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IOT BASED RIVER CLEANING ROBOT

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ABSTRACT –

This paper presents the design and implementation of an IoT-based river cleaning robot. The robot's onboard camera provides constant cleaning supervision; equipped with sensors to locate and collect floating waste, the robot Process. The collected data is sent to a cloud platform for analysis and visualization, therefore enabling remote control and monitoring of the robot.

Keywords - Water debris, aquatic animals, pollution, garbage

INTRODUCTION:

Usually, conventional strategy relies on manual foundation and it's used for collection of water debris, trash, plastic and all other kinds of pollutants which is floating on water bodies or by collecting this impurity by means of boat, thrash skimmer etc. And eliminated this pollutant at the river bank. However, this conventional method is often a risky, costly, and labor-intensive one since it calls for more work.
Given that all remotely operated floating river cleaning devices are more efficient than traditional methods, this is also efficient and environmentally benign. Being remote operated, this gadget requires no human effort whatsoever. So

This tool really helps to lower the pollution on Ganga river brought on by "Kumbh Mela". Given increasing water pollution, Government of India has also taken charge to clean river and pond; thus, they invest considerable money for several river cleaning projects including "Namami Ganga," "Narmada Bachao." And has developed various projects in other cities such Ahmedabad, Varanasi, etc.
Built to clean river floating surfaces by considering this Remote operated river cleaning machine This Remote Controlled unmanned river cleaning machine has been created to clean river floating surfaces by taking into account.
The significance of such technology transcends merely cleaning chores. IoT-driven river cleaning robots help environmental preservation, public health, and sustainable development. Reducing water pollution allows them to preserve aquatic ecosystems, maintain water quality, and support river-dependent populations for drinking water, agriculture, and livelihoods.

MOTIVATION:

Rising trash in rivers endangers aquatic ecosystems, hence endangering plant and animal life. The robot's aim is to quickly eliminate pollutants and garbage, thereby countering this.

Polluted rivers can promote the spread of waterborne diseases, hence compromising the health of those living close by. Cleaning robots could help to improve the environment for people.

PROBLEM DEFINITION :

The practice of tossing garbage into nearby water bodies has become quite common in recent years without waste disposal alternatives, so harming the local ecology as well as the biodiversity of the region.

SYSTEM DESCRIPTION :

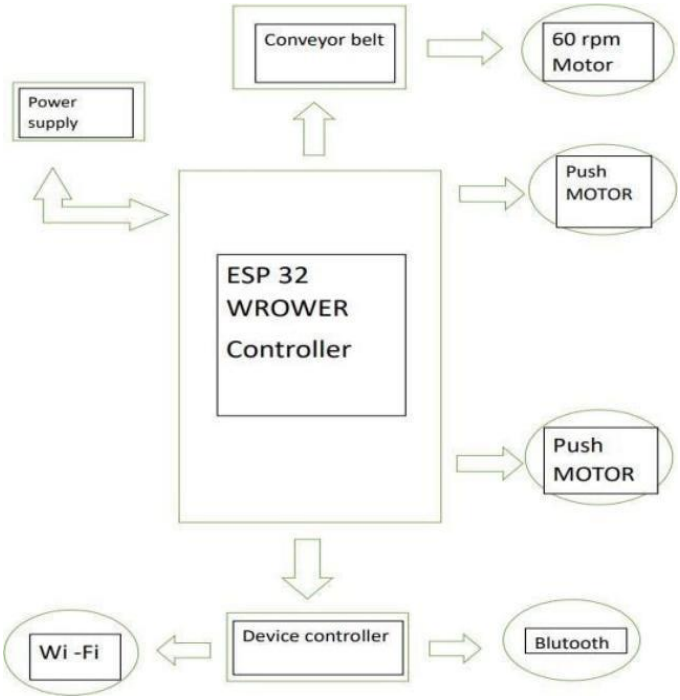

Fig 1: Block Diagram

Running on two servo motors and a conveyor belt, an IoT-based river cleaning robot is designed to automatically travel and clean river surfaces by collecting trash. The robot is driven by two servo motors that govern its movement so that it may travel forward, backward, and turn by

changing the motors' direction and speed to regulate the movement of the robot. Scooping up floating trash, including plastic and other waste, the conveyor belt mechanism collects it as the robot moves through the water of conveyor system, propeller, buzzer, and servo motor. Android app is used for typical remote control objectives.

WORKING:

The main purpose of this machine in this project is to lift waste particles from the water surface and dispose of it inside the tray. Set on the motor shaft, a system of conveyor makes up this. Motor conveyor turned owing to rotation. The movement of the conveyor collects trash, plastics, water debris, and other contaminants from water bodies. Waste trash in the water will be lifted and the machine will move higher since it is located in the water. Reaching the upper extreme point causes the waste particles to fall into the tray. Thus, this will lead to safe gathering of waste particles from water and cleaning of water surfaces. A PMDC motor helps the river machine run propelled by a propeller. All electrical devices are controlled by an RF transmitter and receiver, which lets the machine Collecting be managed remotely.

Since water tension makes trash difficult to collect, our work employs mechanism to solve real time issues.
Using this four bar mechanism, it rotated at a particular angle intended to gather the debris for the model. Operating the device with remote to ON and OFF causes two windows to open and close according to the user's will.
Resting on the frame, a shaft bolted to it holds water wheel A water wheel (propeller) is designed to mane uver the machine forward or backward on water. The engine turns the water wheel with a chain drive system. Included in this project tracking technology is also meant to assist in controlling solar array orientation with respect to sunrays. This will boost our solar production.

COMPONENTS USED:

ESP32-WROVER:

The ESP32 micro-controller, designed by express if system, is the A]ESP32-WROVER. A low-cost, low-power SoC micro-controller with built-in wi-fi and Bluetooth capabilities, it was made for IOT applications. It also provides a set of general purpose input/output pins allowing you to run electronic components for physical computing and explore the Internet of Things (IOT). Comprising 38 GPIO and highly integrated architecture driven by Dual core Ten silica Xtensa CPU.

Li po Battery:

or lithium-ion polymer battery—is a rechargeable battery of lithium-ion technology using a polymer electrolyte instead of a liquid one. Highly conductive semisolid (gel) polymers create this electrolyte. These batteries provide more particular energy than other lithium battery kinds used in circumstances where weight is a major consideration.

Relay: Pirating Voltage:

Theft Relay: Robbery DC 24V Voltage Two separate LEDs to indicate Relay on / off Voltage input for triggering 3.3V to 5V Back protection Electromagnetic field Equipped with high current relay 10A@250VAC / 10A@30VDC It can operate DC and AC devices such solenoids, motors, lights, fans, etc. Included for quick and easy connection, premium screw terminals Freewheeling diodes safeguard your microcontroller. Add Pin connected to Burg stick for easy access. Mounting holes provide.

Propeller:

A propeller is a device with a spinning hub and radiating blades set at a pitch to produce a helical spiral which, when rotated, puts linear thrust on a working fluid such water or air. Propellers either pump fluid through a pipe or duct or give push to propel a boat through water or an airplane through air.

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Shaped by Bernoulli's principle, the blades' spinning motion through the fluid generates a pressure differential between the two surfaces, hence forcing the fluid. Most marine propellers are screw propellers with helical blades rotating on a propeller shaft with a nearly horizontal axis.

Jumper wires:

Usually used to connect the parts of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering, jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them—simply "tinned"). Usually used to connect the parts of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering, jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them—simply "tinned").

Motor :

DC gear motors provide excellent torque at low speeds designed for use on unfiltered SCR rectified AC input. They could also be used with PWM DC variable speed drives or across-the-line applications. Ranging in operating voltage and output shaft type, DC gear motors Interfacing the DC motor with ESP 32 will allow path optimization by hence controlling the Agri-Bot's speed and location.

DESIGN:

Fig 2: IOT based river cleaning robot.

ADVANTAGES :

1. This cleaning system is easy to operate and flexible.
2. This system is Eco-friendly. C] This requires less manpower.

3. This required more use of renewable energy Sources.
4. This system is Cost effective (Initial and Maintenance cost is low).
5. This is efficient method.

DISADVANTAGES :

1. Waste collecting capacity is limited.
2. Only useful to collect waste which is floating on river surface.

APPLICATIONS :

1. Useful to reduce the water pollution in river.
2. It is applicable to reduce water debris, impurities, and all types of impurities which are floating on the water surface in swimming pools.
3. It is useful to remove the environmental marine pollution at Godavari River.
4. It is useful in fishery plants to collect dead fishes.

FUTURE SCOPE :

Future improvements for river-cleaning robots could focus on enhancing their efficiency, adaptability, and environmental sustainability. Advancements in AI and machine learning could improve debris detection, navigation, and decision-making in complex environments. Integrating solar panels or other. renewable energy sources could increase operational duration and reduce reliance on batteries. Modular designs might allow for easier upgrades, repairs, and scalability, while improved materials could enhance durability and corrosion resistance. Enhanced sensors could provide more precise monitoring of water quality and ecosystem health.

CONCLUSION :

River cleaning robots represent a transformative solution to the growing problem of water pollution. By leveraging autonomous technology, IoT connectivity, and energy-efficient designs, these robots provide an effective, safe, and sustainable way to clean rivers and maintain healthy ecosystems. As technology advances, river cleaning robots will continue to play a vital role in preserving water bodies and ensuring a cleaner, healthier planet for future generations.

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