NEHRU ARTS AND SCIENCE COLLEGE

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BSC.INFORMATION TECHNOLOGY

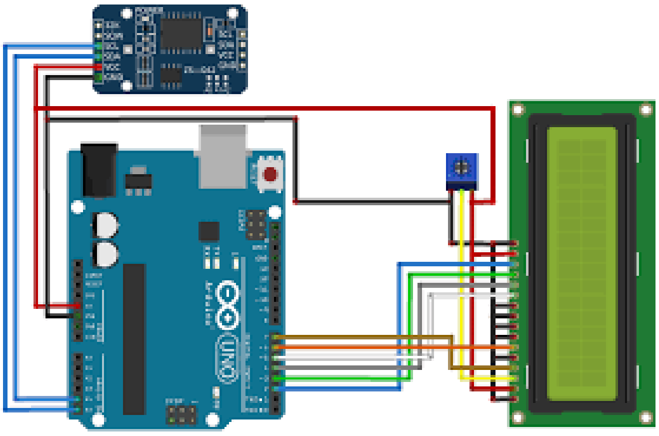
Applied industrial IoT

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:

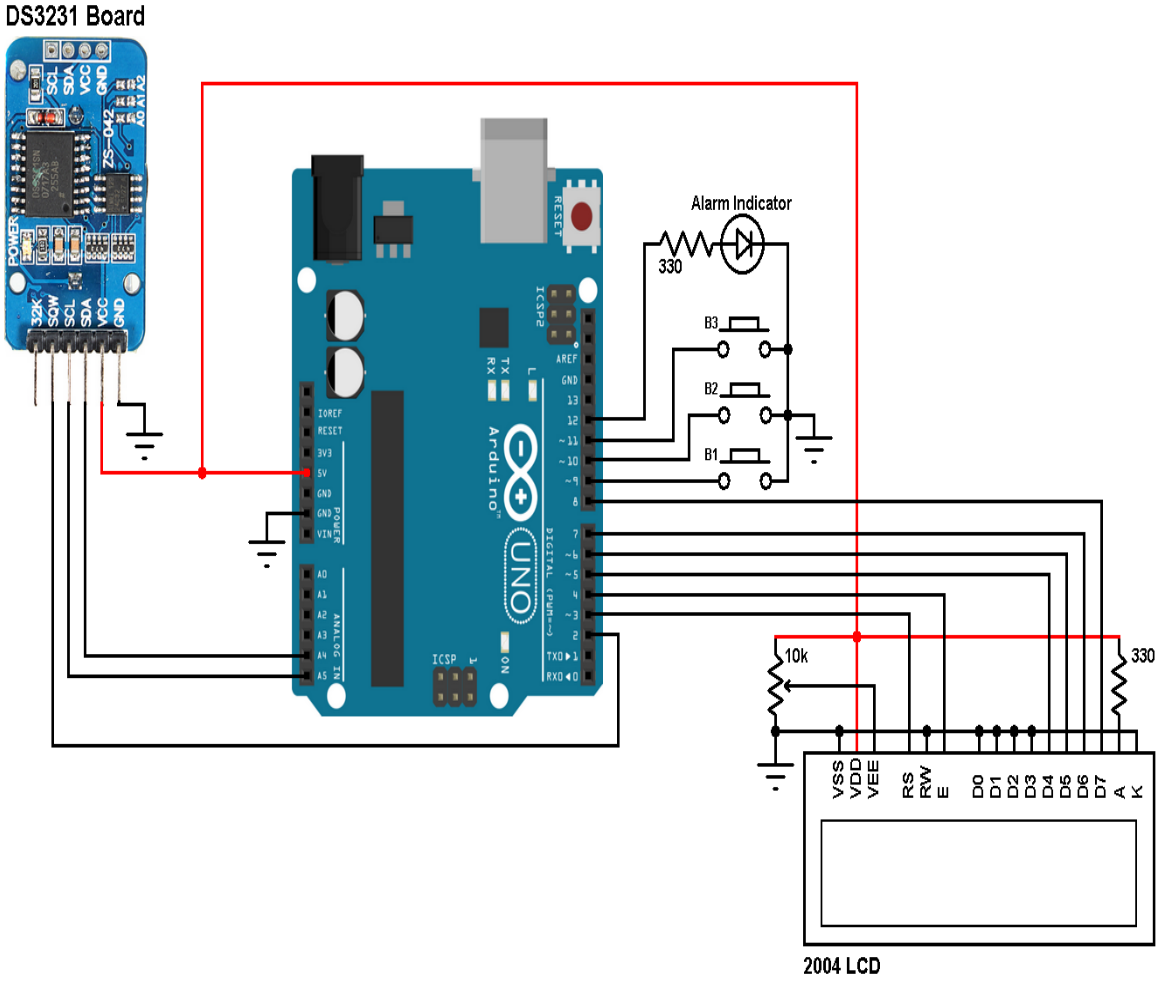
1. Arduino IDE for coding and simulation.

- **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:

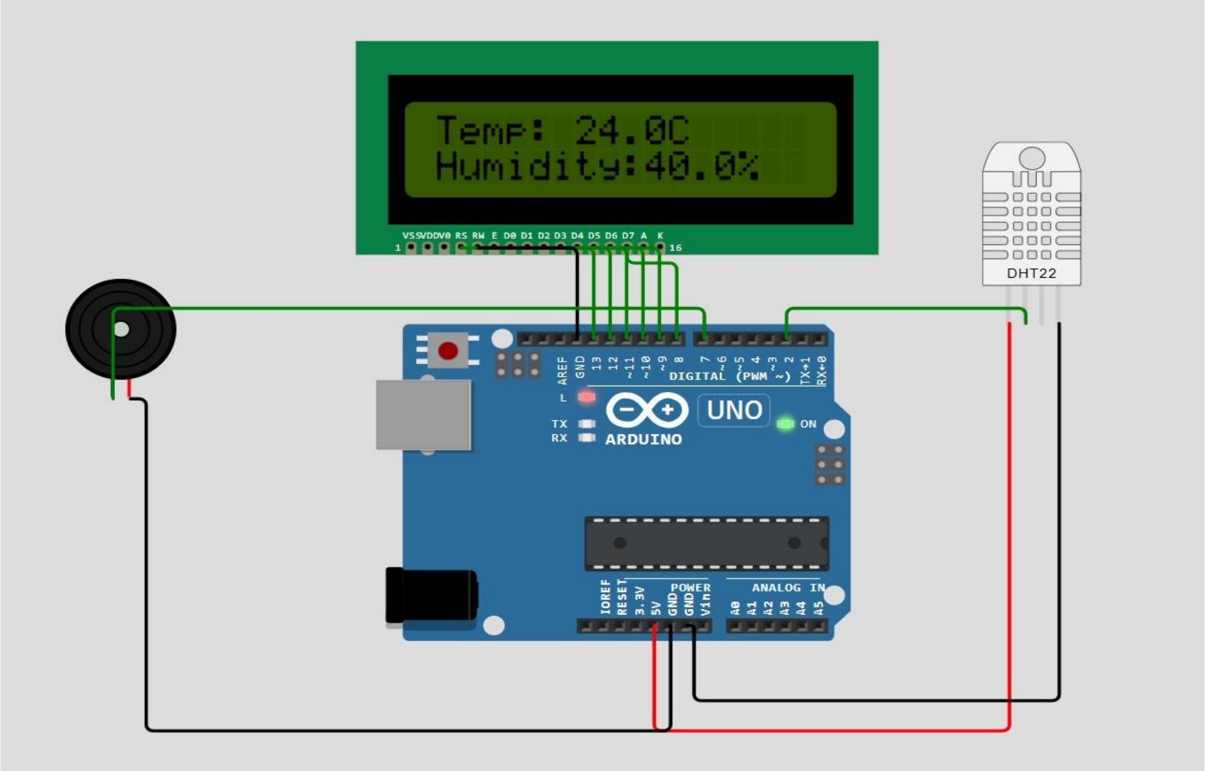
- **DHT11 Sensor:**
- **VCC → 5V**
- **GND → GND**
- **DATA → Pin 2**
- **RTC (DS3231):**
- **VCC → 5V**
- **GND → GND**
- **SDA → A4**
- **SCL → A5**
- **16x2 LCD (I2C):**
- **VCC → 5V**
- **SDA → A4**

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:


Temp: 24.0C
Humidity:40.0%
VSS VDD V0 RS RW E D0 D1 D2 D3 D4 D5 D6 D7 A K
1
16
DHT22
AREF GND 13 12 ~11 ~10 ~9 8 7 ~6 ~5 4 ~3 2 TX→1 RX←0
DIGITAL (PWM ~)
L
TX
RX
UNO
ARDUINO
ON
IOREF RESET 3.3V 5V GND GND Vin
POWER
ANALOG IN
A0 A1 A2 A3 A4 A5

Video of the demo:

https://github.com/Sabarigirivasan1234/L-T-PROJECT