RIVER TRASH COLLECTOR MACHINE
A MINOR PROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree

Of

B. Tech.

IN

MECHANICAL ENGINEERING

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

RAMAPURAM

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BONAFIDE CERTIFICATE

Certified that this project report **"RIVER TRASH COLLECTOR MACHINE"** is the bonafide work of "**MEHUL MORWAL (RA1711002020142), RAJDEEP SINGH (RA1711002020113), CS SUBRAMANYAM VELLALA (RA1711002020133), MILIND VENKATA (RA1711002020153)"** who carried out the project work under my supervision.

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ABSTRACT

The world's oceans are vast and plastic pollution is spread across millions of square kilometers, constantly drifting in all directions, at the will of the currents.

To this day, over six trillion pieces of plastic currently litter our oceans and rivers

Various types of solutions have been used by the government to solve such issues. So this work is done after focusing on the current situation of our water reservoirs in the country

This device aims at reducing plastic waste by the means of an effective trap, powered by the flow of the current itself.

Componets of the machine include: The base, on which the device hovers at the surface of the water; the two slightly submerged air floats, to guide the machine and steer it effectively; a conveyer belt that lifts off the floating debris and dumps it into a collector bin; and two long effective rotating floaters to close in on the plastic waste

The machine would try to outrace the deeper currents and entrap the waste that lies just below or on the surface.

The major challenge would be to increase the life expectancy of the machine, and capacity of thecollector bin. A feasible design could fetch half a tone of solid waste.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLE

CHAPTER 1

1.INTRODUCTION

1.1 GENARAL

The “River trash collector machine” is used in that places where there is waste debris in the water body which are to be removed. This machine is consists of a propeller and an air floats driven mechanism with a conveyerwhich collects& removes the wastage, garbage & plastic wastages from water bodies. This also reducethe difficulties which we face when collection of debris take place. A machine will lift the wastesurface 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. It consists of Belt drive mechanism which lifts the debris from the water. It consists of a detachable waste dump which reduces the time for collection of the waste to be treated later or for further processes. The air float system gives a better efficiency to the machine resulting in less overall energy consumption by the machine. The use of this project will be made in rivers, ponds, lakes and other water bodies for cleaning upper water waste debris. From this project we hopeto clean the surface water debris from water bodies.

1.2 CLASSIFICATION OF WASTE

Waste water is defined as the flow of used water from homes, business industries, commercial activities and institutions which are subjected to the treatment plants by a carefully designed and engineered network of pipes. The biggest impact of cleaning the chemical wastes can cause respiratory diseases and it plays a challenging issue for the municipality officers Water damage is classified as three types of contaminated water. They are clean water, gray water and black water. Clean water is from a broken water supply line or leaking faucet.

Fig 1.Pollution in Cooum river Chennai

If not treated quickly, this water can turn into black water or gray water, depending on length of time, temperature, and contact with surrounding contaminants.

1.3 CURRENT WASTE MANAGEMENT METHOD

The current segregation of waste is done through a drainage ditch. A drainage ditch is a narrow channel that is dug at the side of a road or field to carry away the water. Drainage pipes are used for the disposal of sewage and unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage pipes. The municipality workers are only responsible to ensure that the sewage is clean or not. Though they clean the ditches at the side of buildings, they can't clean in very wide sewages. The municipality workers need to get down into the sewage sludge to clean the wide sewage. It affects their health badly and also causes skin allergies. This is also resulting in over accumulation of the waste in canals and drainage systems increasing waste debris in the waters. Which also effects the aquatic life in the water bodies

1.4 OBJECTIVE

The objective of the whole project is to make the water bodies cleanerNowadays, even though automation plays a vital role in all industrial applications in the proper disposal of sewages from industries and sewage cleaning is still a challenging task. So the maintenance of the automation plays a pivotal role in this project.

Briefly the objective of the project can defined in the following points:

1) To reduce the pollution in water bodies.

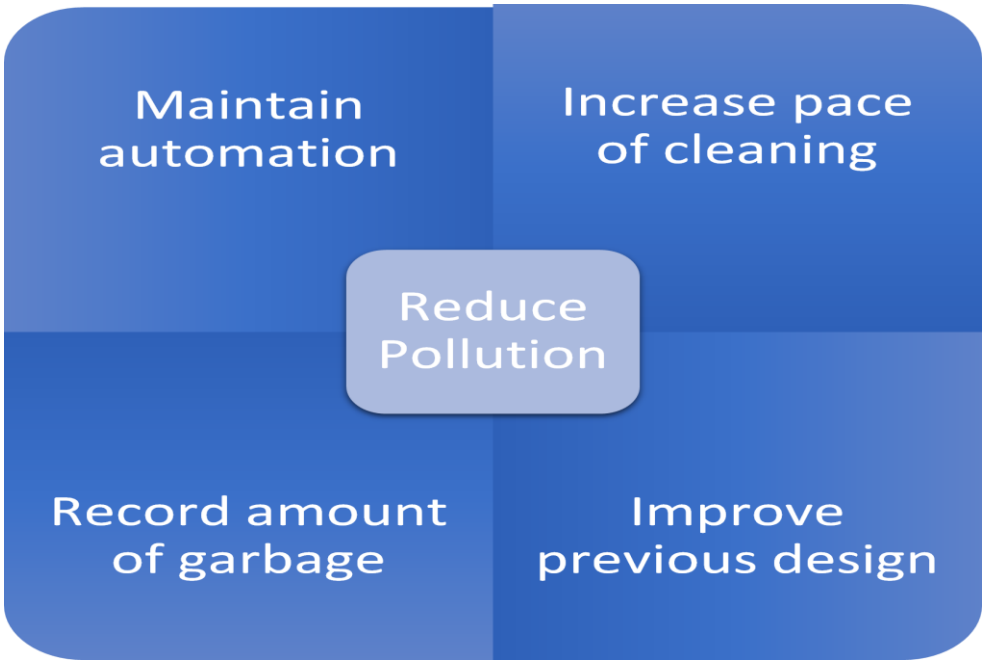
2) To overcome the difficulty of removing waste particulate floating on water surface.

3) To maintain the automation during working towards cleaning River.

4) To perform the fast & reliable operation during cleaning River.

5) Improve the water quality of a stream or river.

7) To work for society for clean up a section of a stream or river



.

Fig 2 objective

CHAPTER 2

2. LITRATURE REVIEW

2.1M. Mohamed Idhris, M. Elamparthi, C. Manoj Kumar DESIGN AND FABRICATION OF REMOTE CONTROLLED SEWAGE CLEANING MACHINE

The motive of the project is to automate the sewage cleaning process in drainage, to reduce the spreading of diseases to human. The black water cleaning process helps to prevent pest infestations by reducing the residues that can attract and support pests. It also improves the shelf life and sensory quality of food products. In the proposed system, the machine is operated with remote control to clean the sewage. Hence, this system avoids the impacts from the sewage wasteand its harmful gases. This helps to prevent the mosquito generation from the wastage. The system has a wiper motor that starts running as soon as the set-up is switched on. Two power window motors are connected to the wheel and it is driven with the help of the remote control set-up. The process starts collecting the sewage wastes by using the arm and it throws back the waste into the bin fixed in the machine at the bottom. An arm is used to lift the sewage and in turn a bucket is used to collect them. The set-up runs even in sewage area with water (limited to a particular amount) so that the wastages which floats on the water surface also gets collected. The garbage which affects the drainage is also picked up and removed. This system has limited human intervention in the process of cleaning and in turn reduces spreading of diseases to mankind. Modern services are becoming polarized.

2.2 Mr.Abhijeet. M.Ballade
Design & Fabrication of river cleaning system

India is holy country & during lots of festival like ganeshvisarjan, navratridurga puja & mainly Siahnsthkumbhmela there is lots of water pollution of Godavari River at Nashik. The water pollution is very important problem in rivers, ponds and water bodies near Godavari River at Nashik. Due to increase in water pollution in the form to waste debris; it is hampering the life of aquatic animal and make their life in danger. Similarly sometimes the aquatic animal tends to eats surface waste debris considering it as a food; which ultimately cause the death of animals. Due to polluted water many skin diseases to human kind are observed. So that to reduce the water pollution we are trying to make river cleanup machine.“River cleanup machine" a machine which involves the removing the waste debris from water surface and safely dispose from the water body. The river cleanup machine works on hydropower to extract waste water debris, plastics & garbage from Godavari River at Nashik

2.3 Mr. P. M. Sirsat, Dr. I. A. Khan
Design and fabrication of River Waste Cleaning Machine

This paper emphasis on design and fabrication details of the river waste cleaning machine. The work has done looking at the current situation of our national rivers which are dump with crore liters of sewage and loaded with pollutants, toxic materials, debris etc. The government of India has taken charge to clean rivers and invest huge capital in many river cleaning projects like “NamamiGange”, ‘’Narmada Bachao’’ and many major and medium projects in various cities like Ahmadabad, Varanasi etc. By taking this into consideration,this machine has designed to clean river water surface. 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. The “River waste cleaning machine” is used where there is waste debris in the water body which are to be removed. This machine consists of DC motors, RF transmitter and receiver, propeller, PVC pipes and chain drive with the conveyor attached to it for collecting wastage, garbage & plastic wastages from water bodies

2.4 Pankaj Singh Sirohi, Rahul Dev
Review on Advance River Cleaner

River water is used for irrigation which in return gives food to the people. They also maintain the ecology of region and bring prosperity. We made this project to clean the river. After implementing this project we can control the pollution of river it is very beneficial for our society. In this project turbine rotates by flow of river water and through the mechanical gear arrangement we arrange two conveyor belts. The first conveyor belt is used to pick solid waste from river and the second conveyor belt is used to draw solid waste out of river for solid waste management. Water is the source of life. It covers 70% of the Earth. But only a small portion of this precious natural resource is fit for human consumption. Out of the earth’s total water 97% is stored in oceans which are not fit for human consumption. The further 3% is stored in various sources like glaciers, rivers, lakes and under-ground aquifers. Rivers have a special place in the lives of the Indians. They consider rivers to be sacred, take holy dip during Amavasya (new moon), Purnamasi (full moon) and on other religious occasions. River water is used for irrigation which in return gives food to the people. They also maintain the ecology of the region and

bring prosperity. An area without a river is considered to be poor. Unfortunately, during the past two decades water quality has deteriorated at a rapid pace. One of the major reasons for this is the solid waste being thrown to the rivers, turning them to be a dirty drain. The Ganga and the Yamuna, the two most sacred rivers of our country are no exception to it. Thousands of crores of rupees is being pumped to save the rivers through various plans. Now days we can see river pollution is biggest problem for our planet so we introduce our society with an advance river cleaner. This is an advance river cleaning system. We make this project for looking to clean river.

2.5 Ndubuisi c. Daniels
Drainage System Cleaner A Solution to Environmental Hazards

The Drainage system cleaner is a machine which helps to protect the environment from different kinds of environmental hazards through the promotion waste management by the removal of garbage from the drainage system. These wastes when not removed end up settling in residential places where these wastes are burnt thereby causing climate change otherwise these wastes block the drainage systems thereby causing flooding. The machine is designed in such a way that it generates motion for its functions by itself through the action of running water thereby cutting out the dangers of the powering the machine by other sources of power because of the harshness of the rain on these other sources. The drainage system cleaner has three major parts which are the Propeller, the Cleaner and the Pan all make up for its effective functioning. The Drainage system cleaner was tested on three different days in the first day it rained in the months of September, October and November 2012 respectively. Based on the findings made after the test the Drainage system functioned well when there is maximum load. I therefore

recommend the use of this system by various individuals, government companies and waste recycling companies for prevention of environmental hazards and also encouraging waste management. Drainage systems are blocked most times by garbage like nylon, plastic bottles, and empty cans which cluster together and find their way into the drainage systems. If these garbage are allowed to flow the will end up flowing down to recreational beaches used for tourism purposes making a scene not pleasurable to the eyes (Larsen et al 2009) else these garbage flow to residential sites where they are burnt in a way of getting rid of them, thereby causing climate change. Overflow of water drainage system occurs when there is a blockage of an end of the drainage system forcing the water to find its way elsewhere apart from the mapped out drainage system, therefore the running water spills over the horizontal height of the drainage systems spreading to regions alongside the drainage system, thereby causing problems such as pushing down of structures such as fences, water logging of farm lands and residential buildings etc

2.6 Prof. N.G.Jogi,AkashDambhare, KundanGoleka
Efficient Lake Garbage Collector by Using Pedal Operated Boat

The most sacred river in the world and the national river of India “Ganga River. Ganga is the soul of India and is Holly River in India. If we look at current status of our national river it is very shocking we dump about 29 crore liters of sewage in Ganga which is loaded with pollutants, toxins.[9] We also dump tones of municipal solid waste. The government Of India takes charge to clean rivers Ahmadabad, Varanasi, etc. All of us know about the Ganga Abhiyan. Similarly, The villages in all state of India which joint with small & big lake and maximum villages does not use the water of lake for farming as well as drinking and daily uses due to the maximum amount of garbage present in the lake water by taking this into consideration. Our main motive is to clean the lake water for that purpose we are making efficient lake garbage collector by using pedal operated boat. In this we are using pedal operated boat with the conveyor attached to it for collecting garbage from the lake. Several companies offer equipment to garbage out of river lakes and harbors .The water surface trash collection boat can work in river or lake, it can collect the floating garbage and some other equipment for weed cutting, it harvest the aquatic weed from lake. This is really a good solution for the aquatic weed management. Many says they could build larger dustcarts for the sea and ocean, if there was a demand of them those seen here may not be ideal for collection on large scale but it is food for thought. We are making the boat which is operated by pedal and clean the waste present in the lake. In this boat the conveyor collect the waste present in lake and then collect it in box like structure present in lower side of the boat. We are trying to collect the waste like polythene, food material, and the waste occurs due to religious festival.

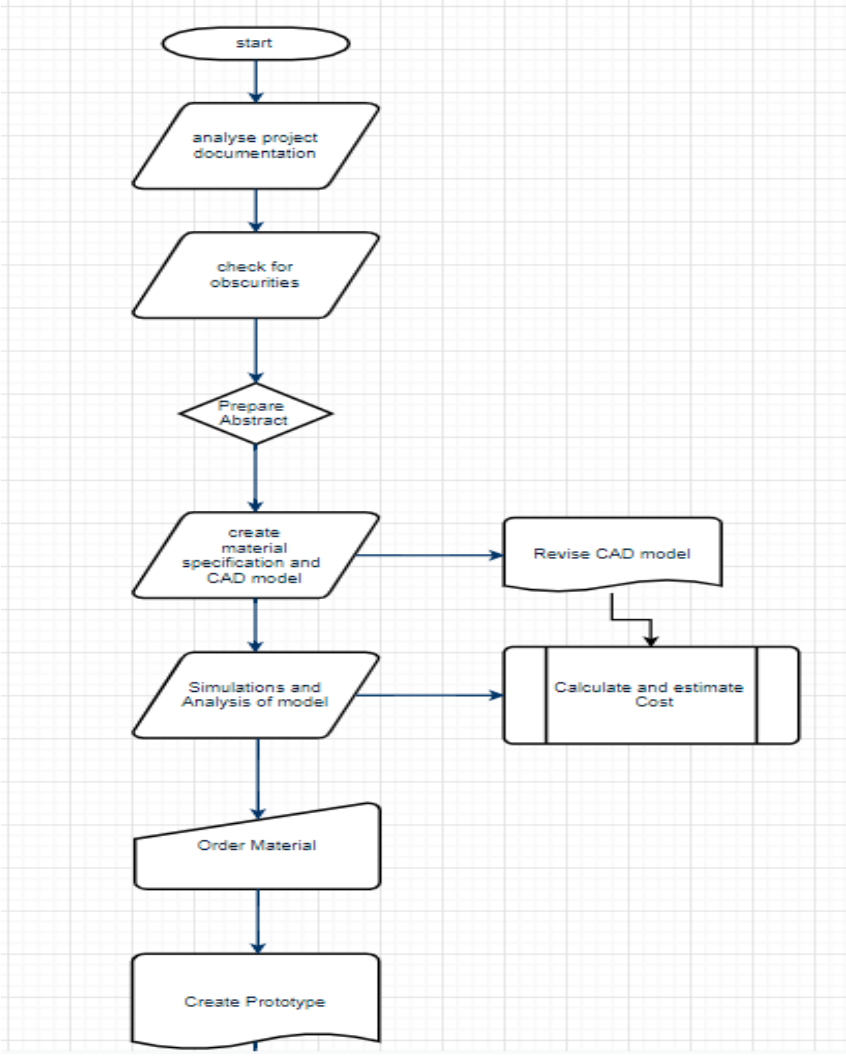
CHAPTER 3

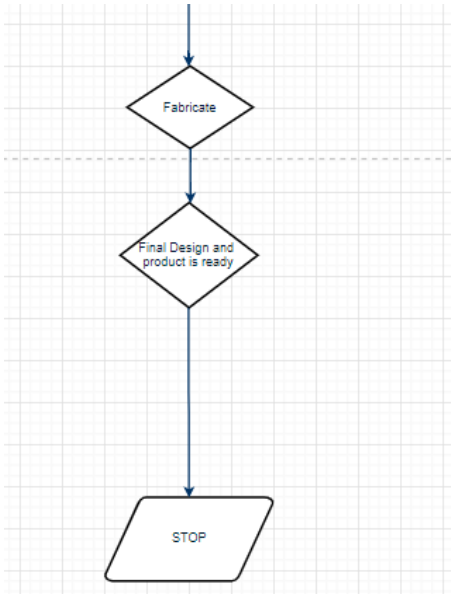
3. STATEMENT OF PROBLEM

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 environmentless human interference: - The very basic idea should be
Satisfied that is to avoid the interference of the operator. This will happen only by the adoption and sustained usage of technology in the workspace. Collect more amount of waste: Very firstly it must collect around 5kg of waste at a time
When it is being left to the water. Easy disposal of waste: Another important thing is easy removal of wastes which are collected in the collecting box.
It must be stable: To make the product stable it must get through with proper design calculations. It should withstand extreme conditions such as additional load exerted by the water waves and as well as by the wastes which are being
Collected. Safety for the user: The product must be user friendly.
Environmental friendly: It should not harm the aquatic animals. It must not have any property that has adverse effect on the water source.

CHAPTER 4

4. METHODOLOGY USED




Fabricate
Final Design and product is ready
STOP

CHAPTER 5

5. CONSTRUCTION

This machine's basic components are listed below .With Catia designs and individual part

Component	Material	Quantity
Gear:Spur	Cast Iron	2
V-Belt (A Type)	Rubber/Neoprene	1
Ball Bearing	Stainless Steel	4
Chain-Sprocket	Stainless Steel	1
Base Frame	Galvanized Steel	1
Battery	Lithium-Polymer	1
Hopper (collection tray)	Galvanized Steel	1
Propeller	Al-Steel Alloy	1
DC motor	-	2
Air floats	Fiber Reinforced Plastic	2
Conveyor Belt (Advanced)	Rubber,PVC	1
Nut	Al-Alloy	25
Bolt	Al-Alloy	25

Table 1

5.1 BASIC FRAME

A Frame is often a structural system that supports other components of a physically. Bedframe, the part of bed used to position the mattress and base.

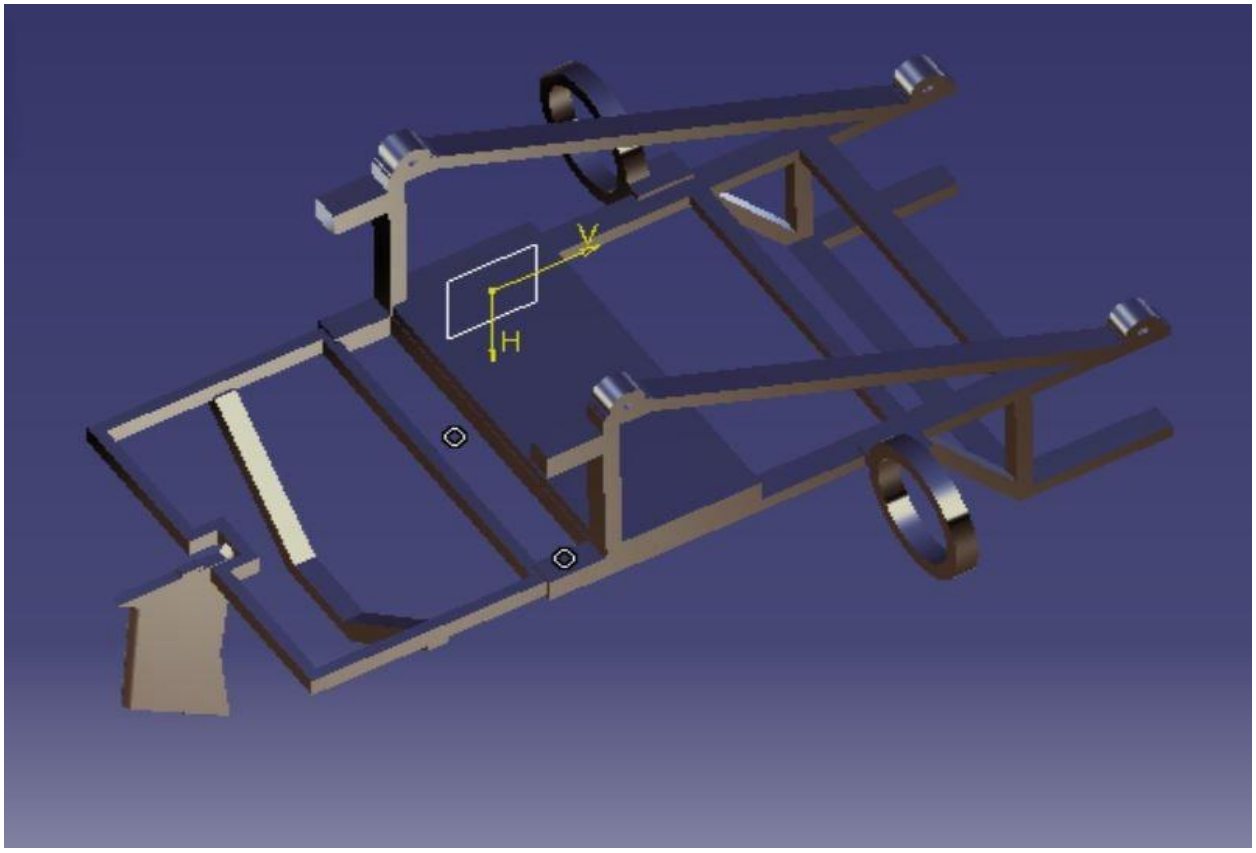


Fig 3 Base frame

5.2 CONVEYER

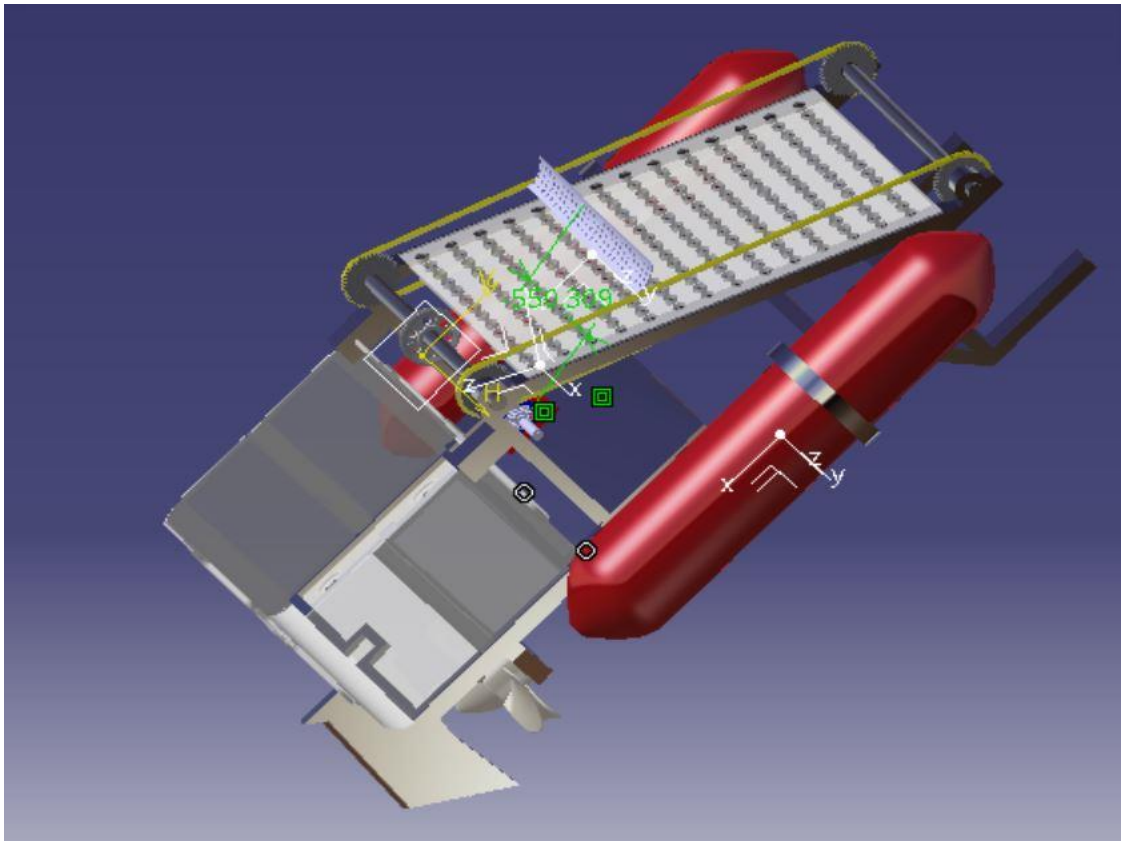


Fig 4 Conveyer

It is the carrying medium and this is used as a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials,which make them very popular in the material handling and packaging industries.

5.3 Hollow pipe (Air Floats)

These are two hollow pipe joint together by permanent fastening with help of M-Seal.These are used as the floating pipes which are used to keep the model balanced and they allow the model to float in the water.The pressurized air adds weight to the hollow pipe and assures the balance and avoids the problem of sinking of model in the water.The design modification of using an air float system to a conventional wheel driven mechanism was brought up to increase the efficiency of the machine.On a wheel driven mechanism we have to keep a separate motor and a energy source for the movement of the system. In this air float mechanism a single propeller with a rotor will reduce the work and energy required for the two wheels making it more efficient method for the machine to stay afloat and move across the stream to carry on the cleaning operations. These floats are airtight hollow structures, similar to pressure vessels, designed to provide buoyancy in water. These floats are made with fiber reinforced plastic which is a lighter and cost effective floating material. The previous models had stainless steel wheels which were heavier and much more prone to corrosion when compared to fiber reinforced plastic. Thus making these floats are much lighter, cost. effective, corrosion resistant and most importantly more less energy consuming

5.4 Gears

We use spur gear in this model.they have straight teeth,and are mounted on parallel shafts.Sometimes,many spur gears are used at once to create very large gear reductions.It also increases stress on every gear teeth.These gears are used to increase or decrease the speed of any object.shafts that are parallel and coplanar, and teeth that are straight and oriented parallel to the shafts. They're arguably the simplest and most common type of gear – easy to manufacture.

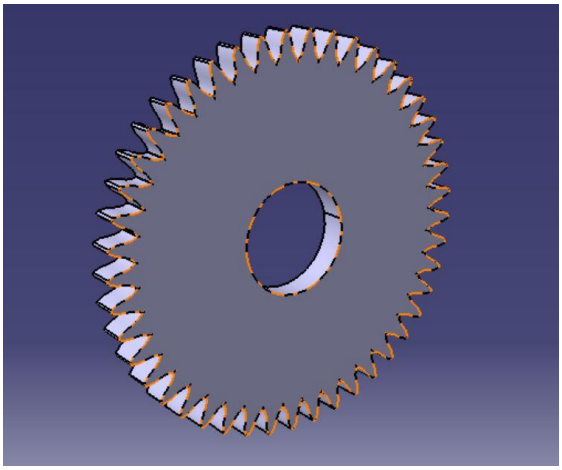


Fig 5 Gear

5.5 Propeller

A propeller is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is produced between the forward and rear surfaces of the airfoil-shaped blades, and a fluid (such as air or water) is accelerated by the pressure difference. Propeller dynamics, like those of aircraft wings, can be modelled by Bernoulli's principle and Newton's third law.Here it is used to develop thrust inside the water for propelling the floating body.

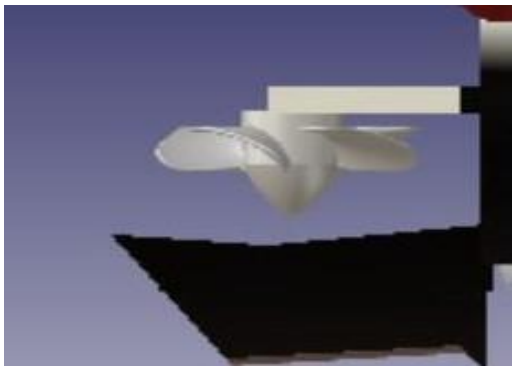


Fig 6 propeller

5.6 Motors and Several Electronic components

A DC motor of A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills

5.7 Detachable Dumper

This is the main component that is placed behind the machine which is designed to collect the water garbage from the river.

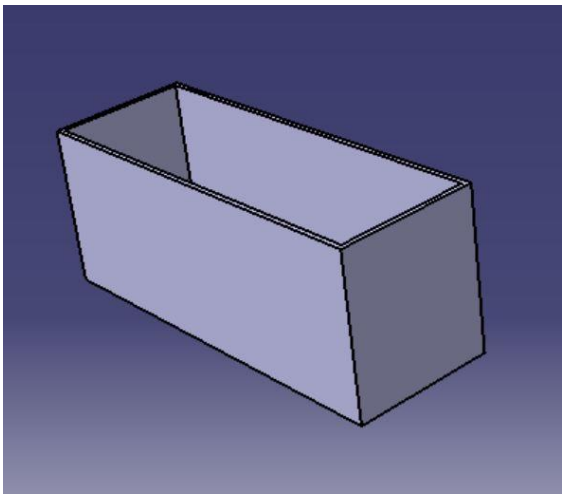


Fig 7 Dumper

5.8 Ball Bearing

A ball bearing is a type of rolling-element that uses ball to maintain the separation between the bearing races.Thepurpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least three races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating

assembly (e.g., a hub or shaft). As one of the bearing races rotates it causes the balls to rotate as well. Because the balls are rolling they have a much lower coefficient of friction than if two flat surfaces were sliding against each other.

Ball bearings tend to have lower load capacity for their size than other kinds of rolling-element bearings due to the smaller contact area between the balls and races. However, they can tolerate some misalignment of the inner and outer races.

5.9 Chain and Sprocket

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain,passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the Morse chain.

5.10 Battery

Battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, mobile phones, and electric cars.

When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode.[2] The terminal marked negative is the source of

electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy.

Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

Primary (single-use or "disposable") batteries are used once and discarded; the electrode materials are irreversibly changed during discharge. Common examples are the alkaline battery used for flashlights and a multitude of portable electronic devices. Secondary (rechargeable) batteries can be discharged and recharged multiple times using an applied electric current; the original composition of the electrodes can be restored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium-ion batteries used for portable electronics such as laptops and mobile phones.

Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to small, thin cells used in smartphones, to large lead acid batteries or lithium-ion batteries in vehicles, and at the largest extreme, huge battery banks the size of rooms that provide standby or emergency power for telephone exchanges and computer data centers.

CHAPTER 6

6. FABRICATION PROCEDURE

6.1 GENERAL PROCEDURE

The basic step is to fabrication of base frame of the project by using hand cutting machine and electric welding machine to withstand the model and its operation. The base frame is made of square channel. 1. Hollow pipe is assembled at the base frame with the help of L- section through nut and bolt. It is made of PVC pipe by using fastening operation. The purpose of this pipe is to float on water, carrying the project weight as compressed air is placed in pipe creating a differential pressure head, causing the machine to float on water. 2. L- Section is welded in base frame which is used to hold the hollow pipe with the help of nut and bolt. 3. T section is welded on base frame to support the bearing and shaft. 4. T- Section is assembled on base frame by welding. It is used to support the pulley with the help of bearing and shaft. 5. Conveyor belt is used to transmit the torque from motor to chain drive. There is two shaft assembled in machine. Shaft 1 is mounted at the front chain drive of machine and shaft 2 is mounted at the rear chain drive with the help of inclined selection and T- section respectively.

One plate is welded at T section from 170 mm from base for mount motor for driving pulley of belt drive 7. The drive source of our project is an electric motor having 12V and 7.6 ampere current which is used to drive gear train, for collecting mechanism. Gear is welded on pulley shaft and another gear is weld on motor shaft drive used to transmit the power from motor to conveyor belt pulley. Drive is required to carry a load as desirable to complete the project objective. 10. Chain drive is a way of transmitting mechanical power from

one place to another. It is often used to convey power to propeller, particularly bicycles and Motorcycles. It is also used in a wide variety of machines besides vehicles. The power is conveyed by a roller chain, known as the drive chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force. 11. Collecting Mechanism is used in our project to collect a garbage and debris. By using circular bar we made one frame for bin. And cover its five side with the square mesh net 12. Propeller is bolted on shaft which is placed on base frame. The purpose of water wheel is to move the machine forward or backward on water. Motor is used to rotate the water wheel with the help

6.2 ASSEMBLY

- The basic step is to assemble base frame of the project by using hand cutting machine and electric welding machine to withstand the model and its operation.
- The purpose of this pipe is to float on water, carrying the project weight as compressed air is placed in pipe creating a differential pressure head, causing the machine to float on water.
- L- Section is welded in base frame which is used to hold the hollow pipe with the help of nut and bolt.
- Inclined section(CONVEYOR BASE) is welded on base frame to support the bearing and shaft.

- T- Section is assembled on base frame by welding. It is used to support the larger chain drive with the help of bearing and shaft.
- The drive source of our project is an electric motor having 12V and 7.6 ampere current which is used to drive gear train AND
- Collecting Mechanism is used in our project to overcome real time issues

6.3 WORKING

•To run the project This project consists of several motor conveyor,basic frame ,several.It has three motors geared and coupled with conveyor,rotor and propeller.The components are under the conveyor for the safety reasons.other components rest on frame and two air float of steel pipe with pressurized sir generates pressure head to run the project on water surface. The fabricated portable storage tank with two or multiple hook is attached to the machine's rear compartment which can be also be used under machine downtime

•And thus it increases effectiveness.

CALCULATIONS

1. Motor calculation

P = VI

Volt = 12v

Amp = 7.6

Power = 12 x 7.6 = 85 watt

2. RPM calculation

Radius of spur gear: 10cm

Total length of the chain = 1+1+2π(0.1)

Rotation needed to complete 1 full mapping=

2+2π(0.1)÷2π(0.1)= 4.18 Rotations

No. of plates = 1, 2 or 3

RPM = 4.18 x 3 = 12.54 RPM

3. Load on chain

Pitch line velocity = πDN÷60 = π x 0.1 x 12.54 ÷ 60 = 0.0656

W= rated power÷ pitch line velocity = 8.5÷0.0656 =129.456 N = 13.2kg

4. Length of belt drive

L = π (r1 + r2) + 2(X)+ (r1-r2)^2÷X

r1 = Radius 1

r2 = Radius 2

X = Distance between two pulleys

L = π x (0.06 + 0.04)+ 2(0.6)+ (0.06-0.04)^2÷0.6 = 1.514m

CHAPTER 7

7.FUTURE SCOPE

7.1 FUTURE SCOPE

British poet W. H. Auden once noted, “Thousands have lived without love, not one without water.” Yet while we all know water is crucial for life, we trash it anyway. Some 80 percent of the world’s wastewater is dumped—largely untreated—back into the environment, polluting rivers, lakes, and oceans.

This widespread problem of water pollution is jeopardizing our health. Unsafe water kills more people each year than war and all other forms of violence combined. Meanwhile, our drinkable water sources are finite: Less than 1 percent of the earth’s freshwater is actually accessible to us. Without action, the challenges will only increase by 2050, when global demand for freshwater is expected to be one-third greater than it is now.

Sip a glass of cool, clear water as you read this, and you may think water pollution is a problem . . . somewhere else. But while most Americans have access to safe drinking water, potentially harmful contaminants—from arsenic to copper to lead—have been found in the tap water of every single state in the nation.

Still, we’re not hopeless against the threat to clean water. To better understand the problem and what we can do about it, here’s an overview of what water pollution is, what causes it, and how we can protect ourselves.

Water pollution occurs when harmful substances—often chemicals or microorganisms—contaminate a stream, river, lake, ocean, aquifer, or other body of water, degrading water quality and rendering it toxic to humans or the environment.

Water is uniquely vulnerable to pollution. Known as a “universal solvent,” water is able to dissolve more substances than any other liquid on earth. It’s the reason we have Kool-Aid and brilliant blue waterfalls. It’s also why water is so easily polluted. Toxic substances from farms, towns, and factories readily dissolve into and mix with it, causing water pollution.

7.2 Groundwater

When rain falls and seeps deep into the earth, filling the cracks, crevices, and porous spaces of an aquifer (basically an underground storehouse of water), it becomes groundwater—one of our least visible but most important natural resources. Nearly 40 percent of Americans rely on groundwater, pumped to the earth’s surface, for drinking water. For some folks in rural areas, it’s their only freshwater source. Groundwater gets polluted when contaminants—from pesticides and fertilizers to waste leached from landfills and septic systems—make their way into an aquifer, rendering it unsafe for human use. Ridding groundwater of contaminants can be difficult to impossible, as well as costly. Once polluted, an aquifer may be unusable for decades, or even thousands of

years. Groundwater can also spread contamination far from the original polluting source as it seeps into streams, lakes, and oceans.

7.3 Surface water

Covering about 70 percent of the earth, surface water is what fills our oceans, lakes, rivers, and all those other blue bits on the world map. Surface water from freshwater sources (that is, from sources other than the ocean) accounts for more than 60 percent of the water delivered to American homes. But a significant pool of that water is in peril. According to the most recent surveys on national water quality from the U.S. Environmental Protection Agency, nearly half of our rivers and streams and more than one-third of our lakes are polluted and unfit for swimming, fishing, and drinking. Nutrient pollution, which includes nitrates and phosphates, is the leading type of contamination in these freshwater sources. While plants and animals need these nutrients to grow, they have become a major pollutant due to farm waste and fertilizer runoff. Municipal and industrial waste discharges contribute their fair share of toxins as well. There's also all the random junk that industry and individuals dump directly into water

Ocean water

Eighty percent of ocean pollution (also called marine pollution) originates on land—whether along the coast or far inland. Contaminants such as chemicals, nutrients, and heavy metals are carried from farms, factories, and cities by streams and rivers into our bays and estuaries; from there they travel out to sea. Meanwhile, marine debris—particularly plastic—is blown in by the wind or washed in via storm drains and sewers. Our seas are also sometimes spoiled by oil spills and leaks—big and small—and are consistently soaking up carbon pollution

from the air. The ocean absorbs as much as a quarter of man-made carbon emissions.

Point source

When contamination originates from a single source, it's called point source pollution. Examples include wastewater (also called effluent) discharged legally or illegally by a manufacturer, oil refinery, or wastewater treatment facility, as well as contamination from leaking septic systems, chemical and oil spills, and illegal dumping. The EPA regulates point source pollution by establishing limits on what can be discharged by a facility directly into a body of water. While point source pollution originates from a specific place, it can affect miles of waterways and ocean.

7.4 Nonpoint source

Nonpoint source pollution is contamination derived from diffuse sources. These may include agricultural or stormwater runoff or debris blown into waterways from land. Nonpoint source pollution is the leading cause of water pollution in U.S. waters, but it's difficult to regulate, since there's no single, identifiable culprit.

7.5 Transboundary

It goes without saying that water pollution can't be contained by a line on a map. Transboundary pollution is the result of contaminated water from one country spilling into the waters of another. Contamination can result from a disaster—like an oil spill—or the slow, downriver creep of industrial, agricultural, or municipal discharge.

The Most Common Types of Water Contamination

7.6 Agricultural

Not only is the agricultural sector the biggest consumer of global freshwater resources, with farming and livestock production using about 70 percent of the earth's surface water supplies, but it's also a serious water polluter. Around the world, agriculture is the leading cause of water degradation. In the United States, agricultural pollution is the top source of contamination in rivers and streams, the second-biggest source in wetlands, and the third main source in lakes. It's also a major contributor of contamination to estuaries and groundwater. Every time it rains, fertilizers, pesticides, and animal waste from farms and livestock operations wash nutrients and pathogens—such bacteria and viruses—into our waterways. Nutrient pollution, caused by excess nitrogen and phosphorus in water or air, is the number-one threat to water quality worldwide and can cause algal blooms, a toxic soup of blue-green algae that can be harmful to people and wildlife.

7.7 Sewage and wastewater

Used water is wastewater. It comes from our sinks, showers, and toilets (think sewage) and from commercial, industrial, and agricultural activities (think metals, solvents, and toxic sludge). The term also includes stormwater runoff, which occurs when rainfall carries road salts, oil, grease, chemicals, and debris from impermeable surfaces into our waterways

More than 80 percent of the world's wastewater flows back into the environment without being treated or reused, according to the United Nations; in some least-developed countries, the figure tops 95 percent. In the United States, wastewater treatment facilities process about 34 billion gallons of wastewater per day. These facilities reduce the amount of pollutants such as pathogens, phosphorus, and nitrogen in sewage, as well as heavy metals and toxic chemicals in industrial waste, before discharging the treated waters back into waterways. That's when all goes well. But according to EPA estimates, our nation's aging and easily overwhelmed sewage treatment systems also release more than 850 billion gallons of untreated wastewater each year.

7.8 Oil pollution

Big spills may dominate headlines, but consumers account for the vast majority of oil pollution in our seas, including oil and gasoline that drips from millions of cars and trucks every day. Moreover, nearly half of the estimated 1 million tons of oil that makes its way into marine environments each year comes not from tanker spills but from land-based sources such as factories, farms, and cities. At sea, tanker spills account for about 10 percent of the oil in waters around the world, while regular operations of the shipping industry—through both legal and illegal discharges—contribute about one-third. Oil is also naturally released from under the ocean floor through fractures known as seeps.

7.9 Radioactive substances

Radioactive waste is any pollution that emits radiation beyond what is naturally released by the environment. It's generated by uranium mining, nuclear power plants, and the production and testing of military weapons, as well as by universities and hospitals that use radioactive materials for research and medicine. Radioactive waste can persist in the environment for thousands of years, making disposal a major challenge. Consider the decommissioned Hanford nuclear weapons production site in Washington, where the cleanup of 56 million gallons of radioactive waste is expected to cost more than $100 billion and last through 2060. Accidentally released or improperly disposed of contaminants threaten groundwater, surface water, and marine resources.

7.10 On human health

To put it bluntly: Water pollution kills. In fact, it caused 1.8 million deaths in 2015, according to a study published in The Lancet. Contaminated water can also make you ill. Every year, unsafe water sickens about 1 billion people. And low-income communities are disproportionately at risk because their homes are often closest to the most polluting industries.

Waterborne pathogens, in the form of disease-causing bacteria and viruses from human and animal waste, are a major cause of illness from contaminated drinking water. Diseases spread by unsafe water include cholera, giardia, and typhoid. Even in wealthy nations, accidental or illegal releases from sewage treatment facilities, as well as runoff from farms and urban areas, contribute harmful

pathogens to waterways. Thousands of people across the United States are sickened every year by Legionnaires' disease (a severe form of pneumonia contracted from water sources like cooling towers and piped water), with cases cropping up from California's Disneyland to Manhattan's Upper East Side Meanwhile, the plight of residents in Flint, Michigan—where cost-cutting measures and aging water infrastructure created the recent lead contamination crisis—offers a stark look at how dangerous chemical and other industrial pollutants in our water can be. The problem goes far beyond Flint and involves much more than lead, as a wide range of chemical pollutants—from heavy metals such as arsenic and mercury to pesticides and nitrate fertilizers—are getting into our water supplies. Once they're ingested, these toxins can cause a host of health issues, from cancer to hormone disruption to altered brain function. Children and pregnant women are particularly at risk.

Even swimming can pose a risk. Every year, 3.5 million Americans contract health issues such as skin rashes, pinkeye, respiratory infections, and hepatitis from sewage-laden coastal waters, according to EPA estimates.

7.11 On the environment

In order to thrive, healthy ecosystems rely on a complex web of animals, plants, bacteria, and fungi—all of which interact, directly or indirectly, with each other. Harm to any of these organisms can create a chain effect, imperiling entire aquatic environments.

When water pollution causes an algal bloom in a lake or marine environment, the proliferation of newly introduced nutrients stimulates plant and algae growth, which in turn reduces oxygen levels in the water. This dearth of oxygen, known as eutrophication, suffocates plants and animals and can create “dead zones,” where waters are essentially devoid of life. In certain cases, these harmful algal blooms can also produce neurotoxins that affect wildlife, from whales to sea turtles.

Chemicals and heavy metals from industrial and municipal wastewater contaminate waterways as well. These contaminants are toxic to aquatic life—most often reducing an organism’s life span and ability to reproduce—and make their way up the food chain as predator eats prey. That’s how tuna and other big fish accumulate high quantities of toxins, such as mercury.

Marine ecosystems are also threatened by marine debris, which can strangle, suffocate, and starve animals. Much of this solid debris, such as plastic bags and soda cans, gets swept into sewers and storm drains and eventually out to sea, turning our oceans into trash soup and sometimes consolidating to form floating garbage patches. Discarded fishing gear and other types of debris are responsible for harming more than 200 different species of marine life.

Meanwhile, ocean acidification is making it tougher for shellfish and coral to survive. Though they absorb about a quarter of the carbon pollution created each year by burning fossil fuels, oceans are becoming more acidic. This process makes it harder for shellfish and other species to build shells and may impact the nervous systems of sharks, clownfish, and other marine life

True scope In future this project can be improved to sort more categories of waste. In this system we can use advance conveyor system and conveyor material for increasing the efficiency of collection of garbage. We can use the solar panel for providing power to the boat instead of battery operation. To modify the size of boat according to its waste collecting capacity is increases. This project makes only for small lake and by doing some modification in its size and capacity it can be used in big lake and river.

CHAPTER 8

8. CONCLUSION

On Calculating and Experimenting the result are very satisfactory. On the basis of these result we can conclude that it is an innovative method of minimizing manual stress and thus very much reliably stabilizing the in the river. The project carried out by us made an impressing task in the environmental purpose and it is very useful for the small scale works. Although this system able to collect the garbage from the lake with human intervention. The objective of the project was successfully achieved.

CHAPTER 9

9. REFERNCES

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