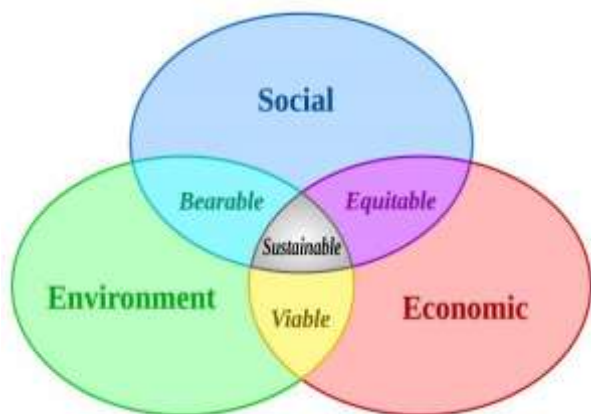
Figure 9 IoT Automatic Notification System

VI. FEATURES OF IOT BASED SEABIN

To protect and clean all water bodies and rid them of all floating wastes, including polythene plastic, bottles, straws, thermocoal, and other sorts of floating wastes, we produce a unique product.

The following stages can be used to define the characteristics of this novel product.

1. It automatically catches floating water trash in the sea bin.
2. It separates oil from water and collects both small and large floating plastics, polythene, straws, and other items.
3. It uses little energy each day. It also functions as renewable energy sources like solar electricity.
4. It is inexpensively made with environmentally friendly materials.
5. Other ponds and lakes in villages can also use it.
6. Ponds, rivers, and lakes may all easily accommodate it for installation.
7. This project directly contributes to the Namami Gange Program and the Swachh Bharat Abhiyan.
8. Continuous cleaning.
9. Easy maintenance.
10. Low energy consumption.
11. Recyclable component.



VII. CONCLUSION

The project is successfully reproduced in a virtual pond, and the outcomes are satisfactory. The container is made to gather floating trash. The concern operator or personnel will receive the bin collection report in%. We have created a system that may be started or stopped depending on the situation. We have added an automatic cutoff feature if the bin reaches 70% capacity. The goal of this project, "Design of Water Waste Collector by Seabin," is to be highly affordable and beneficial for cleaning rivers and ponds.

At Seabin, we try to produce as little waste as we can. One of the most important parts of the Seabin is the catch bag, which is made of jute and actually captures the marine trash. Jute is entirely biodegradable, recyclable, and compostable, thus this is not a problem.

Just clean a catch bag well to remove any plastic or pollutants when it is towards the end of its life cycle or breaks, then compost it to grow your own veggies.

Seabin is a remarkable device that helps in the battle against marine debris in the ocean thanks to these and other properties.

The benefits of using a seabin in a nautical setting include the following:

1. It requires less work from people to remove rubbish from the nearby water bodies.
2. Doesn't need any extra assistance or supervision while working.
3. Utilize as little energy as possible
4. Cleans up trash and other suspended and floating material from water bodies.
5. Easy to build and inexpensive

A Seabin is more effective than a marine worker wandering with a scoop net. By collaborating with these marinas, ports, and yacht clubs, we can put the Seabin in the perfect spot, and Mother Nature will give us the garbage so we can collect it. Although we may not be able to catch everything, for the moment, it's new innovative product.

Although the Seabin initiative is a smaller-scale approach, it nevertheless has admirable objectives. Used at ports and marinas, this trash container is eco-friendly to the ocean and can even remove oil from the water.

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