# _Weather quality monitoring kit with Arduino:_



Weather Monitor v1.0

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Course          : Indroduction to Mechatronics
Guided By       : Prof.Vivekanandhan Sir
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# Introduction:

•Weather monitoring is essential for various applications such as agriculture, forecasting, and home automation.

•The system described in this project uses Arduino to monitor and display weather data like temperature, humidity, and light intensity.

•The system integrates multiple sensors like DHT11 (for temperature and humidity) and LDR (for light intensity) to create a comprehensive weather monitoring system.

# Problem Statement:

•Weather changes affect various aspects of life, including agriculture, construction, and energy usage.
•There is a need for a simple, cost-effective, and easily accessible system that monitors environmental factors such as temperature, humidity, and light intensity.
•This system aims to provide real-time weather data using a microcontroller (Arduino) to help users track weather conditions in their surroundings.

# Components Used:

- **Arduino UNO:** The microcontroller that processes the data from sensors and displays it.
- **LCD Display (16x2):** Used to display real-time weather data.
- **DHT11 Sensor:** Measures temperature and humidity levels in the environment.
- **LDR Sensor (Light Dependent Resistor):** Detects the light intensity (brightness) in the environment.
- **Breadboard:** For connecting the sensors and components.
- **Jumper Wires:** Used for making connections between components.
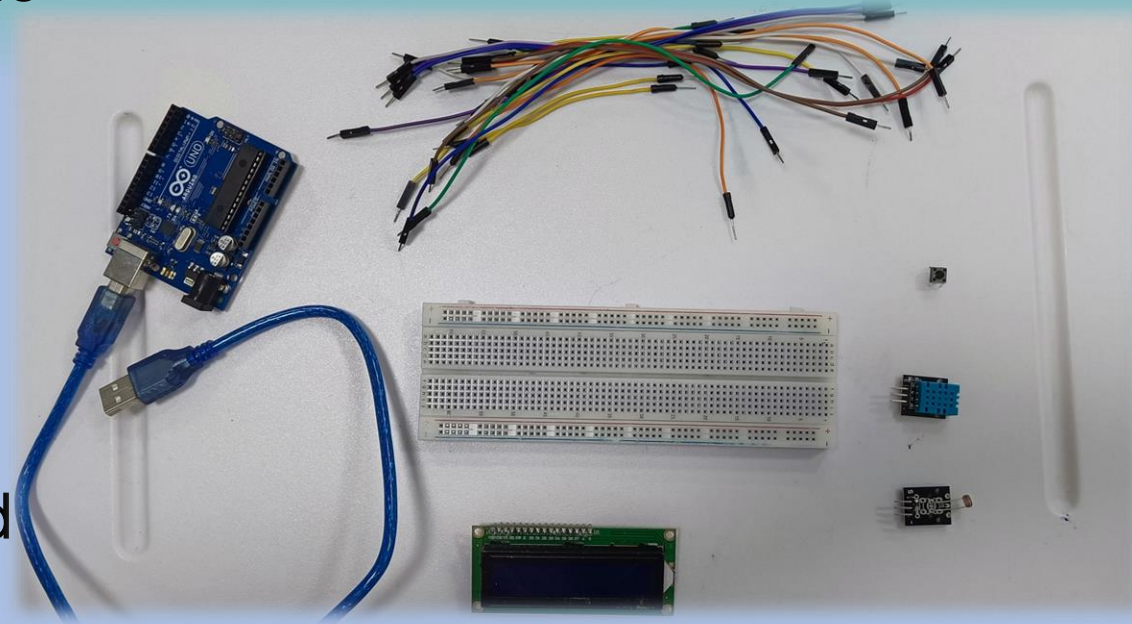
## *System Architecture:*

- **Sensors:**
    **DHT11 Sensor**: Measures temperature and humidity.
    **LDR Sensor**: Measures light intensity.
- **Arduino UNO:**
    Processes data from sensors.
    Controls data flow to LCD display.
- **LCD Display:**
    Displays temperature, humidity, and light intensity readings.
- **Power Supply:**
    Powered by USB or 9V battery

**Data Flow:**
- Sensors → Arduino UNO → LCD Display

## *Working Principle*

- **Sensors** (DHT11 and LDR) collect temperature, humidity, and light intensity data.
- **Arduino UNO** processes the data from the sensors.
- The processed data is converted into readable values (°C, %).
- **LCD Display** shows the real-time weather data (Temperature, Humidity, and Light).
- **Power Supply** is provided via USB or a 9V battery for portability.

# Circuit Diagram:

**1. DHT11 Sensor**

**VCC** → 5V on Arduino

**Data** → Digital Pin 2 on Arduino

**GND** → GND on Arduino

**2. LDR Sensor**

**One end** → 5V on Arduino
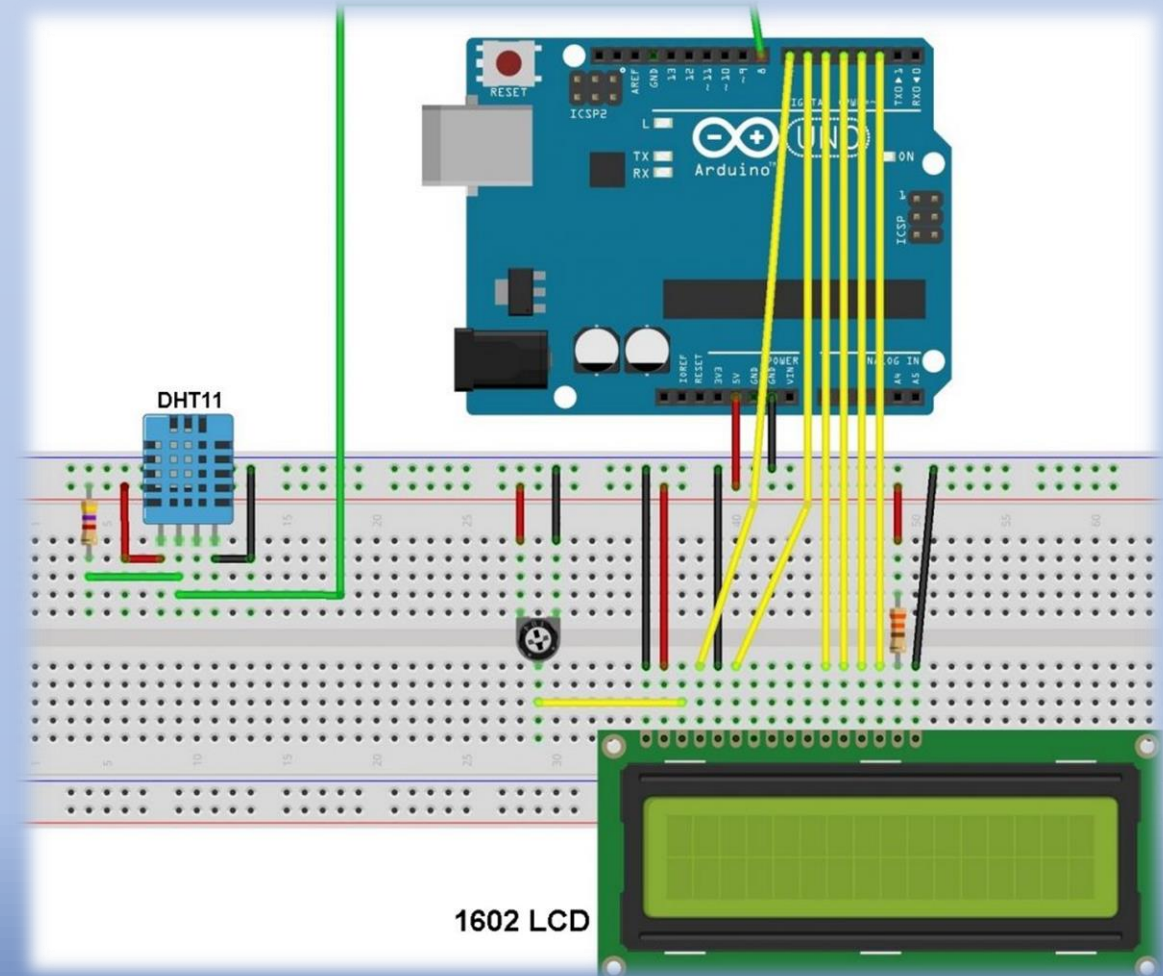
**Other end** → Analog Pin A0 on Arduino

**GND** → GND on Arduino

**10kΩ Resistor** → Between LDR and GND

**3. 16x2 LCD**

**VCC** → 5V on Arduino

**GND** → GND on Arduino

# Arduino Code Snippet:

 **Required Libraries**
Before uploading the code, ensure you have the following libraries installed in your Arduino IDE:

•**DHT sensor library** by Adafruit

•**Adafruit Unified Sensor** library

•**LiquidCrystal_I2C** library

You can install these libraries via the Arduino Library Manager:

1.Go to **Sketch** > **Include Library** > **Manage Libraries...**

2.In the Library Manager, search for each library by name and click "Install."

**Access Full Code:**

https://docs.google.com/document/d/1S1hj7rEOC8Nvv3gha5OUgqtkjCdMMHMt-qpgIfiOypM/edit?usp=drivesdk

# Applications

- **Home Environment Monitoring:** Ensures comfortable living conditions.
- **Educational Projects:** Demonstrates sensor integration and data processing.
- **Agricultural Use:** Monitors greenhouse conditions for optimal plant growth.

# Future Enhancements

- **Additional Sensors:** Integrate gas sensors like MQ135 for detecting pollutants.
- **Data Logging:** Use SD card module to store data for analysis.
- **Wireless Communication:** Implement Wi-Fi or Bluetooth for remote monitoring

# Cost Analysis:

| Component | Estimated Price |
|---|---|
| Arduino Uno (Compatible) | ₹450 |
| DHT11 Temperature & Humidity Sensor | From Lab |
| LDR (Light Dependent Resistor) | ₹20 |
| | |
| 16x2 LCD Display with I2C Module | From Lab |
| Breadboard | ₹125 |
| Jumper Wires (Male-to-Male) | ₹75 |
| **Total** | **₹670/-** |

# Conclusion:

- **Project Summary:**
  Successfully built a basic environmental monitoring system using Arduino.
- **Learning Outcomes:**
  Gained insights into sensor integration, data acquisition, and environmental monitoring.
- **Next Steps:**
  Explore advanced features and broader applications.

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