==NEHRU ARTS AND SCIENCE COLLEGE==

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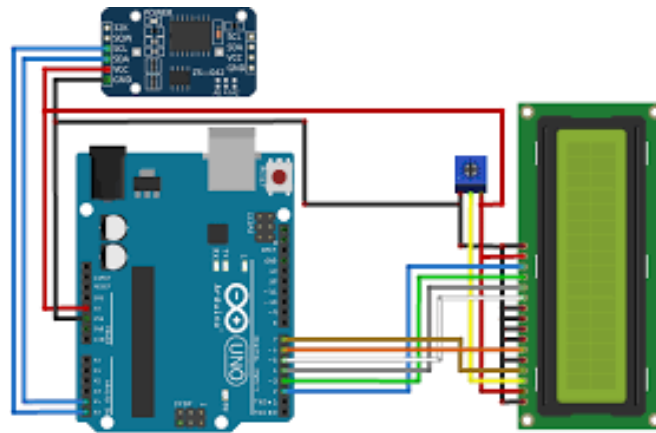
BSC.INFORMATION TECHNOLOGY

==Applied industrial IoT==

Here is the detailed design and simulation of the real-time clock and temperature monitoring system:

Aim:

Design and simulate a real-time clock and temperature monitoring system that display

Exceeds a predefined limit.

Problem Statement:

Temperature monitoring is crucial in various industries, such as food processing, pharmaceuticals, and chemical manufacturing. A real-time temperature monitoring system can help prevent temperature-related issues, ensuring product quality and safety.

Scope of the Solution

The proposed system will:

1. Monitor temperature in real-time using a temperature sensor.

2. Display the current temperature and time on an LCD screen.

3. Trigger a warning message when the temperature exceeds a predefined limit.

4. Simulate the system using Wokwi.

Required Components:

Hardware:

1. Arduino Uno or similar microcontroller board.

2. DS18B20 temperature sensor.

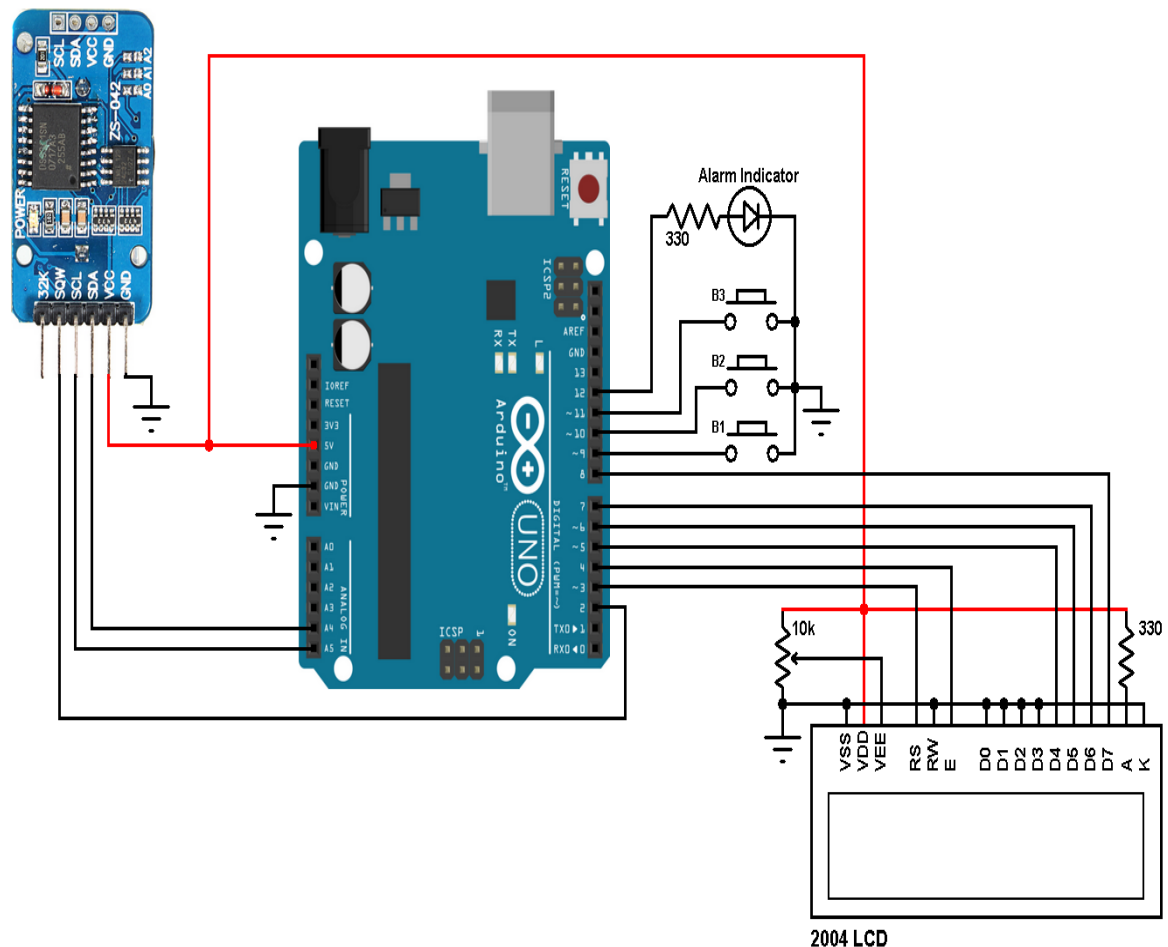3. 16x2 LCD display.

4. Breadboard and jumper wires.

Software:

1. Arduino IDE for coding and simulation.

• Arduino IDE: For programming the microcontroller.

• Wokwi Simulator: To simulate and test the circuit.
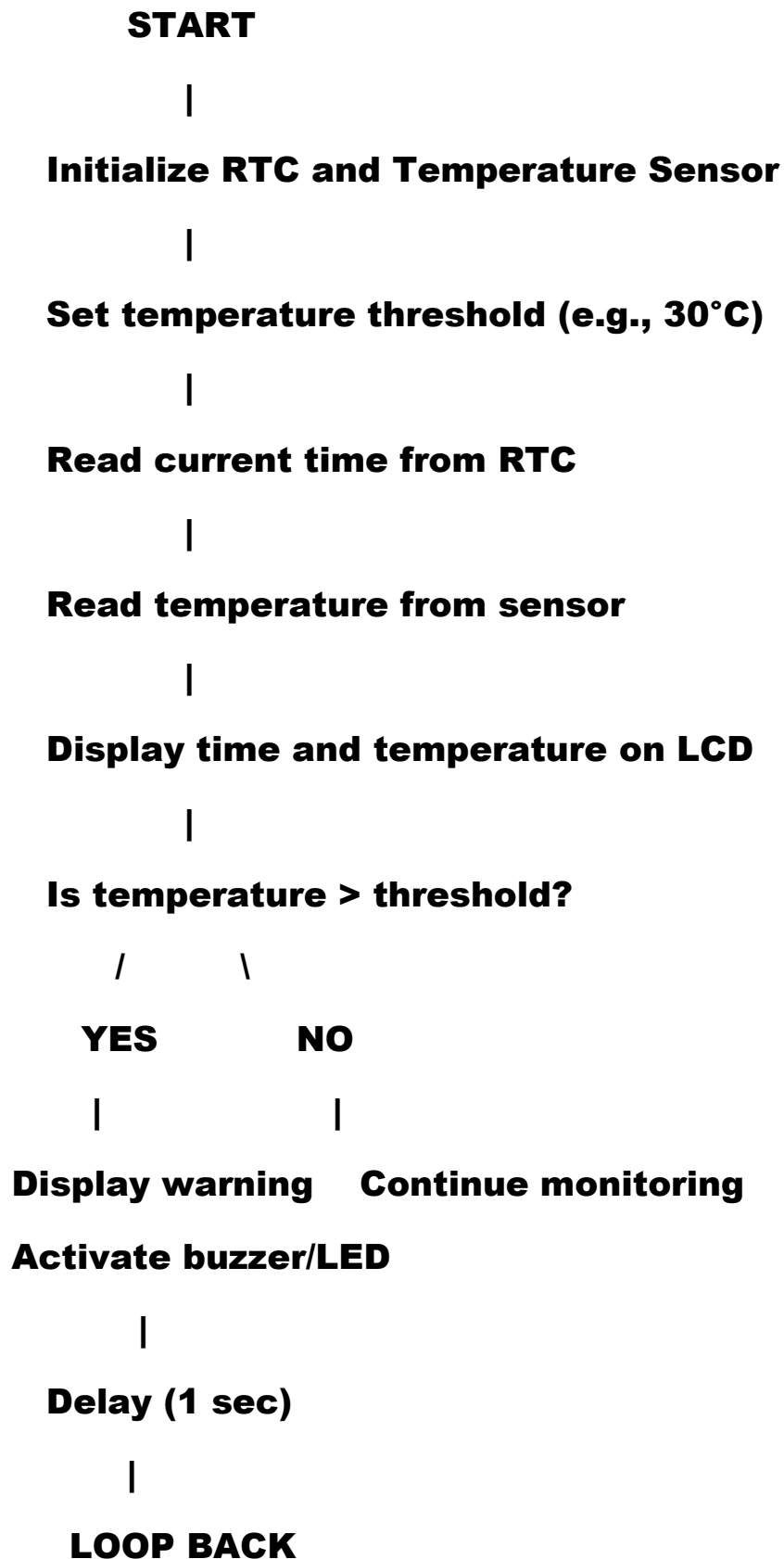
- **GitHub: For version control and collaboration.**

Cloud Environment:

Not required for this simulation, but can be integrated for remote monitoring and data logging.

Flowchart:

```
                START

                 |

       Initialize RTC and Temperature Sensor

                 |

       Set temperature threshold (e.g., 30°C)

                 |

       Read current time from RTC

                 |

       Read temperature from sensor

                 |

       Display time and temperature on LCD

                 |

       Is temperature > threshold?

            /         \

         YES           NO

          |             |

       Display warning    Continue monitoring

       Activate buzzer/LED

                 |

        Delay (1 sec)

                 |

         LOOP BACK
```

Simulated Circuit (Wokwi)

Here's a simulated circuit on Wokwi:

*wokwi

* Arduino Uno

* DS18B20

*16x2 LCD

*Breadboard

*Jumper wires

Wiring for the Simulation:

- DHT11 Sensor:

- VCC → 5V

- GND → GND

- DATA → Pin 2

- RTC (DS3231):

- VCC → 5V

- GND → GND

- SDA → A4

- SCL → A5

- 16x2 LCD (I2C):

- VCC → 5V

- SDA → A4

Here's the sample code for the Arduino Uno:

```
#include <LiquidCrystal.h>

#include <DallasTemperature.h>

// Define constants

const int lcdRS = 12;

const int lcdE = 11;

const int lcdD4 = 5;

const int lcdD5 = 4;

const int lcdD6 = 3;

const int lcdD7 = 2;

const int tempPin = A0;


// Initialize LCD and temperature sensor

LiquidCrystal lcd(lcdRS, lcdE, lcdD4, lcdD5, lcdD6, lcdD7);

DallasTemperature tempSensor(tempPin);


void setup() {
  // Initialize serial communication
  Serial.begin(9600);
 // Initialize LCD
  lcd.begin(16, 2);
// Initialize temperature sensor
  tempSensor.begin();
```

```
}

void loop() {
  // Read temperature
  float temperature = tempSensor.getTempC();

  // Display temperature and time on LCD
  lcd.setCursor(0, 0);
  lcd.print("Temp: ");
  lcd.print(temperature);
  lcd.print(" C");
  if (temperature > 30) {
    // Display warning message on LCD
    lcd.setCursor(0, 1);
    lcd.print("Warning: High Temp!");
  }
else
 {
   lcd.setCursor(0, 1);
    lcd.print("Normal Temperature");
  }
  delay(1000);
}
```
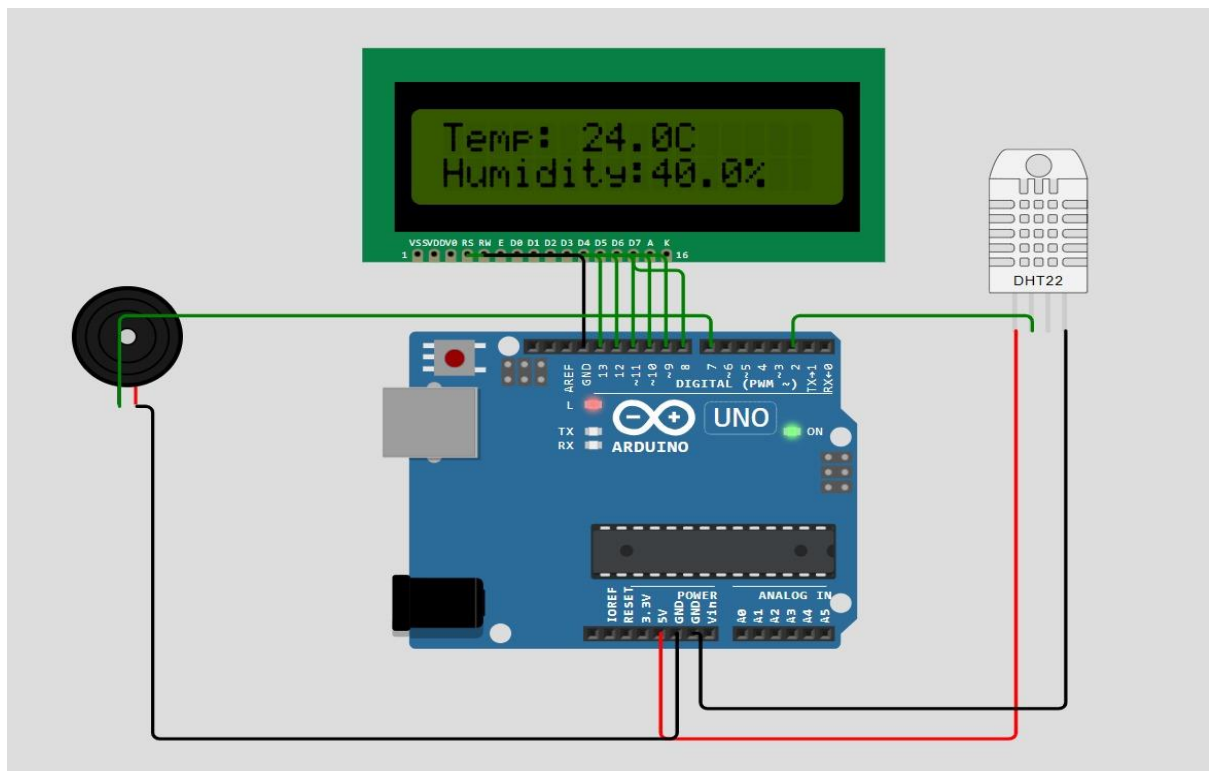
This code reads the temperature from the DS18B20 sensor, displays it on the LCD screen, and triggers a warning message if the temperature exceeds 30°C.

PROJECT OUTPUT:

Video of the demo: