



**UNIVERSITY OF
PLYMOUTH**

NSBM Green University

Faculty of Computing

< The Tank Monitoring System and Garbage Collecting Boat >

PUSL2022 Introduction to IOT

Module Lecturer: <Mr. Isuru Sri Bandara / Mr. Chamindra Attanayake>

INTERNET OF THINGS REPORT

Introduction

Many towns all over the world are becoming increasingly concerned about the problem of waste in rivers. Damage to the environment and health risks might result from the ineffective and time-consuming procedures currently used for rubbish collection and disposal in water. A potential answer to this issue is the tank system monitoring and garbage collection boat, which combines cutting-edge technology with functional design to produce an effective and efficient way to collect waste in the water.

This report's goal is to give readers an overview of the tank system monitoring and garbage collection boat and discuss how it might be used to address the issue of waste in rivers. The tank system monitoring and garbage collection boat's technology, including how it operates and what advantages it has, will be covered in this report. Readers will have a thorough grasp of the tank system monitoring and garbage collecting boat at the end of this study, as well as how it might help with the problem of waste in rivers.

Background

Waste in rivers is a significant environmental problem that has an impact on communities all around the world. Traditionally, trash collection in water has been done by hand or with costs-based technologies. These techniques could not be very effective, and they might take a very long time to collect a large amount of waste. Also because workers who are collecting the trash are exposed to dangerous substances in the water, these conventional methods also pose risks to them.

The tank system monitoring and garbage collecting boat has been designed as an alternative solution to address these issues. This process combines a tracking system for waste in the water with a boat for effective rubbish collection. The boat's ability to travel through tight rivers and lakes and shallow waters lets it collect trash from places that could be challenging to reach using usual methods.

However, it's also crucial to keep an eye on the water quality in these rivers. As a result, adding sensors like pH and temperature ones can improve the efficiency of this method. Water acidity can be measured by pH sensors, which is a crucial factor in determining the quality of the water. To find out the temperature of the boats surroundings and all track the humidity the temperature sensor is used.

Project Approach

The project's planning, design, implementation, and monitoring processes will all be covered in the report.

Planning

To solve the problem of waste in rivers, sensors will be used in tank system monitoring and rubbish collection boat technology. A pH sensor will be installed on the boat to track the acidity levels and the quality of the water. It's vital to remember that the size of the boat determines how much trash it can hold. The team has provided funding for the project's

budget. The project's objective is to clean the water's surface and assess its quality, both of which are crucial for maintaining aquatic ecosystems. In the planning stage, potential locations for the boat's operations will be identified, their waste densities and types will be evaluated, and potential partnerships or collaborations with neighborhood groups or agencies with an interest in preserving the lake's health will be sought after.

Implementation

The tank system monitoring and garbage collecting boat will be constructed using Styrofoam and wood. To collect the rubbish, a conveyor belt fixed to the front of the boat will be included in its equipment. In order to monitor the water's condition and the temperature, the boat will also contain a pH sensor attached to the bottom and the temperature sensor attached on top. The boat's movements will be controlled remotely using a remote control, making it easier for the operator to move the boat in the water.

The construction of the boat and the installation of the required sensors and parts will take place during the implementation phase. The Ph sensors will be fixed to the bottom of the boat to monitor the water quality and the temperature sensor will be fixed on the top of the boat to monitor the temperature and the humidity of the area where the boat is located, while the conveyor belt will be fixed in the front of the boat to collect rubbish effectively. In order to make sure the operator can properly control the boat's actions; we will also test the remote-control system.

Monitoring

It will be observed to see how well the garbage-collecting and tank system monitoring boat cleans the water's surface and keeps track of the water's quality. We'll keep track of how much trash is gathered each day to get a sense of how well the boat works overall at clearing the lake of trash. In order to determine how using the boat has affected the environment, we will also evaluate the lake's aftermath. This observation is essential to determine whether the boat has a beneficial effect on the aquatic habitat and to spot any potential areas for improvement.

We will be able to look at trends in water quality over time by reviewing the data gathered using the pH and temperature sensors, which will be stored in a database. This will be crucial in recognizing any changes in water quality that might be brought on by outside factors, such as weather patterns or local pollution. We can spot any changes in the water quality and take steps to lessen the negative impact on the aquatic ecosystem by routinely monitoring the water quality.

Testing

[https://drive.google.com/file/d/1RA7a5TeS4eNUn5QWlxgrC-IGUE75T4-X/view?usp=share link](https://drive.google.com/file/d/1RA7a5TeS4eNUn5QWlxgrC-IGUE75T4-X/view?usp=share_link)

Project Solution

The issue of improper waste management in water bodies, which has a detrimental effect on the environment and human health, is the focus of the planned solution. The solution suggested combines a garbage-collecting boat with tank system monitoring to efficiently control trash in bodies of water.

Tank Monitoring System

A collection of sensors implanted in the water body serve as part of the tank monitoring system, which keeps track of the water quality. The sensors will keep an eye on variables including pH and temperature. The sensors' data will be transmitted to a database for analysis.

Garbage Collecting System

A boat with a collection tank and a rubbish collection device serves as the garbage collection system. One of our team members will run the boat, moving it to the parts of the water body where rubbish needs to be collected using the remote control. The boat's conveyor belt will be used to gather the trash from the body of water and store it there. In an authorized waste disposal facility, the collected trash will be disposed of.

Conclusion

Expanding the selection of sensors used to track additional water quality factors like dissolved oxygen levels, temperature, and nutrient levels may be one of the technology's future advancements. Additionally, modifications to the boat's overall design and conveyor belt system may help boost the boat's effectiveness and efficiency in cleaning the water of waste. Additionally, we would love to develop an app that would allow us to operate the boat without a controller.

In conclusion, a promising technology solution to the problem of waste in lakes and other waterways is the tank system monitoring and garbage collecting boats with the use of sensors. This technology can help to keep the aquatic ecosystem healthy by keeping track of the water quality and clearing waste from the water's surface.

Appendix

https://drive.google.com/file/d/1SzIWW27i1rkgw5BzP-iHoFdYTl0s7i3B/view?usp=share_link

https://drive.google.com/file/d/1HUCKG8sa9Bey83eFhPJObfWOidqs1uor/view?usp=share_link

Workload Metrix

Name	Plymouth No	Contribution
N H Wanniarachchi	10707430	Send data to thingspeak server using gsm900a module
Dasith chandila wanniarachchi	10818611	Created the propeller, boat turning part using servo motor, the garbage collecting part using two gear motors and programed these things using arduino makes the boat controlling unit using RF remote and programed it to work with arduino created some part of the power supply units of the boat. created 50% of boat's hardware parts.
Bishan M Hewagama	10758414	Created the report and the presentations
B.C.Premathilake	10820851	Created 50% of whole boat with the belt of garbage collecting part And also created all the sensor connection things. some testing parts
S.N. Lokupitiya	10820924	The website
Appabesekara	10818798	

References

canadiangeographic.ca. (n.d.). Expedition report: The great B.C. coastal cleanup of 2020. [online] Available at: <https://canadiangeographic.ca/articles/expedition-report-the-great-b-c-coastal-cleanup-of-2020/> [Accessed 23 Apr. 2023].

Siregar, I.M., Yunus, M. and Siregar, V.M.M. (2022). A Prototype of Garbage Picker Ship Robot Using Arduino Nano Microcontroller. *Internet of Things and Artificial Intelligence Journal*, [online] 2(3), pp.150–168. doi:<https://doi.org/10.31763/iota.v2i3.540>.

Satheesh, J., Nair, A.P., M., D., A., C., Mahesh, G. and Jayasree, P.R. (2020). Wireless Communication based Water Surface Cleaning Boat. [online] *IEEE Xplore*. doi:<https://doi.org/10.1109/ICOEI48184.2020.9142960>.

Saran Raj, B., Murali, L., Vijayaparamesh, B., Sharan Kumar, J. and Pragadeesh, P. (2021). IoT Based Water Surface Cleaning and Quality Checking Boat. *Journal of Physics: Conference Series*, 1937(1), p.012023. doi:<https://doi.org/10.1088/1742-6596/1937/1/012023>.