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Design of Automatic River Cleaning System

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***Abstract*—This project emphasis on design of automatic river cleaning system. The motive of this project is used to remove the waste substance like debris and aquatic plants on the surface of the water bodies. The work has done looking at the current situation of our national rivers which are dump with crore liters of sewage and aquatic plant, bottle, debris etc. The government of India has taken charge to clean rivers and invest huge capital in many river cleaning projects like "NamamiGange" and many major and medium projects in various cities like Ahmadabad, Varanasi etc.**

Nowadays almost all the manufacturing process is being atomized in order to deliver the products at a faster rate. Automation plays an important role in mass production. In this project we have fabricated the river cleaning system. The main aim of the project is to reduce the man power, time consumption for cleaning the river. In this project we have automated the operation of debris cleaning with help of a motor, cutter, conveyor and chain drive arrangement. Some needs of automation are described below. Here using RF transmitter and receiver are to control the components.

Index Terms— Chain drive, Conveyor, Cutter, Collector, Motor, Propeller, RF transmitter and receiver.

I. INTRODUCTION

Water bodies like ponds, lakes, river, sea etc are the main source of water. The excessive growth of the water living type plants and disposal waste substance in the water leads to get polluted and it leads to major loss of water content from earth's surface. By implementing our cleaning systemthe waste weed and debris in the water body which gets removed. This machine is consists 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. It consists of Belt drive mechanism which lifts the debris from the water. The use of this project will be made in rivers, ponds, lakes and other water bodies for to clean the surface water debris from bodies. Similarly they are lots of problems of water pollution.The biggest problem of cleaning the wastes can cause diseases and it plays a challenging issue for the municipality officers.Waste substance has the major resource from homes, business industries, commercial activities and institutions which are subjected to the treatment plants by a carefully designed and engineered network of pipes on the bases of flow. Water damage is classified as three types of polluted water. They are clean water, gray water and black water. Clean water is from a broken water supply line. 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. A drainage ditch is a narrow channel that is dug at the side of a road or field to carry away the water. Nowadays automation plays a vital role in the applications of the proper disposal of sewages from industries and sewage cleaning is still a challenging task.Drainage pipes are used for the disposal of the waste substance unfortunately sometimes there may be loss of human life while cleaning the blockages in thepipes. The municipality employees 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 such as skin allergies.

II. LITERATURE REVIEW

[1]M. Mohamed Idhris, M. Elamparthi, C. Manoj Kumar Dr.N. Nithyavathy, Mr. K. Suganeswaran, Mr. S.

Arunkumar,"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 working starts with collecting of the sewage wastes by using the arm and it put the waste into the bin fixed in the machine at the bottom. An arm is used to lift the waste and the 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]Mr.Abhijeet.M. Ballade, Mr. Vishal.S. Garde, Mr.Akash.S. Lahane and Mr.Pranav.V.Boob,"Design and Fabrication of River Cleaningsystem"- India is holy country and 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 clean up machine a machine which involves the removing the waste debris from water surface and dispose it from the water body. The river cleanup machine works on hydropower to remove the waste water debris, plastics and garbage at Nashik.

[3] Mr. P. M. Sirsat, Dr. I. A. Khan, Mr. P. V. Jadhav,Mr. P.T. Date "Design and Fabrication of River Waste Cleaning Machine"- This paper tells about design and fabrication 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", and many major and medium projects in various cities. By taking this into consideration.This machine has designed to remove the river waste from the water surface. Traditional methods used for collection of floating waste are manual basis. And deposited near the shore of rivers which is a risky operation, expensive and time consuming. By considering this 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 and plastic wastages from water bodies.

[4] Pankaj Singh Sirohi, Rahul Dev,ShubhamGautam, Vinaykumarsingh, sarojkumar, "Review on Advance River Cleaner"- River water which is used for irrigation of the plant and it gives in return food to the people. They also maintain the ecology of region and bring prosperity. We decided to do this project to clean the river. After implementing this project we can control the pollution of river it is very beneficial for our society and environment. 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 essential source for life. It covers 70% of the Earth. But only a small portion of this precious natural resource is fit for the use of human consumption. Out of the earth's total water 97% is salt water which cannot fit to use it for human consumption.The further 3% is stored in various sources like glaciers, rivers, lakes and under-ground aquifers. An area without a river is considered to be poor. Unfortunately, during the past two decades water quantity and 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, is the two most holy rivers of our country are no exception to it. Thousands of crores of rupees is being spent to save the rivers through various plans by the government. Now days we can see river pollution is biggest issue of our planet so we introduce our society with an advance river cleaner. This is an advance river cleaning system. They

make this project to improve the current condition of the water surface by cleaning the river.

III. METHODOLOGY

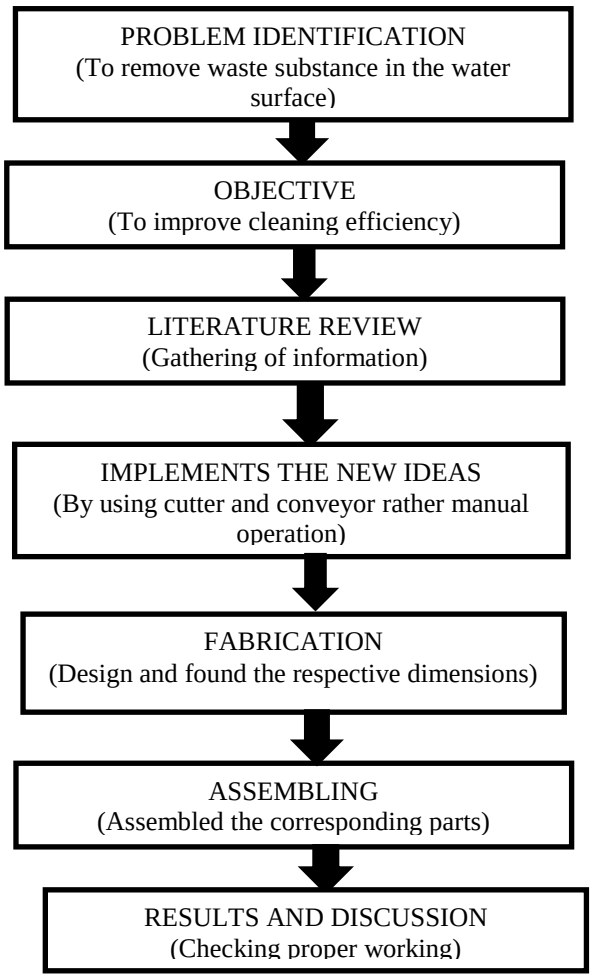

Fig. 3.1- Methodology

By studied from the previous literature review we were decided to do project on cleaning system in river with high efficiency and eco-friendly.

IV. CONSTRUCTION

i. CAD Model of River Cleaning Machine:

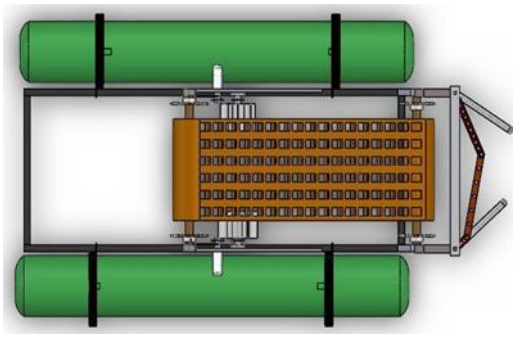

FIG. 4.1- CAD MODEL

ii. Construction

The project consists of a motor operated water wheel to run the project. It has four DC Motor of 12V, 7.6 Ampere. The device which is running the project is chain drive coupled having collecting plate. The project consists of two main shafts balancing and hoisting the sprocket of chain drive. The components are rest on frame serve as main body of the project. The steel pipe with pressurize air generates pressure head to run the project on water surface. The fabricated storage tank is used to store the waste fulfilling the purpose of the project.

iii. Working Principle

In this project the main aim of this machine is to lift the waste debris from the water surface and dispose them in the tray. Here we are fabricating the automatic river cleaning system. The collecting plate and chain drives are rotating continuously by the motor. The collecting plate is coupled between the two chain drives for collect the waste materials from river. The collected wastages are thrown on the collecting tray with the help of conveyer. Our project is having propeller which is used to drive the machine on the river. The propeller is run with the help of two PMDC motor. The total electrical device is controlled by RF transmitter and receiver which use to control the machine remotely.

V. ASSEMBLY OF COMPONENTS

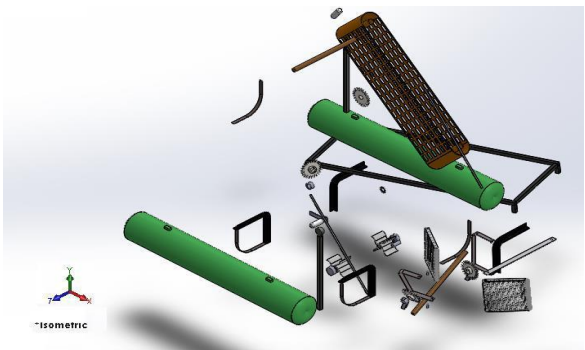

Fig. 5.1- Exploded View of River Cleaning Machine

The components which are involved to make this machine.

1) Base Frame
2) Hollow Pipe 2
3) L- Section 4
4) Inclined Section 2
5) T- section 2
6) Shaft 2
7) Motor 4
8) Gear 8
9) Sprocket
10) Chain
11) Carrying Belt
12) Battery
13) Nut and Bolt
14) cutter

VI. ASSEMBLING PROCEDURE

1. 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 base frame is made of M.S angle.

2. Hollow pipe is assembled at the base frame with the help of L- section through nut and bolt. It is made of tin sheet by using rolling and tapping 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.

3. L- Section is welded in base frame which is used to hold the hollow pipe with the help of nut and bolt.

4. Inclined section is welded on base frame to support the bearing and shaft.

5. 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.

6. Shaft 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.
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, water wheel and collecting mechanism. Here we are used 4 motor. 1 motor is mounted on garbage collector, 2 and 3 motor is mounted on left and right water wheel and 4 motor is mounted on carrying belt with the help of gear train and chain drive mechanism.
8. Gear drive is welded on shaft with the help of connecting link and T- section. Gear drive is power transmission drive used to transmit the power from motor to chain drive as required to carry a load as desirable to complete the project objective.
9. There is 8 sprocket used in the project in which 1,2,3,4 are of same dimension is mounted on shaft of carrying belt with the help of chain and Remaining 5,6,7,8 are used to drive the water wheel which is used to float the machine in water.
10. 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 bicycle andmotorcycle.Itis also used in a wide variety of machinesbesides vehicles. The power which is transmitted by a roller chain known as the drive chain, passing over a sprocketsgear, 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 overcome real time issue as due to water tension garbage is difficult to collect the waste substance from the water surface. By using this four bar mechanism, it rotates at a particular angle intended to collect the garbage for the model. It has two window open and close as user wishes using remote to ON and OFF the mechanism.

12. Water wheel 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 of chain drive mechanism.

VII. ADVANTAGES AND APPLICATIONS

ADVANTAGES

1) Environment friendly system.

2) It's initial & maintenance cost is low.
3) Skill Worker not required to drive the system.
4) Easy in operation.

APPLICATIONS

1) It is applicable to reduce water pollution in rivers & ponds.

2) It is useful to remove the sediments present in swimming pool to keep it clean.

VIII. CONCLUSION

This project is fabricated on the basis of literature and research on different journal and paper relevantly available and fabricated in accordance so it can provides flexibility in operation. This innovation is easy and less costly and has lot of room to grow more economical. This project "Automatic River Cleaning system" is designed with the hope that it is very much economical and helpful to river and Pond cleaning. On the basis of it design and estimating cost and availability it is very cheap and very useful for the society.

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