Components and Specifications:

Fig1: Smart Dustbin

1)Arduino Uno

Microcontroller: ATmega328P

Operating Voltage: 5V

Digital I/O Pins: 14 (of which 6 can be used as PWM outputs)

Analog Input Pins: 6

Flash Memory: 32 KB (0.5 KB used by bootloader)

2)Micro Servo Motor (9g)

Operating Voltage: 4.8V - 6V

Torque: 1.2 kg·cm (4.8 V), 1.5 kg·cm (6 V)

Rotation: 180 degrees

Control Signal: PWM (Pulse Width Modulation)

3)Ultrasonic Sensor (HC-SR04)

Operating Voltage: 5V

Trigger Input Signal: 10 µs TTL pulse

Echo Output Signal: High for duration proportional to distance

Measurement Range: 2 cm to 400 cm

Accuracy: ±3 mm

Working:

An automated dustbin that opens when an object (like a hand or bag) is

detected within a specified distance, promoting hygiene and convenience in waste disposal.

Working Principle:

Distance Measurement: The ultrasonic sensor sends out a sound wave, and the time taken for the echo to return is measured. This time is converted into a distance measurement.

Threshold Check: If the detected distance is less than a pre-defined threshold (10 cm), the servo motor is activated.

Servo Control: The servo motor rotates to open the dustbin lid, allowing waste disposal. After a set duration (3 seconds), the lid closes automatically.

Continuous Monitoring: The system continuously measures distance in a loop, ensuring it responds promptly to users.

Application and Advantages:

Waste Management: The smart dustbin automates waste disposal, encouraging proper waste management and cleanliness.

Hygiene: Reduces direct contact with the bin, promoting hygiene, especially in public places.

Accessibility: Makes waste disposal more accessible, especially for people with disabilities.

Smart Solutions: This project introduces basic principles of automation and robotics, making it a great learning experience in embedded systems and IoT.

MY GOAL FURTHER:

The project can be expanded with additional features such as waste classification, notifications for full bins, and integration with smart home systems.