Revolutionizing Aquatic Cleanliness: Autonomous Water Body-Cleaning Robots

Introduction to Aquatic Cleanliness

We are trying to address the problem of river pollution, specifically the accumulation of waste such as plastic, debris, and other harmful pollutants in rivers. This pollution poses significant threats to aquatic ecosystems, wildlife, and even human communities that rely on rivers for clean water. Current methods for cleaning rivers are often inefficient, expensive, and require substantial human labor.

Current Challenges in Water Pollution

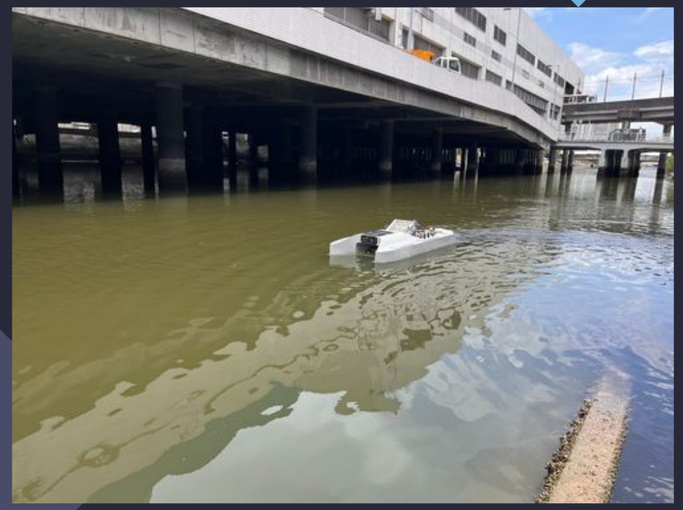
Stagnant Water Accumulation: In areas with little to no water flow, pollutants like plastic, debris, and chemicals accumulate, leading to the rapid deterioration of water quality.

Oxygen Depletion: The buildup of organic waste causes eutrophication, where excessive nutrients deplete oxygen levels, harming aquatic life and creating "dead zones."

Difficulty in Waste Removal: Stagnant water bodies are harder to clean manually due to limited access and the accumulation of waste in hard-to-reach areas.

Bacterial and Algal Blooms: The presence of pollutants leads to harmful algal blooms and bacterial growth, posing health risks to both aquatic organisms and humans.

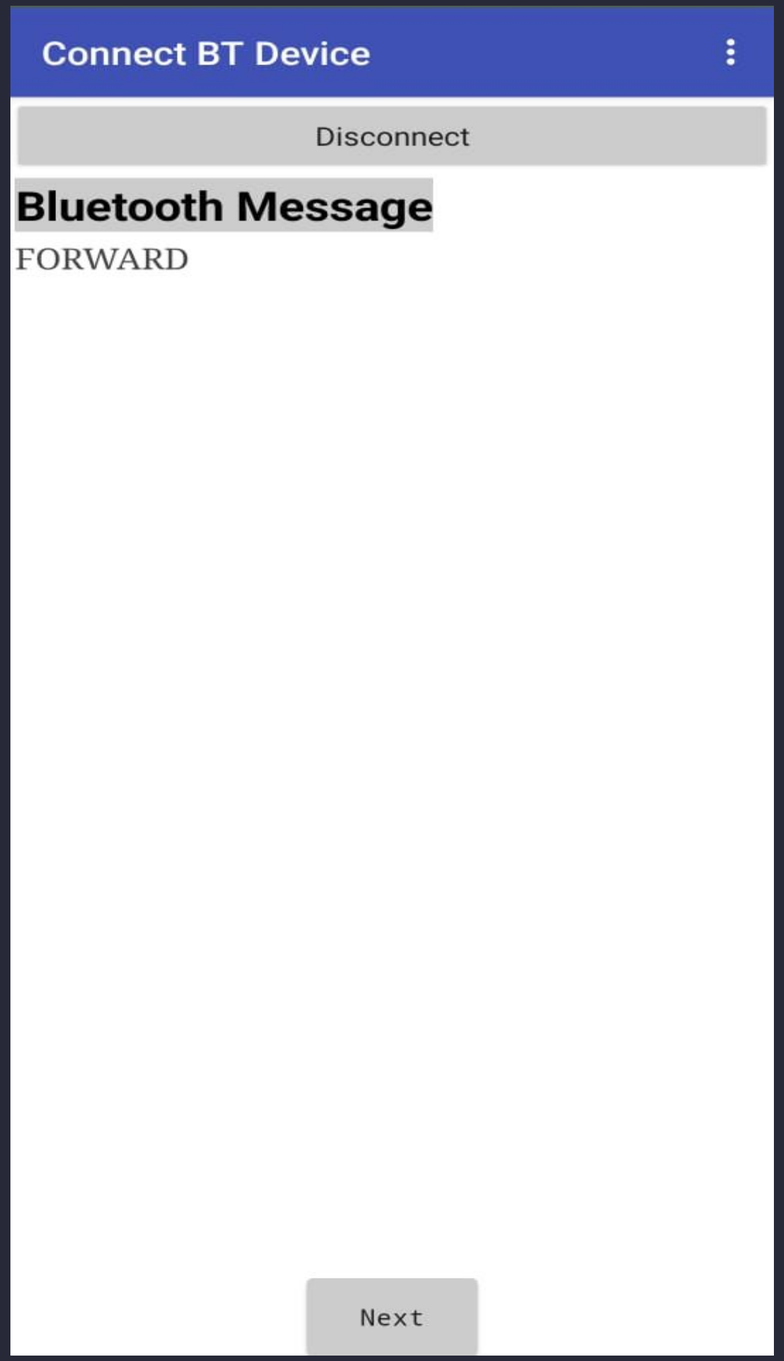
No Natural Dilution or Cleansing: Unlike flowing water bodies, ponds do not benefit from natural flushing, so pollutants remain concentrated and persist for longer periods.



How does Autonomous Water Cleaning Robots work?

Technologies & Methodology Technologies:

- Languages: Python.
- Frameworks: OpenCV, YOLO Algorithm.
- Hardware:Microcontroller,Microprocessor,LoRa Module,
  Web Cam, Motors, GPS.
  Methodology:
- Design & Development:
- Hardware setup(frame, sensors)
- Software integration(sensor control, AI)
- Flow Process:
- Start→Detect→Obstacle→
  Decision Making→Cleaning →Return to Dock



Technological Innovations to control motor through APP

An app has been made with the help of MIT APP INVENTOR. There are two way communication between the user and the robot. The serial values from the user are sent to the receiver through ESP NOW protocol which sends values of linear acceleration and angular acceleration such that the bot can move. And this protocol has the range of 700 metres which can be further increased by using suitable antennas.

SUCCESSFUL PROTOTYPE MADE OUT OF PVC PIPES

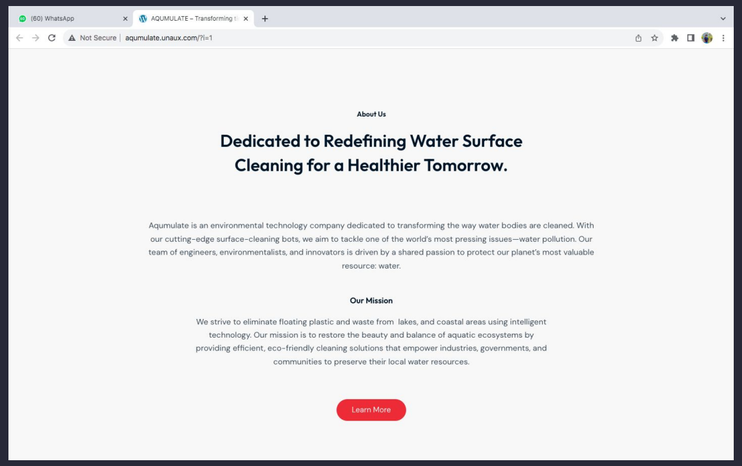
A prototype water cleaning bot made from **PVC pipes** offers a cost-effective and lightweight solution for cleaning water bodies. The frame of the bot is constructed using PVC pipes, making it both buoyant and durable in aquatic environments. A **conveyor belt system** attached to the bot collects floating waste, like plastic and debris, directing it into an onboard storage compartment or floating bags. The bot is powered by **electric motors**, with propellers attached for navigation through the water. Controlled by an **ESP32 microcontroller**, it uses sensors to detect waste and autonomously steer toward polluted areas. The design ensures that the PVC pipes provide buoyancy while housing essential components, making it an ideal low-cost prototype for small-scale water cleanup.

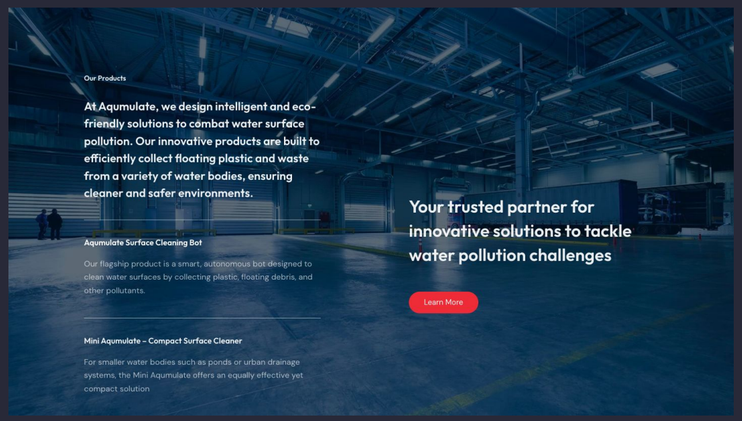
SUCCESSFUL IMPLEMENTATION

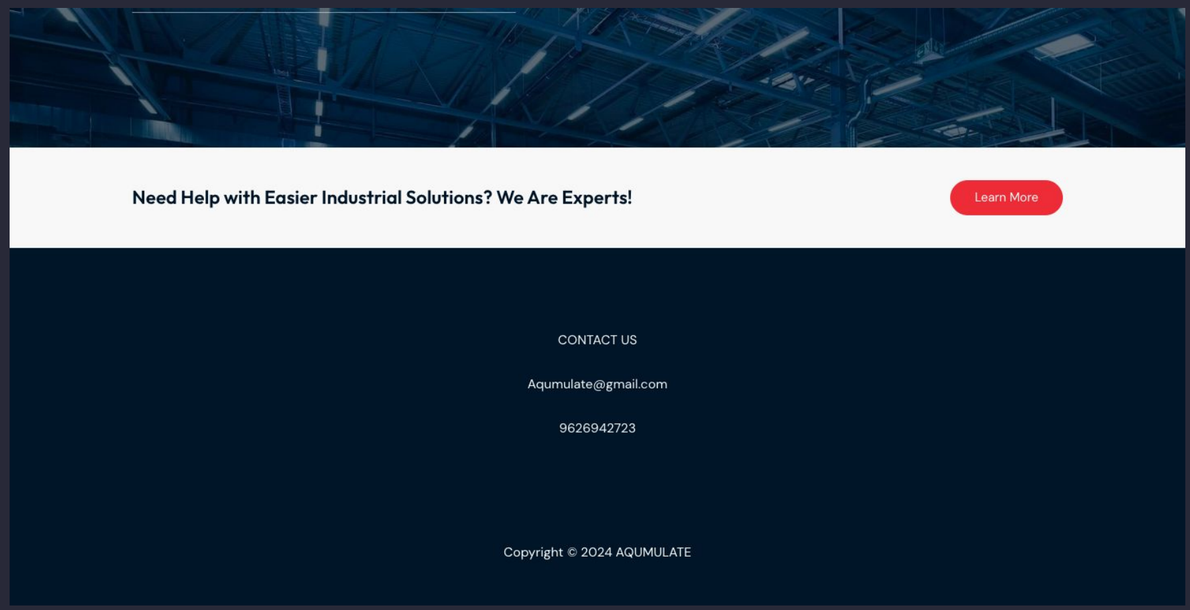
AS THE VIDEO SUGGESTS, THE APP AND MOTOR HERE IS COMPLETELY WORKING FINE

SUCCESSFUL IMPLEMENTATION

AS THE PHOTOS SUGGESTS, A WEBSITE HAS BEEN SUCCESSFULLY CREATED







Environmental and Economic Benefits

Investing in **autonomous water cleaning robots** not only improves environmental conditions but also offers economic benefits. Reduced cleanup costs and enhanced tourism in cleaner areas can lead to sustainable development, making these robots a worthwhile investment for communities.

Conclusion: A Clean Future Ahead

The integration of **autonomous water body-cleaning robots** represents a significant step towards a cleaner, healthier environment. By embracing this technology, we can ensure the sustainability of our water resources for future generations, paving the way for a **revolutionized** approach to aquatic cleanliness.

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- KEEPS LOCAL WATER CLEAN WHILE PROTECTING AQUATIC LIFE.
- COLLECTS MORE WASTE WITH MULTIPLE FLOATING BAGS FOR LARGER CAPACITY.
- CONTROL AND TRACK THE ROBOT'S OPERATIONS VIA A MOBILE APP.

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