

Swirl Sink: A Novel Lake Cleaning Solution

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Abstract: Water is a basic need for all living being, it is important to maintain the cleanliness and hygiene of water. Water gets polluted due to many reasons such as waste from industry, garbage waste, sewage waste etc. Water from lakes and ponds are cleaned by traditional methods. We have to incorporate technology such that cleaning work is done efficiently and effectively. Swirl Sink is our novel solution to this problem which is plaguing our modern world lakes. It is an innovative take on the existing solutions; After extensive research and analysis into the existing lake cleaning devices/machines, we came up with our own unique design. Mechanisms used for our design is such a way that it collects the waste which floats on water bodies and the collected waste can be easily disposed from the product, our product cleans wastes found such as plastic wastes, garlands, bottles and other wastes found floating on water.

Index Terms - Whirlpool, Swirl Sink, Lake, Cleaning, Water.

I. INTRODUCTION

Lakes are an important aspect of the Earth's terrain. They are extremely precious ecosystems and provide a range of resources like food and minerals to humankind. They are not only one of the most significant sources for fresh water, but also extend valuable habitats for plants and animals alike to thrive in, they also moderate the hydrological extreme events like drought and floods, influence microclimate, enhance the aesthetic beauty of landscapes and offer lots of recreational opportunities. Lakes have a very special significance in India.

Pollution: The last two decades have seen an explosive increase in the urban population without a corresponding expansion of civic facilities such as adequate infrastructure for the disposal of waste. Hence, as more and more people flock to the cities the urban civic services are becoming less adequate. As a result, almost all urban water bodies in India are facing repercussions because of the pollution and are also being used for disposal of untreated local sewage and solid waste, and in many places, the water bodies have been turned into landfills.

Even though, there are a plethora of policies and acts for the protection and restoration of urban lakes and wetlands, urban water bodies are in extremely poor condition. Their numbers are declining rapidly. Looking back, in the beginning of the 1960s Bangalore had 937 lakes, now the figures have declined to about 189 and they too are slowly dying. Having unhealthy lakes also result to the fall of ground water levels. Assessments from various research institutes have shown that the number of water bodies in the city has reduced by 79% in the last forty years due to unplanned urbanization and encroachment of lakes simultaneously the built-up area has increased from 8% in 1973 to 77% in 2018.

II. LITERATURE SURVEY

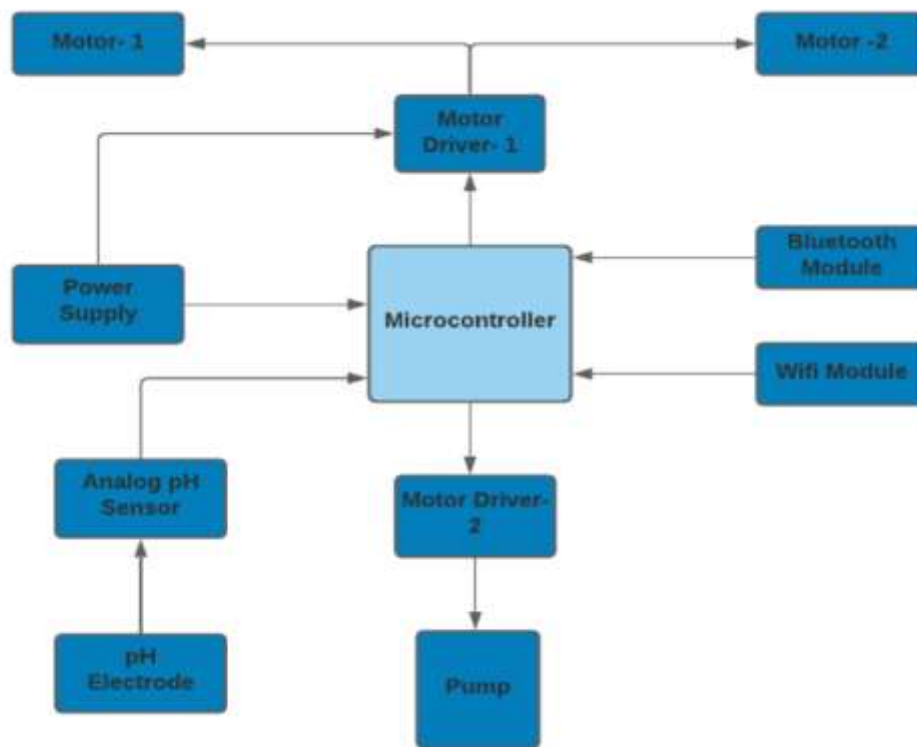
According to Prof. Ketan V. Dhande invented a River Clean up Machine which is used in those places where there is waste debris in the water body [1]. In this device a waterwheel driven conveyer mechanism and belt drive mechanism lifts the debris from the water. According to the article from "The Times of India" newspaper entitled with "Nagpur Municipal Corporation begins Nag-Pilli rivers campaign", The Nagpur Municipal Corporation has set the project for cleansing the Nag and Pilli River in West Nagpur. The goal of the project is to rejuvenate and beautify the river. As the world is moving towards creation of smart cities due to enormous growth in the population and advancement, the technology becomes important to control water cleaning through efficient methods [2]. Although the world keeps advancing with new technologies and advanced infrastructure the way some things are done remain the same. Automation is required is ordered to match the advancements and keep up with the current trends while also having a high efficiency and use [3]. Prof. Ajay Dhumal proposed a mechanical aquatic harvester which is used to perform different of tasks, including aquatic plant handling and garbage removal from rivers, lakes, bays, and harbors [4]. It is nothing but a type of barge. This harvests debris using a conveyor system on a boom and are designed to collect and unload vegetation, cutting height is also adjustable with respect to requirement, can be used up to 6 feet below the water surface. Cutter

bars collect material and bring it aboard the vessel using the conveyor; when the barge has reached capacity, cut material is transported to a disposal site and offloaded using the conveyor. Prof. N. G. Jogi stated cleaning the lake water is the main aim as the villages of India which consist of various small & big lakes and maximum villages does not use the water of lake for farming as well as drinking and for daily uses due to the maximum amount of garbage present in the lake water [5]. For that purpose, the efficient lake garbage collector by using pedal operated boat is fabricated. In this, conveyor attached to pedal and use shaft to drive a propeller. A pedal boat consists of two pedals, two propellers attached to the shaft again it comprises a control assembly. In this boat they have attached conveyor system also which is operated by the same pedal for cleaning the garbage in the lake. For or underwater inspection a system has been proposed which requires more fuel consumption and cameras not work that much efficiently under water [6]. The information generation system implemented for Kanhan River near Nagpur for river modeling. Excess exploitation of natural resources may cause big trouble to the environment, so happening with the Kanhan River. This research work helps to drag awareness in maintenance of natural resources. Generally, R&D activities take adequate time to benefit public domain, whereas public portal of this information system immediately shares approved river water quality data on its portal which is public. The various auto data generation techniques like- data generation through public partnership, data extraction, data estimation and data generation using Geographic information system-based utility software is explained in this paper [7]. The main objective of doing this project is to clean the garbage present in small and big lake. To reduce the cost of river cleaning by use of river surface cleaning machine. To tackle the problems about wastage, food material, plastics present in the lake. To clean the polluted water reservoirs to save the life of aquatic animals. To reduce the human efforts by automation in machine. To make eco-friendly and cost-efficient machine without use of liquors like petrol or diesel. This article by Basant Rai ref [8] talks about a World Bank Sponsored study, according to which pollution levels in the Ganga are contributing to 9-12% of total disease in Uttar Pradesh (U.P.). The coliform bacteria levels are in over 2 lakh MPN as opposed to the national water quality standard of 5000. Of water pollution up to a staggering 6.4 million dailies (Disability Adjusted Life Year). According to the CPCB survey report, the municipal sewage from the identified 25 towns in the year 1985 was 1340 million liters per day (mld). Apart from this sewage, 260 mld of industrial wastewater, residues from about 6 million tons of fertilizers and 9,000 tonnes of pesticides used for agricultural purposes within the basin, large quantities of solid waste, animal carcasses and human corpses were being released into the river every day. Works corresponding to cleaning 873 mld that is approximately 65% were taken up under the first phase of Ganga Action Plan which was formulated to clean up the river Ganga by the government of India.

III. APPLICATIONS

- **Clean Water bodies such as lakes:** Our Project's main objective is to clean lakes and make them pollution free by collecting trash and other floating garbage debris on the surface of the water bodies with minimal interference to the local ecosystem.
- **Less 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.
- **Easy disposal of waste:** Another important thing is easy removal of wastes which are collected in the collecting area inside the Swirl sink.
- **Eco-Friendly:** It should not harm the aquatic animals. It must not have any adverse effect on the water source.
- **User-Friendly:** Users should be able to operate the device with minimal training and prior knowledge about it.

IV. PROPOSED SYSTEM



Block Diagram of Swirl Sink

Motor 1 & 2: For Movement of the machine

Motor driver1: To control the motors m1 and m2.

Power supply: Li-Ion battery source for MC and other components.

Motor driver1: To control the Pump.

Bluetooth module: To control the Arduino Mega (Microcontroller)

Wi-Fi Module: To transmit the data of pH sensor to web server.

Sensor: To test the pH of the water

Hardware components

- Chassis
- Arduino Mega
- LM7805 Voltage Regulator
- Heat Sink
- L298N Motor Driver
- DC Motors
- HC-05 Bluetooth Module
- 12V Diaphragm Water Pump
- 12V Li-ion Battery
- Battery Charger
- pH Sensor

IV. CONCLUSION AND FUTURE SCOPE

4.1 CONCLUSION

Water makes up about 71% of the earth's surface and only 0.5% of the earth's water is available freshwater which in turn is found in lakes, rivers, and swamps. Swirl Sink was designed with an intention of the water debris floating on the lake, by using our device we can collect many floating wastes like plastic bottles, bags, garlands without any human interference and then dispose of the waste easily. Cleaning lakes is possible by remotely operating the device which is very user friendly. Also, our project helps in reducing the water pollutants to a certain extent. The project is socially helpful for the Laborers who clean the lake and makes them economically available. Usage and spread of this device would be the perfect example for "Technological application in environmental protection". This shows tech can also be used constructively unlike how some environmentalists claim that tech is responsible for the downfall of the natural environment and rapidly declining resources.

4.2 FUTURE SCOPE

Currently the project is remote controlled but through automation techniques, it can be made completely automated. This device can be used for many other purposes in the future as its versatility lies in its modularity. It can be modified to clean water bodies by adding the appropriate chemicals using AI to determine the pollutant. Solar panels can be added on it to make it self-sufficient; it can also double down as an eco-system monitor with many more additional features.

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