**Project: Smart Dustbin Using Arduino and Ultrasonic Sensor**

**1. Introduction**

As cleanliness becomes more important, especially in public and shared spaces, there’s a growing need for better ways to manage waste. Traditional dustbins often require people to touch them, which can be messy and unhygienic. This "Smart Dustbin" project aims to solve that problem by automatically opening and closing the lid using an ultrasonic sensor and a servo motor. This system, powered by Arduino, allows for hands-free operation, making it easier and cleaner to dispose of waste.

**2. Problem Statement**

Using a dustbin often means touching a lid, which can spread germs, especially in places like offices and schools. This can make people reluctant to throw away their trash, leading to litter. The goal is to create a dustbin that opens without needing to be touched, encouraging cleaner habits and improving hygiene.

**3. Methodology**

Here’s how to build the smart dustbin:

* **Components Needed**:
  + **Arduino Uno**: The main controller that processes information and controls the motor.
  + **Ultrasonic Sensor**: Detects when someone is near by sending out sound waves.
  + **Servo Motor**: Opens and closes the dustbin lid based on signals from the Arduino.
  + **Power Supply**: Two lithium-ion batteries to power everything.
  + **Wires and USB Cable**: For connecting the parts and uploading code.

**Steps to Build the Smart Dustbin**:

1. **Set Up Components**:
   * Connect the ultrasonic sensor to the Arduino for power and data.
   * Connect the servo motor to the Arduino.
2. **Programming**:
   * Use Arduino software to write a program that tells the ultrasonic sensor to check for nearby objects.
   * If something is detected within 20 cm, the program signals the servo to open the lid and then close it after one second.
3. **Upload the Code**:
   * Connect the Arduino to your computer with a USB cable and upload your program.

**4. Results**

The smart dustbin works well! It can detect people or objects within 20 cm using the ultrasonic sensor. When it senses something nearby, the lid opens automatically and closes after a short delay. The system operates quickly and smoothly, allowing for easy, touch-free waste disposal.

**5. Conclusion**

The Smart Dustbin project is a great way to make waste disposal cleaner and more convenient. By automating the opening and closing of the lid, it reduces the need to touch the bin, which helps maintain hygiene in public areas. This project shows how basic components like Arduino, an ultrasonic sensor, and a servo motor can come together to create useful smart devices. In the future, we could improve this design by adding features to check how full the bin is and alert users when it needs emptying.