IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

AQUATIC WASTE REMOVAL ROBOT USING NIR SENSOR AND RASPBERRY PI

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Abstract: This work presents an Aquatic Waste Cleaning Robot (AWRR) powered by a Raspberry Pi microprocessor and equipped with a near infrared (NIR) sensor. AWRR addresses the problem of water pollution with a system designed to identify and eliminate waste in water bodies. The Raspberry Pi allows real-time data processing and control, while near-infrared sensors detect waste based on spectral signatures. AWRR uses mechanical equipment to clear and locate debris and navigate waterways. Today's technology offers effective methods for wastewater management and can be used in many areas.

Keywords: Trash management, intelligent trash, robotic lake cleaning, Raspberry Pi, and smart cities.

I. INTRODUCTION

Since water is needed by all life on earth, water is used more than other resources. Since most of the water is frozen in ice and ice sheets, only a few wells are suitable for human consumption. The availability of water and drinking water is rapidly decreasing. The problem of water pollution is not new. People have been dumping waste into water bodies for years, even decades. However, in recent years, the problem has accelerated and as a result, the ecology has begun to change. The main causes of water pollution are industrialization, agriculture, urbanization and population growth. Since most of the water is frozen in ice and ice sheets, only a few wells are suitable for human consumption. The availability of water and drinking water is rapidly decreasing. The problem of dirty water is not new; People have been dumping their waste into water for years, even decades. The problem has only become more urgent in recent years and the ecology has begun to change. The main causes of water pollution are industrialization, agriculture, urbanization and population growth. While this helps create business hope, it is a difficult and repetitive task. Another issue that manual labor raises is the safety of workers in hazardous areas. Thanks to Industry 4.0, which brings automation in every field, waste management can now be automated. Personal cleaners are a better option as they are more efficient and can reach remote and polluted areas. They also protect workers from health and safety issues.There are some attempts to purify water, but these solutions are often very expensive and cleaning the machine can require a large investment. And collecting garbage in the water body so that the water body can be properly cleaned to solve the problem of marine debris floating on the water surface. One of our goals is to reduce costs and enable wide-scale use of our solutions. The purpose of this robotic technology is to collect and remove marine debris and other types of garbage. This study proposes a strategy to reduce water pollution and aquatic animal mortality from marine debris. Robots can now be used in water bodies such as lakes and ponds. There may be changes in the future.

II. LITERATURE SURVEY

Published Year	Author Name	Title of the paper	Proposed technique	Limitations
2019 [1]	Dr. Raseduzzaman Ruman et al	Automatic Ocean Surface Air Pipe Cleaner	- Remote-controlled device removes ocean surface waste, - reducing manual labor.	-Limited Effectiveness - Environmental Concerns
2019 [2]	P. K. Dutta et al	Surface Water Cleaning Robot with Conveyor Belt System for Pond and Reservoir Maintenance	-Conveyor Belt System - Assistance in Algae and Duckweed Management	- Limited Adaptability - Maintenance Requirements
2020 [3]	G. Bhavana Priyadarshini et al.	Automated Water Cleaning System: Arduino-Controlled Robot for Eco-Friendly Aquatic Waste Management	- Infrared Object Recognition -GPS-Enabled Autonomous Navigation:	-Limited Cleaning Capacity - Dependency on Environmental Conditions
2020 [4]	International Journal of Scientific Research and Engineering Development et al.	Innovative Solutions for Waste Elimination and Environment Monitoring Using Bug-Inspired Algorithms and Robotic Systems.	-ug-Inspired Recruitment Algorithms - Pontoon-Like Robot and Underwater Sensor Network:	-Complexity of Bug-Inspired Algorithms - Environmental Constraints
2021 [5]	International Journal of Innovative Technology and Research Engineering et al	"Innovative Strategies for Enhancing Wastewater Management and Addressing Water Pollution in Smart Cities."	-Proximity Sensors for Garbage Collection - Robotic Pools Using Raspberry Pi	- Technological Complexity and Reliability - Resource and Infrastructure Constraints:
2021 [6]	Sahana Kumari S et al	Developing Cost-Effective Solutions for Automated Removal of Water Pollution.	- Automated Waste Removal System - Cost-Effective Design	- Technological Constraints - Environmental Considerations
2022 [7]	Aquatic Multi-Robot System for Pool Cleaning by Pranay Agrawal et al	Innovative Multi-Robot System for Enhancing Maintenance of Water Bodies in Developing Countries.	- Multi-Robot System Integration - New Navigation Algorithms	-Environmental and Social Impact

Table 1.Literature Review of with Aquatic waste removal robot using nir sensor and raspberry pi

2022 [8]	Dr. Raseduzzaman Ruman et al. (Second Paper):	Development of an Automatic Surface Debris Collector for Water Bodies	- Remote-Controlled Debris Collection - Suction or Collection Mechanism:	- Technological Constraints

various existing solutions

III. METHODOLOGY

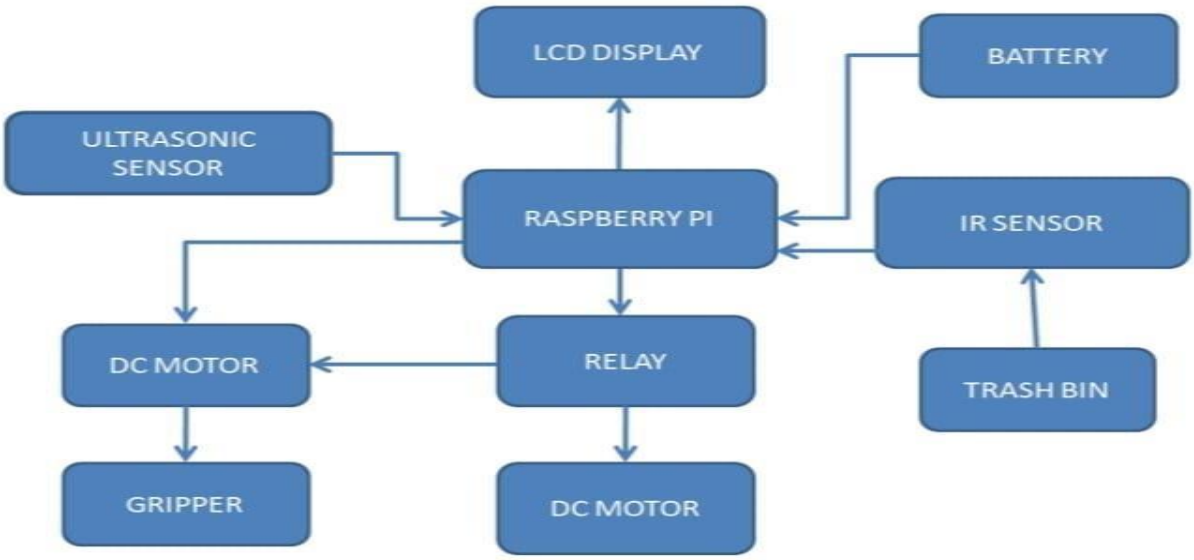

Figure.1 Lake cleaning robot

Fig.1 shows the design of a lake cleaning robot to remove debris and clean surfaces. The robot's power is controlled by the Raspberry Pi 3 board, grippers, motors, ultrasonic sensors and infrared sensors as part of the planned hardware architecture. Table 1 lists the hardware modules and sensors used by the pool cleaning robot. Raspberry Pi 3 is a microcomputer that can perform tasks comparable to computers thanks to its processor, memory, input/output ports and other devices. The design and construction of a solar powered floating garbage collector is the subject of our project. A solar-powered floating garbage bin that can move independently on water proposes a new method for skimming the ocean and removing waste. A bucket is attached to a photovoltaic-powered conveyor belt made of nylon mesh, which powers the device and floats the debris. Floating Garbage is collected by a solar-powered floating garbage disposal system. The system can operate continuously without human assistance. Raspberry Pi Works with Arduino and LoRa modules as the host computer in robotic applications. Arduino connects to the LoRa module and water quality measurement equipment, while Raspberry Pi is responsible for image processing, distribution and motion control. The robot provides greater convenience by separating pollutants in the ocean according to their distribution and collecting them in a separate basket. The robot can also clean up oil spills contaminated with algae in oceans, lakes and ponds. Planning algorithms can be used to prepare the robot's return to base and delivery to specific areas that need to be targeted. Stress when paying. The robot is equipped with Lora-based communication that allows it to connect with the central station gate and other devices.The robot is equipped with an electrical conductivity sensor (EC) for water quality

IV. RESULTS AND DISCUSSION

Accurate waste detection: Using AWRR's integrated NIR sensor, various types of waste can be accurately identified based on spectral characteristics. Check the reliability of sensor information by comparing it with in situ measurements.Guidance and control: AWRR's time processing data and control are effectively controlled by the Raspberry Pi microcontroller. The system can navigate itself within a body of water, detect hot spots of debris and operate mechanical systems to perform centralized cleanup operations.

Garbage removal: AWRR helps reduce water pollution by removing garbage from water bodies. Waste is appropriately collected and stored in compartments onboard for proper disposal via robotic arms or suction systems. Operational challenges: Despite all the progress, there are some problems such as limitations in scaling, environmental impacts and economic problems. These issues demonstrate areas where AWRR systems need improvement in future generations.

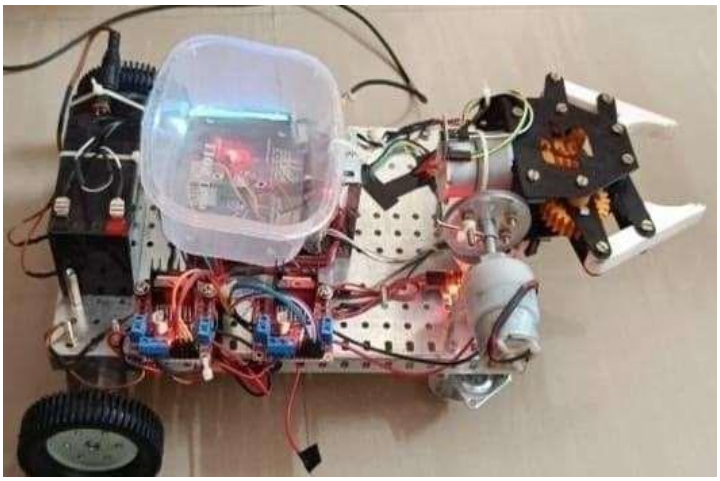

Fig 2-Robot Functioning

The aquatic waste elimination robotic integrates NIR sensors to hit upon underwater particles, relaying facts to a Raspberry Pi for evaluation. the usage of this records, the Raspberry Pi controls automobiles and propellers, permitting the robotic to navigate autonomously through water our bodies. Algorithms for impediment avoidance manual its path, ensuring green motion round underwater boundaries. because the robot identifies waste, it adjusts its trajectory to accumulate and store the particles the usage of its onboard mechanism. This synchronized motion process allows the robot to efficaciously easy aquatic environments even as minimizing human intervention .

Fig 3-gripper movement of dropping waste

Fig 4-Trash display unit

The Aquatic Waste Removal Robot (AWRR) is a major advancement in the field of environmental robotics, combining near-infrared sensors with Raspberry Pi technology. The presentation focused on the effectiveness of near-infrared sensors in waste detection and the data processing and control ability of Raspberry Pi, and their important role in independent waste removal efforts. Business problems are solved by emphasizing the need for continuous improvement and optimization. These issues include sensor limitations and business

issues. Future developments that could improve waste detection accuracy and reliability include sensor fusion techniques and advanced algorithms. Collectively, AWRR is a promising response to water pollution problems by using cutting-edge technology to further promote environmental protection.

IV. CONCLUSION AND FUTURE SCOPE

In summary, one way to combat ocean pollution is to incorporate Raspberry Pi and NIR sensor technology into a robot that collects waste. By constantly improving its self-control and sensing capabilities, the robot can effectively find and remove various types of debris in the aquatic environment. Integration with cloud and IoT platforms enables real-time monitoring and analysis of data to facilitate strategic adjustments and informed decision-making. Partnerships with NGOs and government agencies can facilitate delivery in endemic areas, and business options ensure sustainability and capacity. Finally, this creative concept not only meets the urgent need for ocean conservation, but also supports the role of the environment and the future of the ocean .

Combining Raspberry Pi and NIR sensor technology, the possibilities of this underwater robot are endless.Improvements in measurement and spacing accuracy can lead to the ability to detect waste to enable deeper and better cleaning of water. With further advances in autonomous control, the robot will be able to operate in a variety of aquatic environments such as rivers, lakes and oceans. Operational efficiency and productivity can be increased by integrating with cloud-based platforms and IoT technology to achieve real-time monitoring and remote management. Collaboration between government agencies and environmental groups can improve ocean conservation by using robotic data collection for research and policy development. Businesses can emerge to provide waste removal services to businesses, governments, and coastal communities to support environmental sustainability and economic growth.

REFERENCES .

[1] Dr. Raseduzzaman Ruman et al. "Automatic Ocean Surface Air Pipe Cleaner." Remote-controlled device removes ocean surface waste, reducing manual labor.(2019)
[2] P. K. Dutta et al. "Surface Water Cleaning Robot with Conveyor Belt System for Pond and Reservoir Maintenance." Conveyor Belt System; Assistance in Algae and Duckweed Management.(2019)
[3] G. Bhavana Priyadarshini et al. "Automated Water Cleaning System: Arduino-Controlled Robot for Eco-Friendly Aquatic Waste Management." Infrared Object Recognition; GPS-Enabled Autonomous Navigation.(2020)
[4] International Journal of Scientific Research and Engineering Development et al. (2020)
[5] International Journal of Innovative Technology and Research Engineering et al "Innovative Strategies for Enhancing Wastewater Management and Addressing Water Pollution in Smart Cities."(2021)
[6] Sahana Kumari S et al Developing Cost-Effective Solutions for Automated Removal of Water Pollution. - Automated Waste Removal System.(2021)
[7] Pranay Agrawal et al. "Aquatic Multi-Robot System for Pool Cleaning."(2022)
[8] Dr. Raseduzzaman Ruman et al. (Second Paper). "Development of an Automatic Surface Debris Collector for Water Bodies."