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ECO-FRIENDLY ROBOTIC BOAT FOR PLASTIC WASTE COLLECTION AND MARINE POLLUTION MITIGATION

Dr. Saravanan G[1], Mohamed Riswan J[2], Pragadeesh S[3], Yogesh S[4]

[1]Associate Professor, Mechanical Engineering, Kongunadu College of Engineering & Technology, Trichy, Tamil nadu, India.

[2,3,4]Student, Mechanical Engineering, Kongunadu College of Engineering & Technology, Trichy, Tamil nadu, India.

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ABSTRACT

Eco-friendly robotic boat represent a cutting-edge solution for tackling plastic waste and marine pollution in water bodies. These autonomous, solar-powered vessels are designed to efficiently collect plastic debris and other pollutants from both freshwater and marine environments. Integrated with advanced sensors, and navigation systems, this boat can autonomously identify, target, and collect waste without human intervention. The use of renewable energy ensures a minimal environmental footprint, making them sustainable alternatives to traditional pollution management methods. This robotic boat are equipped with efficient waste collection mechanisms, such as nets, conveyors, or suction devices, which can capture large volumes of plastic waste while avoiding damage to marine life.

1. INTRODUCTION

In response to the urgent need to address the escalating environmental crisis of plastic pollution in oceans, this project presents a cutting-edge robot model specifically designed to tackle the challenge of plastic waste collection. With marine plastic debris reaching alarming levels, there is a critical demand for innovative solutions to mitigate its profound and wide-ranging impact on marine ecosystems. Our proposed robot introduces a novel approach to ocean cleanup by leveraging advanced technology to streamline the collection process. [1]-[2] Waste Management Improvement in Cities using IoT. Garbage collection is one of the most critical problems faced by Municipal Corporation. While implementing the waste management in cities the biggest challenge is the management of waste in cost optimal way with high performance. At the heart of our solution is the integration of a conveyor setup within the robot's design, enabling seamless and efficient collection of plastic waste in aquatic environments. [3]-[4]. Internet of Things Based Model for Smart Campus: Challenges and Limitations. Internet of Things (IoT) provides a platform where devices can be connected, sensed and controlled remotely across a network infrastructure. This conveyor system enhances the robot's ability to navigate through water bodies while effectively gathering plastic debris, thereby maximizing its cleanup capabilities. By utilizing Bluetooth commands, operators can remotely control the robot's movements, directing it to targeted locations for precise and targeted cleanup efforts. [5]-[6] Smart Waste Detection and Segregation. Waste is becoming a potential contributor to environmental pollution. The perk of waste management is significantly increasing with the growing population.

This autonomous system represents a significant advancement in ocean cleanup technologies, offering a promising solution to the global challenge of plastic pollution in oceans. [7]-[8]. Urban Municipal Solid Waste management: Modeling air pollution scenarios and health impacts in the case of Accra, Ghana Gina. A methodology to estimate the impact of waste management on urban air pollution and health. By revolutionizing the approach to ocean cleanup, our robot model aims to contribute significantly to the broader initiative for environmental preservation and the restoration of sustainable marine ecosystems. Through its technologically sophisticated design and efficient waste collection capabilities, the robot underscores our commitment to mitigating the adverse effects of plastic pollution on marine life and habitats. Ultimately, this project represents a crucial step towards achieving a cleaner, healthier, and more sustainable ocean environment for current and future generations. [9]-[10] Solid Waste Management. The main aim of the study is to find out the challenges in managing waste generation till recycling stage and also examines feasibility of technical, economic and environmental aspects of the waste management. This study will be a cross sectional descriptive study. Qualitative method one and one interview, focus group will be use to analyse the quantity of waste. For Quantitative method data will be collected through semi structured questionnaire. The date received will be analyzed by using SPSS software. Awareness need to be created in each level to minimize the waste and educate on impacts on hazards to health as well to Environment. Implementing the Monitoring and evaluating programs on waste prevention and updating the progress will involve many people in many areas. Recycling strategies will be monitored in all areas. It helps to provide a substantial amount of data regarding the amount and types of waste generated, labor and cost and other related aspects. An embedded system is integration of hardware and software, the software used in the embedded system is set of instructions which are termed as a program. The microprocessors or microcontrollers used in the

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hardware circuits of embedded systems are programmed to perform The software of an embedded system is written to execute a particular function. It is normally written in a high-level setup and then compiled down to offer code that can be stuck within a non-volatile memory in the hardware. This operating system is specially designed to run various applications with an exact timing and a huge amount of consistency.

2. METHODOLOGY

The objective of this robot model is to develop an autonomous and efficient solution for plastic waste collection in oceans. By implementing a conveyor setup and utilizing Bluetooth commands for control, the robot aims to streamline the collection process. The primary goal is to enhance the effectiveness of ocean cleanup efforts by providing a robotic system capable of autonomously navigating through water bodies, targeting and collecting plastic waste. This technological innovation seeks to contribute to environmental conservation by mitigating the detrimental impact of plastic pollution control of the plastic waste on marine ecosystems.

3. MODIFIED SYSTEM

This system integrates key components to create an effective robotic solution for oceanic plastic waste collection. The Arduino Uno serves as the core control system of the robot. It interprets Bluetooth commands received from the user and orchestrates the movements of both the conveyor setup and the robot model accordingly. The Arduino Uno is powered by the power supply unit. It is represented in the figure 1.

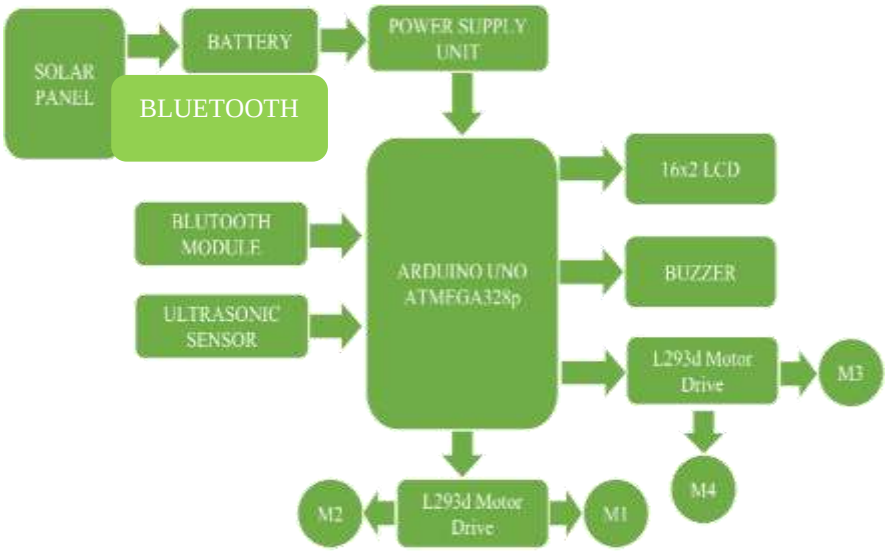

Figure 1 Block Diagram

Power supplies are frequently built as subassemblies for bigger electronics. Natural convection is used to cool several power supply. The enclosure is often made of sheet metal or plastic. The enclosure may also feature several apertures. Power supplies can also be combined to create a specialized power supply unit. This might be the size of a cabinet. This power supply circuit is shown in the figure 4.6. power supplies often have a rather favorable corrosion environment. Normally, power supplies are maintained dry and warm. Unfortunately, of the of system, some of the power supplies are directly exposed to external airflows. The dual power supply circuit as shown in figure 2.

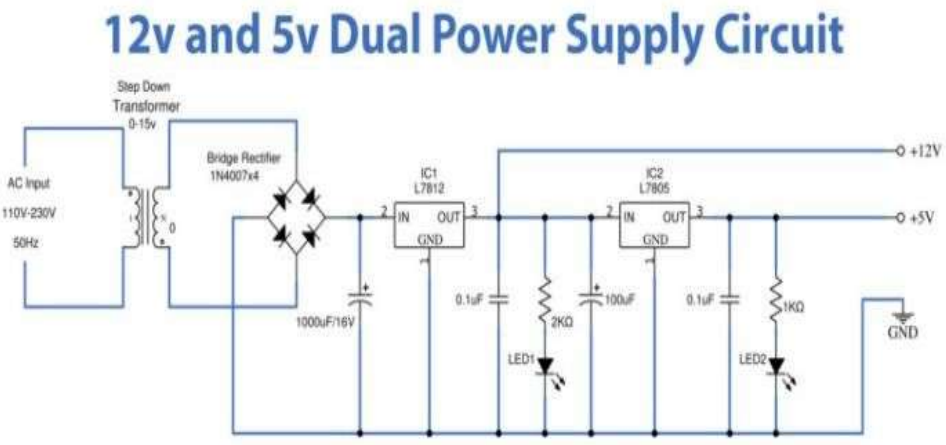

Figure 2 Dual Power Supply Circuit

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Arduino is an open-source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs light on a sensor, a finger on a button, or a Twitter message and turn it into an output activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board The Arduino IDE is show in the figure 3.

Figure 3 Arduino Ide

We start with the L293D. L293D is a popular motor driving IC. It is a 16 pin IC. The IC has 8 pins on both the sides. It has 2 enable pins, 1 V_{SS} pin, 1 V_S pin, 4 ground pins, 4 input pins and 4 output pins. Though not required here, but in case you wish to learn how to interface L293D with a microcontroller. The L293D pin configuration as shown in figure 4.

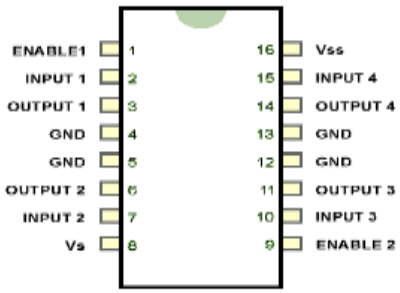

Figure 4 L293D Pin Configuration

An LCD typically consists of two polarizers positioned perpendicular to each other. Polarizers are materials that allow light waves oscillating in a particular direction (the polarization direction) to pass through while blocking light waves oscillating in other directions. The internal working of LCD unit is shown in the figure 5.

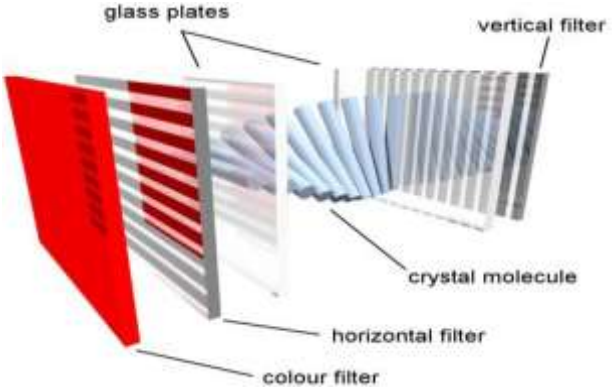

Figure 5 Layers of LCD Unit

4. CONCLUSION

To achieve this goal, this system utilizes a conveyor belt for collecting Debris in the water bodies. Conveyor belt rotates and lift the floating debries from water surface into the basket. The proposed system will also include a Bluetooth module with Arduino that can navigate boat for collecting debris and hazardous environments to assist with rescue and recovery efforts. The boat ability to reduce manual labour and enhance the efficiency of trash collection highlights its potential as a vital tool in environmental conservation efforts. In this project, a robotic system has been developed for the purpose of collecting floating debris from water surfaces. The controls for this system are user-friendly and can be managed by anyone equipped with a smartphone. Additionally, the Bluetooth module may be substituted with a Wi-Fi or RF module to enhance the operational range of the device.

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