DESIGN AND FABRICATION OF WATER BODY CLEANING MACHINE

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Abstract--- This project emphasizes on design and fabrication of the water body cleaning machine. As we know that water bodies are too polluted, similarly sometimes the aquatic animal tends to eat surface waste debris considering it as food which ultimately causes the death of animals and it also causes skin infections & respiratory diseases to human. The water body cleaning machine is used to places where is waste debris in the body which are to be removed. First the area of garbage or debris is approached and cleaned over by an operator, controlling the machine. Due to its design, it is cost effective and very useful for the society. It also reduces the difficulties which we are facing to keep our water body clean. India is the land of rivers but these days it is being polluted more and more. The water pollution is major problem in water bodies, due to increase in water pollution in the form waste debris, it is hampering the life of human, animal & marine. By Looking the current situation of our country' s river we have designed the water body cleaning machine.

Key words--- Rx- Transmitter ,Tx- Receiver,food chain

I.INTRODUCTION

The Over two thirds of Earth's surface is covered by water; less than a third is taken up by land. As Earth's population continues to grow, people are putting ever-increasing pressure on the planet's water resources. In a sense, our oceans, rivers, and other inland waters are being "squeezed" by human activities so their quality is reduced. Minister of Environment, B. Kambuaya, and revealed waste production of 33 cities across India by the Central Bureau of Statistics records in 2007 reached 132,192 cubic meters per day. Not all of the waste disposed and transported in landfill, for example a lot of garbage that have not been handled properly such as burned and dumped in the river. This phenomenon that causes environment problems. Rivers turn into domestic landfill. India' s 80 percent of river has been polluted by domestic waste. River ecosystem that gets under pressure of high pollution load than other rivers in the Ganga and Godavari River. This river is located in Allahabad & Nashik which passes through many villages which have poor sanitary conditions in general. During the rainy season this river often overflows and causes floods. UP government makes efforts to overcome trash pollution in the rivers. One of them is to launch issue regulation in these states which prohibits dumping into rivers.

In this project the main purpose of this machine is to lift the waste debris from the water surface and dispose them in the storage tank. This machine consists of water wheel driven conveyor mechanism which collect and remove the wastage, garbage & plastic wastages from water bodies. This also reduces the difficulties which we face when collection of debris take place. A machine will lift the waste debris from the surface of the water bodies[1]. This will ultimately result in reduction of water pollution and lastly the aquatic animal death to these problem will be reduced. It consists of belt drive mechanism which lifts the debris from the water body. The use of this project will be made for river, ponds, lakes and other water bodies to keep clean. similarly they are lots of problem of water pollution in Godavari river, Nasik which affects the acoustic , human life & beauty of these rivers.

The some photo graphs are shows the water pollution near Godavari River Nasik. 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. 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]. A drainage ditch is a narrow channel that is dug at the side of a road or field to carry away the water. Nowadays, 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. 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.

II. PROBLEM STATEMENT

1. The statement of the project is " Design & Fabrication of River Cleaning System" to remove the waste debris, plastic waste & garbage from River, This causes harm to acoustic & human life.

2. To achieve clean water body for reduction of river pollution & to achieve the beauty of River by clean water bodies.

3. To reduce the difficulties which we are facing right now and it also remove the chemical wastages from the water body.

II.A. EFFECTS OF POLLUTION IN WATER BODY
Effects of water pollution.
The effects of water pollution are varied and depend on what chemicals are dumped. Many water bodies near urban areas (cities and towns) are highly polluted. This is the result of both garbage dumped by individuals and dangerous chemicals legally or illegally dumped by manufacturing industries, health centers, schools and market places.
Death of aquatic animal
The main problem caused by water pollution is that it kills organisms that depend on these water bodies. Dead fish, crabs, birds and sea gulls, dolphins, and many other animals often wind up on beaches, killed by pollutants in their habitat (living environment).
Disruption of food chain
Pollution disrupts the natural food chain as well. Pollutants such as lead and cadmium are eaten by tiny animals. Later, these animals are consumed by fish and shellfish, and the food chain continues to be disrupted at all higher levels.
Diseases
Eventually, humans are affected by this process as well. People can get diseases such as hepatitis by eating seafood that has been poisoned. In many poor nations, there is

always outbreak of cholera and diseases as a result of poor drinking water treatment from contaminated water.

Fig.1. Effects of pollution by debris and garbage in water body

III. CONSTRUCTION AND OPERATION OF WATER BODY CLEANING MACHINE

The Water body cleaning machine Consists of Battery(12V,7.1Ah), motor driver, Bluetooth module , 12V DC Motor(one for conveyor mechanism 160 rpm, 10kg of Torque & two for locomotion waterwheels 160rpm, 10kg of Torque), chain , conveyor belt , propeller & Arduino. The project consists of a motor operated water wheel to run the project. It consists of DC Motor. The device which is running the project by chain drive and between the chains is having collecting plate coupled. The project consists of two main shafts balancing and hoisting the sprocket of chain drive[2]. The components are rest on frame serve as main body of the project. The PVC 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. The collecting plate and conveyor chain mechanism drivers are rotating continuously by the motor and motor gets the supply from the battery. The collecting plate is coupled between the two chain drivers for collecting the waste materials from the water body. The collected wastage are thrown on the collecting tank with the help of conveyer. Our project consists of PVC pipe for float the machine over the water body. PVC pipe does not let sink the machine. The propeller is used to drive the machine in the water body[2]. The propeller is run with the help of the DC motor (12 V). The total electrical device is being controlled by Arduino and Bluetooth module which is used to control the machine by mobile. Our machine has been constructed on base frame. Bottom of base frame is fixed PVC pipe for not let the machine to sink into the water body machine. One DC motor is coupled with roller rod when battery supply the source to the motor, conveyor belt mechanism starts working. And same battery is supplies the source to the locomotive motor to propel the machine. collecting plate is mounted on conveyor belt to collect the debris from water body.

Fig2. 3D model of water body Cleaning Machine

III. A.OPERATION

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. It consist arrangement of the conveyor which is placed on the shaft & bearings support; the shaft is coupled to the pedestal bearing and bearing is mounted on the M.S angle frame, the frame is welded and resembles the shape of slope facing machine part. Due to waterwheels are rotate; this power is transmitted to conveyer system by means of belt drives. As the conveyer is move, it collects the water debris, waste garbage &plastics from water bodies. As the machine is placed in the water the waste debris in water will get lifted and it moves in upward direction. As the waste debris reaches the upper extreme position it will get dropped in the tray[3]. Hence this will result in cleaning of water surface and safe collection of waste debris from water. After collection of all wastage debris the second conveyer is convey it out of the river. The River Cleanup Machine utilizes long floating barriers which is being at an angle capture the plastic, making mechanical extraction possible.

The machine is being controlled by Bluetooth module. Two Motor driver are being used and both drivers are getting the supply from Battery. Bluetooth module and propeller's motor driver is connected to the UNO. One Motor driver is connected to the DC Motor and that DC Motor is coupled with Roller where conveyor belt mechanism operates. Another one motor driver is connected to DC Motor for propulsion. When Battery supplies the current to Motor via Motor driver, conveyor belt mechanism starts operating[3]. Propeller's DC Motor also gets the charge from the Battery, then starts to propel the machine. Our project consists of PVC pipe for float the machine over the water body. PVC pipe does not let sink the machine. The main aim of this project is to lift the debris, plastic & garbage with the help of conveyor belt & chain mechanism and store them in storage tank. The aim of the project is to reduce the man power and bring the semi- automated operation of water bodies cleaning with the help of motor and chain drive arrangement into operation. The biggest advantage is that it can clean chemical wastes with minimized respiratory disease risk & environment.
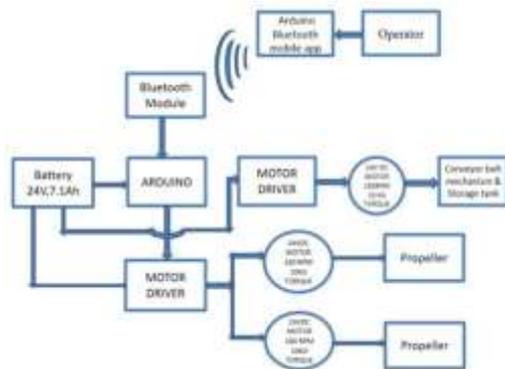
IV. FUNDAMENTAL OF BLOCK DIAGAM

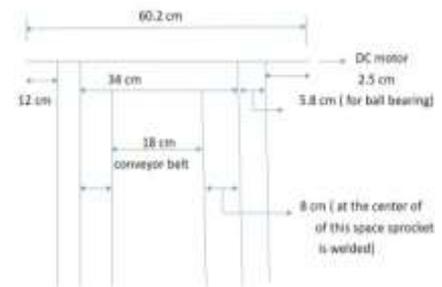*Fig.3. Block diagram of water body cleaning*

Fig 5. Roller rod arrangement

IV.A.BLOCK DIAGRAM EXPLANATION

The machine is being controlled by Bluetooth module. Two Motor drivers are being used and both drivers are getting the supply from Battery. Bluetooth module and propeller's motor driver is connected to the UNO. One Motor driver is connected to the DC Motor and that DC Motor is coupled with Roller where conveyor belt mechanism operates . Another one motor driver is connected to DC Motor for propulsion. When Battery supplies the current to Motor via Motor driver, conveyor belt mechanism starts operating. Propeller's DC Motor also gets the charge from the Battery, and then starts to propel the machine.

IV.B.MODEL OF WATER BODY CLEANING MACHINE

The water body cleaning machine is basically constructed upon the ply board. Roller stands are connected with the ply board[3]. Ball bearing has been mounted with the roller rod both sides. Ball bearing is placed upon the roller stand. Chain sprockets are welded along with the roller rod and then chain is coupled between chain sprockets. Conveyor belt is placed between the chain sprockets on the roller rod. Storage tank is placed behind the roller stand so wastages from the water body is stored in the storage tank. Collecting plate is being placed on the conveyor belt. PVC pipe is mounted at the bottom of ply board for floating the machine over the water body. Propellers are being used for propel the machine.
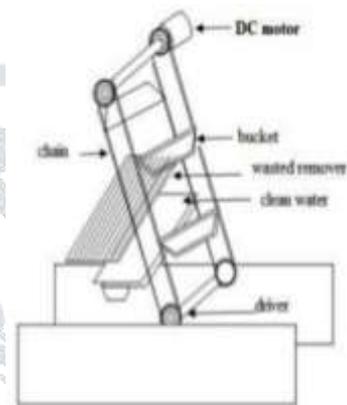

Fig. 4.Model of water body cleaning machine

Fig 6. Model picture of our machine

V.WORKING OF WATER BODY CLEANING MACHINE

The " Water body cleanup machine" used in that places where there is waste debris in the water body which are to be 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 [4]. 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 under Godavari River.

Nasik which affect the acoustic, human life & beauty of Godavari River.The some photo graphs are shows the water pollution near Godavari River Nasik. 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. 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, 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 [3]. 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.

The project consists of a motor operated water wheel to run the project. It has four DC Motor of 12V. 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 [8]. 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. Here we are fabricating the remote operated water body cleaning machine. 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 tank with the help of conveyer. Our project is having propeller which is used to drive the machine on the river. PVC pipe is being used to float the machine over the water body. The propeller is run with the help of two DC motor. The total electrical device is controlled by Bluetooth module and Bluetooth module is connected to the Arduino which use to control the machine remotely.

V.A.ASSEMBLY PROCEDURE OF MACHINE

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.

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 [4]. 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 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.

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 [5].

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.

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. 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.

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 [5]. 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.

Collecting Mechanism is used in our project to overcome real time issue as due to water tension garbage is difficult to collect. 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.

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 [6].

VI. SOFTWARE EXPLANATION AND PROGRAMMING

The machine is being operated by Bluetooth module which is connected with Arduino. These all are wireless connected with Arduino Bluetooth RC car. A Bluetooth module is used to receive command from android phone and Arduino UNO is used for controlling the whole system [9]. Bluetooth controlled car moves according to button touched in the android Bluetooth mobile app. We can use any Bluetooth app that supporting or can send data.

A Bluetooth module is used to receive command from android phone and Arduino UNO is used for controlling the whole system. Bluetooth controlled car moves according to button touched in the android Bluetooth mobile app. To run this project first need to download Bluetooth app form Google play store. We can use any Bluetooth app that supporting or can send data. Here are some apps' name that might work correctly.
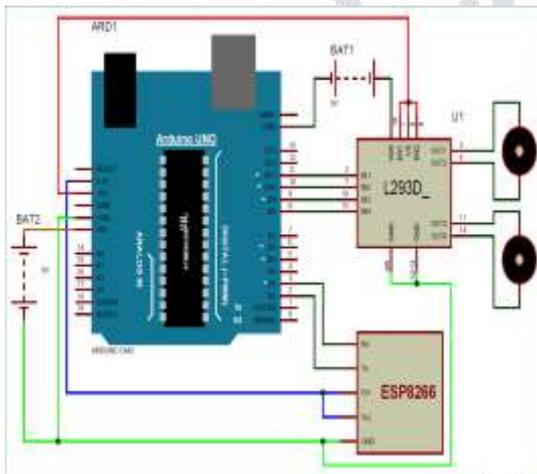

Fig. 7. Connection of Electronics media

After installing app you need to open it and then search Bluetooth device and select desired Bluetooth device. And then configure keys [8]. Here in this project we have used Bluetooth controller app.

1. Download and install Bluetooth Controller.

2. Turned ON mobile Bluetooth.

3. Now open Bluetooth controller app

4. Press scan

5. Select desired Bluetooth device

6. Now set keys by pressing set buttons on screen after setting keys press ok.

When we touch forward button in Bluetooth controller app then machine start moving in forward direction and moving continues forward until next command comes.

When we touch backward button in Bluetooth controller app then machine start moving in reverse direction and moving continues reverse until next command comes.

When we touch left button in Bluetooth controller app then machine start moving in left direction and moving continues left until next command comes. In this condition front side motor turns front side wheels in left direction and rear motor runs in forward direction.

When we touch right button in Bluetooth controller app then machine start moving in right direction and moving continues right until next command comes. In this condition front side motor turns front side wheels in right direction and rear motor runs in forward direction. There by touching stop button we can stop the machine.

VI.A.RESULTS AND DISCUSSION

A Motor driver is connected to Arduino to run the car. Motor driver' s input pins 2, 7, 10 and 15 are connected to Arduino digital pin number 12, 11, 10 and 9 respectively [7]. Here we have used two DC motors to driver car in which one motor is connected at output pin of motor driver 3 and 6 and another motor is connected at 11 and 14. A 6 volt Battery is also used to power the motor driver for driving motors. Bluetooth module' s RX and TX pins are directly connected at RX and TX of Arduino. And vcc and ground pin of Bluetooth module is connected at +5 volt and gnd of Arduino. And a 9 volt battery is used for power the circuit at Arduino Vin pin.
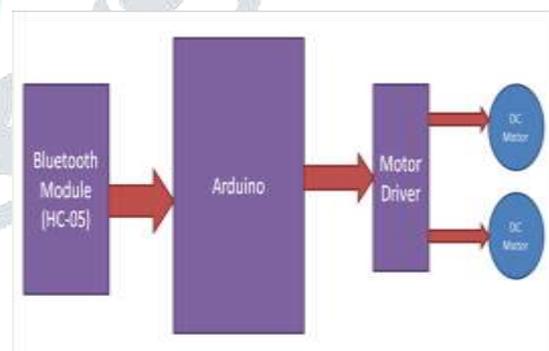

Fig.8. Circuit diagram of electronics media

Then it has created functions for different directions of machine. There are five conditions for this Bluetooth controlled machine which are used to give the directions:

VII. CONCLUSION

This project is fabricated on the basis of literature and research on different journals and papers relevantly available and fabricated accordingly. It can provide flexibility in operation. This innovation is easy & cost effective and has lots of room to grow more economical. The Water body cleaning machine is designed with the hope that it can serve the purpose of water body cleaning with minimum disease risk and optimum effectiveness. Due to its design, it is cost effective and very useful for the society. It also reduces the difficulties which we are facing to keep our water bodies clean. By using this machine, water body can be kept pollutant free. We were able to gain valuable insights while designing and constructing the water body cleaning machine. These precious learning and critical thinking skills will help us throughout our careers.

Touched button in Bluetooth controller app.	Output for front side motor to give direction		Output for rear side motor to move forward or reverse direction		
Button	M11	M12	M21	M22	Direction
Stop	0	0	0	0	Stop
Forward	0	0	0	1	Forward
Backward	0	0	1	0	Backward
Right	1	0	0	1	Right
Left	0	1	0	1	Left

REFERENCES

[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" , IJETT – Volume-45 Number2 -March 2017

[2] Mr.Abhijeet.M. Ballade, Mr. Vishal.S. Garde, Mr.Akash.S. Lahane and Mr.Pranav.V.Boob, " Design & fabrication of river cleaning system" , IJMTER Volume 04, Issue 2, [February– 2017] ISSN (Online):2349– 9745.

[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" , IJCMES 2017 Special Issue-1 ISSN: 2455-5304

[4]Pankaj Singh Sirohi, Rahul Dev, Shubham Gautam, Vinay Kumar Singh, Saroj Kumar," Review on Advance River Cleaner" , IJIR Vol-3, Issue-4, 2017 ISSN: 24541362.

[5] Osiany Nurlansa, Dewi Anisa Istiqomah, and Mahendra Astu Sanggha Pawitra, " AGATOR (Automatic Garbage Collector) as Automatic Garbage Collector Robot Model" International Journal of Future Computer and Communication, Vol. 3, No. 5, October 2014.

[6] Basant Rai, " Polltution and Conservation of ganga river in modern India" , International Journal of Scientific and Research Publications, Volume 3, Issue 4,April 2013 1 ISSN 2250-315

[7] Huang Cheng, Zhang Zhi*," Identification of the Most Efficient Methods For Improving Water Quality in Rapid Urbanized Area Using the MIKE 11 Modelling System" , 2015 Seventh International Conference on Measuring Technology and Mechatronics Automation.

[8] Emaad Mohamed H. Zahugi, Mohamed M. Shanta and T. V. Prasad," Design Of Multi-Robot System For Cleaning Up Marine Oil Spill" , IJAIT Vol. 2, No.4, August 2012.

[9] Prof. N.G. Jogi, Akash Dambhare, Kundan Golekar, Akshay Giri, Shubham Take, " Efficient Lake Garbage Collector By Using Pedal Operated Boat" , IJRTER Volume 02, Issue 04; April 2016 ISSN: 2455-1457.