AUTOMATED DUST BIN SYSTEM

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L&T PROJECT

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AIM: Develop a simple Arduino UNO-based Automatic Dust Bin system which can open the lid when it senses the object movement nearby

ABSTRACT: The "Smart Dustbin" project leverages Arduino Uno, an ultrasonic sensor, and a servo motor to create an automated waste disposal solution. The system can detect nearby individuals using the ultrasonic sensor and respond by opening its lid to facilitate convenient disposal. This report provides an overview of the project, its components, and the functionality it offers. The software used here is Tinker cad for simulation purpose and we have used fritzing software for designing a PCB thereby to generate a Gerber file.

INTRODUCTION:

The Automated Smart Dustbin System represents a revolutionary approach to waste management by incorporating modern technology and automation. This system leverages sensors, microcontrollers, and mechanical components to create an intelligent waste disposal solution. Unlike traditional dustbins, a smart dustbin can detect the presence of an individual and automatically open its lid, making it possible for users to deposit waste without physical contact. The integration of various sensors and a control system ensures a more hygienic, efficient, and user-friendly waste disposal process.

Significance of Automated Smart Dustbin System:

1. Improved Hygiene: One of the primary benefits of a smart dustbin system is enhanced hygiene. By allowing users to dispose of waste without touching the dustbin's lid, it reduces the risk of spreading germs and bacteria, promoting a cleaner and healthier environment.

2. Convenience: Smart dustbins offer an unparalleled level of convenience. Users no longer need to physically open the lid, making waste disposal quick and effortless. This is especially valuable in public spaces and high-traffic areas.

3. Efficiency: The automation of waste disposal saves time and effort. It ensures that the lid is open only when needed, reducing unnecessary exposure to the waste contents and preventing overflow.

4. Waste Management Optimization: Smart dustbin systems can be integrated with waste management databases. This enables real-time monitoring of waste levels, allowing for efficient scheduling of waste collection and reducing operational costs.

5. Environmental Benefits: By facilitating efficient waste disposal, these systems contribute to the reduction of littering and promote responsible waste management. This, in turn, has a positive impact on the environment.

6. Innovation and Modernization: Smart dustbins represent a step forward in modernizing everyday infrastructure. They are an example of how technology can be integrated into common objects to improve quality of life and sanitation.

8. Scalability: The automated smart dustbin system is scalable and adaptable to various environments, from homes to public spaces, allowing for broad implementation.

9. Data Collection: These systems can provide valuable data about waste generation patterns, helping in long-term urban planning and waste management strategy.

In conclusion, the Automated Smart Dustbin System is a significant innovation with numerous advantages, ranging from improving public health and convenience to optimizing waste management processes. As technology continues to advance, smart dustbins are poised to play a crucial role in creating cleaner, more efficient, and smarter urban environments.

COMPONENTS REQUIRED:

- ARDUINO UNO R3
- ULTRASONIC SENSOR
- MICRO SERVO

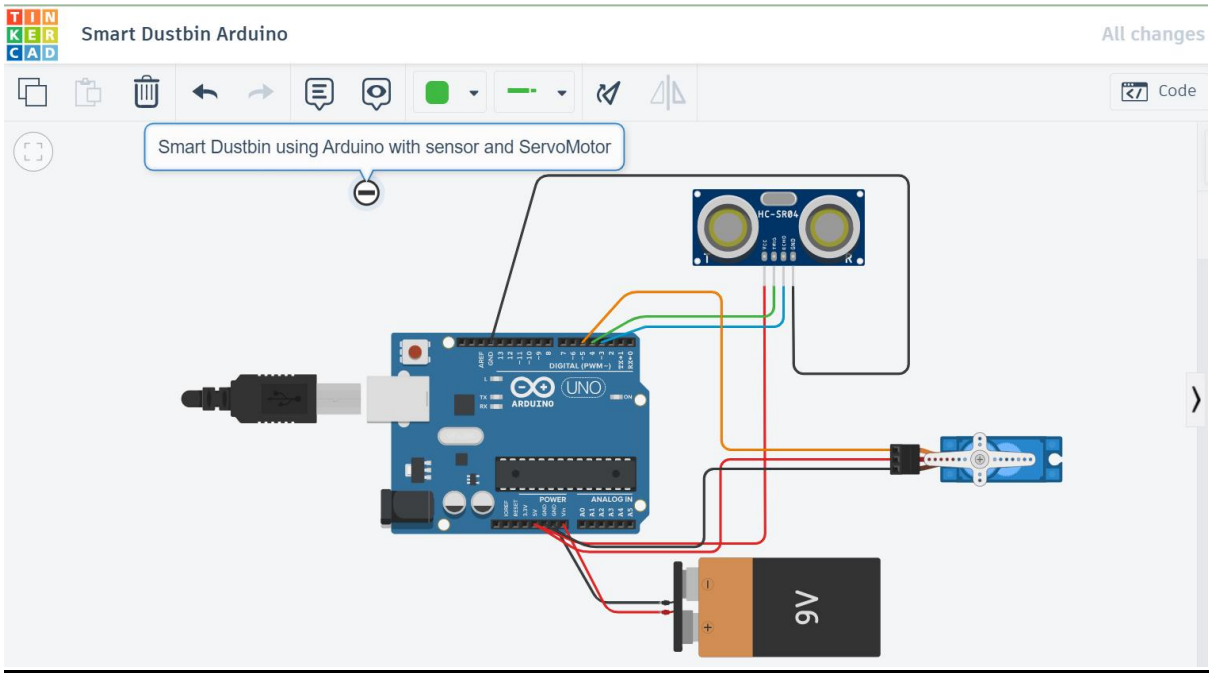
WORKING:

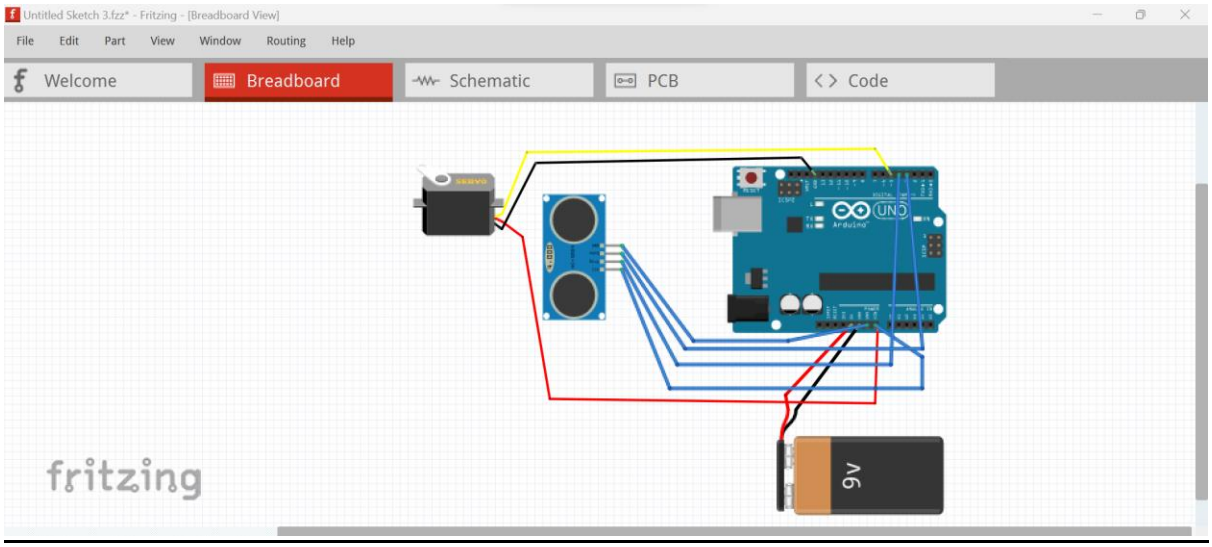
Arduino Uno: The heart of the system, the Arduino Uno, acts as the central control unit. It processes sensor data and controls the servo motor. Powered by a 9V battery connected to its Vin and GND pins, the Arduino ensures the system's autonomy.

Ultrasonic Sensor: This crucial sensor is responsible for detecting the presence of individuals near the dustbin. It is powered from the Arduino's 5V pin and its GND, with the echo pin connected to digital pin 3 and the trig pin to digital pin 4.

Micro Servo Motor: The micro servo motor, which controls the dustbin lid, is powered directly. The signal pin of the servo is connected to digital pin 5, allowing the Arduino to control the servo's position.

CIRCUIT DESIGN:



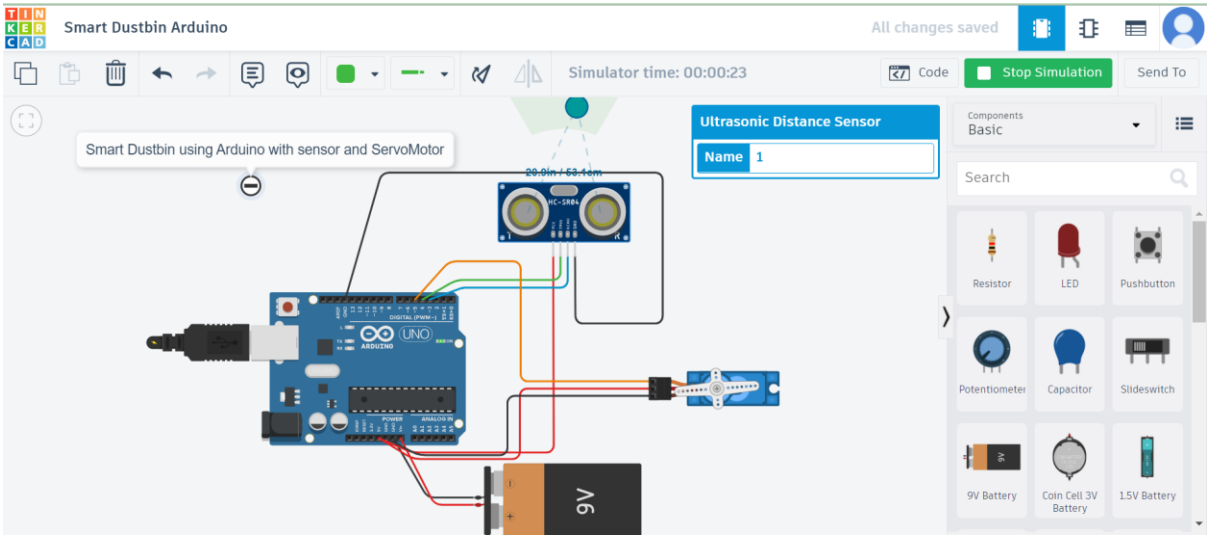


CODE:

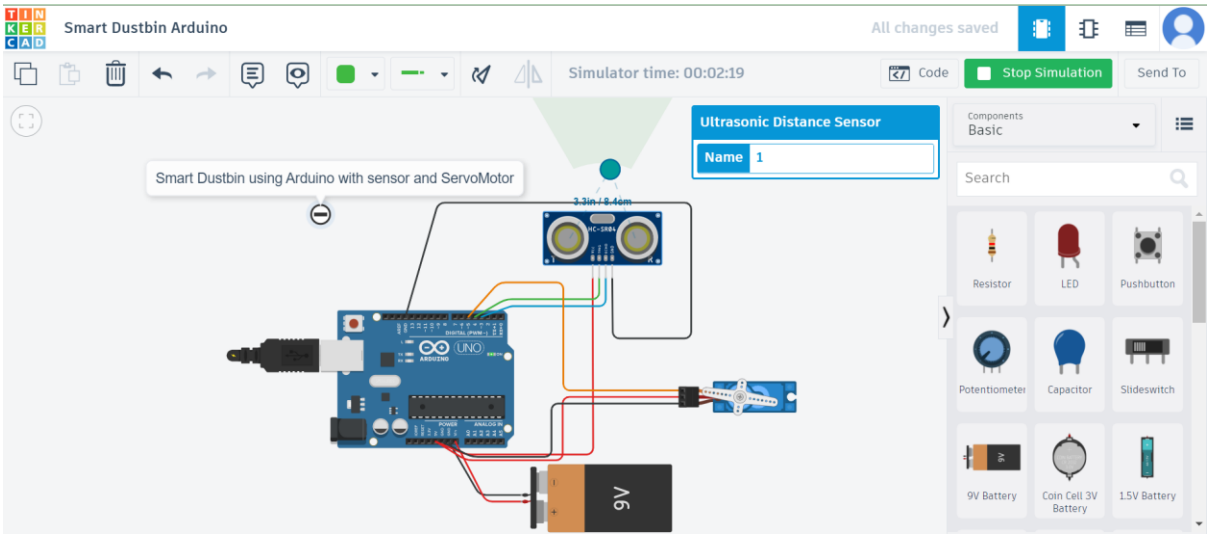
```
#include <Servo.h>

Servo servoMain;  // Create a servo object
int trigpin = 4;
int echopin = 3;

void setup() {
  servoMain.attach(5);  // Attach the servo to pin 5
  pinMode(trigpin, OUTPUT);
  pinMode(echopin, INPUT);
}

void loop() {
  long duration, cm;

  digitalWrite(trigpin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigpin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigpin, LOW);

  duration = pulseIn(echopin, HIGH);
  cm = duration / 58.82;  // Calculate distance in centimeters

  if (cm < 30) {
    servoMain.write(180);  // Open the lid (180 degrees)
    delay(3000);  // Keep the lid open for 3 seconds
  } else {
    servoMain.write(0);  // Close the lid (0 degrees)
    delay(50);  // A small delay for stability
  }
}
```

OUTPUT PICS:

1) **DUSTBIN CLOSED:** ULTRASONIC SENSOR IS CLOSED AS THERE ARE NO ONE LESS THAN 30cm.



2) DUSTBIN OPEN:-ULTRASONIC SENSOR SENSES PEOPLE LESS THAN 30cm.



USES:

Automated dustbin systems have a wide range of applications and can be beneficial in various contexts. Here are some good uses of automated dustbin systems:

1. Public Spaces: Automated dustbins in parks, streets, and other public areas can help maintain cleanliness by minimizing litter and preventing overflowing waste bins.

2. Smart Homes: In smart homes, these systems can offer convenient, touchless waste disposal, adding a modern touch to daily living.

3. Hospitals: In healthcare facilities, where hygiene is critical, automated dustbins reduce the risk of cross-contamination by eliminating the need to touch the bin's lid.

4. Commercial Buildings: Office complexes, shopping malls, and other commercial spaces can benefit from these systems to provide a clean and convenient waste disposal solution for employees and customers.

5. Restaurants: In the food industry, automated dustbins can help maintain a high standard of hygiene, ensuring that kitchen and dining areas are clean and odor-free.

6. Educational Institutions: Schools and universities can use automated dustbins to encourage students and staff to practice responsible waste disposal.

7. Smart Cities: In the context of smart cities, these systems can be integrated with waste management networks to optimize waste collection routes and schedules, reducing operational costs.

8. Airports and Transportation Hubs: In busy transportation terminals, automated dustbins minimize the spread of germs and provide a modern and efficient waste disposal solution for travelers.

9. Industrial Settings: Automated dustbins can be implemented in manufacturing and industrial environments to ensure that waste is properly managed and disposed of, contributing to a safer workspace.

10. Smart Waste Collection: These systems can be part of a larger waste collection and management network, helping municipal authorities efficiently monitor and collect waste, leading to cleaner and more sustainable cities.

11. Event Management: During large events, such as concerts or festivals, automated dustbins can help manage waste efficiently, ensuring a clean and safe environment for attendees.

These are just a few examples of the diverse applications of automated dustbin systems. Their convenience, hygiene benefits, and waste management capabilities make them valuable in a wide range of settings, contributing to cleaner, more efficient, and more sustainable environments.

CONCLUSION:

In conclusion, the Automated Smart Dustbin System represents a transformative leap in waste management and sanitation. By merging cutting-edge technology with everyday waste disposal, this innovative system offers a multitude of benefits. From enhancing hygiene and convenience to optimizing waste collection processes and contributing to environmental sustainability, the smart dustbin system has the potential to revolutionize how we handle waste in our homes, public spaces, and businesses.

With the ongoing advancement of technology, we can anticipate even more sophisticated and interconnected smart dustbin systems that contribute to data-driven decision-making, further reducing manual labor, and making our communities cleaner and healthier. The Automated Smart Dustbin System is not just a convenience; it's a glimpse into a smarter, more sustainable future where waste management is efficient, environmentally responsible, and user-friendly.

RESULT:

From this experiment we have analysed the working of automated dustbin system with a software (tinkercad) and verified the results successfully.