

WEATHER MONITORING SYSTEM



SUPERIOR UNIVERSITY

Project Report Digital and Logic Design (Lab)

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Department of Computer Science

Superior University

Gold Campus Lahore, Pakistan

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DECLARATION:

We Students of BSCS Semester 2nd Section 2-M declared that we have completed the Project work Presented in this report, during the required time period of 2nd semester BSCS program. We also declare that we have not taken any material that violate the rules of university from any sources except referred to wherever due.

Signature of Student

Abdul Rehman

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DEDICATION:

We dedicate this endeavor to our **SIR HASSAN AMEER** whose affection, encouragement, support and prayers make us able to get such success and honor.

To our Respected SIR, who inspired us to set a target and gave us the courage to achieve it. Whom guidance and unwavering support have been the driving force behind my journey towards achieving our theoretical knowledge practical work.

Your inspirational words have instilled in us the courage and determination to overcome challenges and reach for excellence. We truly grateful for your mentorship and the valuable lessons you've imparted.

Thank you for being a beacon of inspiration on this academic endeavor.

GROUP:

- **Abdul Rehman**
- **Arshad Ali**
- **Asfandyar**
- **Zainab Batool**
- **Mehwish Malik**
- **Kaneez Fatima**

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Abstract

The Weather Monitoring System is an innovative solution designed to collect and analyze real-time atmospheric data using a combination of sensors and microcontroller-based technology. This system continuously measures environmental parameters such as temperature, humidity, atmospheric pressure, and rainfall, enabling accurate monitoring of local weather conditions.

By integrating wireless communication and **IoT (Internet of Things)** technology, the collected data can be transmitted to a remote server or cloud platform, allowing for real-time access and analysis via web or mobile applications. This not only enhances the accuracy and accessibility of weather data but also enables timely alerts and informed decision-making in sectors such as agriculture, transportation, disaster management, and urban planning.

Introduction

A Weather Monitoring System is a technological solution designed to observe, measure, and report atmospheric conditions in real time. These systems collect data such as temperature, humidity, wind speed, rainfall, and atmospheric pressure using various environmental sensors. By continuously tracking these parameters, weather monitoring systems play a critical role in meteorology, agriculture, disaster management, aviation, and public safety.

The main objective of a weather monitoring system is to provide accurate and timely information to help individuals, businesses, and governments make informed decisions based on current and predicted weather conditions.

Weather Monitoring System

Aims and Objectives

To design and implement a real-time weather level monitoring system capable of collecting, analyzing, and displaying environmental data such as temperature, humidity, rainfall, and atmospheric pressure for weather forecasting and early warning systems.

- Data Collection
- System Design
- Data Transmission
- Data Storage and Analysis
- Testing and Calibration
- Documentation and Reporting

Method of Preparation

Components

- ★BMP-180 (Atmospheric Pressure)
- ★MQ-135 (Air Quality Monitoring)
- ★DHT11 (Temperature and Humidity)
- ★Arduino R3 (IDE / Python)
- ★Rain Sensor Module (Rain Detection)

Process

Monitor weather parameters such as temperature, humidity, rainfall, pressure, etc.

- Study existing systems and available technologies.
- Decide on the features your system will have.
- Choose between **IoT-based**, **offline**, or **cloud-integrated** solutions.

Working

Sensor Data Collection:

The system uses various environmental sensors to continuously measure weather parameters:

Sensor	Measures	Example
BMP-180	Atmospheric Pressure	1008 hPa
MQ-135	Air Quality Monitoring	Ammonia (NH3)
DHT11	Temperature and Humidity	28°C, 60% RH
Arduino R3	IDE / Python	Compact Weather
Rain Sensor Module	Rain Detection	Wet=Rain, Dry=No Rain

Example Workflow:

1. Temperature sensor reads 31°C and 70% humidity.
2. Arduino processes the values and sends them to Thing Speak via Wi-Fi.
3. Thing Speak plots this data on a live graph.
4. If it starts raining, the rain sensor detects it and sends a signal.
5. A message "Rain Detected" appears on the app, and the system could send an SMS to notify the user.
6. It converts raw analog or digital data into meaningful values (e.g., 25°C or 55% humidity).
7. The controller checks for any critical conditions (e.g., very high temperature or rainfall detected).

Project

Project Cost

- **Basic** (Wi-Fi, temp/humidity, rain): **\$15 – \$30**
- **Intermediate** (adds pressure, display, better accuracy): **\$30 – \$50**
- **Advanced** (adds GSM, solar, wind speed, enclosure): **\$50 – \$100+**
- Use **Node MCU** instead of separate Arduino + Wi-Fi module.
- Skip non-essential sensors like pressure or wind speed if not required.
- Use **free platforms** like Thing Speak for data logging and visualization.

Application

Smart Cities

- Integrates into smart infrastructure to monitor local climate conditions.
- Improves traffic, energy, and waste management systems using weather insights.
- Helps in reducing air pollution and urban heat island effects.

Environmental Research

- Gathers long-term data for climate studies and weather trend analysis.
- Assists in academic or scientific projects related to climate change and ecology.

Education and Training

- Used in schools and colleges for STEM learning and research projects.
- Teaches students about sensor technology, microcontrollers, and IoT.

Industrial Safety

- Used in industries to monitor ambient conditions for worker safety.
- Prevents overheating or condensation in sensitive production environments.

Conclusion

The Weather Monitoring System project successfully demonstrates how modern technology can be used to monitor environmental conditions in real time. By integrating sensors with microcontrollers and communication modules, the system is capable of measuring key weather parameters such as temperature, humidity, rainfall, and atmospheric pressure.

Moreover, the system can be enhanced with features like solar power, mobile app integration, and advanced data analytics for predictive weather forecasting. Overall, this project not only improves awareness of changing weather conditions but also lays the foundation for future developments in IoT-based environmental monitoring systems.

Project

CERTIFICATE:

It is certified that the project work contained in this report entitled
“Weather Monitoring System” has been accomplished by

“Abdul Rehman, Arshad Ali, Asfandyar, Zainab Batool, Mehwish Malik, Kaneez Fatima”.

Semester 2nd BSCS Department at Gold Campus Superior University,
Lahore , Pakistan, Under my supervision in partial fulfillment of the
criteria of rules of university, for the Digital and logic Design Lab
Course

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THANK YOU