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Implementation of River Surface Cleaning Machine – A Review

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Abstract: In the present work, the design of the river garbage collecting is the main focus. Currently, trillions of bits of plastic pollute the ocean, rivers, lakes, and seas, killing marine life, destroying ecosystems, and causing a mess on beaches. Hence, removing the plastic from the water is crucial, but no one is sure of the best way to go about it. In order to deliver the goods more quickly, nearly the entire assembly process is automated today. In large-scale production, automation is crucial. Water environmental contamination results from floating materials on the water surface for an extended period of time, such as aquatic plants, plastic bottles, and bags.

These floating objects typically do not disintegrate naturally or decompose slowly. By putting cameras on the riverside, the government management agency keeps an eye on the floating objects in the river in real time. To overcome this issue, we are creating a remotely operated waterway cleaning machine for this project. Our project's main goal is to gather all unwanted waste that is discovered floating on bodies of water while minimising labour requirements. We propose a river cleaning machine that will remove all floating waste particles from the river body. It is made up of two infrared sensors that detect waste particles and an ultrasonic sensor that detects the distance between the particle and the sensor. When the particles are detected, the machine moves towards them and collects the waste with the conveyor belt. This waste is collected in the machine's waste basket.

Keywords: Arduino uno, Ultrasonic sensor, IR sensor

I. INTRODUCTION

For all living things, water is the most vital resource. Water purity is therefore a fundamental requirement. Yet, humans are responsible for the pollution of lakes and rivers. Our goal is to reduce water pollution and clean the water, which is beneficial to all living things. If properly implemented, the present project might also be a huge security benefit. Solar electricity, which is free, is used by the boat to operate. Since this boat won't need an external energy source, money is saved. Urban population growth has been tremendous, but civic centers like those with sufficient infrastructure for trash disposal have not kept pace.

Additionally, if properly implemented, the suggested project could provide a significant security advantage. Solar electricity, which costs nothing, is used to operate the boat. Urban populations have grown significantly, yet there hasn't been a corresponding rise in civic infrastructure, including trash disposal facilities. Additionally, if properly implemented, the suggested project could provide a significant security advantage.

Solar electricity, which costs nothing, is used to operate the boat. Urban populations have grown significantly, yet there hasn't been a corresponding rise in civic infrastructure, including trash disposal facilities. Hence, as more people move into cities, less urban municipal services are provided. Hence, virtually all of India's urban water bodies are polluted and are being used to dump solid waste and untreated sewage, which in many cases has resulted in the water bodies finally becoming landfills. Urban water bodies are in terrible shape, despite the fact that there may be numerous laws and regulations for their protection and rehabilitation.

Solar panels transform light energy into electrical energy by utilising the sun's rays. All electrical and electronic devices are powered by batteries, which serve as energy storage devices. A microcontroller called an Arduino can be programmed to change the speed of a conveyor belt or the amount of waste that it collects.

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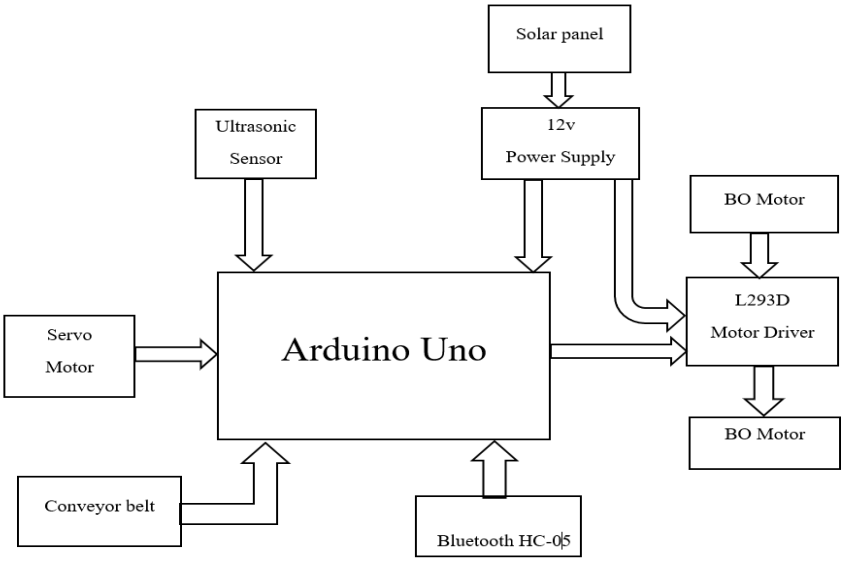

Figure 1: Block Diagram.

boat's motion, and other things. This boat runs solely on solar energy, thus there is no need for an additional power source. An internet-downloaded app for Bluetooth controllers or any other mobile application can be used to control the Bluetooth module, which is connected to the Arduino. As soon as it receives the Arduino command, the four motors will start turning. By transmitting and receiving signals, the ultrasonic sensors will identify obstructions and convey this information to Arduino. The conveyor and propeller are controlled by Arduino after that. The rubbish will then be collected through water on a rotating conveyor after that. Using the conveyor belt, the trash will be transported to a container.

II. LITERATURE REVIEW

N. A. S. Kamarudin et al.,[1] created a robot that relies on input from an Android phone app developed by MIT. To move forward, backward, left, right, or break, use the app's commands. The Bluetooth transceiver from the cell phone will send signals to the Bluetooth module HC-05 linked to the Arduino UNO microcontroller when the appropriate command is pushed. The input signal will then be processed by the microcontroller using the DC Motor Drive L293N. The DC geared motors attached to the microcontroller will then receive output signals from the microcontroller. According to the desired input supplied from the MIT programme, these motors will operate.

According to P.S Maguvm et al.,[2] design and construction of the river trash cleaning equipment are the main topic. A device that includes extracting waste particles from water surfaces and disposing of it safely from the water body. The work has been done in light of the current state of our nation's rivers, which are clogged with trash, pollution, hazardous chemicals, and millions of litres of sewage. Aquatic creatures' quality of life is being hampered by the growing amount of water pollution caused by waste materials. The device removes the floating garbage and debris from the water bodies, reducing water pollution in the process and, eventually, the loss of aquatic life. The project's major objective is to use less labour and time to clean the river. In this project, the energy is stored in the battery and used to power a motor and chain drive system that cleans the river.

V. N. Sagar et al.,[3] developed device where the ultrasonic sensor is used to determine the amount of waste in the dust bins. The waste is evenly distributed into the bins once the distributed conveyor is loaded to capacity. The stepper motor is used to control the distributed conveyor's forward and backward motion. By removing plastic waste from rivers rather than seas, the goal of minimizing the accumulation of plastic in larger water resources (oceans) is attained. The threshold values are established by researching the impact on the system at various value points in journals. An alarm message is delivered to the administrator when the trash cans are full. The conveyor is immediately shut off. The pH and water level of the river are also monitored using the sensors. The proposed system includes a real-time monitoring system, and sensor data is published on a website that anyone can access. Using Esp8266, the data is uploaded to the Blynk cloud platform. N. v Bandewar and S. J. Joshi et al.,[4] used a conveying mechanism made up of a pulley and a cleated rubber belt arrangement to pick waste from the water's surface. The cleated belt prevents waste material from slipping during the

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conveying process. This waste is collected in a 10 kg storage tank mounted on the robot's back side. A paddlewheel on each side of the robot, powered by a motor, aids in propelling the robot while it is floating. The robot has three motors: one wiper motor for the conveying mechanism and two other motors for the paddle wheel. These motors are controlled by the operator via a Bluetooth module-connected remote control.

S. A. kumar and S. Sasikala et al.,[5] constructed a model with Raspberry Pi-connected to DC motor setup allows the lake leaning System robot to move through water. The robot is made up of two DC motors with a combined speed of 30 rpm, a transistor, a garbage bin, an IR sensor, a gripper, and an ultrasonic sensor. To assist in the movement of the robot, the motors are connected to the Raspberry Pi through a relay. For proper movement, the motor's speed is regulated at a minimal level. While the robot is moving across the water's surface, things are detected using the ultrasonic sensor that is connected to the Raspberry Pi. The gripper's input is provided by the sensor's output. An adequate ground is used to attach this gripper on the base's front side.

Angle K.A, Bhatkar A.G al.,[6] used the association that is located on the motor shaft makes up the model. Motor rotation caused the conveyor to circle. Water debris, waste materials, and plastics from water bodies are gathered by the conveyor as it moves. As the gadget is submerged in the water, waste particles in the water will be raised and move upward as a result. The waste material will fall into the tray as it reaches the upper intensity position. As a result, this may lead to the safe removal of waste particles from water and the cleaning of water surfaces. The contraption near the river is propelled by a propeller and powered by a PMDC motor. By utilizing this four-bar system, it spun at a specific angle designed to collect the trash for the version. It has windows that the customer can open and close at will by turning on and off the mechanism from a distance. On a shaft that is mounted to the base frame, a water wheel is fastened. The water wheel is turned by a motor with help from a chain force mechanism.

R. Raghavi et al.,[7] collect the surface waste that is present in the water bodies, the machine is made up of a bucket collector attached to a motor, relay, and IR sensor. The gathered trash is placed on the container. With the aid of the DC motor, the device will operate the water features. By using an RF transmitter and receiver, which are utilised to remotely control the machine, all electrical devices are managed. Waste that is both acidic and alkaline may be created; neutralization can be achieved by properly mixing the trash at the appropriate periods. To prevent slugs of acid or alkali, however, this necessitates the storage of waste. To neutralize the waste, it can be held in liquid form and sprayed using a spray pump. This project is particularly beneficial for both small and large lakes and rivers where there is a lot of waste. The system can be operated without the need for skilled personnel and ecologically sound system. The system's design is kept simple.

M. A. Ali et al.,[8] proposed a model and the primary function of which is to remove waste materials from the water's surface and deposit them in the tray. It comprises of a conveyor arrangement that is mounted on the motor shaft. Conveyor rotated as a result of motor rotation. Water debris, trash, and plastic are gathered from water bodies when the conveyor is moved. The waste debris in the water will be raised as the machine is submerged and will migrate upward. The trash will fall into the tray once it reaches the uppermost extreme point. So, this will lead to the safe collecting of waste debris from water and the cleansing of water surface. The water wheel is turned by a motor using a chain drive system. It features four switches that allow the robot to travel in a specific direction (i.e., forward, backward, right and left).

S. M. Rafique and A. Langde et al.,[9] The robot's motor is utilised to continuously rotate the chain drives and collecting plate. The collecting plate is attached to two chain drives, which are used to remove trash from the river. The waste that has been collected is put on a collecting tray using a conveyer. In our project, a propeller on the machine moves it along the river. It can be used to reduce pollution in ponds and rivers. To keep the swimming pool clean, it is helpful to eliminate the sediments that are already there. The design is very cost-effective, simple to use, and beneficial for cleaning water. It can also be adjusted to increase cleaning capacity and effectiveness. Keep a lower design cost for the machine than the ones that are currently on the market.

B. Mahendra Moon and N. Bawane et al.,[10] constructed device which is used to lift waste debris off the water's surface and deposit it into the tray. In this picture, we are creating the remote-controlled river cleaning device. The chain drives and collecting plate rotate continually thanks to the motor. The remote controls the dc motors, which can travel in four directions: forward, backward, left, and right. The collecting plate is attached to two chain drives in order to collect river garbage. With the help of a conveyer, the gathered waste is placed on a collecting tray. The contraption in this project is propelled by a propeller while floating along a river. Two PMDC motors assist in driving the propeller. An RF transmitter and receiver pair that is used to remotely control the machine controls the entire apparatus.

J. Wang, X. D. Liu, and J. Lu et al.,[11] proposed bio-eco remediation of the river should be prioritised and the physicochemical remediation should be used as an assistant method in order to ensure health and sustainable development

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of the river ecosystem. Bioremediation materials should be modified, and the bioremediation process should be investigated from multiple angles and hierarchically, in order to progress the bioremediation technology. Aeration, bio-film preparation, microbial dosing, and other technologies' general application conditions are established. The proper bacteria are accustomed to diverse polluted rivers and may adapt.

P. M. Y. v Dathu et al.,[12] constructed a device removes trash, waste plastic, and other materials from water bodies using a waterwheel-driven conveyer mechanism. There are extra difficulties that arise from the accumulation of flotsam and jetsam. In order to reduce water contamination and, eventually, the susceptibility of marine species to these issues, a machine will be used to remove waste surface flotsam and jetsam from the water bodies. By use of its belt-driven component, the flotsam and jetsam are hoisted out of the water. This project will be utilised to clean up surface water debris from rivers, ponds, and other bodies of water.

H. S. Naicker et al.,[13] this model includes onshore surveillance and a robot for cleaning the water's surface. The use of open-source tech stacks guarantees that the code base is modern and affordable. The suggested remedy combines proactive and reactive elements. For faster and more accurate trash detection in dynamic scenes collected in image frames, the garbage detection algorithm needs to be thoroughly trained. The robot's size needs to be increased for waste collecting and vertically scaled for real water bodies. A fleet of robots may be required, depending on the area of the water body to be covered and the typical output that one robot exhibits during on-site testing. The bot's power source needs to be examined after deployment, and adjustments can be made to enhance performance. Finally, the improved solution may be used right away to protect aquatic bodies.

III. SUMMARY

The main purpose of the suggested model is to gather the garbage floaters on the river's surface. The waste is gathered by the conveyor belt and disposed of in the basket that is located at the system's back. There is no need for human power because the system is totally automated.

IV. CONCLUSION

In this study, it was demonstrated that a prototype water garbage collector could collect trash on the water surface, and the floating particles that are partially submerged. Here, a method for waste detection and automatic navigation of the water garbage collector without human operator is possible. The prototype can be improved in order to better achieve the goal of reducing the risk of flooding by using materials that are high strength and water proof for the collector body. Higher speed and torque DC motors can also be supported by an autonomous solar panel.

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