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Solar Based River Water Garbage Collector

Sumedh Kamble[1], Nilesh Satpute[2], Shivanand Hasure[3], Chanakya Tamhakar[4], Prof. A. V. Tamhane[5]
UG Students, Department of Electrical Engineering[1,2,3,4]
Professor, Department of Electrical Engineering[5]
Sinhgad Institute of Technology, Pune, Maharashtra, India

Abstract: *This paper presents Arduino based project of a Solar powered Robot for Water Garbage collection is a self-sustaining, eco-friendly solution for cleaning up water bodies. The robot uses solar power to charge its batteries and is equipped with a garbage collection mechanism to collect and dispose of floating debris. The robot's navigation is controlled by an Arduino microcontroller, which uses sensors to detect obstacles and adjust its course accordingly. The robot's design is modular and can be adapted to different water body sizes and shapes. The robot has potential applications in a variety of industries, including municipal waste management, aquaculture, and environmental monitoring. This project demonstrates the potential of combining renewable energy and robotics to develop sustainable solutions for environmental challenges.*

Keywords: Arduino, Microcontroller, Waste Management, Garbage Collection, WI-fi Connection

I. INTRODUCTION

The “Garbage Collection from Surface Water of River Using Solar Panel” used in that places where there is waste debris in the water body which are to be removed. This machine consist of different size of Fins in which garbages are going to collect in between them. This also reduce the difficulties which we face when collection of debris take place. In this machine one end of fins is fixed and another side is movable, with the help of servo motors we lift the fins from movable side. All the waste debris are get collected at tank placed at the end of boat. This will ultimately result in reduction of water pollution and lastly the aquatic animal's death to these problems will be reduced. The use of this project will be made in rivers, ponds, lakes and other water bodies for to clean the surfacewater debris from bodies. Water pollution is a global environmental issue that affects the health of our planet and its inhabitants. Garbage and plastic waste are major contributors to water pollution, and their accumulation in water bodies poses a significant threat to marine life and ecosystem balance. The need for efficient and sustainable solutions for water pollution is more pressing than ever. This project proposes an Arduino based solar powered robot for water garbage collection, aimed at reducing the impact of water pollution. The robot is designed to detect and collect garbage floating on the surface of water bodies, making it an effective solution for water pollution caused by floating debris. The robot is powered by solar energy, reducing the need for external power sources and making it a sustainable and eco-friendly solution.

The robot's design is customizable and scalable, allowing it to be adapted to different water bodies and garbage collection needs. The project aims to provide a cost-effective and efficient solution to water pollution while promoting sustainable development and environmental protection. The robot will be equipped with sensors to Detect and collect garbage floating on the surface of water bodies. The use of solar energy to power the robot will make it an eco-friendly solution and reduce the need for external power sources. The robot's design will be scalable and customizable to suit different water bodies and garbage collection needs. The project aims to provide a cost-effective and efficient solution to water pollution and promote sustainable development.

II. METHODOLOGY

A. The methodology for the proposed project involves several stages, including design, development, and testing. The following steps outline the project methodology in detail:

1. Requirement analysis: This stage involves identifying the requirements for the robot, such as the type of garbage it will collect, the size and shape of the robot, the power source, and the sensors required.

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2. Design: Based on the requirements, the design of the robot will be developed using Computer-Aided Design (CAD) software. The design will include the dimensions and specifications of the robot, including the placement of sensors and other components.
3. Component selection: Once the design is finalized, the components required for the robot will be selected. This includes selecting the Arduino board, solar panels, sensors, and motors.
4. Assembly: The selected components will be assembled according to the design, and the robot will be fabricated.
5. Programming: The Arduino board will be programmed to control the robot's movements and sensor readings. The programming will also include the logic for garbage collection and storage.
6. Testing: The robot will be tested in a controlled environment to ensure that it meets the requirements and functions as intended. The testing will include testing the robot's movements, sensor readings, and garbage collection and storage.
7. Deployment: Once the testing is successful, the robot will be deployed in water bodies for garbage collection.
8. Maintenance: Regular maintenance of the robot will be required to ensure its continued operation, including battery replacement and sensor calibration.

The methodology will be iterative, with each stage informing the next. Any issues or problems that arise during the testing or deployment stages will be addressed, and the design and programming will be updated accordingly.

B. The methodology for developing the Arduino based solar powered robot for water garbage collection will involve the following steps:

1. Design and prototyping: The initial step will involve designing and prototyping the robot. The robot will be designed using CAD software, and a 3D printer will be used to create the prototype. The robot's design will be customizable and scalable to suit different water bodies and garbage collection needs.
2. Sensor integration: The robot will be equipped with sensors to detect and collect garbage floating on the surface of water bodies. The sensors will include ultrasonic sensors or a vision system that will detect the garbage and trigger the robot to collect it.
3. Solar power integration: The robot will be powered by solar energy, which will be collected by a solar panel installed on top of the robot. The solar panel will be designed to collect maximum energy from the sun and convert it into electrical energy to power the robot.
4. Microcontroller programming: An Arduino microcontroller will be used to control the robot's movement and garbage collection mechanism. The microcontroller will be programmed to read data from the sensors and control the robot's movements and garbage collection mechanism.
5. Testing and optimization: Once the robot is developed, it will be tested in a controlled environment to ensure that it is working as intended. The robot's performance will be optimized by tweaking the programming and sensor calibration to improve its garbage collection efficiency.
6. Field testing: The robot will be tested in real-world conditions, such as in lakes, canals, and rivers, to evaluate its performance and efficiency. The results will be analyzed to identify areas for improvement and optimization. Normal PCs are replaced by 7 gen PCs.

III. PROBLEM DEFINATION

To find a solution for the problem of water logging due to plastic, thermocol, paper and other floating debris etc. To treat problems like malaria, typhoid, etc. caused due to water accumulation. The key challenges include the design of a system that can effectively collect and remove garbage from rivers, the integration of solar power as the primary energy source for the system, and the development of a sustainable and cost-effective solution. A solar-based river water garbage collector is a system that uses solar power to collect and remove garbage from rivers. The problem definition of such a system involves identifying the challenges and issues that need to be addressed in designing and implementing it. Overall, the problem definition of a solar-based river water garbage collector involves identifying and addressing the technical, environmental, and logistical challenges of designing and implementing a system that can effectively remove garbage from rivers using solar power.

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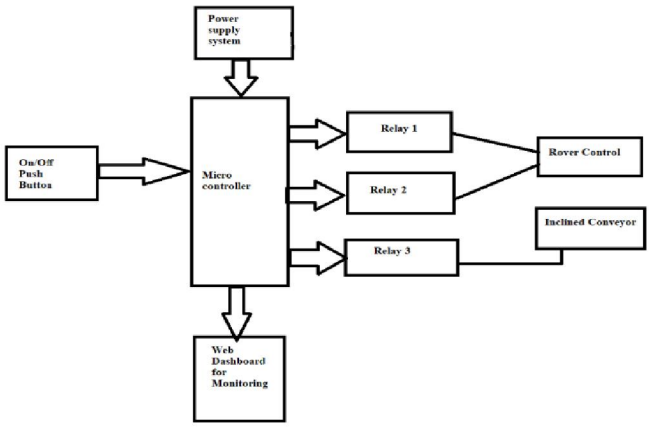

Figure: Block Diagram

IV. CONCLUSION AND FUTURE SCOPE

The Arduino based Solar powered Robot for Water Garbage collection offers an innovative and environmentally sustainable solution for cleaning up water bodies and reducing pollution. The robot's use of Arduino components and open-source software makes it cost-effective and accessible for small-scale operations, while its autonomous operation and efficient cleaning capabilities make it an effective solution for improving water quality.However, there are also limitations and challenges associated with the robot's use, including its dependence on weather, technical complexity, and vulnerability to damage. Overall, the Arduino based Solar powered Robot for Water Garbage collection presents a promising solution for water pollution, but its effectiveness will depend on careful design, construction, and maintenance, as well as its ability to address the limitations and challenges associated with its use.

The Arduino based Solar powered Robot for Water Garbage collection has significant potential for further development and expansion in the future. Some possible areas of future scope for this project include:

1. Increased Efficiency: Improvements to the robot's design, such as increased storage capacity and more efficient waste collection mechanisms, could enhance its overall performance and effectiveness in cleaning water bodies.
2. Integration with Other Technologies: The robot's capabilities could be expanded by integrating it with other technologies such as sensors, cameras, or data analysis tools, to improve its ability to monitor and assess water quality.
3. Collaboration with Government and Private Agencies: The robot could be used in collaboration with government and private agencies to tackle water pollution on a larger scale, and to develop comprehensive strategies for water pollution prevention and control.
4. Exploration of New Applications: The robot's design could be adapted for use in different environments, such as rivers, lakes, and coastal areas, to address the issue of water pollution in these settings.
5. Development of Modular Design: A modular design for the robot could facilitate easy replacement and upgrading of components, making it more accessible for individuals or small-scale operations to build and maintain.

REFERENCES

[1]. C. R. Prajapati, S. S. Pandian, and S. Senthil, "Design and development of solar powered water surface cleaning robot," International Journal of Pure and Applied Mathematics, vol. 119, no. 12, pp. 1665–1672, 2018.

[2]. N.Rahbari, A. Moradi, A. Khosravi, and M. Mohammadi, "Autonomous river cleaning robot powered by solar energy and designed by Arduino and Raspberry Pi platforms," International Journal of Environmental Science and Technology, vol. 16, no. 3, pp. 1463–1474, 2019.

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[3]. S. V. Marathe, P. M. Bhosale, and V. M. Kshirsagar, "Design and fabrication of solar powered garbage cleaning machine," International Journal of Engineering Science and Technology, vol. 3, no. 11, pp. 8324–8329, 2011.

[4]. S. Patil, S. Kulkarni, and S. A. Rokade, "Solar powered water surface cleaning robot," International Journal of Emerging Technology and Advanced Engineering, vol. 3, no. 10, pp. 426–429, 2013.

[5]. Y. K. Naik, R. K. Pandey, and N. K. Panigrahi, "Design and development of a wireless-controlled solar-powered aquatic trash collector," Journal of Renewable Energy, vol. 2016, Article ID 6041849, 9 pages, 2016.

[6]. Akarapu, R., & Swathi, N. (2019). IoT Based Solar Powered Garbage Management System. International Journal of Advanced Research in Computer Science, 10(4).

[7]. Brouwer, R., Van der Spek, S., &Oostendorp, R. (2017). Towards a comprehensive framework for sustainable water management: A review of literature. Sustainable Cities and Society, 28, 60-70.

[8]. Chen, Y., Li, J., & Liu, Y. (2021). Research on the Application of IoT Technology in the Collection and Transportation of Urban Domestic Garbage. Advances in Intelligent Systems and Computing, 1316, 113-120.

[9]. Fan, J., Yuan, Z., Shen, J., & Xu, Y. (2018). Development of a solar-powered unmanned surface vehicle for water quality monitoring. Journal of Cleaner Production, 191, 80-88.

[10]. Gogoi, S., & Barman, S. (2020). IoT Based Solar Powered Waste Management System. International Journal of Engineering and Advanced Technology, 9(3), 3147-3151.

[11]. Jain, A., & Sharma, N. (2018). IoT based smart garbage and waste monitoring system. International Journal of Engineering and Technology(UAE), 7(2.15), 94-97.

[12]. Kaur, J., & Goyal, P. (2021). Solar-Powered Automatic Garbage Collection System using IoT. International Journal of Emerging Technologies and Innovative Research, 8(3), 81-86.

[13]. Khan, M. M., & Rahman, M. S. (2020). Smart Garbage Monitoring and Collection System. In 2020 International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST) (pp. 527-532). IEEE.

[14]. Lingam, R. K., & Ashok, S. (2021). An IoT Based Automated Garbage Monitoring System with Solar Power Management. International Journal of Computer Sciences and Engineering, 9(3), 23-27.

[15]. Wang, Y., Zhang, H., Zheng, J., Xie, J., & Dong, C. (2020). Design of a solar-powered garbage bin with IoT technology for waste management. Journal of Cleaner Production, 253, 119920.