Automatic Hand Sanitizer Dispenser using Arduino

1. Introduction

This project creates an automatic hand sanitizer dispenser using Arduino, an ultrasonic sensor to detect hands, and a servo motor to dispense the sanitizer. It ensures touchless operation to maintain hygiene.

2. Key Components

- Arduino Uno (or any compatible board)
- Ultrasonic Sensor (HC-SR04)
- Servo Motor
- Jumper wires
- Breadboard
- External 5V power supply (for Servo)
- USB cable for programming and power

3. Working Principle

1. Initialization: The ultrasonic sensor and servo motor are set up in the `setup()` function.

2. Hand Detection:
   - The ultrasonic sensor continuously measures the distance in front of it.
   - When an object (hand) is detected within 10 cm, the Arduino triggers the servo.

3. Sanitizer Dispense:
   - The servo moves to 90 degrees to simulate pressing a sanitizer pump.
   - After 1 second, the servo resets to its original position.

4. Delay:
   - A 2-second delay is introduced to avoid multiple triggers.

4. Circuit Overview

- Trig pin of Ultrasonic Sensor -> Digital Pin 2 on Arduino
- Echo pin of Ultrasonic Sensor -> Digital Pin 3 on Arduino
- Servo motor signal wire -> Digital Pin 9 on Arduino
- VCC and GND of Ultrasonic Sensor -> 5V and GND on Arduino

- Servo VCC -> External 5V (recommended)

- Common GND between Arduino and Servo power supply

5. Code

```
//Code Written by -
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//Hand Sanitizer with Arduino

#include <Servo.h>

#define TRIG_PIN 2  // Trig pin of Ultrasonic Sensor
#define ECHO_PIN 3 // Echo pin of Ultrasonic Sensor
#define SERVO_PIN 9 // Servo motor pin

Servo myServo;

void setup() {
  pinMode(TRIG_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  myServo.attach(SERVO_PIN);
  myServo.write(0); // Initial position of the servo
  Serial.begin(9600);
}

void loop() {
  long duration;
  int distance;

  // Trigger the Ultrasonic Sensor
  digitalWrite(TRIG_PIN, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);

  // Read the Echo pin
  duration = pulseIn(ECHO_PIN, HIGH);
  distance = duration * 0.034 / 2; // Convert to cm

  Serial.print("Distance: ");
  Serial.print(distance);
  Serial.println(" cm");

  // If a hand is detected within 10 cm
  if (distance > 0 && distance < 10) {
    myServo.write(90);  // Move servo to dispense sanitizer
    delay(1000);        // Wait for sanitizer to be dispensed
    myServo.write(0);   // Reset servo to initial position
    delay(2000);        // Delay before next detection
  }
```

```
}
```

6. Code Explanation

Library Inclusion

- `Servo.h` library is included to control the servo motor.

Pin Definitions

- TRIG_PIN set to pin 2, ECHO_PIN set to pin 3, SERVO_PIN set to pin 9.

Setup Function

- Sets up the pins for the ultrasonic sensor.

- Attaches the servo motor to pin 9 and sets it to the initial position.

Loop Function

- Triggers the ultrasonic sensor to send an ultrasonic pulse.

- Measures the time taken for the echo to return and calculates the distance.

- If the distance is less than 10 cm, moves the servo to 90 degrees for 1 second and then resets it.

- Adds delays to ensure clean operation.

7. Conclusion

This Arduino-based automatic hand sanitizer dispenser project successfully demonstrates a contactless method to promote hygiene. The setup is simple yet effective, making it ideal for homes, offices, and public places.