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Aquabot Lake Cleaning System

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Abstract: One of the main environmental issues for lakes and ponds, particularly those located in urban and semi-urban areas, is floating solid waste-generated water pollution. Because it involves direct contact with contaminated water, cleaning water bodies by hand is ineffective, time-consuming, and dangerous. This paper introduces Aquabot, a small robotic platform-based lake cleaning system that can remove floating debris. Propulsion motors, a conveyor-based waste collection system, a floating structure, and a smart bin monitoring unit make up the system. Bluetooth communication via a mobile application is used to accomplish wireless control. Stable navigation, effective waste collection, and dependable bin level monitoring are revealed by experimental evaluation. The suggested system provides a practical, safe, and affordable way to keep water bodies cleaner.

Keywords: Aquabot, Lake cleaning robot, Floating Waste, Arduino Uno, Bluetooth control

1. INTRODUCTION

Water bodies are the most important ecological entities that provide living organisms with a proper ecological balance and maintain human livelihoods.

However, due to rapid urbanization and improper waste management, water bodies are suffering from serious pollution problems. Floating waste, such as plastic bottles, wrappers, and organic debris, lies on the surface of water bodies, which impairs water quality and endangers aquatic life.

Traditional methods of cleaning lakes are heavily dependent on manual involvement, which is time-consuming, inefficient, and dangerous to workers. Contact with polluted water exposure can cause severe health risks. Automatic robotic alternatives are quite effective in reducing human involvement and may facilitate continuous cleaning operations. Aquabot is a low-cost, easy-to-operate robotic solution for the removal of floating waste from a lake or pond environment.

2. Body of Paper

The system architecture consists of a mobile application, Bluetooth module, Arduino Uno, motor driver, propulsion motors, conveyor motor, ultrasonic sensor, and power supply unit. Through Bluetooth communication, the mobile application sends control commands to the Arduino. The Arduino processes these commands and drives the motors and sensors accordingly. This modular architecture provides easy maintenance and allows for future upgrades.

Experiments with the Aquabot prototype were conducted in a controlled water environment. The robot showed stable floating and smooth navigation. No disruption to system balance was observed due to the mechanism of the conveyor belt that collected floating waste. Bluetooth communication acted reliably throughout the operation, while the ultrasonic sensor worked well in monitoring the bin fill level. The system ran well with relatively low power consumption, hence very suitable for long cleaning periods.

Figure 1: Final Prototype Assembly and Component Integration

Testing the final model in the Pool to know the stability and floating capacity of the model.

3. CONCLUSIONS

Aquabot provides an efficient and cost-effective solution for cleaning the floating waste of lakes and ponds. This system decreases manual labor, improves operational safety, and ensures efficient collection of wastes. Experimental results confirm that the proposed system meets the design objectives and can be practically implemented for environmental maintenance and control of water pollution.

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