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TECHNICAL ANSWERS FOR REAL WORLD PROBLEMS (CSE1905)

Title : Smart Elevator System Based On Human Detection Sensor

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CODE

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

// Initialize the LCD with the I2C address (adjust the address if necessary)
LiquidCrystal_I2C lcd(0x27, 16, 2); // Change 0x27 to your I2C address if needed

const int buttonPin = 2;      // Push button pin
const int ledPin = 11;        // LED pin
const int irSensorPin = 8;    // IR sensor pin
const int trigPin = 9;        // Ultrasonic trig pin
const int echoPin = 10;       // Ultrasonic echo pin

void setup() {
  Serial.begin(9600);               // Start serial communication
  pinMode(buttonPin, INPUT_PULLUP);    // Button pin
  pinMode(ledPin, OUTPUT);             // LED pin
  pinMode(irSensorPin, INPUT);         // IR sensor pin
  pinMode(trigPin, OUTPUT);            // Ultrasonic trig pin
  pinMode(echoPin, INPUT);             // Ultrasonic echo pin

  // Initialize the LCD
  lcd.init();                       // Initialize the LCD
  lcd.backlight();                  // Turn on the backlight
  lcd.clear();                      // Clear the display
  lcd.print("System Ready");           // Display initial message
  delay(2000);                      // Wait 2 seconds for startup
}

void loop() {
  // Read the button state
  int buttonState = digitalRead(buttonPin);

  // Check for button press
  if (buttonState == LOW) {
    while (true) { // Continuously check sensors after button is pressed
      // Trigger the ultrasonic sensor
      digitalWrite(trigPin, LOW);
      delayMicroseconds(2);
      digitalWrite(trigPin, HIGH);
      delayMicroseconds(10);
```

```
digitalWrite(trigPin, LOW);

// Measure the echo time
long duration = pulseIn(echoPin, HIGH);
// Calculate the distance (in cm)
long distance = (duration / 2) * 0.0343;

// Check if the IR sensor detects a person
int irState = digitalRead(irSensorPin);

// Debug output to verify the sensor readings
Serial.print("IR Sensor: ");
Serial.print(irState);
Serial.print(" | Distance: ");
Serial.println(distance);

// If human is detected (IR sensor is HIGH and distance is < 50 cm)
if (irState == HIGH && distance < 20) {
   digitalWrite(ledPin, LOW);   // Turn on LED continuously
   lcd.clear();                 // Clear previous messages
   lcd.print("Lift will not ");   // Display message
   lcd.setCursor(0, 1);         // Move to the second line
   lcd.print("stop here");           // Display message on second line
}
// If no human is detected (IR sensor LOW or distance > 50 cm)
else {
   digitalWrite(ledPin, HIGH);     // Turn off LED
   lcd.clear();                  // Clear previous messages
   lcd.print("Lift will ");
   lcd.setCursor(0, 1);          // Move to the second line
   lcd.print("stop here");       // Display message on second line
   for (int i = 0; i < 5; i++) {  // Blink LED 5 times
      digitalWrite(ledPin, HIGH); // Turn on LED
      delay(500);               // Wait for half a second
      digitalWrite(ledPin, LOW);  // Turn off LED
      delay(500);               // Wait for half a second
   }
}

delay(2000);  // Delay for human detection update

// Check if the button is pressed again to stop the loop
if (digitalRead(buttonPin) == LOW) {
   break;   } }}}// Break out of the loop if button is pressed agaiN
```

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const int trigPin = 9;        // Ultrasonic trig pin
const int echoPin = 10;       // Ultrasonic echo pin

void setup() {
    Serial.begin(9600);                   // Start serial communication
    pinMode(buttonPin, INPUT_PULLUP);     // Button pin
    pinMode(ledPin, OUTPUT);               // LED pin
    pinMode(irSensorPin, INPUT);           // IR sensor pin
    pinMode(trigPin, OUTPUT);              // Ultrasonic trig pin
    pinMode(echoPin, INPUT);               // Ultrasonic echo pin

    // Initialize the LCD
    lcd.init();                            // Initialize the LCD
    lcd.backlight();                       // Turn on the backlight
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void loop() {
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    // Check for button press
    if (buttonState == LOW) {
        while (true) { // Continuously check sensors after button is pressed
            // Trigger the ultrasonic sensor
            digitalWrite(trigPin, LOW);
            delayMicroseconds(2);
            digitalWrite(trigPin, HIGH);
            delayMicroseconds(10);
            digitalWrite(trigPin, LOW);

            // Measure the echo time
            long duration = pulseIn(echoPin, HIGH);
            // Calculate the distance (in cm)
            long distance = (duration / 2) * 0.0343;

            // Check if the IR sensor detects a person
            int irState = digitalRead(irSensorPin);

            // Debug output to verify the sensor readings
            Serial.print("IR Sensor: ");
            Serial.print(irState);
            Serial.print(" | Distance: ");
            Serial.println(distance);
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            // If human is detected (IR sensor is HIGH and distance is < 50 cm)
            if (irState == HIGH && distance < 20) {
                digitalWrite(ledPin, LOW);   // Turn on LED continuously
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                lcd.print("Lift will not ");   // Display message
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            }
            // If no human is detected (IR sensor LOW or distance > 50 cm)
            else {
                digitalWrite(ledPin, HIGH);     // Turn off LED
                lcd.clear();                    // Clear previous messages
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                lcd.setCursor(0, 1);            // Move to the second line
                lcd.print("stop here");         // Display message on second line
                for (int i = 0; i < 5; i++) {  // Blink LED 5 times
                    digitalWrite(ledPin, HIGH); // Turn on LED
                    delay(500);                 // Wait for half a second
                    digitalWrite(ledPin, LOW);  // Turn off LED
                    delay(500);                 // Wait for half a second
                }
            }

            delay(2000);  // Delay for human detection update

            // Check if the button is pressed again to stop the loop
            if (digitalRead(buttonPin) == LOW) {
                break;  // Break out of the loop if button is pressed again
            }
        }
    }
}
```

COMPONENTS USED

- Arduino Uno

  It is a microcontroller used to control all the activity and take actions based on the data collected from the sensors and proceed with the help of any software platform.

- Ultrasonic Sensor

  The ultrasonic sensor detects how far away something is by emitting sound waves and measuring the time it takes for them to bounce back.

- IR Sensor

  The IR sensor detects if a person is standing near the button by sensing infrared light reflected back from them

- Push Button

  The push button simulates the lift call button. When pressed, it will trigger the sensors to scan for people.

- LCD Display

  The LCD display will show messages like "Lift will not stop here" or "Lift will stop here."

- Resistors

  The resistors make sure the activities of the buttons are updated and connected without any errors

- LED

  The LED will blink when no one is detected at the floor after a button press, and it will turn off the button after a few seconds.