

Review on Water Garbage Cleaning Robot

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Abstract - It describes the design of a robot for surface cleaning solid waste floating materials on the water surface. The objective of robot is to clean the ponds, lakes, and swimming pools. This project describes designing of the vehicle structure that can provide high stability and can easily collect of the floating substance. Because if floating particles continue to float on the water surface it leads to the amount of sunlight passing through water being reduced due to which photosynthesis slows down which leads to less dissolving of O₂ in water bodies. Hence, there is a need to remove this floating material from water bodies. "Water Garbage Cleaning Robot" is an attempt to clean the floating material from the water surface.

Key words - Floating substance, photosynthesis, garbage, water cleaning, water bodies.

1. INTRODUCTION

Water bodies cover around 71% of the earth, filling our seas, lakes, waterways, narrow water valley, etc. The total water volume in cubic miles is 321,000,000 and the groundwater in cubic miles is 5,614,000 (1.69%) of the total water, and freshwater includes 2,526,000 cubic miles (0.76%) of total water. Surface water from freshwater sources other than the ocean represents over 60% of the water conveyed to our homes. The Composite Water and Management Index (CWMI) report 2018-19 of NITI Aayog stated that about two lakh people die every year due to inadequate access to safe water. In the same report of NITI Aayog, it is estimated that about 600 million people may face water stress.

Here is some river name that is polluted chemically and by solid particles floating above the water's surface. The traditional method for collecting floating waste is manual basis, through a boat trash skimmer. These methods are costly, risky, and consume lots of time. To eliminate the drawbacks of the above-mentioned method the "water garbage cleaning robot" will help in cleaning the water from solid particles efficiently and eco/friendly. This machine consists of a cleaner mechanism and a conveyor belt which collect solid particles and garbage from water bodies. This also reduces the difficulties we face when the collection of debris takes place.

A machine will lift the waste surface debris from the water bodies, which will ultimately result in the reduction of water pollution, and lastly, the aquatic animal death to these problems will be reduced. It consists of a conveyor belt

mechanism that lifts the debris from the water, this system consists of several sensors and motors which will constructively enhance the system. The use of this project will be made in rivers, ponds, lakes, and other water bodies to clean the surface water debris from bodies in a cost-effective manner.

1.1 PROBLEM STATEMENT

Solid waste materials are floating everywhere in water bodies and also useless vegetative propagation which reduces the penetration of light and dissolve of O₂ molecule in water bodies, which results decrease level of biological species in water body.

Similarly small water valley also suffers from this problem. The amount of waste particles/materials increasing day by day worldwide in water bodies, plastic is the largest component of the solid waste stream more than 80% of the garbage comes from this sector. These plastic wastes affect marine life and marine ecosystem day by day.

1.2 DIFFERENT TYPES OF WASTE

1] Liquid Waste

Liquid waste is frequently found both in households and in industries. It can include dirty water, organic liquids, and wash water. We need to consider that liquid waste can be classified as point-source waste and nonpoint-source waste. All liquid waste is classified as point-source waste. Natural liquid waste is classified as nonpoint source waste. It is good to get in touch with waste removal experts to dispose of liquid waste securely and efficiently.

2] Organic Waste

Organic waste is known as common household waste. Organic waste is grown into manure by microorganisms. This does not mean that you can cast out of them in any location of your choice. Organic waste in landfills purpose for the production of methane, so it must never be simply thrown away with waste. Preferably, take a look to get a green bin from our local council.

3] Hazardous Waste

Hazardous waste includes all somewhat scraps that are flammable, toxic, corrosive, and reactive. These items can potentially be tremendously harmful to you as well as the

environment and must be inclined off correctly. Therefore, I suggest you make use of a waste removal company for the perfect disposal of all hazardous waste.

4] Recyclable Rubbish

Recyclable rubbish we are all likely familiar with and involves all waste items that can be transformed into products that can be used again. Solid materials such as paper, metals, furniture, and organic waste can all be recycled.

2. SYSTEM DESIGN WITH PARAMETERS

System design is mainly concerned with the various physical aspects, space requirements, arrangement of various components on the model at the system, man-robot interaction, scope of improvement, weight of robot, and a lot more things. In robot design, we mainly focused on the following parameter:

2.1 Parameter

1] System selection based on constraints:

Our robot is used for small-area purposes so space is a major constraint. The system is to be very compact therefore it can be adjusted in small applications.

2] Arrangement of various components:

Keeping into view the space restrictions all components should be laid such that the components are easy to remove or servicing is possible.

3] Man-robot Interaction:

The friendliness of the robot with the operation that is operating is an important criterion of design.

4] Chances of failure:

Losses incurred by the owner in case of any failure are an important criterion of design. The factor of safety while doing design should be kept high so that there are fewer chances of failure. Periodic maintenance is required to keep the system healthy.

5] Servicing facility:

The layout of components should be such that easy servicing is possible. Those which require frequent servicing can be easily disassembled.

6] Scope of future Improvement:

Arrangements should be provided in such a way that if any changes have to be done for future scope for improving the efficiency robot.

7] Weight of Robot:

Total weight depends on the selection of the material of all components as well as their dimensions. Higher weight will result in difficulty in transportation; it is difficult to take it to the workshop because of more weight.

2.2 Hardware Requirement

The hardware requirements are discussed in the following section.

1] Arduino Uno -

The microcontroller takes input from the smartphone & sensors and operates the robot as per the requirement.

2] Ultrasonic Sensor -

This is distance measuring sensor. It is used to detect the obstacles and its distance from the water garbage cleaning robot.

3] Bluetooth Module HC05 -

HC-05 module here acts as a bridge to control the robot movement and wheels of the boat.

4] DC Motors -

4 DC motors with wheels are used to propel the water robot as per the instructions given.

5] PH Sensor -

It is used to isolate the PH level of water.

6] Conveyor Belt -

A conveyor belt is used to move objects from one location to another location. It allows for movement of objects that are too heavy for humans to carry by hand. Conveyor systems save time.

2.3 Working

The basic agenda of the "Water garbage cleaning robot" is to clean the water surface utilizing cleaning the debris, and floating particles present over the water surface. The system consists of a conveyor belt which helps to collect the floating pollutant from water bodies, a dc motor is used to maneuver the system and also the conveyor belt, and the ultrasonic sensor is used to check the object distance from the system, the system has PH sensor which will help to check the pH of the water and it will help to collect pH data of water bodies, the system consists an Arduino Uno which will be used for controlling the system and an hc05 Bluetooth module used for wireless connection from a user, the battery is being used

as a primary source for system and backup renewable source (solar panel) is being installed.

2.4 3D Modelling

1] Front View

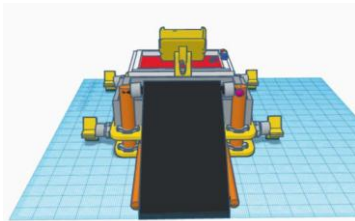


Fig 1 Front View

2] Side View

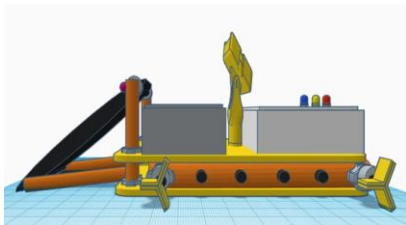


Fig 2 Side View

3] Top View

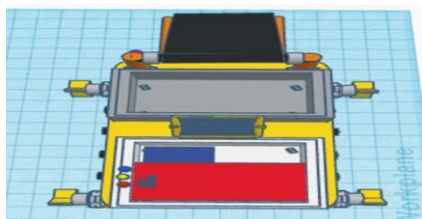


Fig 3 Top View

4] Back View

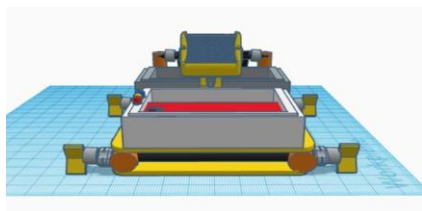


Fig 4 Back View

2.5 Survey

Table 1 - Water Sources and their PH Values

Water Source	PH Values
Mine Waters	3-4
Swamps	4-6
Ground Waters	5-7
Rivers	6.8-7.8
Fresh Lakes	7.3-9.2
Ocean	7.8-8.3

3. ADVANTAGES AND LIMITATIONS

3.1 Advantages

1. Initial and maintenance cost is low.
2. Useful for small as well as big valleys.
3. Manpower not required.
4. Environmental friendly system.

3.2 Limitations

This robot is able to collect a water waste material which is only floating on water surface.

4. CONCLUSION

The problem of water logging due to debris present over water surface which leads to pest growth and it favor disease like malaria , typhoid etc. This is unsafe for human life as well as to marine life.

The proposed system will clean the garbage present in narrow water valley, small and big lake and it will help to reduce the use of fuel operated garbage collector. It will reduce the human efforts required to clean the lake.

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