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Smart water cleaning boat

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Abstract:

Water pollution has become a pressing global concern, necessitating innovative solutions for its mitigation. This project presents the design, development, and evaluation of a smart water cleaning boat equipped with wireless connected electronic system to efficiently remove floating wastes from water bodies. The boat's adaptive cleaning mechanisms include rotational motion of DC motors equipped with conveyor belt for collecting floating debris, plastic, leaves, psilophytes present on water surfaces. These mechanisms are controlled by a microprocessor based electronic system which has a wireless connection established with a mobile phone. The project involves a comprehensive design and development process, including conceptual design, component selection, software development, and prototype construction. Results from the performance evaluation demonstrate the effectiveness of the smart water cleaning boat in removing pollutants, reducing water contamination by floating wastes, and improving water quality. User feedback from field testing highlights the ease of operation and the boat's potential for addressing water pollution challenges in various environments. Overall, this project contributes to the advancement of smart technologies for environmental conservation, offering a promising solution for the sustainable management of water resources and the protection of aquatic ecosystems.

Keywords: Motor, Arudino uno microcontroller board, Motor driver controller, Bluetooth circuit, Conveyor, Collector

I. INTRODUCTION:

Across the globe, water bodies serve as crucial reservoirs of life, providing habitats for diverse ecosystems and serving as sources of drinking water, recreation, and transportation. However, these invaluable resources are increasingly threatened by pollution, ranging from plastic debris to chemical contaminants. Addressing this challenge requires innovative solutions that not only clean water surfaces efficiently but also leverage technology to minimize environmental impact and optimize resource utilization. This report explores the design, functionality, and potential impact of smart water surface cleaning boats. Through an in-depth analysis of their operational principles, technological components, and real-world applications, it aims to elucidate the transformative role of these innovative platforms in environmental conservation efforts. From their ability to adapt to diverse water conditions to their capacity for real-time monitoring and remote operation, smart boats represent a paradigm shift in the way we approach water surface cleaning, promising a cleaner, healthier future for our planet. In the following sections, we delve into the key features and operational mechanisms of smart water surface cleaning boats, examining their performance metrics, environmental benefits, and challenges. Through a comprehensive review of existing literature, case studies, and expert insights, we aim to provide a comprehensive understanding of the opportunities and implications associated with this groundbreaking

technology. Ultimately, this report seeks to inspire continued innovation and collaboration in the pursuit of sustainable solutions for preserving our water resources and safeguarding the health of ecosystems worldwide.

LITERATURE REVIEW:

1] Haller 2009; Lembi 2009 used “management techniques for plants” This technique was used for some specific floating derbies and plans as well. There are limitations to the size of waste. And the development of the technique is under limiting stage. No further development for this technique is mentioned.

2]Y. Sharma;Dec (2011)“universal reverence to water” have stated that, in many religions of the world water is used to celebrate the occasion which causes pollution of water. This is hazardous for aquatic lives an make the water unusual. Due to which the concept of removing waste from water is arrived

3] Ute S. Enderlein, ussRainer E. Enderlein and W. Peter William stated that there should be strictly ban on the hazardous compound production as well as their imports which indirectly will help prohibiting the pollution in countries The toxic compounds may directly attack on human as well as aquatic lives. However some amount of compound is essential in water.

4] S. Veenstra, G.J. Alaerts and M. BijlsmaCWE in the International Conference on Water and the Environment in the year January 1992, have stated that, in the newly industrializing cities economic growth is the very basic factor of consideration. More attention on pollution carrying capacity of environment is preferred. Basic west water treatment plant transferred 1m of west water in to 1-2lit of concentrated sludge.

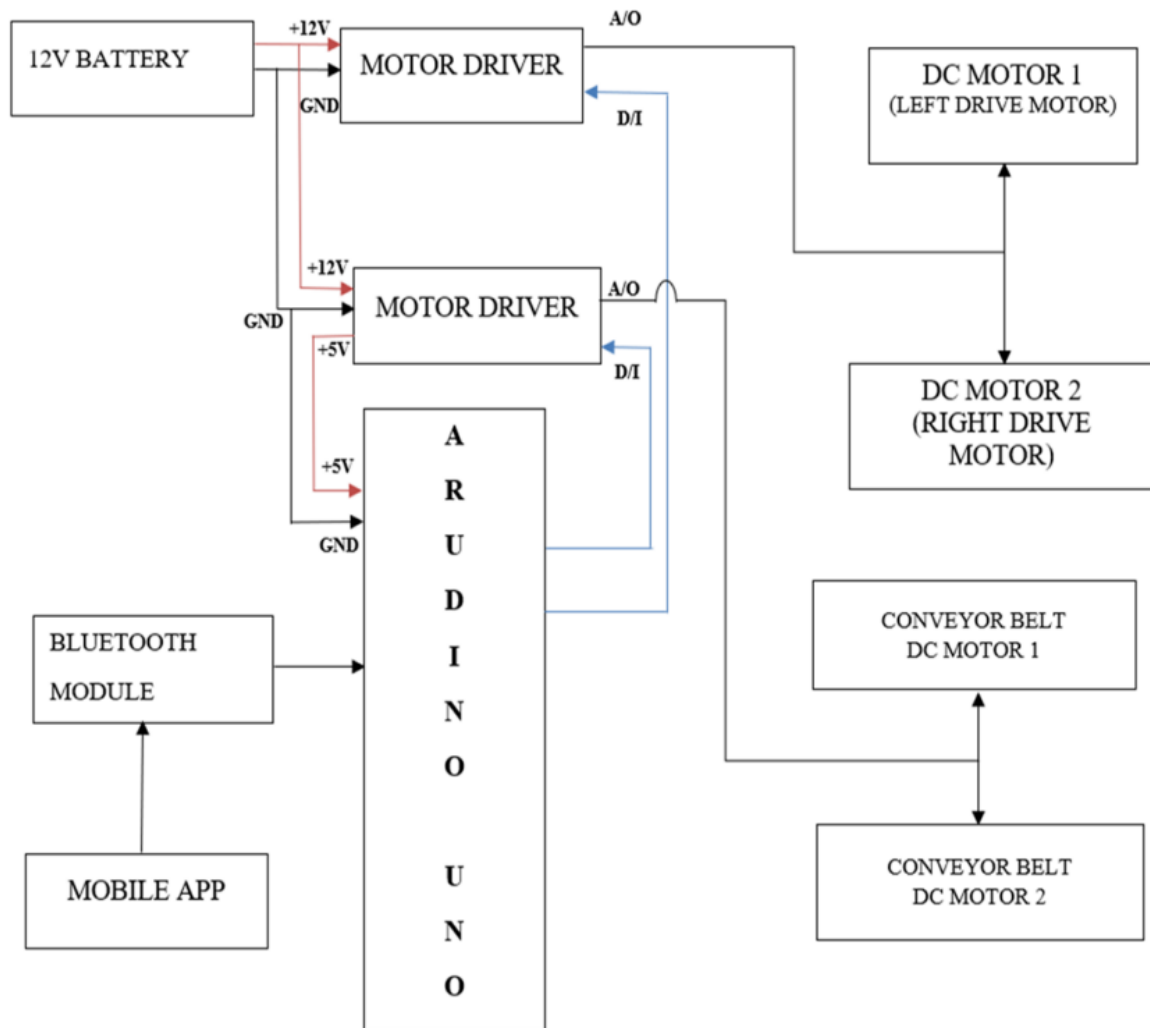
PROBLEM STATEMENT

The previous models as mentioned above has few disadvantages like,

The model design was not done, and no advancements of the model was done by Haller and lembi

The model proposed by Akash Sinha is completely mechanical and will directly involve manpower.

The model proposed by Chen Su doesn't have any control over garbage collection

SYSTEM DESIGN:

The block diagram of the components used in our projects are as shown above the connections of various components are represented. The circuit diagram of the above components is represented hereafter

HARDWARE COMPONENTS:**ARUDINO UNO BOARD:**

Arudino Uno Board acts as brain of our project the program to control the movement and operation of boat is fed into the board by computer using a data cable especially made for the purpose. It consists of Atmega 328P microcontroller.

HC-05 BLUETOOTH MODULE:

The HC-05 module is a popular Bluetooth module used for wireless communication in our project. The pairing of Bluetooth module is established with mobile phone. The wireless signals are sent by using a software application named 'Arudino bluetooth control'. The Bluetooth module is connected to Arudino board using jumper wires. The wireless signals are received by Bluetooth module and transmitted to the arudino uno board through the wires.

12V DC MOTORS:

DC motors operate based on the principle of Lorentz force, where a current-carrying conductor placed in a magnetic field experiences a force. these motors are commonly used in a wide range of applications due to their simplicity, reliability, and ease of control. They consist of a rotor (the rotating part) and a stator (the stationary part), with brushes and a commutator to facilitate the flow of electricity and generate motion.

Depending on the design and specifications, 12V DC motors can vary in size, torque, and speed capabilities, making them suitable for tasks ranging from powering small electronic devices to driving larger machinery.

MOTOR CONTROLLER:

Motor controller is a device or a set of devices that govern the performance of an electric motor. It typically regulates the speed, torque, and direction of the motor. Depending on the application and complexity, motor controllers can vary widely in features and designs. They can be simple, like those used in household appliances, or sophisticated, like those found in industrial automation or electric vehicles. Some common types include DC motor controllers, stepper motor controllers, servo motor controllers, and brushless DC motor controllers. The details of a motor controller would include its specifications such as input voltage, output voltage, current rating, control interface, protection features, and supported motor types.

ACCESSORIES:

Other accessories like connectors, Jumper wires, PVC sheets and Switches etc are used.

RESULT:

Preserving and conserving the water has always been the most discussed topic in the world, as the most valuable natural entity is the water which is the ultimate source of life. Pollution of the water is the most challenging thing a human can face, therefore the projects which help in conserving the purity of the water are at utmost demand. Our project is the one which is of the mentioned purpose. It has the following simulation results:

- i. the operation of the boat is completely wireless i.e., by mobile phone.
- ii. The boat can be operated from a longer distance of around 50 feet.
- iii. Efficient collection of wastes present on water surface
- iv. The trash bin can be removed separately after collection of waste and can be cleaned.

CONCLUSION:

Water is and has been the most important naturally available thing which is being polluter by various means, the floating debris on the surface of the water bodies will block the entry of the sun rays into the water bodies which causes death of inner aquatic life which will cause the ultimate pollution of water, conservation of water life requires complete removal of surface debris which will lead to the healthy aquatic ecosystem. The wireless control of the boat will simulate the movement of conveyor belt and driving motors, the conveyor belt pulls all the floating wastes and collects it into the trash box. This efficient system of floating waste collection is more efficient and economical. The future advancements in this project will be more useful which may include the use of AI and IoT, thus hereby we conclude that the model proposed will deliberately solve the problem of water pollution and thus help in maintaining a healthy eco system.

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