

Smart Waste Collector Boat for Lake

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Abstract: This paper discusses the 'Smart Waste Collector Boat,' which collects waste from the lake's surface. The project was designed using Solidworks software and sketched in Fritzing software. The boat was constructed using recycled materials. Because it is lightweight and waterproof, this boat may float on the water's surface. The latest electronic component such as Arduino Uno, battery 12 V, PIR Sensor, motor module (L298N) and Bluetooth module (HC-05) have been installed at the circuit. The boat is controlled with an Arduino Bluetooth controller apps by using a smartphone. The boats can move and collect garbage from the surface of the lake. This initiative has the potential to solve the issue of water, air, and smell pollution.

Keywords: Smart Boat, Arduino Bluetooth Controller, Waste Collector

1. Introduction

The attitude of the people who love to throw garbage without caring about its impact on the quality of the lake. This region must be maintained since it contributes significantly to ecological, hydrological, economic, socio-cultural, and behavioural variety [1]. The mentality of the people, who are less concerned with hygiene in this region become pollutes the water, air, and smell.

This garbage disposal problem needs to be handled before it gets worse. A remote access technology known as the 'Smart Waste Collector Boat for Lake' has been designed to help collect the garbage. This waste may be cleaned up by utilizing a 'Smart Waste Collector Boat for Lake,' which can be controlled by a smartphone app to gather garbage. As a result, this technology might make it easier for the user to clean and maintain the lake in order to minimize water contamination.

1.1 Remote Control

The remote control is an electronic device used to operate another device from a distance, usually wireless. The remote control can allow the operation of devices out of convenient reach for the direct operation of controls [2]. A remote control can control the boat from a short distance. In some cases, remote controls allow a person to operate a device that the user would not reach the range, for example, in the water surface at the lake. Present-day remote controls are commonly consumer infrared devices that send digitally-coded pulses of infrared radiation. The remote control can control the boat movement

in all direction, such as forward, left, right and reverse. However, there are universal remotes, which emulate the remote control made for most major brand devices. The latest of remote controls was use Bluetooth or Wi-Fi connectivity, motion sensor-enabled capabilities and voice control [3][4]. It easy to control by a user because that can be use in handphone application and remote control.

2. Materials and Methods

The materials and methods section, often known as methodology, covers all of the information needed to achieve the study's results.

2.1 Materials

This boat has been built using recycled materials and is easily accommodated on the water surface such as plastic box, toy wheel, wiring, Casing Capping Wiring and other. The material was plaster by using hot glue. There are few components that use for circuit such as Arduino Uno, PIR sensor, LED, Buzzer, Bluetooth module (HC-05), motor module (L298N) ,12 V and 3.6 V DC motor.

2.2 Process of Project Development

The boat is control by using Arduino Bluetooth Controller in smartphone. The Arduino Bluetooth controller apps can give the signal to boat moving and collect the waste. This smartphone needs to active a Bluetooth mode to pairing with the prototype. The waste that has been collect will be store into boat. When waste passes through the surface of the boat, the sensor will detect and LED and buzzer is on. The LED and buzzer will keep on if storage is full. if storage can be refilled, the LED will blink. The process of waste collector is shown in Figure 1.

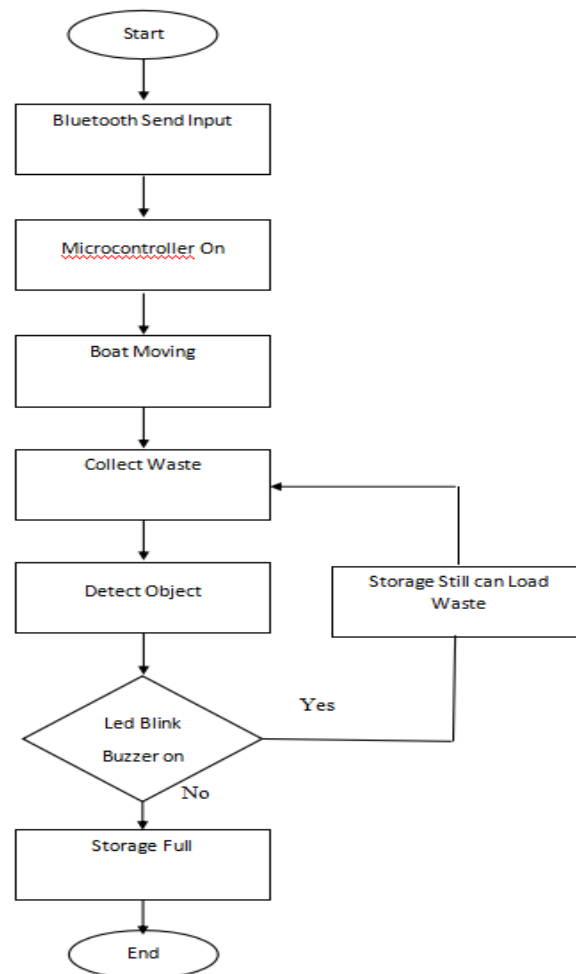


Figure 1: Flowchart of process smart waste collector boat

2.2 Design 3D Smart Waste Collector Boat

The prototype model is designed using Solidworks software. This programme is used to design the smart trash collecting boat for the lake prototype, which is seen in Figure 2. For the drawing stage, the Solidworks programme was simple to learn and utilize. This drawing makes extensive use of features such as line, circle, and dimension. The tool extrudes and cut extrude use to make change the plot turn into solid type. The prototype can sketch and view form side such as front, right, left, top, bottom and backside. This software also can measure the long, wide and height. Besides that, the model was drawn to 87.94 cm (L) x 44.48 cm (W) and 20.32 cm (H).

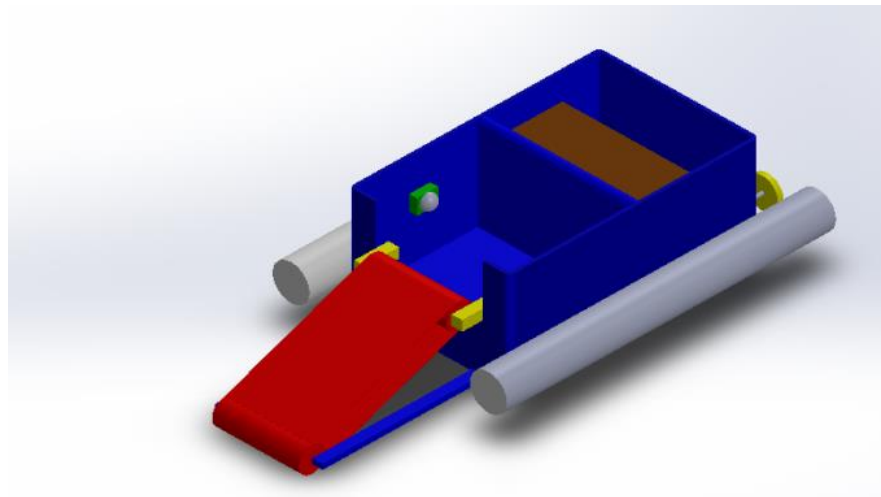


Figure 2: Design 3D smart waste collector boat

2.2 Arduino Bluetooth Controller Apps

Arduino Bluetooth Controller apps connects between smartphone and Bluetooth module (HC-05), as shown in Figure 3. This apps can be download and install in android smartphone type. The apps can be found on the google play store only. Many mode types in this apps are controlled by a smartphone, such as a controller mode, switch mode, dimmer mode, and terminal mode, just as shown in Figure 4. The controller mode is used for this project to control the boat for moving. It easy to be set up for the coding and pair with a smartphone.

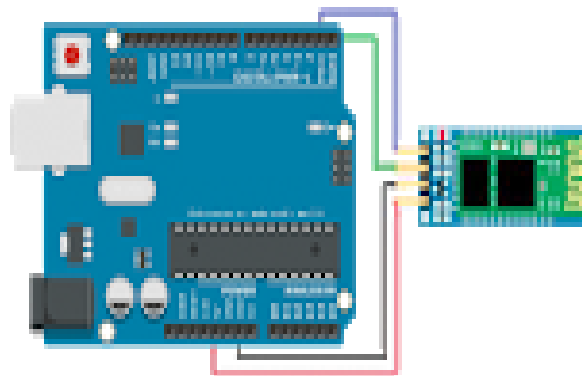


Figure 3: Arduino Bluetooth controller apps

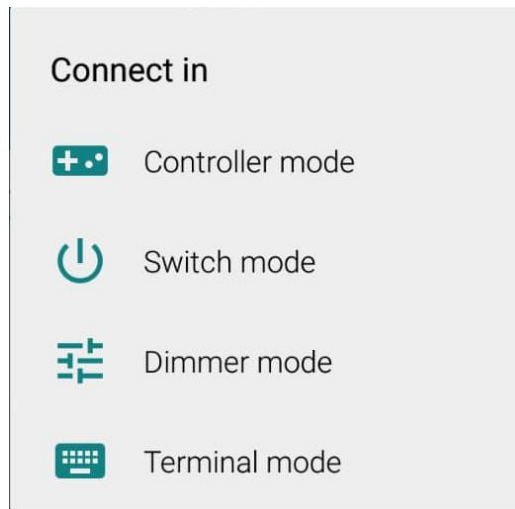


Figure 4: Mode type in Arduino Bluetooth controller

3. Results and Discussion

The data and analysis from a prototype test are presented in the findings and discussion section. This section can be organized based on the stated objectives, the chronological timeline, different case groupings, different experimental configurations, or any logical order as deemed appropriate.

3.1 Results

The Result of build a Smart Waste Collector Boat is shown in Figure 5. The size of a boat is 95.25 cm (L) x 43.18 cm (W) x 22.86 cm (H). The total weight for the prototype around 4.3 kg. This prototype is capable of accommodating the wrath of water. The function of circuit is success to run such as control with smartphone, motor moving and detect from sensor.



Figure 5: Smart waste collector boat

3.2 Discussions

The prototype was test at surface of the lake. The test duration is 15 minutes. This prototype was able to control by using smartphone. The boat can move with any direction. The waste such as small, dry leaf, plastic bag and plastic food is collect with roller at the front of boat. Figure 6 shows the process of the collecting waste. The sensor was active when detect the waste on the water surface. When the waste is full in storage of the boat, the LED and buzzer will be kept ON. If boat can be loading more waste, the LED and buzzer will be ON in 3 s then off. The weight of waste has been collected is around 500 g.



Figure 6: Waste collection process

4. Conclusion

The design of ‘Smart Waste Collector Boat’ for the lake was achieved. The prototype design has been sketched by using SolidWorks software. This drawing can help the process fabricate of prototype to be more easily. The Fritzing software is used to design for a circuit. The components have been installed by following a circuit design. The prototype was able to float on the water surface because of lightweight and waterproof. This prototype was tested for movement on the lake's surface and was found to be functional. The smartphone was able to control a boat for movement and collect the waste. Finally, the sensor capable of detecting incoming trash into the prototype's waste storage.

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