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Remote Operated Water Floating Garbage Cleaning Machine by RF Module

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ABSTRACT: This study is focused on development of water floating garbage cleaning machine or river waste cleaning machine; a machine which is capable of removing waste debris from water efficiently and effectively. For the existence of life on earth water is the basic need and only about 3% of Earth's water is fresh for drinking. Of that, only about 1.2 percent is often used as drinking water; remaining is in the form of glaciers, ice caps, or deep inside the ground. The drinkable water which we drink comes from rivers and waterfalls. If we move our eyes towards existing situation of our rivers and water bodies which supply drinking water, they are serving as dumping yards for waste debris, solid and liquid wastes, which includes plastic bags, bottles, plastic wrappings of food, beverage cans, so many toxic materials, pollutants, etc. Due to this pollution in water is increasing rapidly, which is dangerous for humans as well as aquatic animals. The motive of this project is to clean this type of garbage from the water bodies like rivers and lake by, "water floating garbage cleaning machine." This machine will work on the chain drive mechanism which is operated by RF module remote control arrangement having components like conveyor belt attached with fins, motor, battery or solar panels, propellers, floating pipes, collecting tray, etc. assembled together. As motor runs conveyor belt will also run, which will collect the garbage floating on water and further transfer it to the collecting tray. With less human intervention reducing time and man power for cleaning water bodies is our alternating aim.

KEYWORDS: Motor, chain drive, propeller, conveyor, collector, RF transmitter and receiver

I. INTRODUCTION

Water is basic need of human as well as aquatic life. About 71% of the total earth is covered with water. we get water from many sources likes rivers, lakes, dams, reservoirs etc. We use water for many purposes such as drinking, washing, washing utensils etc. But what if the water is not fresh? What if we get polluted water to drink, cook, etc.? Nowadays the main problem of human & living organism is pollution. Due to the water pollution many aquatic livesare in danger. The main reason of the water pollution is the solid waste, waste from factories, plastic waste, beverages cans, food wrapping plastic, etc. It gives adverse effect on environment and biodiversity. Thus, considering all above problems we designed a small project i.e., "REMOTE OPERATED WATER FLOATING GARBAGE CLEANING MACHINE ". Our project is basically a model that can help reducing the water pollution. It removes waste debris, plastic bags, bottles cans etc. In that machine we use chain drive mechanism & motor drive conveyor mechanism which collecting solid waste floating on water bodies, further the conveyor mechanism consists of the belts on which fins are attached these fins collect the waste then transfer it on conveyor belt and lastly to the collecting tray or box. The mechanism of our model is driven by using batteries. This project also collects the impurities present in drainage water like empty bottles, polythene bags, wrapping plastics, etc. So, this can help the society to reduce the pollution. In this way our project will be able to fulfill the main objective ofreducing man power and less human intervention.

II. LITERATURE REVIEW

1] In this project aim to "Design and fabrication of sewage cleaning machine was to automation the sewage cleaning processes and reduce the spread of disease in human. They proposed a machine-made system by remote control to clean the sewage from the bodies, therefore their system reduces the effects of sewage waste and its harmful chemicals and gases. They

used a wiper motor that started working as soon as the setup started. They attached two power window motors to the wheel and operated them with help of a remote-control system. They used they're with the help of remote-control system. They used their hands to picks up the sewage and arranged for a dustbin bucket to collect the sewage. They proposed that their machine is also capable of picking up debris floating on the surface of the water. Interference in the process of human contact and hygiene in their systems is limited and this reduces the spread of disease in humans.[1]

2] The project focuses on the "design and fabrication of river waste cleaning machines." A "river cleaning machine" is a machine that involves removing surface debris from water and safely disposing of it. Looking at the current state of our national rivers, billions of litres of sewage and pollutants, toxins, debris, etc. Are filled with. This has led to increased water pollution in the form of waste disposal; It is endangering the lives of aquatic animals and endangering their lives.A machine will pick up aquatic waste surface waste, which will ultimately reduce water pollution and ultimately reduce the death of aquatic animals due to these problems.The main objective of this project is to reduce the use of manpower and time to clean the river. In this project we have put energy in the battery and with the help of motor and chain drive system this energy is used to clean the river[2]

3] This paper focuses on the "Lake Health Monitoring and Waste Collecting Aquabot." They explained the present condition of the National sacred rivers which are infected by large amount of waste and loaded with pollutants, toxic chemicals, debris, etc. due to such situation and also because of the multiplying water pollution in the form of waste debris the aquatic life is in danger. They designed the machine that will be collecting all the waste debris from the water. This will be resulting into reduction of water pollution and also reduce the rate of aquatic animals' death. Also, their other aim was to reduce the man efforts and reduces the time for cleaning the water bodies. In their project (Design and Fabrication of River Cleaning Machine) they stored the energy in the battery and used the same for the purpose of cleaning using motor and chain drive arrangement[3]

4]This paper emphasis on"Automatic garbage collector robot model" They emphasized the basic need of the human body i.e., water**.** They studied how pollution is affecting people and society**.** They explain that environmental problems occur for a number of reasons such as no public awareness in the protection of people in such an environment i.e., hygiene information. Low budget allocation on environmental management is another problem. All the environmental issues that come up day by day have been coming up over the years and yet they have not been solved yet. Garbage, water flow can be stagnant, at the same time the water becomes dirty, makes sulfur. Sometimes overflow of water can cause it to flood immensely. Thus, with all these problems in mind, they designed adapters that are automatic waste collectors. The aggregator is a rotor robot model as an automatic waste collector. The main objective of his project was to collect garbage from the river which was not effective and efficient. Their method involves identifying the necessary components, analysing them, and so on. He also linked hardware and software engineering, system development and testing. This design has an ATMAJ16 that has a voltage of 5 volts, as well as a 1 ampere current and an IC driver with a voltage of 12 volts and a 1.2 ampere current and they provided a limit switch to control the model. Accessories include robot control systems, sensor systems that detect waste, mechanical robots that have robotic arms that collect waste, and even actuator robots. Garbage can be collected up to 5kg load and the collector tray robot has a speed of 0.26 m. [4]

5] The motive of the project is "Design and Fabrication of river cleanup system." In this project they looked after the rising water pollution and due to the pollution, the life of aquatic animals and causing danger to their life. They explained that this rising water pollution is a very severe problem to the society. Also, the aquatic animals sometimes eat the water surface debris considering it as a food, which ultimately results in causing death of the aquatic animals. Also due to this polluted water many skins disease to human kind is observed. So, looking after this major problem which is hampering the aquatic life and also to reduce the rising water pollution which is mainly caused due to solid waste, they proposed the system "River cleanup machine". With this design they claimed that removing the waste debris from the water surface and dispose from the water body can we made effectively. Their project basically works on the hydropower to clean the waste debris, plastics and garbage from Godavari River. They used hydropower energy for rotating the waterwheels, which converts the Kinetic Energy (K.E.) into the mechanical energy from the drive shaft to the conveyor.[5]

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III. CAD MODEL

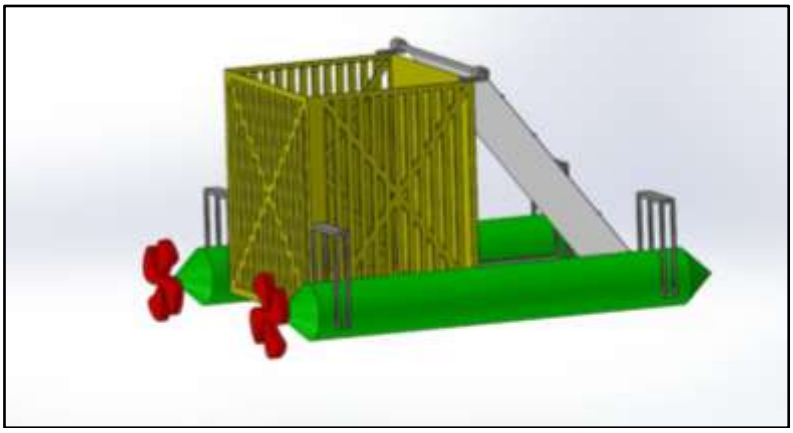

Fig: - CAD Model of Remote Operated Water Floating Garbage Cleaning Machine by RF Module.

IV. SPECIFICATION OF COMPONENT

SR. NO.	COMPONENTS	MATERIAL USED	DIMENSIONS (mm)
1	Base Frame	Mild Steel	L=1220, W=480
2	Hollow Pipe	Mild Steel	D1=2000, D2=180
3	Waste Collector/Box	Plastic	
4	Hollow Shaft	Iron	D1 =20mm, D1 =18mm
5	Propeller	Plastic	
6	Bearings	Steel	B=.7500, OD Ball=1.6250
7	Conveyor Belt	Chrome Steel	L=1700mm, W=400mm
8	Batteries	Lithium-ion Battery	12v 7.5-amp ups battery
9	RF Model	Thin film magnetic material	-
10	Signal Transmission Device	Outer plastic sheath	-
11	Remote	Acrylonitrile butadiene-styrene	-
12	DC Motor		DC Motor- RPM=50
13	Chain & Sprocket	Alloy Steel	No. of Links =108

V. CONSTRUCTION AND WORKING

CONSTRUCTION:

The base frame using hand cutting machine and electric welding machine to cope with the operation. The base frame is made of square rod. The base frame is assembled through nuts and bolts with the help of L section hollow pipe. It is made by PVC pipe using fastening operation. The purpose of this pipe is to float on the water and carry the weight of the project because compressed air is placed in the pipe which creates differential pressure, causing the machine to float on the water. The L-section is welded to the base frame to hold the hollow pipe which is used with the help of nuts and bolts. The T section is welded to the base frame to support the bearing and the shaft. T-sections are assembled on the base frame by welding. It is used to support the bridge with the help of bearings and shafts. A

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conveyor belt is used to move the torque from the motor to the chain drive. The two shafts are joined together in the machine Shaft 1 is mounted on the chain drive next to the machine and the shaft 2 is mounted on the rear chain drive with the help of inclined selection and T-section, respectively. A plate is welded in the T section from the base for the mounting motor to drive the pulley of the belt drive. The drive source of our project is an electric motor, current which is used to drive the gear train to assemble the system. The gear is welded to the pulley shaft and another gear is welded to the motor gift drive which is used to transmit power from the motor to the conveyor belt pulley.

WORKING:

The operation of the device will be based on chain drive system. There will be 2 gears, one gear is welded to the pulley shaft and the other to the motor shaft drive, which will be connected together by a chain drive. After supplying power to the motor through the DC battery, the chain drive will transmit power from the motor to the conveyor belt play. This way the conveyor belt will rotate and with the help of the wings attached to the strap, it will pick up the floating waste of water and supply it to the collection tray. At the same time when power is supplied to the motor, the propeller will turn on and give the machine forward and backward speed. The main automation of the machine is that, it will operate on a remote-control system, the system of which will be based on a radio frequency transmission module (RF module).

- **Chain Drive Mechanism:**

Chain drive is a way of transmitting mechanical power from one place to another. The power is conveyed by a roller chain known as 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.

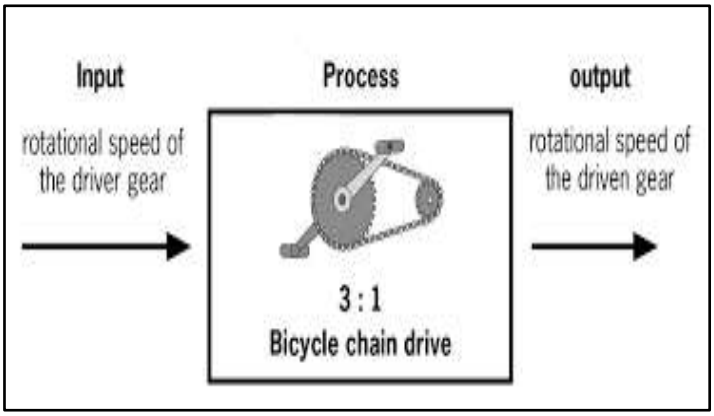

Fig. Chain drive mechanism

- **RF Module:**

An RF module (short for radio-frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio-frequency (RF) communication. For many applications, the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver. RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required to achieve operation on a specific frequency.

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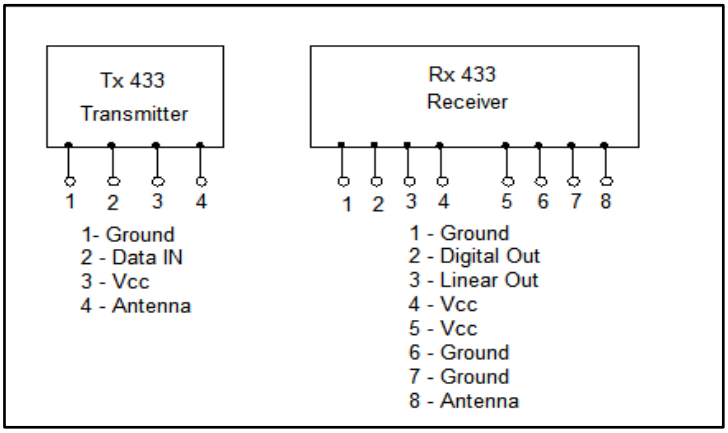

Fig. RF Module Transmitter and Receiver

VI. APPLICATION,ADVANTAGE AND DISADVANTAGE

APPLICATION:

1.It is applicable to reduce water pollution in rivers & ponds.
2.It is useful to reduce the environmental marine pollution at river, Lake.
3.It is also useful in fishery plant to collect dead fishes and solid impurities in waste water.
4.It is useful to remove the sediments present in swimming pool to keep it clean.

ADVANTAGES:

1.Initial & maintenance cost is less.
2.It is very useful for small as well as big lake, rivers, where garbage is present in large amount.
3.Easy replacement and installation of various parts
4.Skill worker not required to drive the system self-propel.
5.Environment friendly system.

DISADVANTAGES:

1.The waste collecting capacity of machine is limited at a time.
2.This machine is able to collect the waste which is only floating on water level.

VII. RESULT AND CONCLUSIONS

In this project we discussed research on materials, various journals and available documentation and then operation design and development remote operated water floating waste cleaning system provides flexibility. This innovative design in the hope that it is extremely economical and beneficial for cleaning rivers, lakes, etc. or all water bodies.The project designed by us did an effective job with environmental purpose and it is very useful for small work.The system is capable of collecting waste from the pond by human intervention.

- By increasing the perfection of the conveyor and the thematic material used in the conveyor, the efficiency of the project can be increased.
- A sorting system is possible for different categories of waste.
- Garbage carrying capacity can be increased and deep cleaning capacity can be increased.

In this way we can conclude that the objective of the project has been achieved successfully.

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