

Design & Fabrication of Automatic River Cleaning System

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ABSTRACT : India is a holy country and during festival like Ganesh Visarjan, Navratri, Durga Puja and daily waste dumping etc. there is a lot of water pollution done on nearby water bodies. These water pollutions are a very serious concern, for e.g.: Futala Lake. Due to increase in water pollution in the form of waster debris, it is hazardous to the life of aquatic animals as they can consume it and choke or die instantly. Not only the aquatic animals but also humans are in danger due to this problem. As this water is used for irrigation and drinking purpose it is not safe for us humans. This water when used for irrigation can infect the vegetable and can cause health issues for us. If drink then it can cause respiratory as well as diseases caused by water like jaundice and can also cause skin disease. As per a report published every year, we dump 29 crore liters of sewage waste in the Ganga river. Government and NMC are constantly working to remove the waste from these water bodies. One such moment was started by NMC to clean the Nag river in Nagpur in 2013. In total over 5,000 tons of garbage and other waste was removed from a 17.68km stretch of the Nag river, starting from Ambari's overflow point to the confluence with Pili River beyond Bharatwada during a 15-day campaign. While doing this The Times of India newspaper gave the report of the amount of waste daily being dumped in the river to be around a ton. The major population to be dumping waste in the rivers are those living in the slum areas. Every year the NMC is approximately removing at least half a ton of waste from nearby lakes. Our project focuses mainly cleaning the floating waste on the surface of these water bodies, generally plastics waste. In this project "DESIGN AND FABRICATION OF AUTOMATIC RIVER CLEANING SYSTEM" there is a conveyor belt which is located on the front side of the boat and would be driven with the help of two rotor motors. The frame of the boat is entirely made from U-PVC pipes (of 5mm thickness) the conveyor belt is having dimensions of 1300X1000X500 (mm) (LXBXH). At the back side of the boat a tank made from plastic is used which is used to collect all the garbage collected from the water body, the dimensions of the tank could be varied as per the limitations of the length and breadth of the boat and its volume would vary accordingly. The collection bin is removable and could be removed for safe disposal of the waste in it. To run the boat a propeller is provided which would turn in either clockwise or anti-clockwise direction so as to make the boat go in forward or backward direction. The boat is going to be operated by a remote control (wired). The waste collected would then be bought back to the shore and from there the collection bin would be removed from the boat and then the waste would be collected in a garbage truck and then will be disposed off safely in the dumping yard.

Keywords—conveyor belt, propeller, collection bin, RC controller

I. INTRODUCTION

Nowadays, the environment problems arise in many towns in India these problems come along by developing activities such as construction of houses, offices, and other business areas. The Environment problems occur due to several reasons they are the low budget allocation on environment management and public awareness in protecting the environment. The Environment issue which comes up from year to year and still cannot be solved is about garbage and waste from various places dispose into rivers. That garbage can clog water flow, induce the water become dirty, smelly, and often over flow so then give effect floods. Conventional methods used for collection of floating waste are manual basis or by means of boat, thrash skimmers etc. and deposited near the shore of rivers. These methods are risky, costly and time consuming. By considering all the parameters of river surface cleaning systems and eliminating the drawback of the methods used earlier, the remote operated river cleaning machine has designed which helps in river surface. cleaning effectively, efficiently and eco-friendly. This machine is consisting of waterwheel driven conveyer mechanism which collect & remove the wastage, garbage & plastic wastages from water bodies. This also reduce the difficulties which we face when collection of debris take place. A machine will lift the waste surface debris from the water bodies, this will ultimately result in reduction of water pollution and lastly the aquatic animal's death to these problems will be reduced.

River trash collect boat was invented by John Kellett in 2008 at Baltimore in USA. And after this Kellett built larger machine 2014, which was able to pick up larger matter and held two dumpsters.

On April 20,2015 after the 1st significant rainstorm his project removed 19 tons of garbage on that one day.

II. PROBLEM STATEMENT

- In the absence of garbage disposal facilities, the practice of dumping garbage into nearby water bodies has become quite common in recent years and has posed long-term negative impacts both on biodiversity of the area and as well as on the local environment.
- Many animals that live on or in the sea consume flotsam by mistake, as it often looks similar to their natural prey. Bulky plastic debris may become permanently lodged in the digestive tracts of these animals, blocking the passage of food and causing death through starvation or infection.
- To achieve clean water body for reduction of river pollution & to achieve the beauty of Godavari River by clean water bodies.

III. OBJECTIVES

- 1) To clean the garbage present in small and big water bodies.
- 2) To minimize the use of fuel operated garbage collector.
- 3) To tackle the problem regarding wastage food material, plastic present in the water bodies.
- 4) To clean the polluted water due to which save the aquatic animals.
- 5) To minimize the human effort which requires to clean the lake.

IV. METHODOLOGY

In this system we are using a boat which is battery operated and a belt conveyor is used to collect a garbage present in small and big water bodies. With the help of this conveyor we can collect the garbage like plastic bags, plastic bottles, beverage cans, food wrappers, paper bag, straws, marine debris, etc. We can use this boat beside the slum areas, where we can find a lake river or dam. As the people living in this slum areas use this water for daily usage like drinking and bathing their health may be affected. With this methodology resources like petrol and diesel can be saved.

V. CONSTRUCTION & WORKING

Construction: -

As per the boat concern we have to make it corrosion less. So, we used the non-metallic material for the fabrication of river cleaning boat. There is no. of parts which will comes in contact with the water when the boat will start to clean the river or lake, such as frame, conveyor. So, the boat consists of following parts: -

- 1) Frame
- 2) Conveyor
- 3) Propeller
- 4) Remote
- 5) Tank (collector)

1) Frame: - Here the frame is called the skeleton of the boat on which the tank, propeller, conveyor is to be mounted. Because of light weight and anti-corrosion property we have selected PVC pipe to make the frame of the boat. There are so many advantages of PVC like;

- PVC is radially available and relatively in expensive.
- PVC is very dense & thus very hard so the resist impact is very well comparing to other plastics.
- PVC has very good tensile strength.
- It is very good resistant to the chemicals & alkalise.

• Size of frame: -

1. Height = 500mm
2. Length = 1300mm
3. Breadth= 1000m

2) Conveyor: - In this the conveyor is used to lift the garbage float on the surface of river or lakes. There are so many conveyors in practice but as per our boat concern we used plastic flat belt conveyor. As shown in picture the starting portion of the conveyor is deemed in the water and directly comes in contact with the water.

If we use the metal conveyor it will corrode and we have to change the conveyor very earlier, also the metal conveyors are very costly so that's why we are using the plastic conveyors.

• Size of conveyor: -

1. Length=700mm
2. Width=413mm

3) Propeller: - In this project we are developing the thrust power to move the boat in forward direction by the propeller. For that we used the propeller fan of **diameter 73mm** and the motor to drive the the fan is about 10000rpm.

4) Remote: - As per human life concern, we are operating this boat by the remote control. So, the circuit of the remote is made by the DPDT switch (double pole double throw toggle switch).

5) Collector tank: - In collector we are collecting the waste garbage which is float on the water.

Working: -

In this project the main aim of the machine is to lift the waste from the water surface and dispose them into the dumping yard. The machine consists of the conveyor which is supported on two shafts with the help of motors and wheels. These shafts are made up of PVC and the motors are 200rpm DC motors, the motors are mounted on the shaft.

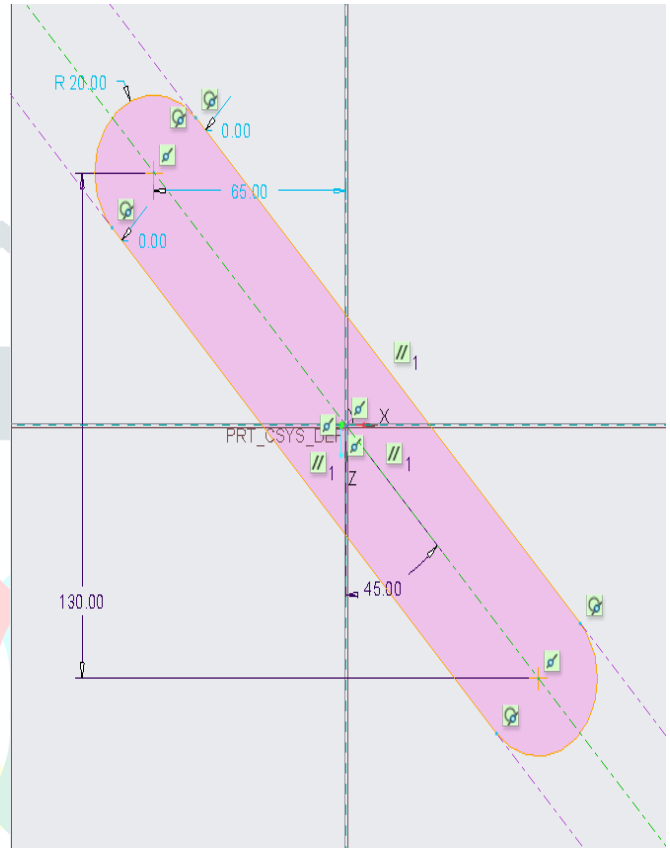
The conveyor is move by means of two DC motors as the conveyors moves it will collect the garbage, debris & plastic bottles from the water bodies. As the boat is float on the water, the garbage on the water surface will get lifted in the upward direction. As the waste garbage reaches the topmost position it will collected in tank. And that will result in cleaning of water bodies and also in the safe manner in the water bodies.

There is no human interference to actual operating of boat but the boat is remote control. So, there is no human hazard.

In this project we are very much concern about the human life that's why we are operating this boat by remote control.



1.1 Actual Model



1.2 Conveyor design

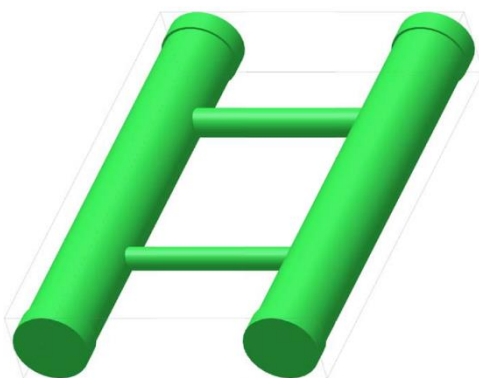


Fig 1.3. Base Frame

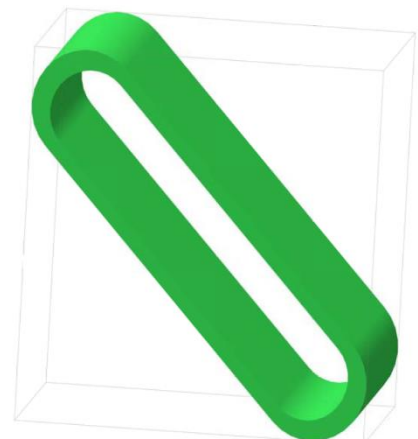


Fig 1.4.3D model of conveyor

VI CONCLUSION

This project focused on modelling, design and control of motor operated boat, with emphasis on lightweight, portable appliances. An innovative method of minimizing manual stress and thus reliably stabilizing the garbage collect in the boat. The project carried out by us made an impressive task in the environmental purpose. It is very useful for the small-scale works. This project has been designed to perform the entire requirement task, which has also been provided.

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