**1. Introduction:**

The Eco Bot is an autonomous water-cleaning machine designed to remove floating garbages from water bodies while monitoring environmental factors about water such as pH, dissolved oxygen, and temperature.

**2. Objective:**

The objective of this project is to create a robot capable of detecting and collecting garbage from water surfaces, utilizing sensors and GPS for navigation and data collection.

The **Eco Bot** is an autonomous water-cleaning robot that collects floating garbage while monitoring water quality. Using image recognition and GPS, it identifies waste types and navigates efficiently, avoiding obstacles with sensors and AI. Powered by renewable solar energy, it operates autonomously, transmits environmental data, and prevents overflow with garbage level monitoring. Designed for durability, it ensures safe operation while resisting corrosion, making it a sustainable solution for water pollution management.

 **Garbage Collection:** Efficiently collect floating garbage using an automated conveyor mechanism

**Environmental Monitoring:** Measure water quality parameters such as pH, temperature, and dissolved oxygen (DO).

**Garbage Identification:** Identify and categorize floating garbage types (plastic, glass, organic, etc.) using image recognition.

**GPS Tracking:** Enable real-time GPS tracking for navigation and mapping.

**Autonomous Operation:** Operate autonomously for extended periods, adapting to environmental changes.

**Data Integration & Reporting:** Collect, store, and transmit data on water quality and garbage collection status.

**Energy Efficiency & Sustainability:** Run on renewable energy sources like solar panels or efficient batteries.

**Safety & Environmental Considerations:** Prevent harm to aquatic life with collision detection and safe operation.

**Maintenance & Durability:** Ensure resistance to corrosion and wear in harsh aquatic environments.

**Obstacle Avoidance:** Use sensors and algorithms to detect and avoid obstacles in real time.

**Garbage Level Monitoring:** Monitor the garbage collection level to optimize cleaning and prevent overflow.

**Ignition Control System:** Implement ignition control for efficient starting and stopping of the system.

The system integrates advanced technologies for autonomous garbage collection and environmental monitoring. It uses an automated conveyor mechanism with proximity sensors to detect floating waste, including plastics, glass, and organic material. A mechanical arm with nets captures the waste, which is then moved to a collection bin via the conveyor belt. Image recognition technology identifies and classifies different types of debris.

For environmental monitoring, the system is equipped with pH, temperature, and dissolved oxygen sensors to measure water quality in real time. The data is processed onboard and transmitted to a cloud-based platform for analysis, helping track water health and enabling timely action if the conditions deteriorate. It contains a GPS to navigate the real-time location via maps.

The platform operates autonomously, adapting its speed, direction, and collection mode based on real-time environmental data. This reduces the need for human intervention and allows continuous operation. The system is powered by solar panels and rechargeable batteries, ensuring sustainability and reducing operational costs while minimizing carbon emissions.

To ensure safety, collision detection sensors prevent harm to aquatic life and obstacles, while obstacle avoidance algorithms help navigate floating debris. The system’s materials are corrosion-resistant, ensuring durability in harsh aquatic environments. Garbage level sensors monitor the collection bin’s capacity, alerting the system when full to optimize the cleaning process.

This integrated system provides an efficient, sustainable, and eco-friendly solution for garbage collection and environmental monitoring, making it a vital tool for cleaning water bodies and preserving aquatic ecosystems.

**3. Methodology:**

The Eco Bot uses a combination of GPS for navigation, ultrasonic sensors for detecting the garbage collection area, and propeller-controlled servos for movement, while utilizing image processing to identify floating garbage.

**4. Result:**

The Eco Bot successfully navigates to identified garbage locations, collects the garbage, and returns to base when the collection area is full, while providing real-time environmental data to a client computer.

**5.Key Features:**

* Cleans floating garbage from water bodies.
* Monitors water quality in real-time (pH, dissolved oxygen, temperature, etc.).
* Uses automated navigation, avoids obstacles.
* Uses fiberglass chopped sheet for body, which is durable, makes the machine float and also doesn’t pollute the water in any way.

### **Target Population:**

The **Eco Bot** is designed for environmental organizations, government agencies, researchers, and communities dependent on clean water. It supports waste management efforts and scientific studies on water quality.

### **Social Impact:**

For **aquatic life**, it reduces pollution, prevents habitat destruction, and minimizes harm to marine species. For **humans**, it improves water quality, promotes public health, and raises awareness about responsible waste disposal, contributing to a cleaner and more sustainable environment.

**PROMPT**

A detailed and innovative design of a miniature solar-powered machine specifically engineered for cleaning the ocean. The machine features a compact, sleek body equipped with a conveyor belt system that efficiently collects garbage from the water's surface. This design includes sensors for monitoring the pH levels of the water, showcasing its dual functionality. The overall appearance is both functional and futuristic, highlighting the importance of environmental conservation through advanced technology. The machine is depicted against a backdrop of gentle ocean waves, symbolizing its purpose in maintaining the health of marine ecosystems

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