POND CLEANING ROBOT USING MOBILE APPLICATION

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Abstract- **The issue of water logging because of plastic, thermocole and metal is provoking irritation advancement and it favors infirmities like digestive infection, typhoid etc. Cleaning the losses by using manual systems would be lacking as it consistently covers a huge area of works. It is a notable reality that life began with water and the cleanliness of water is a vital part of life to make due on the planet. In any case, the results of science laid their tremendous strides as poisons. A large portion of these poisons are harmful and are influencing antagonistically the water assets (wells, lakes, streams, and ocean), living life forms in the water, and every single ward creature. This study includes a proposed plan of trash gathering system practical and successful for cleaning up squander from streams, channels and lakes. The waste gathering framework is expressly planned to application for getting up a wide assortment of flotsam and jetsam, counting skimming litter, waste, logs, arranged tires and others. The coordinated framework consolidates the use of IoT innovation that can screen and control the whole process[1].**

Keywords – IoT, Arduino, Pond, App, debris.

1. INTRODUCTION

There are various wellsprings of contamination, for example, homegrown and modern sewerage, effluents from animals homesteads, fabricating and agro-based enterprises, suspended solids structure mining, lodging, and street development, logging and getting free from forest and weighty metals from production lines. Additionally, in 2017, Appointee Energy, Green Innovation and Water has ordered numerous streams in West Malaysia as "dead" because of contamination, added to the decrease of broken up oxygen for which the absence of disintegrated oxygen in inland streams prompts basic conditions to the fishes and different biodiversities in those waterways. It's assessed that around 70% of surface water in India is unsuitable for consumption. Water contamination is significant wellbeing chance to people and kills amphibian creatures. The majority of these poisons are harmful plastic and are influencing unfavorably the water assets (wells, lakes, streams, and lakes)

which likewise influence Sea-going Life. So that to diminish the water contamination we are attempting to make a 'Lake Cleaning Robot', a gadget which includes eliminating the waste It is critical to find a solution. that would make it, at the very least, a better condition through a river cleaning robot. There are many methodologies with regards to cleaning a static and dynamic climate. It might incorporate hereditary calculations, fluffy rationale, brain organizations [2].To beat those issues, this study means to plan and mimic a garbage gathering framework that is supposed to additionally grow tentatively for the application in reality. Thus, it will actually want to getting a wide variety of flotsam and jetsam, including floating litter, junk, logs, arranged tires and others. Consequently, it is normal to improve the interest and need for a plan of a stream cleaning machine that is capable for cleaning up squander from waterways, channels and lakes and defeat the recent concerns. The coordinated framework consolidates the utilization of IoT innovation that can screen &control the whole cycle [1] Indian streams like Ganga offer more than 40% of the Indian's water populace across 11 states, serving around an expected populace of 500 million individuals which is exceptionally high contrasted with some other streams in India, yet it was positioned second most dirtied waterway on the planet in 2017 [2].

2. LITERATURE SURVEY

This Segment portrays the past works on the water cleaning boats in view of various advancements planned by different analysts all over the planet.

2.1 EXISTING METHODS

Block in the waste frameworks is somewhat present overall in many spots. It has turned into a basic circumstance because of the utilization of polythene packs and other strong waste particles present in the sewer framework. The waste and sewage gathering of lines are for the most part stifled towards their blockage and surpass of stream level outcomes in disinfection issues and makes wellbeing danger for residents. The current techniques for blockage recognition depend on manual visual examination. The principal constraint of this framework is that pipeline in the sewage framework should be depleted out first.

Chen Su, et al. portrayed "A self-contained boat for cleaning trash floating on something like a lake".The article also proposes the design and guidelines for an independent boat to clean up trash floating on the lake. In light of ultrasonic distance estimation, the boat was modified to work both physically and naturally with a movement control system. The significant disadvantage noticed was, development of the boat wasnot smooth and zero influence over the assortment of trash. In presented another idea of adaptability slithering system in planning a modern submerged cleaning boat, which is equipped for working submerged, checking the ideal surface, and recording natural responses. The framework configuration was restricted to eliminate bacterial growth from water surfaces. "Productive Lake City worker by Utilizing Pedal Worked Boat" was portrayed by Aakash Sinha et al. The construction plan was mechanical in nature and relied on human acceleration. There is no programmed command over the trash collection because no hardware is involved in the plan. In a strategy for cleaning up floating trash in bodies of water was proposed. The planned robot's capability is to collect trash particles from the water's surface and deposit them in the provided plate. However, the framework was not robotized to recognize garbage. Soumya et al. proposed a "Lake Cleaning Robot," which uses a cell phone to remove trash from the lake. The machine is designed around the AT89S51 regulator. The framework lacked sensors for programmed trash identification and robot guidance . Raghavi et al invented the 'Water Surface Cleaning Robot.' The proposed work's primary objective was to develop a surface vehicle. Water quality sensors were mounted on the robot. The main downside of this method is that it is not cost-effective, and themanufacturing process is intricate.

1. The paper which we have referred is Design and development of river Cleaning Robot using IOT Technology which was published in 2020 by IEEE. The author of paper is M. N. Mohammed , S. Al-Zubadi, Siti Humairah Kamrul Bahrain and findings are The proposed system is implemented in using IoT technology. The proposed system had ability to control and manage entire process of cleaning garbage and wastemanagement.

2. The paper which we have referred is Design and development of sewage cleaning mobile robot which was published in 2021 by IEEE.The author of paper is Baluprithviraj K. N., M a d h a n Mo h a n M . , Kalavathi Devi T., Saktthivel P. and findings are a user friendlysewage cleaning system

3. The paper which we have referred is Autonomous Cleaning Robot which was published in 2021 by IEEE. The author of paper is Shri Vishva R., Naresh R., Venkada Krishnan M.S., andfindings are In this paper we propose the design, detects garbage andcollects it by itself.

4. The paper which we have referred is Swachh Hast- A water cleaning Robot, which was published in 2020 by IEEE.The author of paper is Baluprithviraj K. N., M a d ha n M o h a n M . , Kalavathi Devi T and findings are In this paper they used Arduino Uno controlled robot that cleans water surface with a robotic arm

2.2 PROPOSED SYSTEM

This study includes a proposed plan of trash gathering system practicaland successful for cleaning up squander from streams, channels and lakes. The waste gathering framework is expressly planned to application for getting up a wide assortment of flotsam and jetsam, counting skimming litter, waste, logs, arranged tires and others. The coordinated framework consolidates the use of IoT innovation that can screen andcontrol the whole process.

3. REQUIREMENT SPECIFICATIONS

The requirement specification for a pond cleaning robot using a mobile application includes defining the functionalities, design specifications, and user interface requirements necessary for the efficient and user-friendly operation of the robot via the mobile application, ensuring effective pond cleaning and maintenance.

3.1 HARDWARE SPECIFICATIONS

The Arduino Uno platform is necessary for the framework's hardware. Two Arduino Uno sheets are used, one to control the boat's wheels and collect data from the sensors, and the other to operate the robotic arm. The chapter that follows looks at the necessary equipment.

1. MICROCONTROLLER(Arduino UNO R3 CH340G): On the Arduino UNO platform, an ATmega328 regulator is used. The regulator uses data from the phone and sensors to control the boat and mechanical arm in accordance with the necessary conditions..

2. ULTRASONIC DISTANCE SENSOR MODULE – HC‑SR04 : This distance-estimating sensor is used to determine the obstruction's location relative to thewatercraft.

3. PIR MOTION SENSOR : The passive infrared sensor (PIR) is used to determine if an observed impediment isa living thing or nonliving trash.

4. BLUETOOTH MODULE HC05: Here, the HC-05 module serves as a bridge to operate the boat's wheels and robotic arm.

5. DUAL SHAFT BO MOTOR: The water boat is propelled by four DC motors with wheels in compliance with the commands given.

6. CONVEYOR BELT: Conveyor is used for the deliverysystem of the waste from the water to the designated trashcans

7. ANDROID APPLICATION: The boat's servo motorsand mobility are managed by an Android app.

3.2 SOFTWARE SPECIFICATIONS

Arduino IDE: The Arduino IDE is a freely available integrated development environment that is specifically created for programming Arduino boards. It provides a straightforward and user-friendly interface, a simplified programming language, and an extensive collection of libraries that simplify intricate tasks. With its integrated code editor, serial monitor, and seamless compilation and upload process, the Arduino IDE offers an accessible and enjoyable experience for developing Arduino projects. It is compatible with multiple operating systems and can be extended with the use of third-party plugins.

MIT App Inventor: It is a platform that provides a simplified and accessible way for individuals to create Android mobile applications, even without prior coding experience. This user-friendly environment allows users to visually design the app's interface and define its functionality by connecting blocks of code in a drag-and-drop manner. MIT App Inventor fosters creativity and empowers users of all skill levels to transform their ideas into functional mobile apps with ease and efficiency.

4 METHODOLOGY

The proposed system is divided into two segments first one is the mobile application and second one is the IoT robot. Where the mobile application is used to control the robot indirectly. The mobile application connects to the system which gives user access to control the robot. When user reaches a certain check point by playing the game then the robot autonomously collects the waste material in the garbage bin. The main structure of the framework encompasses the data wellspring of the component,

which includes the enticing switch cell phone application. The processor improvement was the second section of framework advancement. The microcontroller processor was integrated in this section using the Arduino IDE programming to operate source code coding. The program enables the placement of crucial orders and source code into the processor. The plan stage is an imperative part of the created framework since it's the goal and degree are legitimate through the calculated plan while the connection point configuration empowers better vision for the framework improvement in view of the sensible and actual plan. The plan of this model was finished utilizing the Blender3D programming rendition 2018, a strong demonstrating PC supported plan program that runs fundamentally on Microsoft Windows [11-12]. This product has a rich component that can be utilized for designing from hardware plan and mechanics, 3D models, liveliness, and has an advantageous development environment. A few parts, including the robot's body, which is moulded like a boat, a propeller to propel the robot forward, and in reverse then a kind of transport is utilized to welcome the loss on the outer layer of the stream to the assigned region squander that will be capably gathered by this robot is drifting on the outer layer of streams, like containers, plastic jars, covers, and so on. It is gathered through a belt transport then positioned in the planned spot. This transport planned pivoting ceaselessly, particularly when it is recognizing garbage and waste, accordingly some kind of sensor will be put in additional review.

5. IMPLEMENTATION

The implementation process for a pond cleaning robot using a mobile application involves several key steps. First, the robot is designed with necessary components such as obstacle detection sensors and cleaning mechanisms. Simultaneously, a mobile application is developed to enable remote control and real-time monitoring of the robot's status. Communication protocols are established to facilitate seamless command transmission and receive instant updates from the robot. The robot's software is programmed to execute cleaning operations based on user instructions. Extensive testing is conducted to ensure reliable communication, precise command response, and efficient cleaning performance. User feedback is then collected and incorporated to improve the user interface and overall functionality. This iterative process leads to the successful deployment of an integrated system that enables efficient pond cleaning through the mobile application. In the implementation process, it is of utmost importance to give careful consideration to safety measures and adhere to applicable regulations and guidelines for operating a pond cleaning robot.

5.1 SYSTEM ARCHITECTURE

The implementation process for a pond cleaning robot system integrated with a mobile app comprises several essential steps. Firstly, the system requirements are defined, specifying the desired functionalities and features. Following that, a comprehensive system architecture is designed, taking into account the mobile app, communication protocols, and the robot's components. In the development phase, the mobile app's user interface and control features are created, allowing users to control the robot, monitor its progress, and receive notifications. Simultaneously, the software for the robot is developed, including control algorithms, sensor integration, and communication with the mobile app. A reliable wireless communication mechanism is established to facilitate seamless data exchange between the robot and the mobile app. Thorough testing and debugging are conducted to identify and resolve any issues, ensuring the system operates smoothly. Once the system is validated, it is deployed by installing the robot's hardware components in the pond and making the mobile app available for users to download and install. User training and support are provided to ensure efficient utilization of the system. Regular maintenance, updates, and continuous improvement efforts are undertaken to optimize performance and address changing requirements. Collaboration with a proficient team of professionals is vital throughout the implementation process to leverage their expertise and domain knowledge, ensuring the successful integration of the pond cleaning robot system with the mobile app.
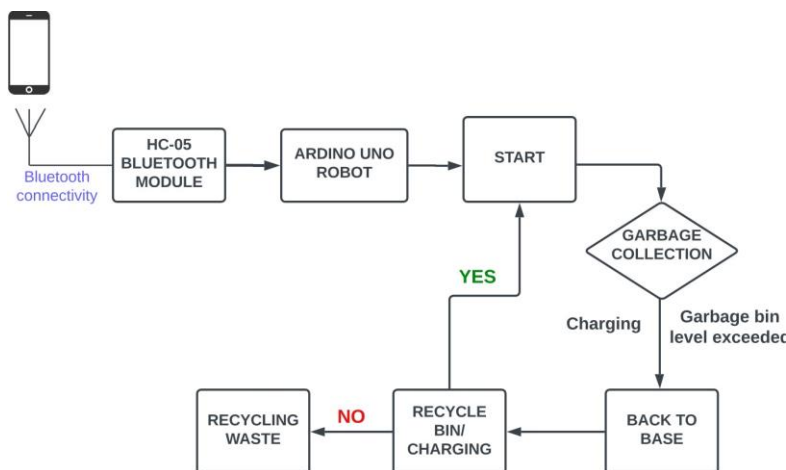
5.2 FLOWCHART

The mobile application enables users to control the pond cleaning robot wirelessly. By opening the app and establishing a wireless connection with the robot, users can initiate the cleaning process. The app provides a user- friendly interface to start the robot and monitor the cleaning progress in real-time. It also offers notifications and updates to keep users informed. The app includes controls to pause or stop the cleaning operation as needed. Once the cleaning is finished, either automatically or by user intervention, the app provides valuable information such as data on the pond's cleanliness and the bin's depth. This data helps users maintain the pond effectively and make informed decisions for future cleaning tasks.

**Figure 5.2: Flow chart**

Figure 5.1: System Architecture
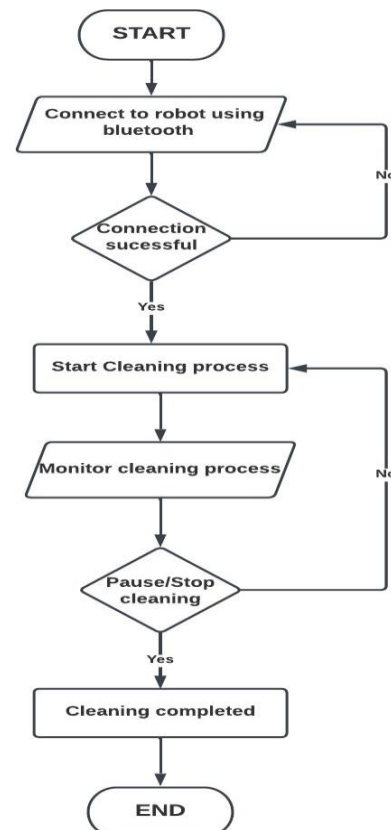
6. RESULTS

The research paper presented promising findings for the pond cleaning robot project, indicating its effectiveness in autonomously and efficiently cleaning ponds. The robot, controlled via a mobile application, successfully eliminated debris, algae, and contaminants, resulting in improved water quality. Comparative analysis demonstrated a significant reduction in cleaning time compared to manual methods. User feedback indicated a high level of satisfaction with the user-friendly interface of the mobile application and the robot's performance. These results underscored the practicality and efficiency of the pond cleaning robot system as a valuable solution for pond maintenance, offering time-saving benefits and contributing to enhanced water quality.
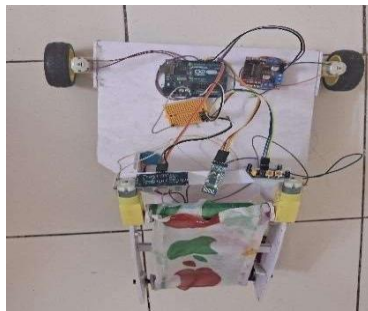
Figure 6.1: Robot Top view
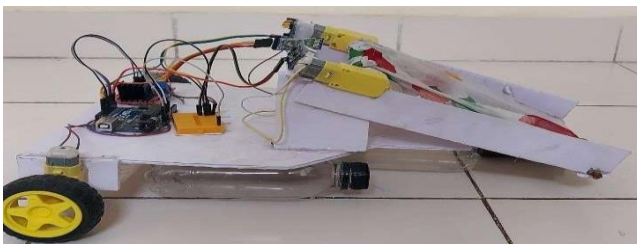
Figure 6.2: Robot Side view

Figure 6.3: Robot Front view

Figure 6.4: Application UI

Our mobile application for the pond cleaning robot enables seamless Bluetooth connectivity, allowing users to control the robot remotely. The application features intuitive navigation buttons for easy control of the robot's movement. Real-time updates of the ultrasonic sensor values are provided to assist users in monitoring the robot's proximity to obstacles in the pond. Additionally, the application offers live feedback of the PIR sensor values, facilitating the detection of potential disturbances or wildlife near the pond.

7. CONCLUSION

We can reason that it is an inventive procedure of limiting manual pressure and consequently especially dependably balancing out inside the stream. The undertaking executed through us made a dazzling errand inside the ecological reason and it is extremely valuable for the limited scale works. Albeit this framework in a situation to gather the trash from the lake with human mediation. The objective of the endeavor was effectually accomplished. Stream purifying mechanical is planned with an objective of clean the water particles drifting on the lake, using our robot we can get many drifting squanders like plastic jugs, sacks, plants with next to no human impedance and afterwarddiscard the waste effectively, one can smooth the lake basically by running it with the assistance of controller.

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