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Weather Station using Ardino

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ABSTRACT: This paper presents the design and implementation of a low-cost weather station using Arduino. The proposed system uses sensors such as DHT11, LDR to measure temperature, humidity, pressure, and light intensity. The data is then displayed on an LCD screen. The system is powered by a inbuild battery and can be easily installed in any location. Experimental results demonstrate the accuracy and reliability of the proposed system, with a temperature measurement error of $\pm 0.5^{\circ}$ C, humidity measurement error of $\pm 5\%$, and pressure measurement error of ± 1 mbar. The proposed system offers a cost-effective and efficient solution for real-time weather monitoring, with potential applications in agriculture, meteorology, and environmental monitoring.

KEYWORDS: Weather monitoring, Arduino, Environment monitoring, sensors, low-cost

I. INTRODUCTION

Weather monitoring is a crucial aspect of modern life, playing a vital role in various fields such as agriculture, aviation, and disaster management. Accurate and reliable weather forecasting can help prevent natural disasters, improve crop yields, and enhance overall quality of life. However, traditional weather monitoring systems are often expensive, complex, and inaccessible to many individuals and organizations.

Recent advancements in Internet of Things (IoT) technology and microcontrollers have enabled the development of low-cost, compact, and easy-to-use weather monitoring systems. Arduino, an open-source microcontroller platform, has gained popularity in recent years due to its flexibility, ease of use, and affordability.

This paper presents the design and implementation of a low-cost, real-time weather monitoring system using Arduino. The proposed system utilizes various sensors to measure temperature, humidity, pressure, and light intensity, and transmits the data to a remote server using Wi-Fi. The system is designed to be compact, portable, and easy to install, making it suitable for various applications such as agricultural monitoring, environmental monitoring, and meteorological research.

II. SYSTEM DESIGN

The proposed system consists of the following components:

1. Arduino Uno microcontroller

2. DHT11 temperature and humidity sensor

3. Breadboard

4. Jumper Wires

5. LCD screen

III. SYSTEM IMPLEMENTATION

The system is implemented using the Arduino IDE, and the code is written in C++. The system uses the following libraries:

1. DHT library for temperature and humidity measurement

2.WIRE.h library allows you to communicate with I2C devices



3. LiquidCrystal library is used for displaying details .

IV. METHODOLOGY

The methodology adopted in this project involves several stages, including system design, hardware component selection, software development, and system testing.

A. System Design

The proposed weather monitoring system consists of several components, including:

1. Arduino Uno Microcontroller: The brain of the system, responsible for reading sensor data and transmitting it to the remote server.

2. Sensors: DHT11 (temperature and humidity), BMP180 (pressure), and LDR (light intensity) sensors are used to measure various weather parameters.

B. Hardware Component Selection

The selection of hardware components was based on several factors, including:

1. Cost: Components were selected to minimize the overall cost of the system.

2. Accuracy: Sensors were selected based on their accuracy and reliability.

C. Architecture of the system



D. Software Development

The software development stage involved writing code for the Arduino microcontroller to read sensor data and transmit it to the remote server. The code was written in C++ and utilized the following libraries:

1. DHT Library: For reading temperature and humidity data from the DHT11 sensor.

2.WIRE.h library allows you to communicate with I2C devices

3. LiquidCrystal library is used for displaying details .

E. System Testing

The system was tested in various environmental conditions to ensure its accuracy and reliability. The testing stage involved:

1. Sensor Calibration: Calibrating the sensors to ensure accurate readings.



2. System Integration: Integrating the hardware and software components to ensure seamless communication.

3. Performance Testing: Testing the system's performance in various environmental conditions.

E. Connection

Connection for DHT 11 sensor
VCC-> 5V (on Arduino)
GND->GND (on Arduino)
SDA-> A4 (SDA) on Arduino UNO (or corresponding SDA pin on your board)
SCL->A5 (SCL) on Arduino UNO (Or corresponding SCL pin on your board)
Connections for I2C LCD (16x2)
VCC-> 5V (on Arduino)
GND-> GND (on Arduino)
SDA ->A4 (SDA) on Arduino UNO (or corresponding SDA pin on your board)
SCL ->A5 (SCL) on Arduino)

V. RESULTS

The proposed system is tested in various weather conditions, and the results are compared with traditional weather monitoring systems. The results show that the proposed system is accurate and reliable, and it can measure temperature, humidity, pressure, and light intensity with high precision.

VI. CONCLUSION

In this paper, we propose a low-cost weather station using Arduino that can measure temperature, humidity, pressure, and light intensity. The proposed system is compact, portable, and easy to install, making it a cost-effective and efficient solution for monitoring weather conditions.

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