

Design and Fabrication of Semi-Automatic Drain Cleaner for Floating Materials

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ABSTRACT

Nowadays though mechanical drainage system plays an important role in all industrial application in the appropriate disposal of wastage from industrial and commercials are still a difficult task.

Improper use of or inconvenient type of drainage equipment is being used for disposal purposes and unfortunately, many a time led to a loss of human life while the time of maintenance and cleaning system.

To reduce this problem and save human life. We have designed a "Semi-Automatic Drain Cleaner for Floating Materials" and so that it can efficiently control the disposal of wastage by increasing its filtration techniques.

This drainage cleaner is a modified machine that will help to reduce the environmental issue and hazards that being drown out the environment using promotion waste management by the removal of hazardous, garbage from the drainage outlets. These wastes block the drainage systems can cause chances of flooding.

Keywords— Mechanical drainage system, Filtration technics and waste management.

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I. INTRODUCTION

Earlier time the maintenance of sewage and drainage system is being carried out manually hence the desired result of practice was not satisfactory. Due to less equipment and human body limitation. Thus, in need of time and no human fatal rates. There is a need for upgraded techniques that can be helpful to clean the drain sites continuously with mainly by monitoring every action with the help of the system. This system overcomes the main issue and the result is more accuracy and precision along with the speed.

This drain cleaner is placed opposite the side of the flow. This drain cleaner is a chain conveyor type assembly having dc permanent magnet motor assemble on it and driven by a supply of DC 12 volt with 10 rpm speed. The jaw is connected to the chain called as collector jaw. This project also concerns with increasing accuracy and precision along with the speed more than manual and repeated operation.

Currently, we have many mechanical cleaners available in our market such as hydro-jetting, drain augers, electric drain cleaner, hydro-mechanical drain cleaner which collect the solid waste which can be easily recycled but the cost used

in buying this equipment is comparatively high as compared to drain cleaner. Approximately the drain cleaner can be made within 3500-4000 rupees when produced in bulk. It can be easily used in our nearby drainage system.

II. LITERATURE REVIEW

Kanagala Veerendra Kumar,[1] In this system use the most important parameter like ultrasonic sensor, motors, raspberry pi etc. The project provides a warning system is used for the checking of the status of the dump collector bin. This system is also operated by a raspberry pi. The ultrasonic sensor is connected to the raspberry pi and mounted on the top of a bin. The sensor will help to measure the distance of filling of a bin by using python code. The exact level is decided as a threshold level. When the dump reaches this level as soon as and then a signal is sent to the motor and then the motor turns off and will send an alert message.

Harshvardhan Baria, Mackwan Akash, Nirav Makwana, Raj Parmar, Mr Sharad Chhantbar "Review Paper on Automated Drainage Cleaning System" [2], had made such a Design that can work without any human interaction. They used such type

of components as sockets, motor, conveyor belt and collector jaw. This device had overcome human problem mainly during the rainy season and prevents the draining from getting blocked due to solid waste floating on water.

Manoj Rathod, Vasant Pound, Rahul Pungle, Jiwan Rathod "Automatic Floating WasteCollector" [3] They had designed such a setup which not only clean the lakes but also the combination of various mechanical, electronics and computer into a single device which helps us of solid waste floating on water. This device is quite simple in design and easy to handle.

Mahto Ravishankar Kumar Ravindra Bhai, Dehadray Vaibhav, Kaka Smit, Prof. Ankur Joshi "Design and Fabrication Of River Waste Collector" [4], They converted the boat into a floating waste collector machine to be used in river and they think over it and wrote on a various research paper and showed that how river waste collector is made for cleaning river.

Prof. N.G. Jogi, Akash Dambhare, Kundan Golekar, Akshay Giri, Shubham Take "Efficient Lake Garbage Collector By Using Pedal Operated Boat" [5] In addition to a conveyor system, they have designed a pedal boat which gathers all the floating waste end up in into inside the tank this activity mainly focusses on the design and control of pedal it compares mainly on lightweight material it was good to step forward for purpose.

Sheikh Md, Shahid Md Rafique, Dr Akash Langde "Design and Fabrication of River Cleaning Machine" [6] This project has been implemented after looking at the condition of river overloaded with plastic waste and savage the main focus of the project of reducing human effort in cleaning the river. The government has established many actions plan like "Namami Ganga" and "Narmada Bacho" and large lots of capital has been invested in implementing this plan their project is affordable and using the motor range between 80-to-85-watt battery which provide a runtime at 1 hour and 15 min on paper.

Madhavi N. Wagh, Kashinath Munde "Design and Analysis of River Water Cleaning Machine" [7], their project focuses on improving the government efforts for cleaning the Lakes and River. Their project is automated which can be operated remotely. Without being on the machine their machine can clean the river with some commands to be given through a controller. Arduino board, Bluetooth Model, Battery's, Solar Panel, Uncontrol Android APP, DC Motors, Conveyor Belt. As it is powered by solar energy, they achieved their objective of automation for a small-scale cleaning purpose.

Ganesh S. Patil, Rahul A. Pawar, Manish D. Borole, Shubham G. Ahire, Ajay L. Krishnani, Amit H. Karwande "Review Paper on Drainage Water Cleaner Machine" [8] they had device such a model which prevents any blockages in drains and it even doesn't require any e human assistance their project focuses and solid waste management. In monsoons, there is a high chance of the device getting blocked so this is necessary especially during rainy seasons so their machine is needed to be set up near a damaged opening with some bucket type collection whose it can automatically dump whole waste.

Pranay Agrawal, Bishakh Bhattacharya "Aquatic MultiRobot System for Lake Cleaning" [9], Their project is a type of aquatic vehicle that can be operated randomly without any human assistant. Their project is based on an algorithm which is used for navigation and waste removal technique. Their devices do not require any kind of maintenance, this robot can even be used in catching fishes if certain changes have been made in its mechanism and algorithm.

III. METHODOLOGY

1. The drain cleaner should be placed to the opposite side of the flow in such a manner that water should flow through the lower basement.
2. All the light-weighted waste materials like bottles, cans, plastics and these waste materials are being lifted upward with the help of a lifter that is connected to the chain.
3. The chain is connected with a sprocket wheel which rotates when the motor is on and the motor is connected with a sprocket wheel.
4. The electrical energy is being provided to the motor then the collector jaw is being lifted upward and circulated with the help of a chain when the motor is on.
5. Then waste material is carried by the collector jaw and thrown towards the conveyor belt and beside the conveyor belt, there is a dustbin.



Fig. 1 Drain Cleaner

1. Bill of material List

Table 4.1: Bill of material List

PARTS	MATERIALS	QUANTITY
Sprockets	Stainless steel	4
Motor	Cast iron	2
Shaft	Shaft Mild steel	2
Chain	Stainless steel	2
Fabrication of frame	Mild steel and G.I Sheet	2
Conveyor Belt	Rubber	1

2. Design Inputs

- Shaft
 Material used=Mild steel.
 Length=905mm
 Inner Diameter=20mm
 Outer Diameter=24mm
 Length between shaft to shaft=800mm
 Power transmitted by the shaft = 108577.6watt
- Maximum Bearing Load
 $L g = 248.256 \cdot 9.81 = 25.3064 \text{Kg}$
- Chain Drives
 $P=11.32 \text{mm}$.
 Chain length = $L = pLp = 2057.2 \text{ mm}$
- 4.3.3 Lifter
 Length=610mm
 Breadth =120mm
 Gap between each lifter=700mm

ADVANTAGES

1. After buying the cleaner you won't require any equipment to use it and this is one of the best advantages in this way. you can save your capital and no technical knowledge needed to do this job
2. The use of this cleaner is very simple. you just need to put this cleaner into in drain and it doesn't require plumbing knowledge.

3. So, another advantage is that you can use this cleaner at any time in the morning or night and this might not lead to any plumbing problem

IV. CONCLUSION

Our research highlights the regular advancement in the drainage cleaning system. Many specific studies have been carried out and categories such as semi-automatic drainage cleaning systems. And their automation has been studied to a great depth. We focus more on some points given below.

1. Steps to implement this setup in the right way in the drainage and do modification in the previous design.
2. According to our review about the drainage cleaning system which replaces manual work with automation.
3. Generally, people use plastics, bottles, wrappers, and some other kind of disposals for their daily needs, and after using them throw them in the drainage system. As a result, they (disposal, wrapper, etc) get stocked somewhere in a narrow canal and creates a blockage. This blockage is the major cause of the pollution, flooding in the metro cities which opposes the flow system as the flexible disposal passes through the narrow channels. As the small drain merges with some big drain outlets and

ultimately big drainage system join the river, polluted drainage system makes the river polluted.

- Govt allows funds every few months or year for cleaning the river and the process goes in a slow way as to find manpower.
- The machine we made can replace manpower with machine power at the same time. It's a one-time investment which can be proved as an economical and standard way of doing things
- Finding a way to do things in the best possible way was the only motive of our project. We can place the machine at the starting, middle, or at the

end of the drainage system to lift the disposal out of the flow.

- Maximum people who worked on Semiautomatic drain cleaner machine uses chain and sprocket Mechanism with the dustbin. This is a conventional process but nowhere, we are using a nonconventional process. In which conveyor belt is used instead of dustbin which increases the machine efficiency.

- Setup is designed according to the drainage system. In case change the size of the drainage system changes then the design setup also changes according to that.

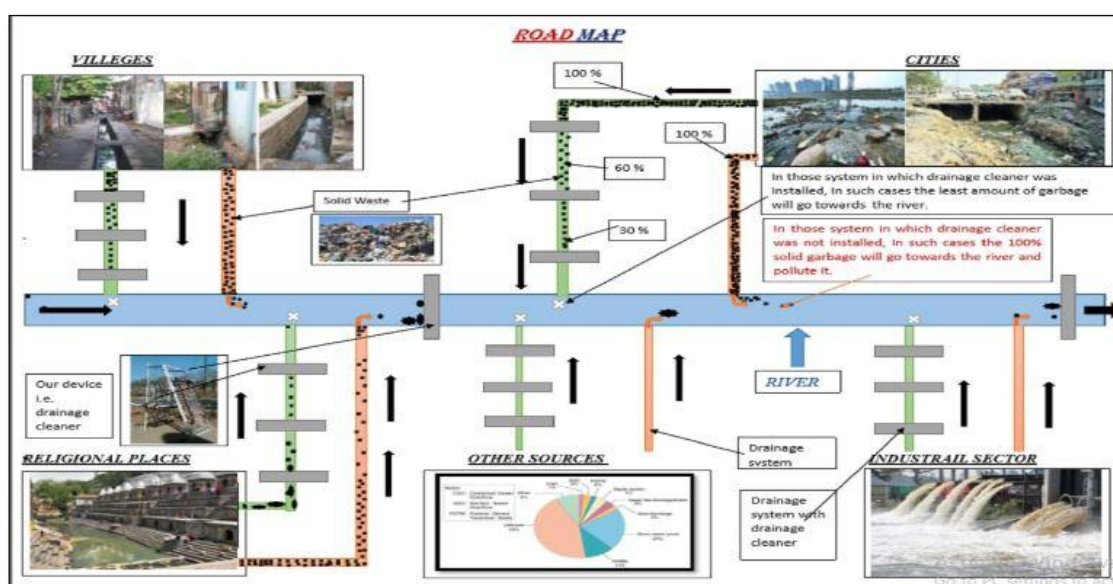


Fig 4. Road Map

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