Solar Powered Waste Trash Collector For Rivers And Ponds

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Abstract

The poisoning of water sources and rivers by solid waste is a serious problem all over the world. Waste, such as plastics, chemicals, and other non-biodegradable items, can end up in rivers if they are not disposed of properly. The improper disposal of hazardous waste, such as batteries and electrical equipment, releases toxic compounds into the environment. Reduced water quality, destroyed aquatic ecosystems, and damage to aquatic animals are some of the undesirable effects that can result from solid waste contamination. In addition, it also has an effect on human health since polluted water can lead to the spread of waterborne diseases. Due to rapid economic growth, overpopulation, inadequate urban planning, and a catastrophe, the world is currently facing a major garbage crisis. This article's purpose is to introduce a solar-powered garbage collector to bodies of water. The world is currently facing a major garbage crisis. This article introduces a solar-powered garbage collector for bodies of water. Our battery-operated, autonomously floating, solar-powered system cleans the water surface. The primary goal is to collect the solid wastes from water bodies, minimise the amount of labour and time necessary to clear the river, and remove the solid objects that pollute the water.

Keyword: Water body, Solar, Trash Collector

1. INTRODUCTION

Pollution of water sources is a major global environmental problem. Particularly susceptible to contamination are rivers and ponds from a wide range of sources, including industrial and agricultural waste, sewage, and trash from homes. This pollution has a negative impact on the health of fish and other aquatic life, as well as on human health. Waste garbage collectors might be a solution to this issue in water bodies. These machines are meant to gather trash from waterways and haul it away, decreasing pollution and boosting the wellness of aquatic ecosystems. These types of equipment are both sustainable and ecologically beneficial, and they are capable of collecting trash in real time, so they can efficiently avoid polluting. When the container is full, trash may be taken out and thrown away. Cleaner water and more robust ecosystems are the results of installing and using these devices to minimise pollution in water bodies. Using solar garbage collectors in water bodies has various advantages. These tools are, first and foremost, eco-friendly and long-lasting. The fact that they run on solar power instead of fossil fuels is a major plus when compared to other types of garbage pickup. Long-term savings can be realised because of the low cost of ownership for such devices due to their low maintenance requirements and high durability in the face of repeated use. Last but not least, solar-powered waste garbage collectors can increase community understanding of the significance of proper waste management. These gadgets can help spread awareness about the dangers of pollution and the value of recycling by collecting trash from waterways and displaying it in a public display. Overall, solar-powered garbage collectors offer a novel and long-term answer to the issue of water contamination in rivers and ponds. These gadgets use solar energy to efficiently remove trash from water, making for cleaner water and better ecosystems. These tools may also be used to teach people about the importance of waste management and inspire them to make changes that will lead to a greener tomorrow.

R. Raghavi et al. have created a fascinating RF-controlled robot for measuring the pH of a body of water. Changes in the normal pH of a body of water may indicate pollution or other environmental issues. Consequently, pH sensors assess the chemical solubility and biological availability of water's constituents. [1] S. Suresh et al., initiated to replace manual drain work with an automated system. These water-borne debris obstructs the sewers. To address this issue and save lives, implemented an "Automated Gutter Cleaning System," which we designed to regulate waste disposal and provide regular waste filtration. [2] M. Khot et al., The remote-controlled river cleansing apparatus were constructed. The primary objective of the initiative is to reduce the amount of labour and time necessary to clean the river. Using a motor and chain drive system, the river-cleaning process was automated.[3] M. Lakshmi et al., provided the function and potential benefits of a solar-powered water garbage collector that consists of a floating medium with a series of impediments or booms that collect floating refuse as it passes through the water. The platform's integrated actuators and control systems are powered by electricity generated by solar panel. Using sensors and cameras, the system detects and monitors garbage in the water, enabling remote management of the collector. As the platform moves through the water, the barriers capture the refuse and transport it to a collection receptacle or conveyor for disposal.[4] M. Zaman et al., Along the shore of the Malacca River, a completely operational trash collector is stationed to remove garbage. RTCS would substantially assist the Malacca River in addressing its water contamination

issues. [5] P. Ramesh et al., designed a project to routinely manage waste disposal and filtering. Similarly, the locomotive system is powered by a battery. [6]

Plastic bags, floating bottles, dead fish, and even toys can be collected from the surface of rivers using a method that without disturb the aquatic habitat. This device can be controlled from afar. During the day, the device is powered by sunlight. At night, its operation will be powered by batteries.

1.1.2 Pollution of Streams by Garbage and Trash

Household trash, such as fast food containers, plastic bottles, cups, bags, and other plastic containers, is the most frequent type of trash found in rivers and streams across the world. Polymers are extremely harmful to wildlife. They might progressively suffocate or induce organ failure if swallowed, depending on their shape. Organic waste, such as solid waste, has the potential to negatively affect rivers and streams chemically and biologically. Inhibiting aquatic plant growth, disrupting fish and other species' reproductive processes, and decreasing the amount of dissolved oxygen in the water are just a few of the many consequences. Dangerous substances may also leak or leach from some types of trash (including old oil filters, pressure-treated wood, and lead-acid batteries).

1.1.3 Motivation

As a result of persistent solid waste pollution of readily accessible and useful water sources, such as lakes and ponds, this problem persists. The need for clean, uncontaminated water has emerged as a major issue for modern life. The use of water is essential for every aspect of human existence.

While the goal of developing river-cleaning robots is admirable, the reality of removing trash and pollutants from rivers is far more challenging. Governmental organisations, nonprofits, and activist groups all lend a hand and actively participate in environmental preservation initiatives in most developed countries. As a consequence of regulations put in place to protect the environment, the amount of waste and sewage that is dumped into rivers has fallen significantly. In underdeveloped countries, however, such attempts frequently fall short.

1.2 Problem definition

Almost all urban water bodies in India are polluted because they are used to dispose of untreated sewage and solid waste. Several times, trash and debris end up in these waterways. Many initiatives and measures have been taken by the Indian government to solve these problems. The "Solar Powered Waste Trash Collector for Rivers and Ponds" project was designed to address this issue by collecting trash from these bodies of water. Reduce the time and effort required to clean the river by using this strategy.

This method is also useful for retrieving trash from water sources like rivers and lakes. Pollution from plastics is a problem that can't be ignored. Suffocation, entanglement in garbage, and even death are real threats to aquatic life.

2. Design Methodology

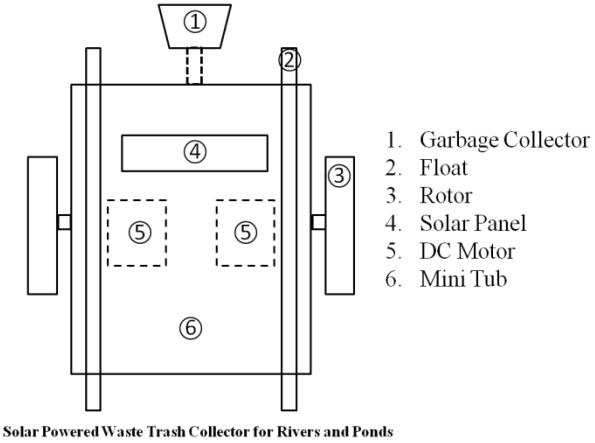

Fig.1 – Design Model

The proposed approach to the trash collection system is depicted in Fig. 1. It needs to be buoyant in water and keep floating even as its mass rises. The situation is exacerbated by the fact that the collecting tray can be moved, which increases the possibility that the system's centre of gravity will shift due to the weight of the trash on the tray. Due to the addition of heavy gear and supplies (such as motors and batteries), we have chosen a bottom-heavy boat design.

To create the floating body, PVC pipes are placed within polystyrene. Two DC motors are used to rotate the turbine to keep the model moving in the required direction, while the other two are dedicated to collecting trash. Wastes from bodies of water are gathered and stored in the tub. A solar panel with a power output of 40 watts is used to replenish the power system's four lead acid batteries (voltage: 14.4–15.0, current: 0.39 A). There are four DC motors used (Model: 385 Motor, Voltage Range: 3-36V, Rated Voltage: 12V, No-load Speed: 18,000rpm).

3. Conclusion

Water pollution is one of the most serious ecological problems of our day, impacting not only human health but also the environment and aquatic life. Several forms of trash and detritus harm rivers and ponds, which are essential water supplies but are frequently contaminated. Effective waste management in water bodies is crucial because of the serious danger that pollution poses to aquatic life and ecosystems. Creating a solar-powered trash collection system for water bodies like rivers and ponds might be an effective response to this issue. The solar-powered waste garbage collector is a cutting-edge innovation that uses solar energy in tandem with physical and mechanical processes to efficiently filter out contaminants from water. In this setup, a battery stores the electricity that solar panels produce and uses to power the mechanical parts. The garbage collection system includes a trash-gathering device mounted on a mobile platform that floats on the water. There are a lot of positive aspects to this technology. As the system uses solar energy to power its components, it has a low impact on the environment and can be maintained indefinitely without resorting to fossil fuels or other non-renewable energy sources. Secondly, the system is built to be low-maintenance, so it can function with a minimum of human input. As a result, it saves money and time because

it doesn't require constant, labour-intensive manual cleaning. In addition, the system may run nonstop, relieving aquatic life and ecosystems once and for all of the burden of waste removal. Because of the system's adaptability, it may be adapted to meet the unique demands of a wide variety of bodies of water. It can be set to work optimally in either shallow or deep water thanks to its adaptable design. Additional sensors for measuring water quality, temperature, and other factors can be added to this to aid in the detection and control of water pollution. It is perfect for both urban and rural settings since the solar-powered waste garbage collecting system may be employed in a broad variety of locations, from small ponds to major rivers. There are a variety of potential deployment sites for the system, including regions with significant concentrations of trash like riverbanks and underpasses. Because of this, it may be used in a wide variety of solid waste situations involving water surfaces, making it an effective and adaptable solution to the problem of water pollution. In conclusion, we developed a solar-powered waste garbage collector for rivers and ponds and identified a solution to the growing issue of water pollution due to waste and debris. Its cutting-edge gadget is sustainable and eco-friendly since it runs on solar energy. The waste garbage collector uses a mix of physical and mechanical methods to efficiently capture and remove pollutants from bodies of water, mitigating their effects on aquatic life and ecosystems. As an added bonus, this innovation may greatly lessen the need for both money and labour-intensive manual labour when it comes to cleaning up trash from bodies of water. The solar-powered garbage collector is a great example of a forward-thinking effort to make the world a better place. While nations throughout the globe struggle to find effective solutions to environmental deterioration and pollution, projects like the solar-powered waste and rubbish collecting device provide cause for optimism. The effects of pollution on our world may be lessened, and a better future for future generations can be secured via continuing innovation and investment in sustainable technology.

4. Application

Useful in reducing river water pollution

- Helpful in decreasing pollutant levels in water supplies.
- It may be used to clear a pool's surface of any debris, pollutants, or toxins that may have settled there.
- It helps produce less sewage by products.
- Dead fish may be collected in this process, and the technique can be used to rescue other forms of marine life.

5. Advantage

The costs, both upfront and over time, are low. This method works really well for both large and small bodies of water with a lot of trash in them. The system can be run without the help of specialists. Ecologically beneficial structure.

6. Limitations

- Limited Capacity
- Dependence on Sunlight

- Not Effective for All Types of Waste
- Limited Coverage

7. FUTURE SCOPE

Deep cleaning functionality may be built into the machine. To clean large rivers and lakes, the machine's capacity may be expanded.

8. Acknowledgment

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