

ES-116 Project Report

Automatic Trash-Bot

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Abstract— This report explains the procedure and working principle of our project, the automatic trash bot.

the range of the ultrasonic sensor, the Arduino UNO sends another signal to the servo motor SG90 to rotate back and close the lid.

I. AIM

The aim of this project is to design and build a smart trash bin that can detect the presence of a person and automatically open its lid for the person to deposit trash, and then close its lid when the person leaves.

II. INSTRUMENTS REQUIRED

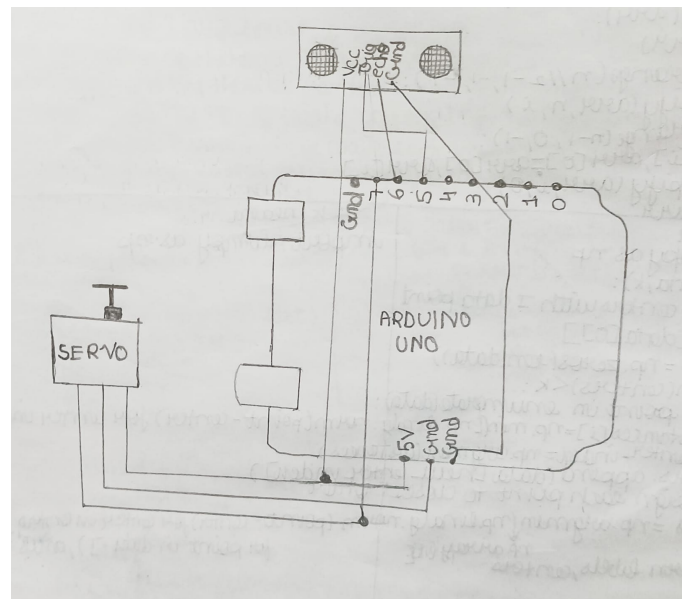
- Arduino UNO Board -1
- HC-SR04 Ultrasonic Sensor -1
- SG-90 Servo motor -1
- Trash bin -1
- Jumper wires
- Cardboard
- Transparent tape
- Double Tape
- Thread

III. THEORY

An ultrasonic sensor works by emitting an ultrasonic sound wave and measuring the time it takes for the wave to bounce back after hitting an object. This time is then used to calculate the distance between the sensor and the object. The HC-SR04 ultrasonic sensor used in this project has two main components: a transmitter and a receiver. The transmitter emits an ultrasonic sound wave, which travels through the air and bounces off any objects in its path. The receiver then detects the reflected sound wave and sends a signal to the Arduino UNO. The Arduino UNO calculates the time it took for the sound wave to travel to the object and back, and uses this information to determine the distance between the sensor and the object.

In this project, the HC-SR04 ultrasonic sensor is used to detect the presence of a person within a 30 cm range. When the person is detected, the Arduino UNO sends a signal to the servo motor SG90 to rotate and open the lid of the trash bin. The servo motor SG90 is a type of motor that can rotate to accurate angles and hold its position. When the person leaves

IV. CIRCUIT DIAGRAM



V. ARDUINO CODE

[ARDUINO CODE FOR AUTOMATIC TRASH-BOT](#)

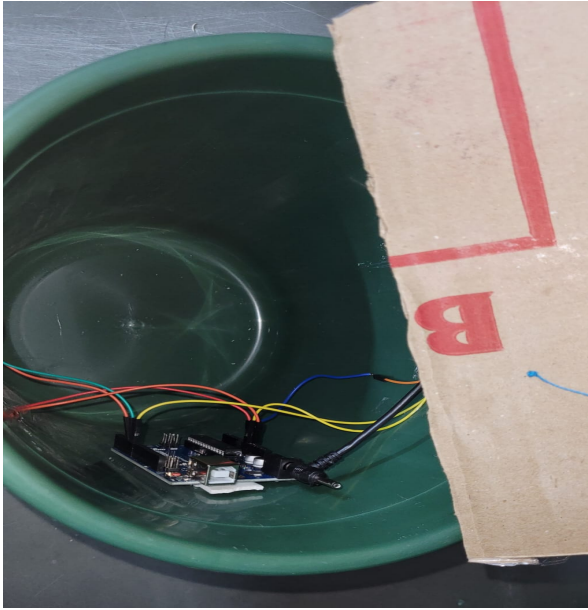
VI. PROCEDURE

Step 1: Assemble the components. Gather all the necessary components for the trash bot, including an Arduino board, a micro servo sg90, an HCSR04 ultrasonic sensor, cardboard, and a trash bin.

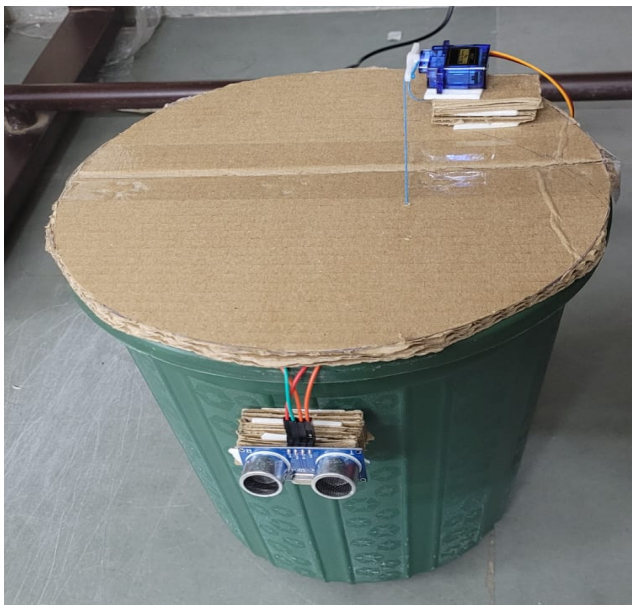
Step 2: Build the Circuit. Connect the ultrasonic sensor and servo motor to the Arduino board. The servo motor should be connected to the appropriate pins on the board and the ultrasonic sensor should be connected to the designated pins. Make sure to follow the correct wiring diagram for your specific components.

Step 3: Write the code in Arduino IDE according to the need, upload it to the Arduino board using the USB cable provided along with the kit, and check if the setup is working as intended.

Step 4: Take the Arduino UNO board to which the servo and ultrasonic sensors are connected and attach it to the inner wall of the trash bin using a double-sided tape



Step 5: Add Servo & Ultrasonic Sensor to the Trash Bin. Cut a piece of cardboard to fit the lid of the trash bin. Attach the servo motor on top of the cardboard using double-sided tape. Now attach the ultrasonic sensor to the trash bin using double-sided tape.



Step 6: To provide electricity to the Arduino board used in the project, we will use the plug provided in the Arduino kit and connect it to the power port of the Arduino UNO board.

Our automatic trash bot is now ready to use

VII. RESULTS

The automatic trash bin functioned as intended, with the lid opening when someone approached it to dispose of their trash and then closing as soon as they left the range of the ultrasonic sensor. Overall, the system was deemed effective, hygienic, and easy to use. This project serves as a great example of how technology can be utilized to solve everyday problems.

VIII. USES

1) This project can be used in public places such as parks or malls where people frequently dispose of trash. It can help keep these areas clean and hygienic by reducing contact with trash bins.

2) Additionally, this automatic trash bin can be useful for disabled people, particularly those with mobility impairments who may have difficulty using normal trash bins. By automatically opening and closing its lid, this trash bin makes it easier for disabled people to dispose of their trash without having to physically manipulate the lid.

IX. DISCUSSION

In conclusion, the automatic trash-bot is an innovative and practical solution to managing waste. By using an ultrasonic sensor, a servo motor, and an Arduino board, the trash-bin can open and close its lid automatically, reducing the need for manual operation and making waste disposal more convenient and efficient. This project is not only useful but also environmentally friendly, as it promotes waste management and helps keep our surroundings clean.

X. VIDEO LINK

[VIDEO EXPLAINING THE WORKING PRINCIPLE OF AUTOMATIC TRASH BOT](#)

XI. REFERENCES

- "ARDUINO PROJECT HUB," PROJECTHUB.ARDUINO.CC. [ONLINE]. AVAILABLE: [HTTPS://PROJECTHUB.ARDUINO.CC/](https://projecthub.arduino.cc/). [ACCESSED: 23-APR-2023].
- "Language reference," Arduino Reference - Arduino Reference. [Online]. Available: <https://www.arduino.cc/reference/en/>. [Accessed: 23-Apr-2023].