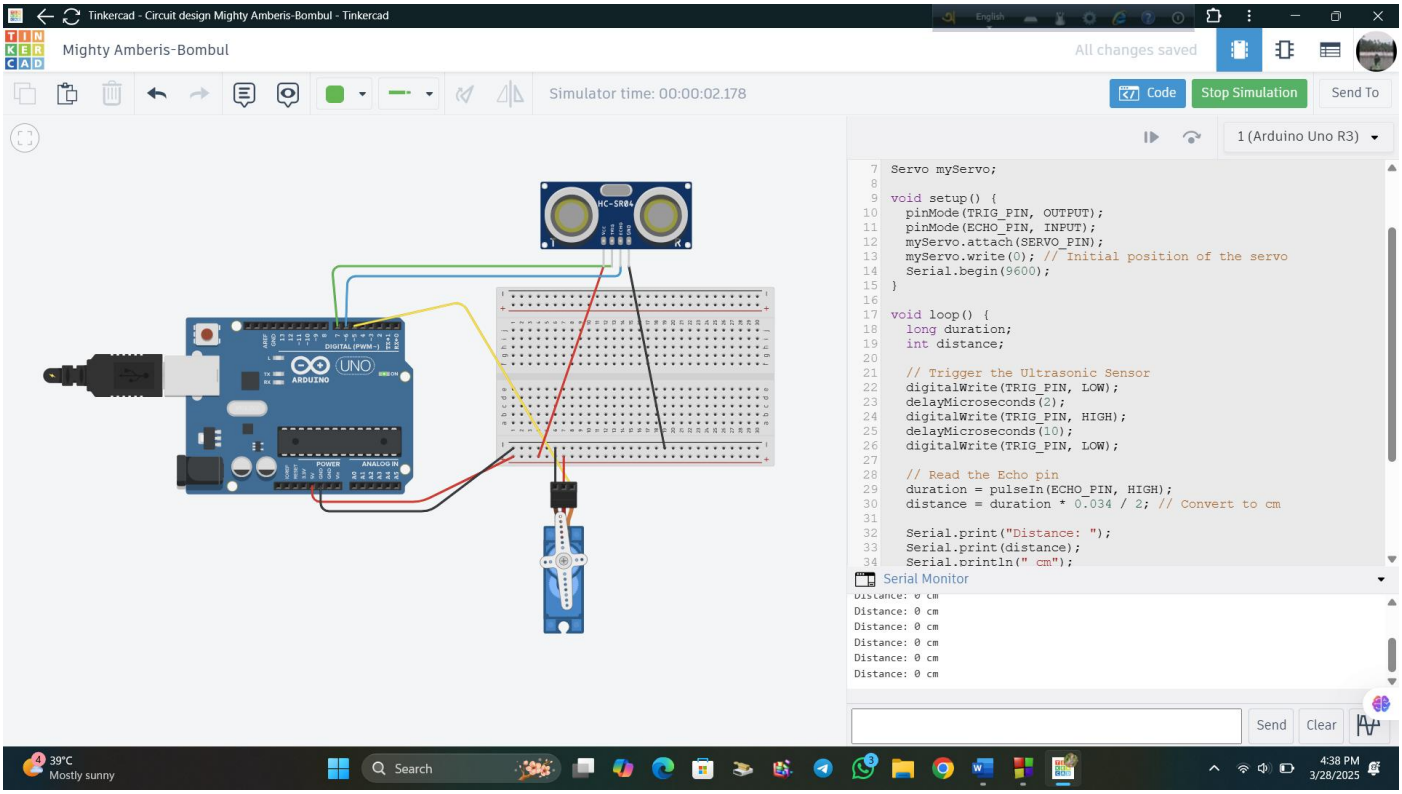
AUTOMATIC HAND SANITIZER DISPENSER

By using an **ultrasonic sensor** and **servo motor** controlled by an **Arduino** we can make hand sanitizer. The system detects the presence of a hand using an **ultrasonic sensor** and then activates a **servo motor** to dispense sanitizer. The video emphasizes **hygiene, preventive measures, and smart automation**.

Key Components and Their Details

1. **Arduino Uno/Nano** – Acts as the microcontroller to control the circuit.
2. **Ultrasonic Sensor (HC-SR04)** – Measures the distance to detect a hand under the dispenser.
3. **Servo Motor (SG90)** – Controls the dispensing mechanism. A servomotor is a linear or a rotatory actuator that aids in the precise control of velocity, acceleration, and angular position. It works on the principle of Pulse Width Modulation.

4. **Power Supply (5V)** – Powers the Arduino and the servo motor.
5. **Jumper Wires** – Used for connections.
6. **Hand Sanitizer Bottle with a Mechanism** – The nozzle is controlled by the servo motor.



Arduino Code for Automatic Hand Sanitizer Dispenser

#include <Servo.h>

```
#define TRIG_PIN 7 // Trig pin of Ultrasonic Sensor
#define ECHO_PIN 6 // Echo pin of Ultrasonic Sensor
#define SERVO_PIN 5 // 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
```

Code Explanation

1. **Library Import & Pin Definitions**
    - The Servo.h library is used to control the servo motor.
    - Defines TRIG_PIN and ECHO_PIN for the ultrasonic sensor and SERVO_PIN for the servo motor.
2. **Setup Function (setup())**
    - Initializes the ultrasonic sensor and attaches the servo motor.
    - Sets the servo to its initial position (0°).
3. **Loop Function (loop())**
    - Sends an ultrasonic pulse and calculates the distance.
    - If an object (hand) is detected within 10 cm, the servo rotates to **90°**, dispensing sanitizer.
    - The servo then returns to its original position.

Working Principle

1. The **ultrasonic sensor** emits sound waves and detects the reflected waves to measure distance.
2. When a hand is detected **within 10 cm**, the **Arduino** sends a signal to the **servo motor**.
3. The **servo motor** rotates **90°**, pushing the sanitizer nozzle to dispense liquid.
4. After **1 second**, the servo motor resets to its original position.
5. The system waits **2 seconds** before checking for another hand.

Conclusion

This **Arduino-based automatic hand sanitizer dispenser** provides a **contactless** solution to maintain hygiene and prevent germ spread. By using an **ultrasonic sensor and a servo motor**, the system **automatically detects a hand and dispenses sanitizer**. This project can be implemented in **homes, offices, schools, and public places** to enhance **safety and convenience**.