Detailed report on Arduino projects

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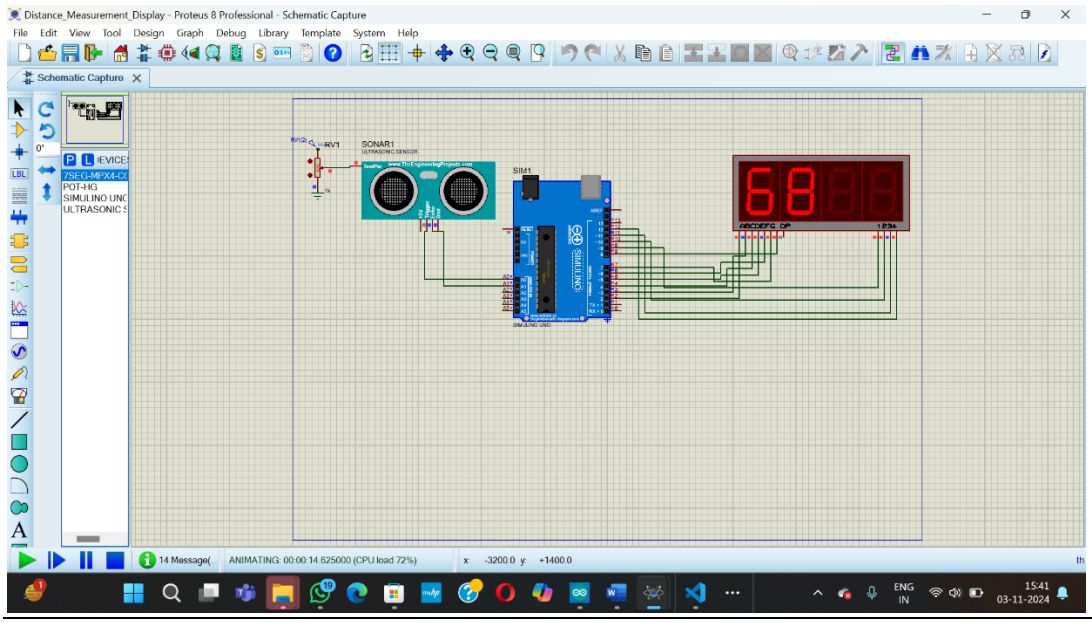
1.Distance Measurement Display

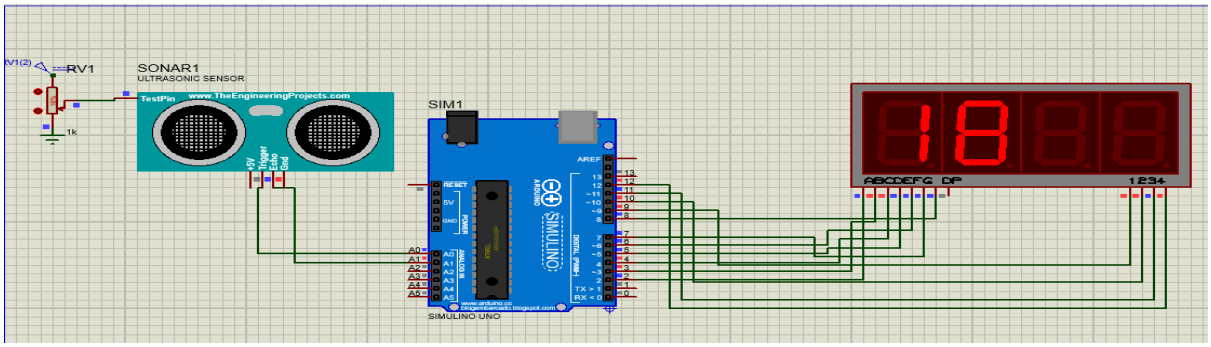
Components used: Ultrasonic sensor (HC-SR04), 7-segment display

Objective: Measure the distance of an object and display it in real-time on the 7-segment display.

Working Principle: The ultrasonic sensor emits ultrasonic waves, measures the time taken for the waves to return after hitting an object, and calculates the distance. This value is displayed on the 7-segment display.

Result: The 7-segment display accurately displayed the distance measured by the ultrasonic sensor in centimeters, updating in real-time as the object's distance varied.





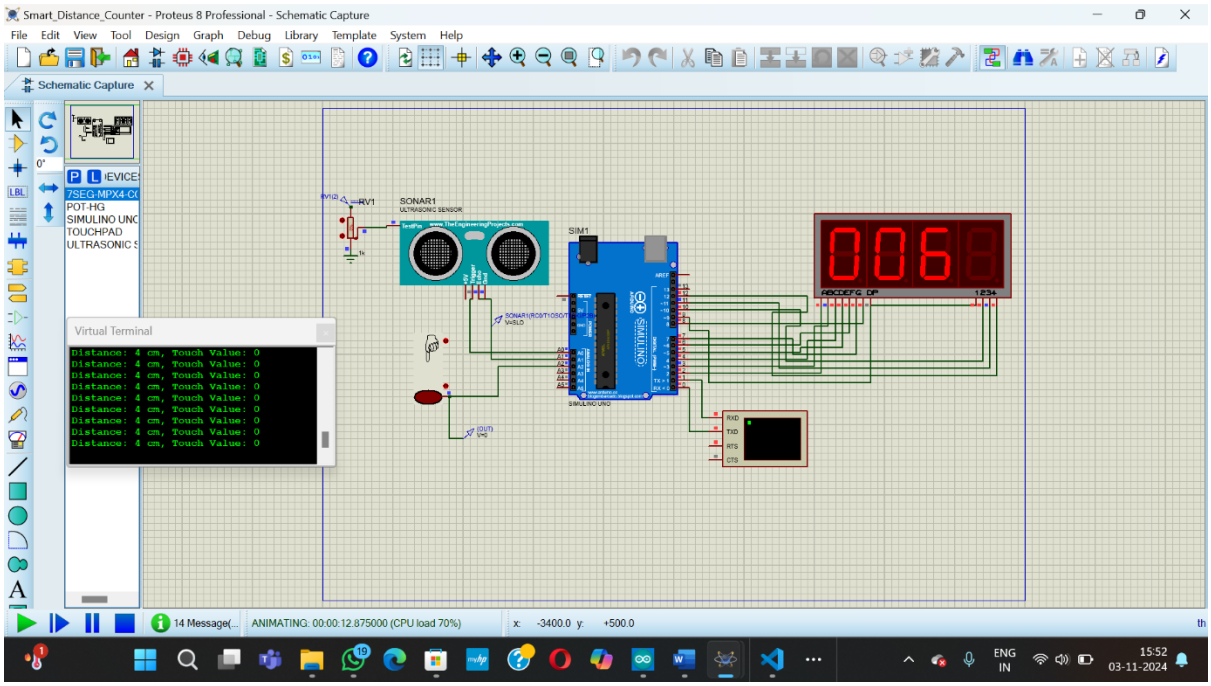
2.Smart Distance Counter

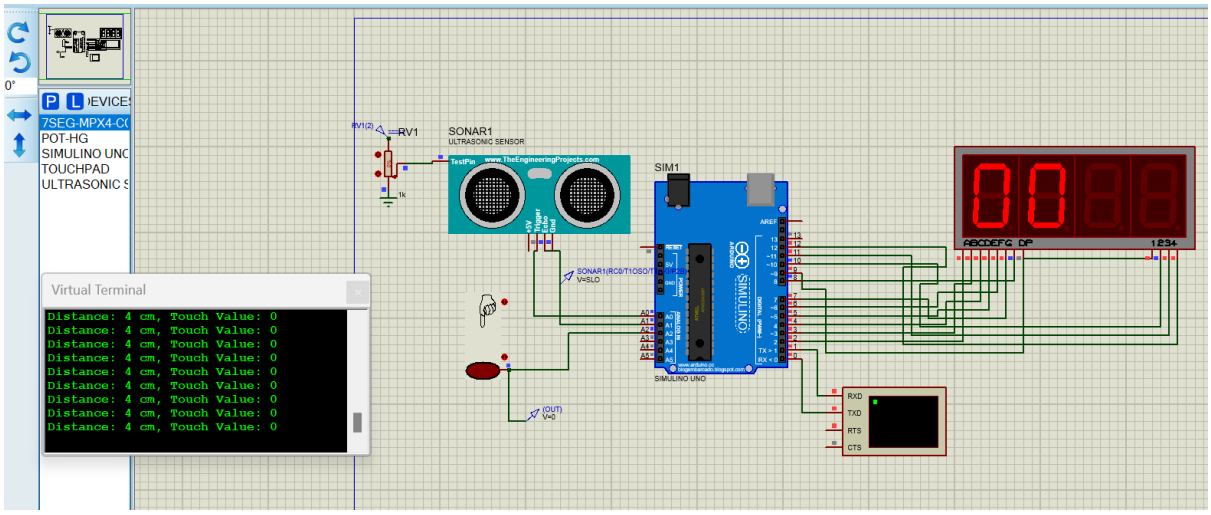
Components used: Ultrasonic sensor, touch sensor, 7-segment display

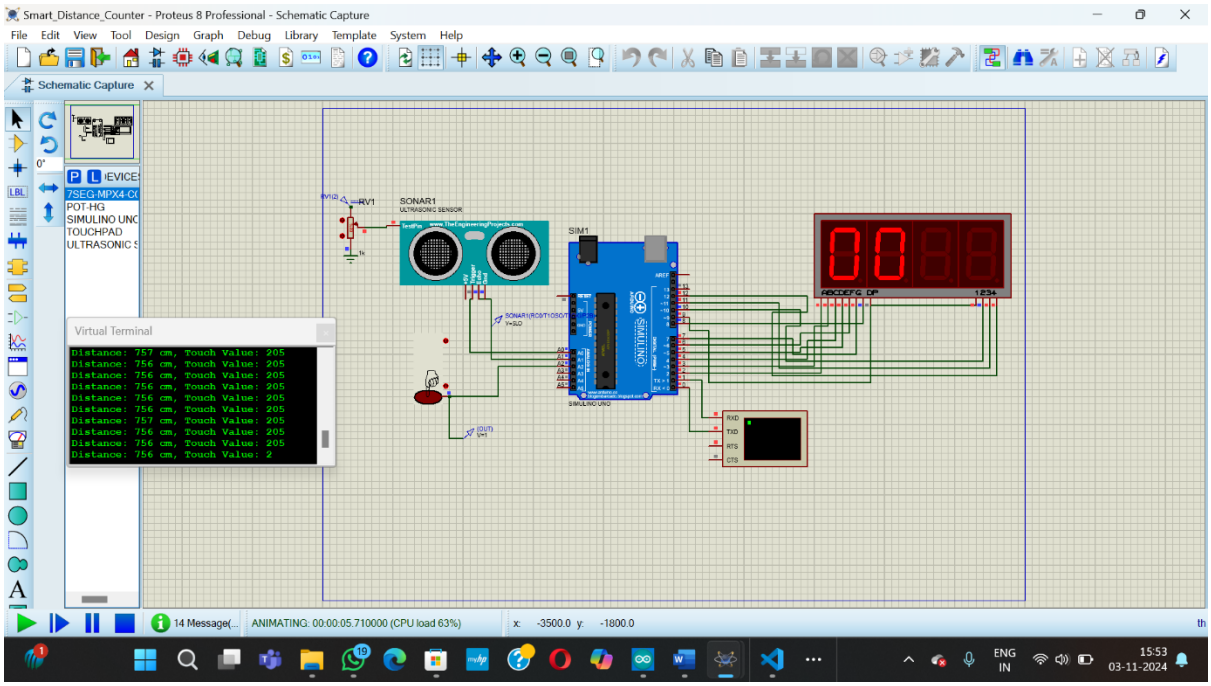
Objective: Increment a counter each time an object crosses a specific threshold distance, and reset the counter via a touch sensor.

Working Principle: The ultrasonic sensor continuously monitors distance. If an object crosses a preset threshold (e.g., less than 10 cm), the counter on the display increments. Pressing the touch sensor resets the counter.

Result: The counter accurately tracked the number of threshold crossings, and the touch sensor reset the counter without errors.







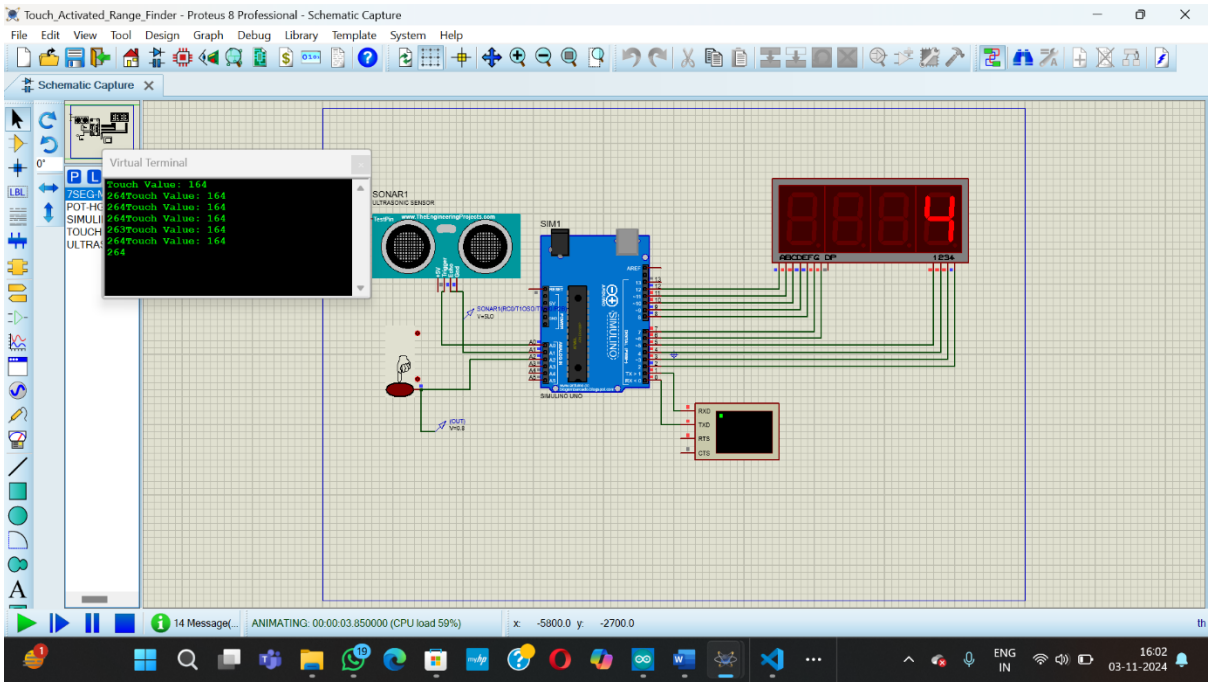
3. Touch-Activated Range Finder

Components used: Ultrasonic sensor, touch sensor, 7-segment display

Objective: Take a distance measurement only when the touch sensor is pressed, hold the displayed value for 5 seconds, then clear it.

Working Principle: The system remains idle until the touch sensor is activated, then takes a reading using the ultrasonic sensor. This reading is displayed for 5 seconds before the display clears.

Result: The display correctly showed the measured distance for 5 seconds after activation by the touch sensor and then cleared as programmed.


Touch_Activated_Range_Finder - Proteus 8 Professional - Schematic Capture
File Edit View Tool Design Graph Debug Library Template System Help
Schematic Capture
Virtual Terminal
Touch Value: 164
264Touch Value: 164
264Touch Value: 164
264Touch Value: 164
263Touch Value: 164
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SONAR1
ULTRASONIC SENSOR
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SIMULINO UNO
14 Message(...
ANIMATING: 00:00:03.850000 (CPU load 59%)
x: -5800.0 y: -2700.0
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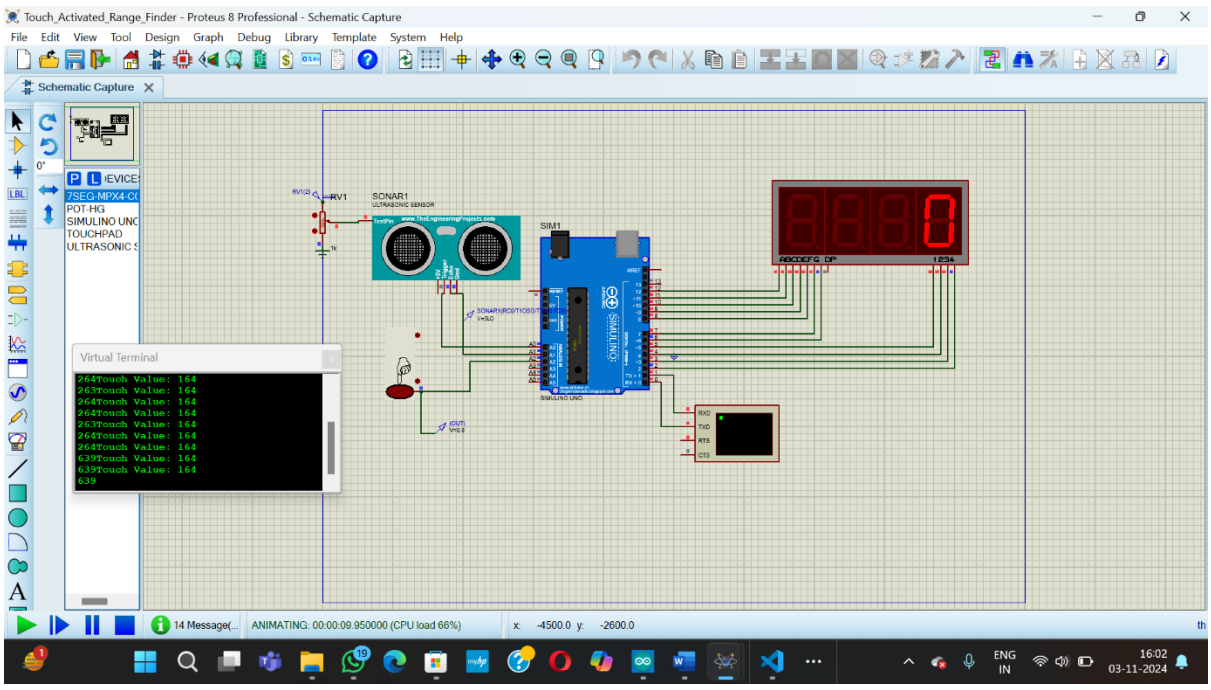
Touch_Activated_Range_Finder - Proteus 8 Professional - Schematic Capture
File Edit View Tool Design Graph Debug Library Template System Help
Schematic Capture
Virtual Terminal
264Touch Value: 164
263Touch Value: 164
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264Touch Value: 164
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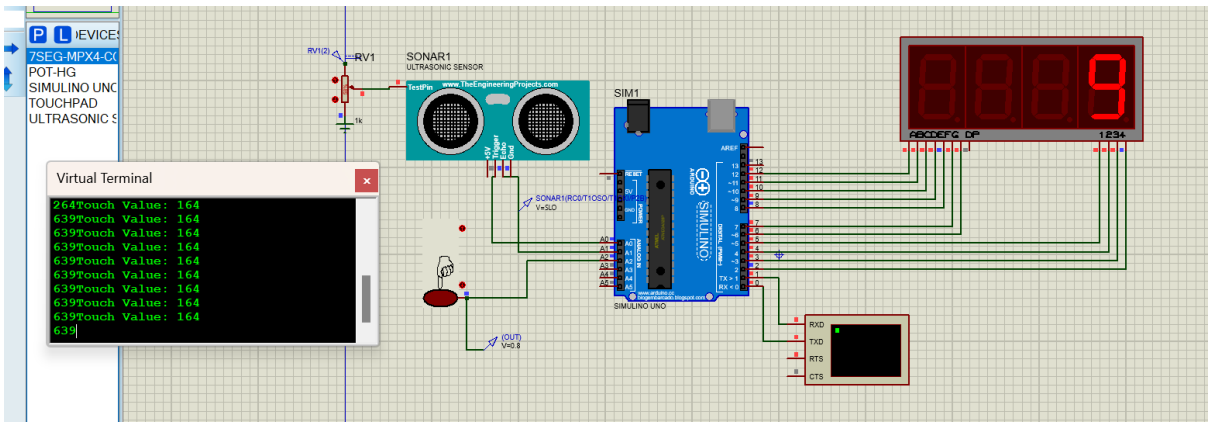
RV1
SONAR1
ULTRASONIC SENSOR
SIM1
SIMULINO UNO
14 Message(...
ANIMATING: 00:00:09.950000 (CPU load 66%)
x: -4500.0 y: -2600.0
ENG
IN
16:02
03-11-2024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SIMULINO UNC
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SIM1
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Virtual Terminal
264Touch Value: 164
639Touch Value: 164
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639

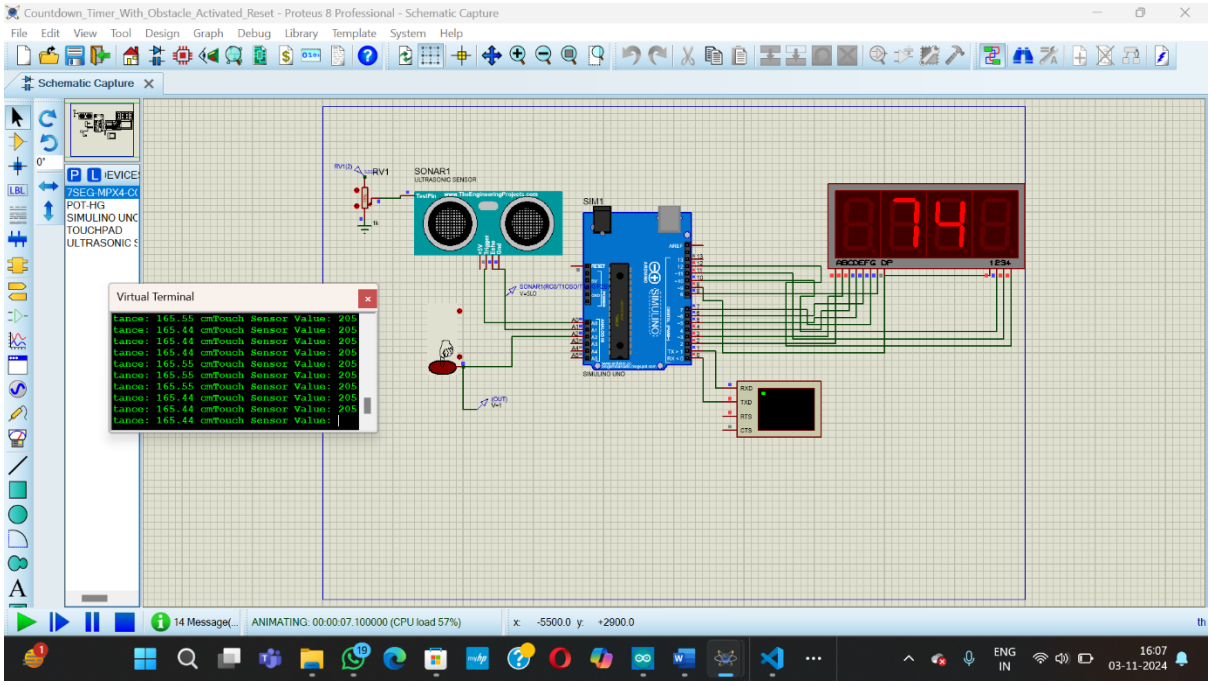
4.Countdown Timer with Obstacle-Activated Reset

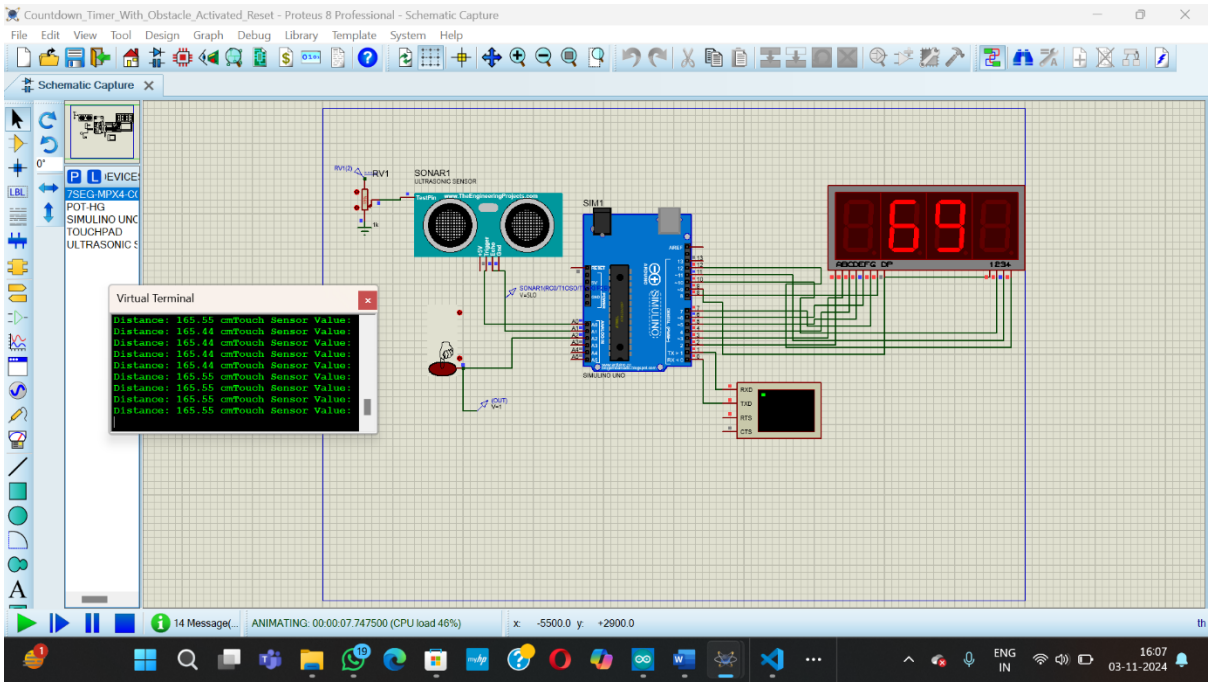
Components used: Ultrasonic sensor, touch sensor, 7-segment display

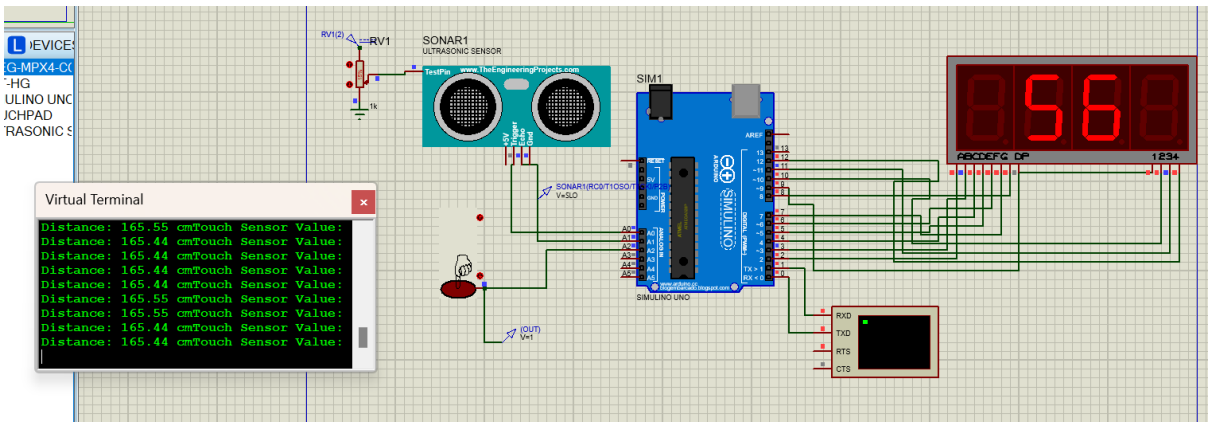
Objective: Start a countdown timer using the touch sensor. Reset the timer if an obstacle is detected within a specified range. Display “E” if the countdown completes without interruption.

Working Principle: Pressing the touch sensor initiates a countdown. If an obstacle (detected by the ultrasonic sensor within a certain range, like <10 cm) interrupts the countdown, the timer resets. If no interruption occurs, "E" is displayed.

Result: The countdown functioned correctly with the obstacle-based reset, and the display showed “E” when the countdown completed without interruption.







5.Digital Stopwatch

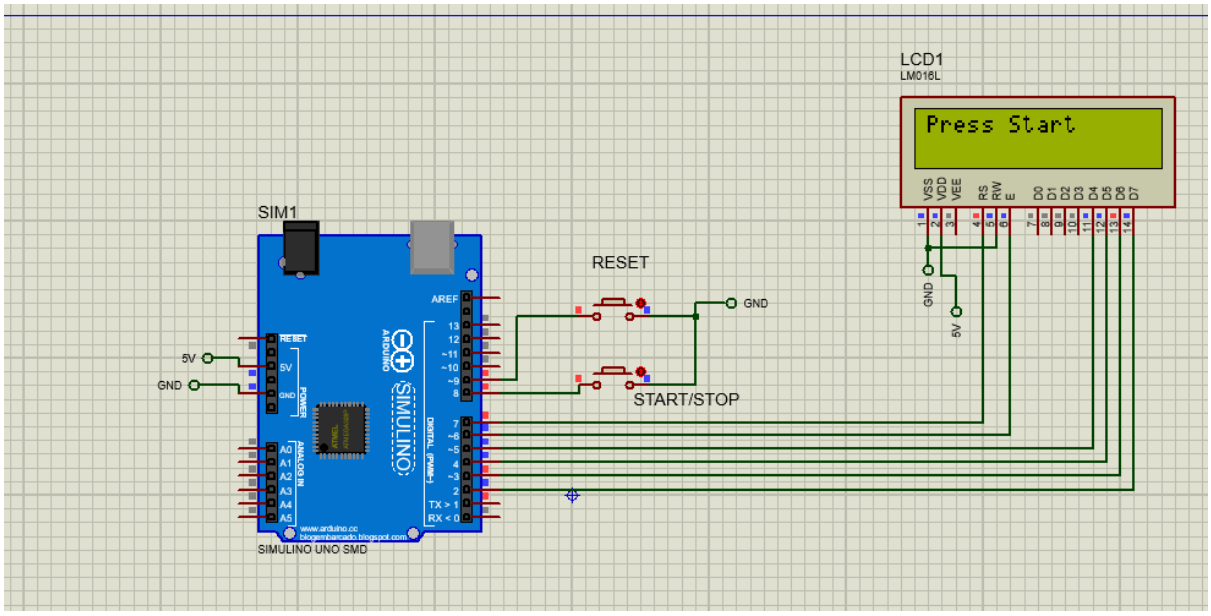
Components used: LCD display, two buttons

Objective: Create a stopwatch that starts/stops with one button and resets with the other.

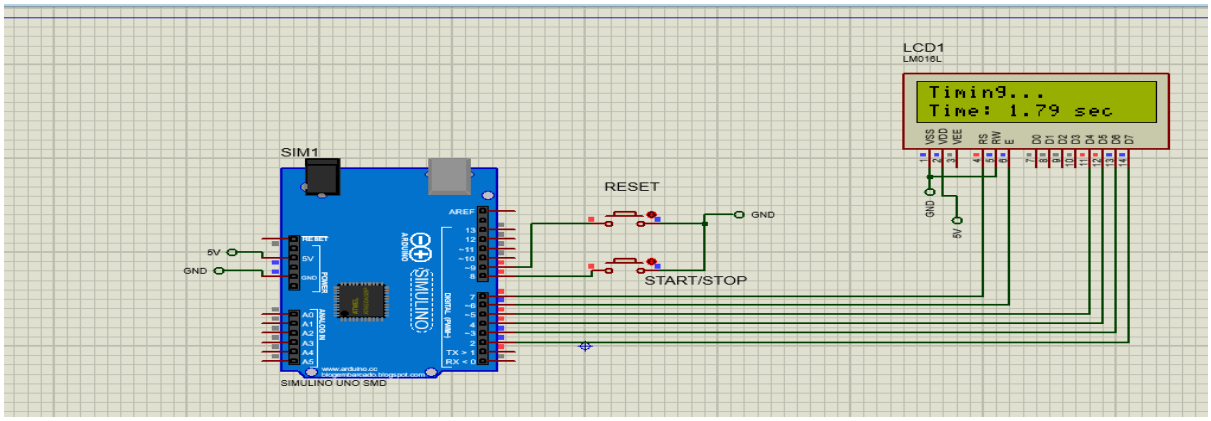
Working Principle: Button 1 toggles between starting and stopping the stopwatch, while button 2 resets the time to 0.

Result: The stopwatch accurately started, stopped, and reset, with clear display of elapsed time on the LCD.

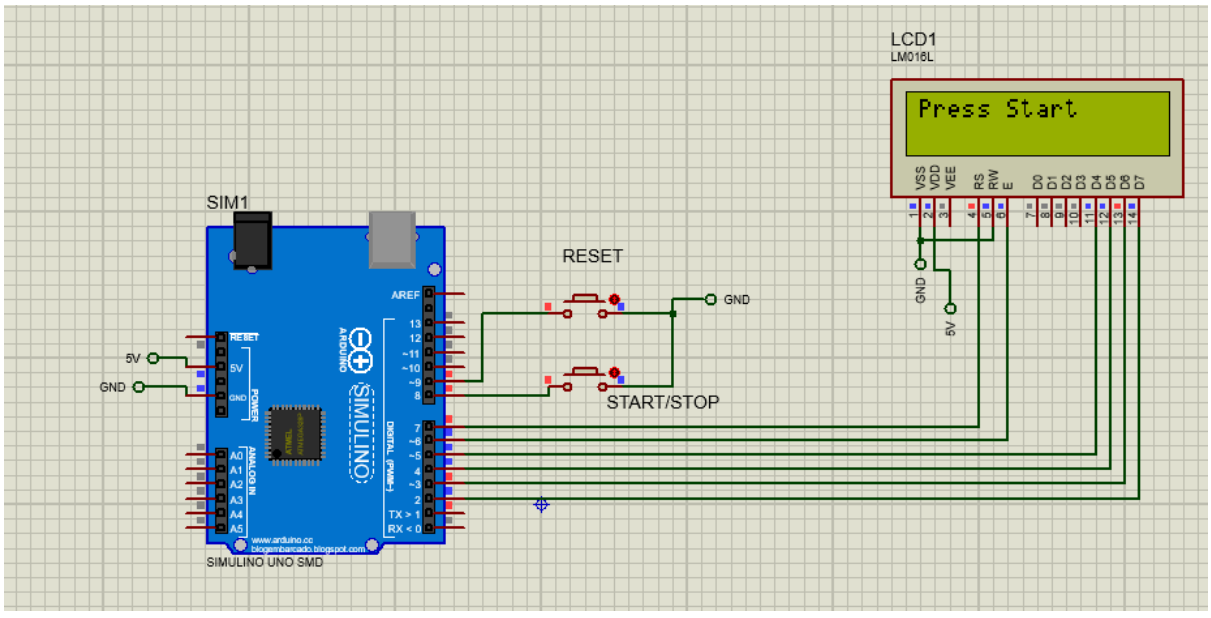
Initial start condition



After starting



After resetting



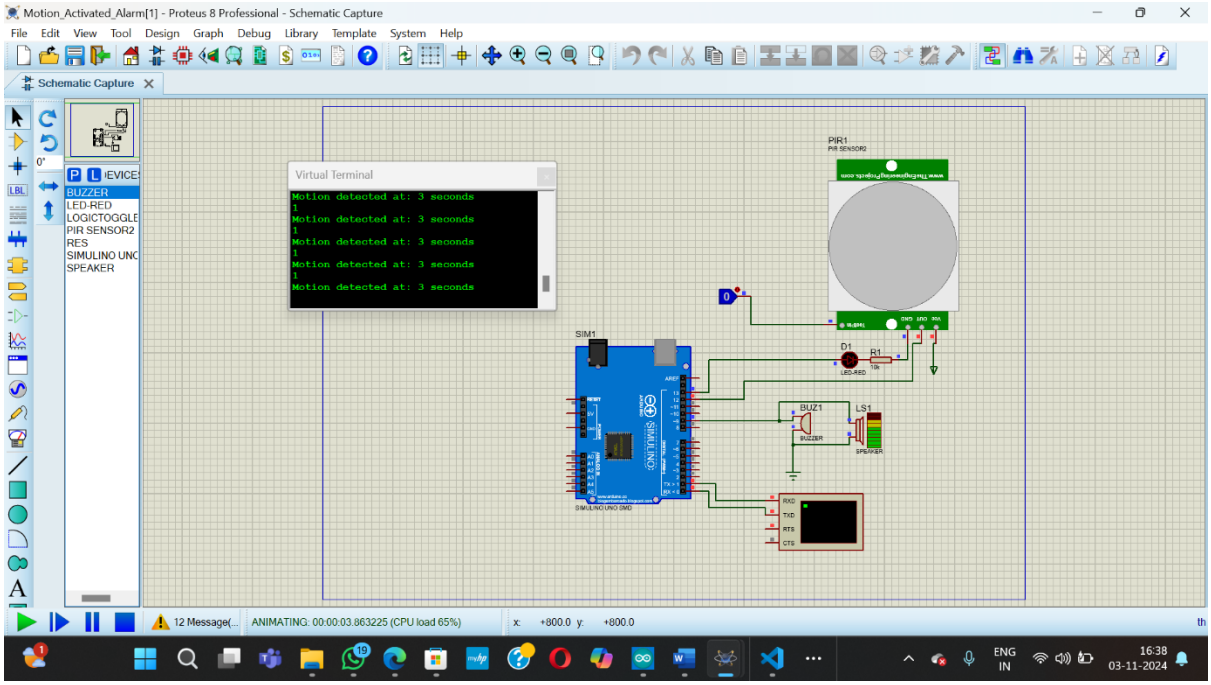
6.Motion-Activated Alarm

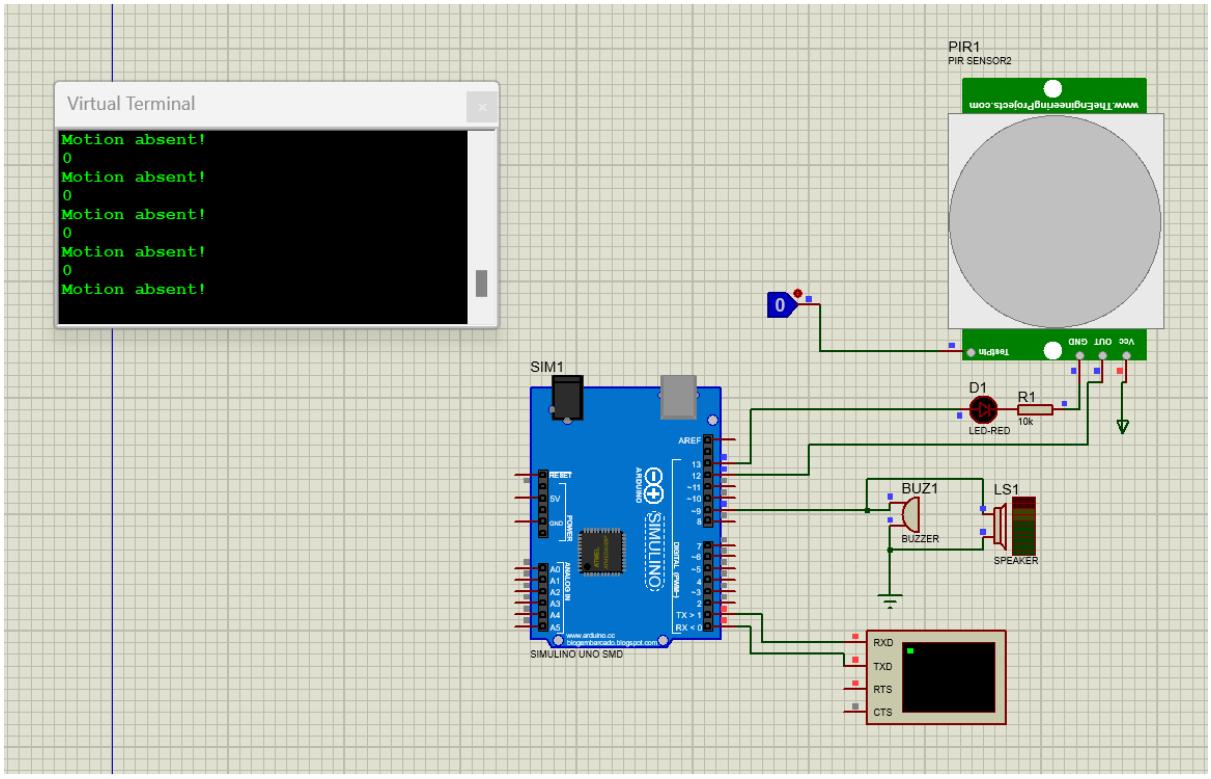
Components used: PIR motion sensor, buzzer

Objective: Sound an alarm when motion is detected and log each event timestamp in the Serial Monitor.

Working Principle: The PIR sensor detects movement, triggering the buzzer and sending a timestamped alert to the Serial Monitor.

Result: The alarm successfully sounded upon motion detection, and accurate timestamps appeared in the Serial Monitor for each event.





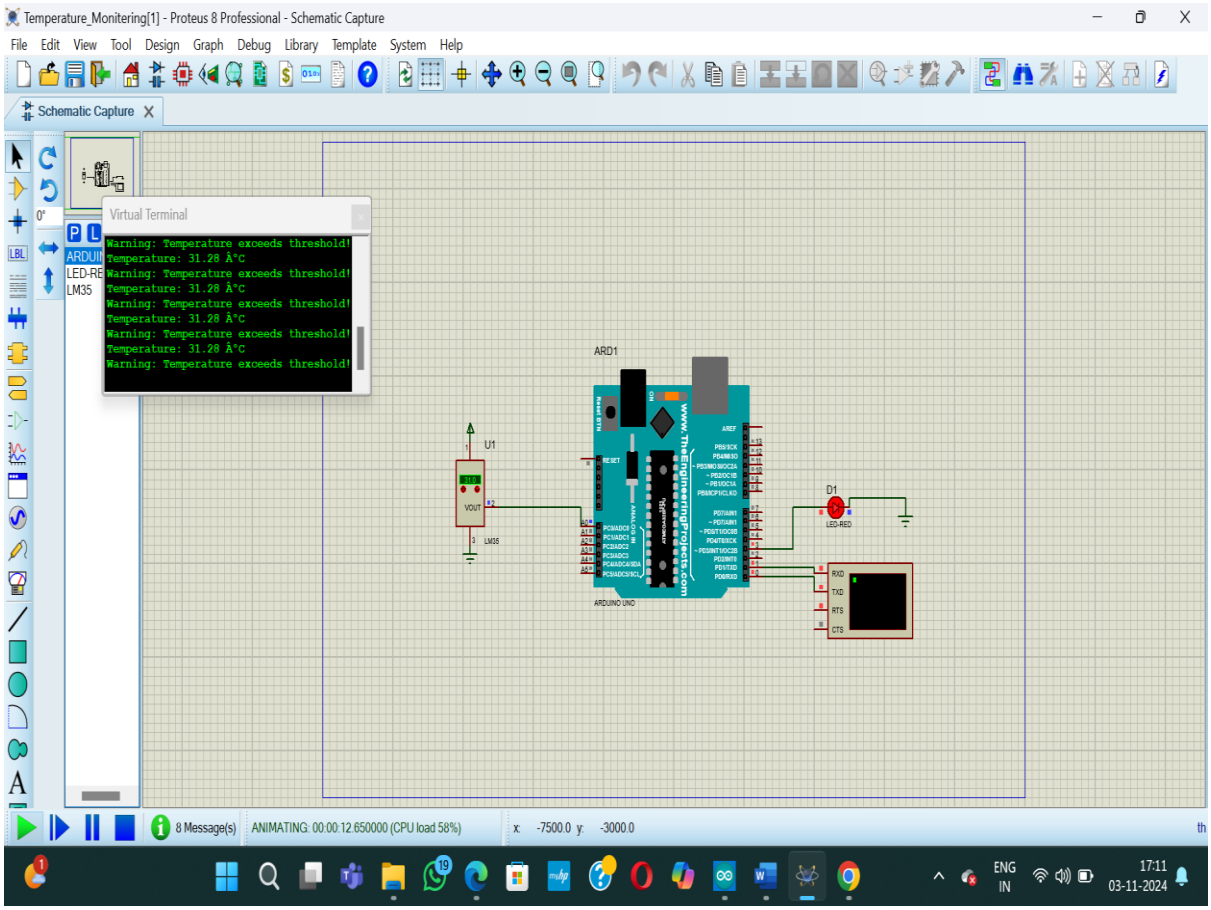
7. Temperature Monitoring System

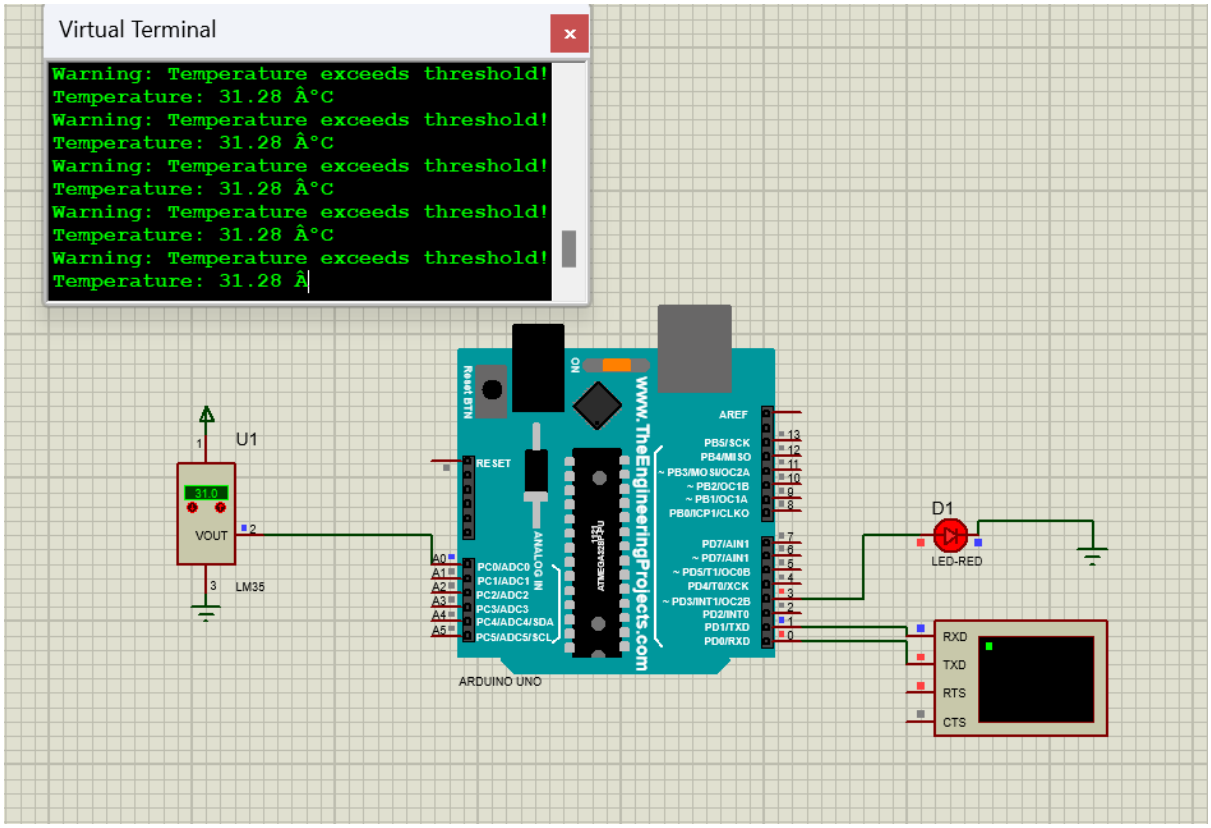
Components used: DHT11 or LM35 temperature sensor

Objective: Monitor temperature readings and display data on the Serial Monitor. Trigger a warning if the temperature exceeds a set threshold.

Working Principle: The sensor measures the temperature, which the Arduino reads and displays in the Serial Monitor. If the reading exceeds a specified threshold, a warning message is displayed.

Result: The system displayed accurate temperature data and provided timely warnings when the threshold was breached.





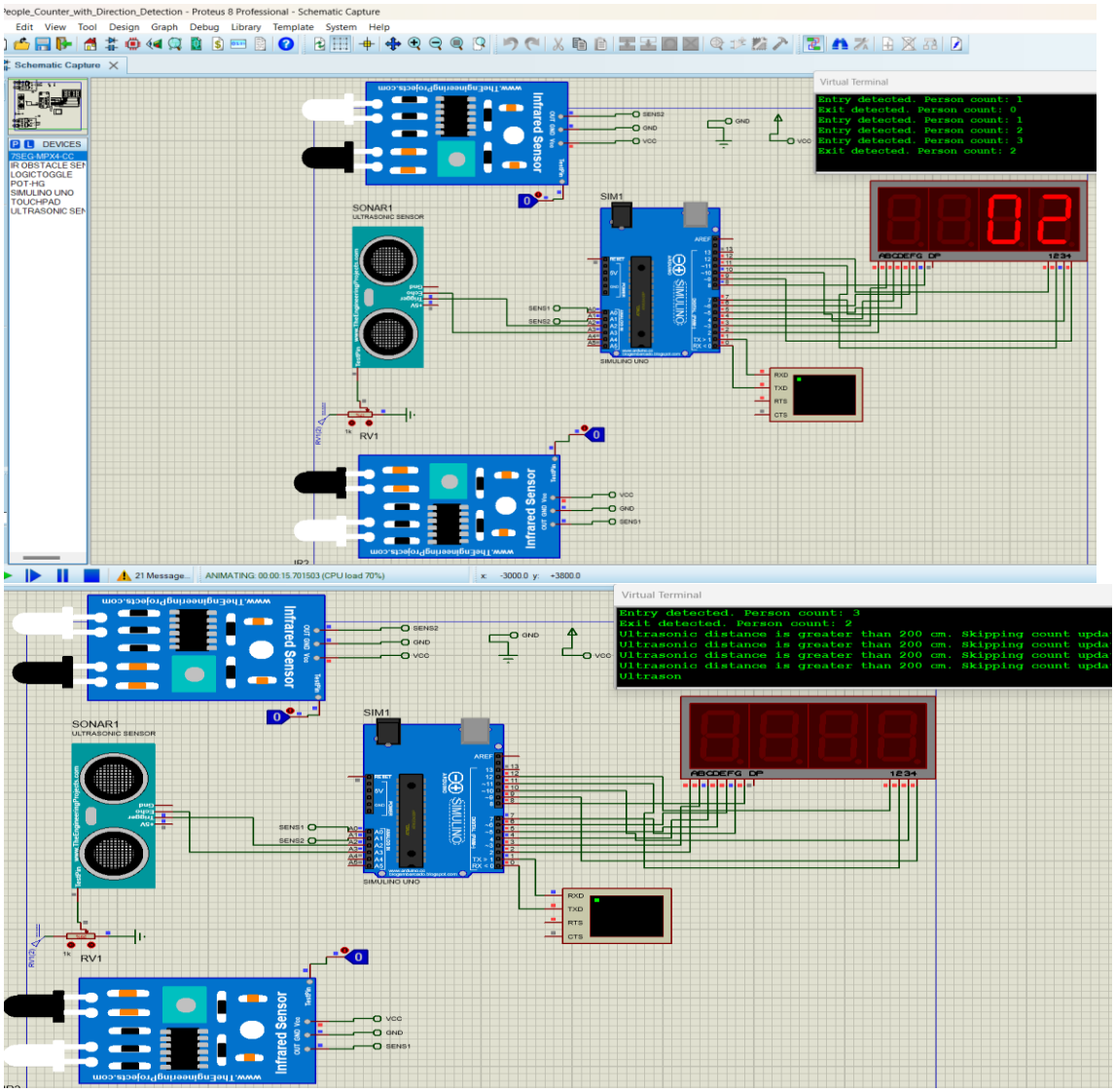
8.People Counter with Direction Detection

Components used: Two IR sensors, ultrasonic sensor, 7-segment display

Objective: Count people entering and exiting through a doorway and display the count. Use ultrasonic sensor data to confirm direction.

Working Principle: When a person crosses both IR sensors in sequence, the system determines direction and increments or decrements the count based on entry or exit. The ultrasonic sensor confirms direction by timing the object's movement.

Result: The system accurately counted entries and exits, with the 7-segment display showing the correct total based on directional data.



Each project showcases effective use of sensors and displays, enhancing real-world applications of distance, motion, temperature, and counting.