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Innovating Waterborne Cleanup with Remote-Controlled Debris Collection

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Abstract: *This project is about making a boat that can be controlledfrom a distance. The boat will have different parts and tools that are controlled by a small computer called the ATmega328P microcontroller. The boat will be able to pick up garbage from the water and change its direction using the microcontroller. The microcontroller will also beable to communicate with a remote control through Bluetooth, which will help the boat navigate accurately and collect garbage effectively. This project revolves around the development of a remotely controllable boat equipped with various components managed by the ATmega328P microcontroller. The primary goal is to enable the boat to perform tasks such as debris collectionand directional adjustments, all orchestrated by the microcontroller. Bluetooth connectivity will be employed to establish seamless communication between themicrocontroller and a remote-control interface. This integration will enhance the boat's precision in navigationand its efficiency in collecting debris. Furthermore, acamera system will be incorporated for real-time monitoring and control, ensuring the effective utilization ofthis versatile waterborne device. In summary, thisabstract highlights a multifunctional boat project that leverages advanced technology for remote control, debris collection, and monitoring, promising valuable applications in environmental clean-up and water resource management.*

Keywords: Boat, Remote Control ATmega328P Microcontroller, Debris Collection Navigation, Water Clean-up Remote Control Interface, Garbage Collection

I. INTRODUCTION

Water sources are contaminated by garbage, weeds andplastic wastes. Effective waste removal in water sources such as lakes, ponds and rivers is essential for waste management and control. In India, aquatic waste management and control is of main concern for implementing smart cities and achieving the mission of acleaner India. Therefore, this work aims at creating an automated system to tackle the problem of water waste removal. Lake cleaning robot system for removing the surface wastes is experimented in this work. In this projectwe are going to use Proteus software to model and build Arduino Circuit for our water collector bot. It will collect thewaste from the surface of water and dump it into the tub placed behind it. With the use of motors, the bot and collectors will have to & for movement. The "Solid West Collector Boat " project aims to address one of the pressing environmental challenges of our time – the pollution of surface water bodies caused by the accumulation of plastic waste and other debris. This project introduces an innovative solution that harnesses technology to combat water pollution, enhancing the quality of aquatic ecosystems and promoting a cleaner environment.

Background:

The contamination of surface water bodies, such as rivers, lakes, and oceans, by plastic waste and other floating debris has become a global concern. These pollutants not only mar the natural beauty of waterways but also pose serious threats to marine life, wildlife, and human health. The Surface Water Garbage Collectorproject recognizes the urgency of mitigating this issue and seeks to develop a proactive approach to cleaning up water surfaces.

II. LITERATURE REVIEW AND OBJECTIVE

A metallic waste collection robot was proposed in [1] for automating waste removal in factories. An end-to-end robotic system was developed using Arduino Mega microcontroller interfaced with sensors and actuators. A remote controller-

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based sewage cleaning embedded system is achieved by use of Radio Frequency (RF)transmitter and receiver modules in addition with relays, switches, motors and a metallic casing setup .[2]. The robot is autonomous and traverses the path and collects the waste using a recruitment navigation algorithm. A pedal operated boat to clean the surface wastes and debris is described in [3]. The setup in the researchconsists of a pedal operated boat with propellers attachedto a shaft and a conveyer belt for collecting the waste.

Objectives:

- To reduce the accumulation of plastic and other debrisin oceans, rivers, and lakes, with the goal of preserving aquatic ecosystems and protecting marine life.
- To raise awareness about the importance of proper waste disposal and recycling by visibly showcasing the boat's ability to remove and manage waterborne garbage.3.To design and operate the boat in a way that maximizesthe collection and disposal of floating debris, contributingto cleaner water bodies and minimizing the negativeeffects of pollution.

III. MATERIALS AND METHODS

The methodology for this project involves several key steps. First, we will start with the design phase, where wewill create a detailed plan for the remote-controlled boat. This plan will include the specifications for the AT- mega328P microcontroller and the peripherals it will control. We will also outline the boat's construction and the integration of actuators, such as motors, to facilitate the collection of floating debris. Next, we will move on to the fabrication phase, where we will physically build the boat according to the design specifications. This includesassembling the hull, mounting the microcontroller, and connecting all the necessary components. After the boat's construction, we will focus on programming the ATmega328P microcontroller to enable precise navigation and effective waste retrieval.

This involves writing code for controlling the motors and Conveyor Belt, as well as integrating Bluetooth modules for remote control communication. Throughout thismethodology, a comprehensive approach is taken to ensure the successful construction and operation of the remote-controlled boat, with a focus on user interaction through the Android application. Once the boat is fully functional, we will proceed to field testing, where we will deploy it in water bodies to evaluate its performance in real-world conditions. This step will help us identify any potential challenges and make necessary adjustments.

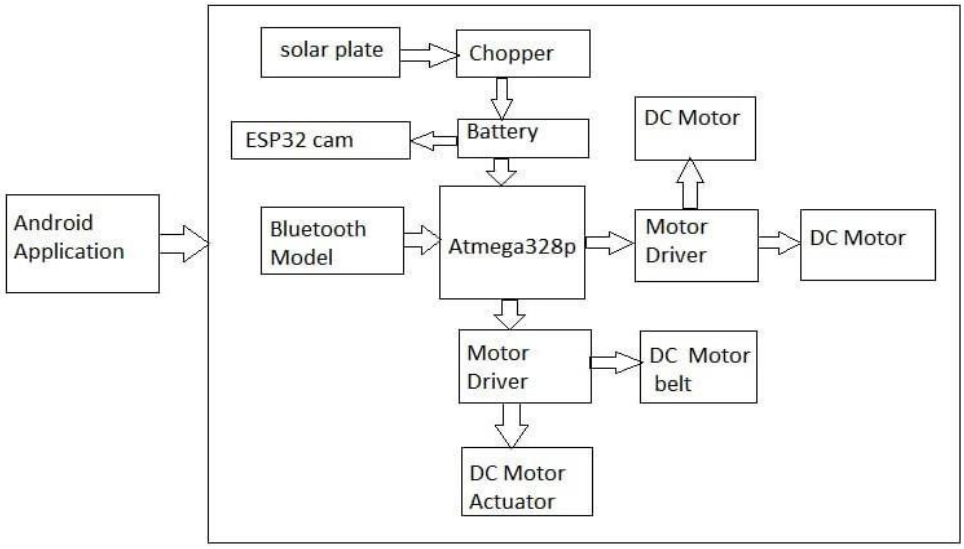

Figure 1: Block Diagram

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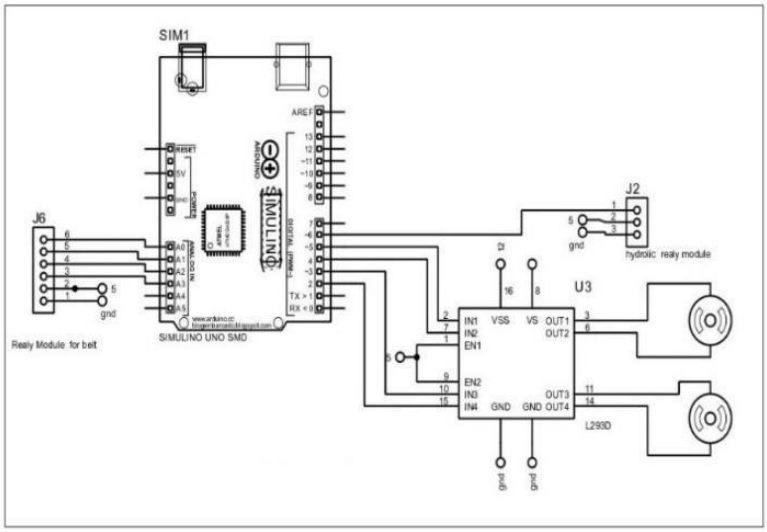

Figure 2: Circuit Diagram

To connect an AT mega ESP32, a hydraulic relay module, and an L293D Arduino connection board, you'll need to follow these steps: Identify the Pins: First, identify the pinson each component. The AT mega ESP32 will have GPIOpins for general-purpose input/output, as well as pins for power and communication. The hydraulic relay module will have pins for power, control, and the hydraulic pump.The L293D Arduino connection board will have pins for the motor, power, and control signals. 19 Power Supply: Connect the power supply to the hydraulic relay module and the L293D Arduino connection board. Make sure thevoltage and current ratings of the power supply are compatible with the components. Motor Connections: Connect the hydraulic pump to the motor pins on the L293D Arduino connection board. The L293D is a dual H-bridge motor driver, so it can control two motors independently. Make sure to connect the positive and negative terminals of the pump to the correct pins on the L293D. Control Signals: Connect the control signals fromthe AT mega ESP32 to the L293D Arduino connection board. These signals will control the direction and speed of the hydraulic pump. You can use PWM signals to control the speed of the pump. Relay Connections: Connect the hydraulic relay module to the ATmega ESP32. The relay module will have pins for the control signal and the power supply. Make sure to connect the control signal to a GPIO pin on the ATmega ESP32. Programming: Write the code to control the hydraulic pump and the relay module. You'll need to use the appropriate libraries for each component. The code will need to read sensor data from the hydraulic pump and send control signals to the L293D Arduino connection board and the hydraulic relay module. Testing: Test the system in a controlled environment to make sure everything is working properly. Make any necessary adjustments to the code or the hardware to improveperformance.

IV. RESULTS AND DISCUSSION

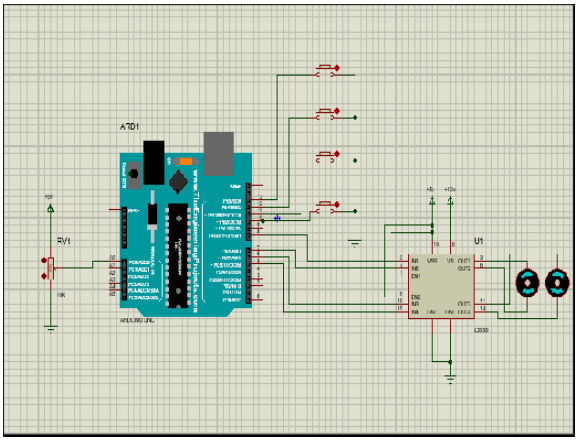

Figure 3: Motor control circuit in proteu

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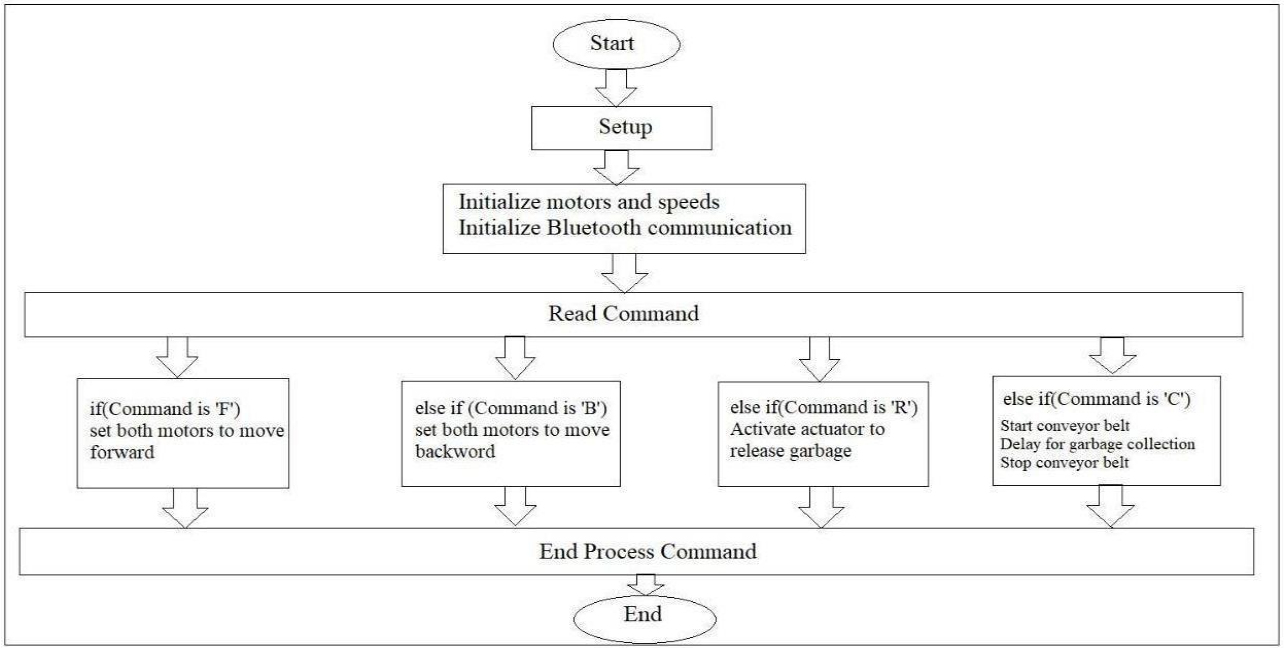

Fig 4: Flow Chart

Working Model:

Fig 5: Working Model

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V. CONCLUSION

Water plays a crucial role in sustainability, and this project is all about minimizing waste in water bodies. What sets it apart is its emphasis on reducing manual work and introducing an innovative approach to clean up large areas in rivers, lakes, and more. Waste management and water treatment are key factors in determining whether a city is s aspects and showcases the synergy of fluid mechanics, machine design, and electronics. It embodies the future of modern industries and meets the demands of robotics and automation. Beyond just advancing science and technology, it contributes to environmental conservation and preservation.

REFERENCES

[1]. Jishnu Satheesh, Anagha P Nair, Devipriya M, Chithra A, Govind Mahesh, Jayasree P R.” Wireless Communication based Water Surface Cleaning Boat” Department of Electrical and Electronics Engineering Amrita Vishwa Vidyapeetham, Amritapuri, India 2020.

[2]. Chao-Chun Ku, Ming-Tien Wu, Shu-Min Tsai, and Ming- Lin Chuang developed a “small remote-controlled boat “used to collecting nearshore floating waste. Department of Communication Engineering, National Penghu University of Science and Technology Magong City, Penghu, Taiwan 2020 IEEE.

[3]. Aayush Shah, Abhishek Mishra, Aditya Sahu, Prof. S.M. Farhan. "Design and Controlling of River Cleaning System via loT". IUG Scholar, Department of Mechanical Engineering, SRMCEM, Lucknow, Uttar Pradesh, INDIA Year May 2022.

[4]. K. Sathwik reddy, b. Rohith varma, g. Bhagath veer, dr. S. Ramani. "robotic trash collector boat to drive floating trash using AI "Department of Electronics and Communication, SNIST, Hyderabad-501301, India, 1,2,3 B.Tech Scholars, Department of ECE, SNIST, Hyderabad-501301, India.2023.

[5]. Padwal AB, Tambe MS, Chavare PS, Manahwar RK, & Mhatre MS Reviewpaper on "fabrication of manually controlled drainage cleaning system," Int. Jour. Sci. Engine. Res.2017;8(3):204-20

[6]. Yujie Bai1 , Shuang Yang2 , Ying Wu3, Yongcan Chen4 , Shiqi Pan5 , Yansong Deng*”Expansible Surface Waste Cleaning Robot” College of Electrical and Information Engineering, Southwest Minzu University, Chengdu 610225, China 2020.

[7]. Sahana Kumari S, Pooja R, Pooja K, Prathiksha Shetty”” Development of Aqua Robot for Floating Collection in Water Body” International Journal of Engineering Research & Technology (IJERT) NCCDS – 2021

[8]. Akash Shahu “Remote Controlled Unmanned River Cleaning Bot” Thakur College of Engineering and Technology Kandivali,

[9]. Mumbai 400101, India March-2021. 9. Shubham Chikhalkar1 , Mahesh Kamble1 , Avinash Ubale1 , Vivek Loli1 , Parag Kapre1 , Vithoba Tale” Design and Fabrication of River Water Cleaning System” UG Students, Department of Mechanical Engineering1 Assistant Professor, Department of Mechanical Engineering2 JSPM’s Rajarshi Shahu College of Engineering, Pune, Maharashtra, India Mat 2022

[10]. Shihan Kong , Manjun Tian, Changlin Qiu, Zhengxing Wu , and Junzhi Yu , Senior Member, IEEE” IWSCR: An Intelligent Water Surface Cleaner Robot for Collecting Floating Garbage” 2020 IEEE

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