GPS-based Smart Weather System

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Embedded System Design

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Certificate

This is to certify that the Project titled "GPS-based Smart Weather System" is a bonafide work carried out by Ms. Keerthi S bearing Reg. No. RSAGWPESD08 and Ms. Nidhi V J bearing Reg. No. RSAGWPESD14 in partial fulfilment of requirements of the award of the Certificate for the Program Embedded System Design of Ramaiah Skill Academy.

January 2025

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Declaration

GPS-based Smart Weather System

The project work is submitted in partial fulfilment of the training requirements for the award of the Certificate for having completed the training program in Embedded System Design at Ramaiah Skill Academy from October 16th 2024 to January 30th 2025. The project report submitted herewith is a result of our own work and in conformance with the guidelines of Ramaiah Skill Academy.

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Summary

The project focuses on developing a Smart Weather Station with GPS Integration to monitor real-time environmental conditions such as temperature, humidity, atmospheric pressure, and rainfall. The inclusion of GPS allows for precise location-based data collection. This project was chosen due to the increasing importance of IoT in environmental monitoring and its potential applications in agriculture, smart cities, and personal weather tracking. The motivation was to create a portable and efficient system to address localized weather monitoring needs.

The scope of this project extends beyond simple data collection to include real-time data display on an I2C LCD and Bluetooth-based wireless transmission for remote monitoring. The system is designed to collect long-term data, enabling future integration with machine learning algorithms for predictive analytics. The project utilized Arduino as the microcontroller platform, integrating DHT11, BMP280, rain sensors, GPS modules, and the TinyGPS++ library for efficient sensor interfacing and data processing.

This project successfully demonstrates the integration of IoT components to deliver a portable weather monitoring solution. Key highlights include accurate environmental data acquisition, seamless location tracking, and wireless data sharing. It also establishes a foundation for predictive weather systems using machine learning. The project showcases the potential of smart technologies in solving real-world problems, offering scalability for future enhancements like solar power, cloud storage, and advanced analytics.

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Nomenclature

P	Pressure (hPa)
H	Humidity (%)
t	Temperature (^oC)

Abbreviation and Acronyms

IOT	Internet of things
GPS	Global Positioning System
hPa	Hectopascals
LCD	Liquid Crystal Display
IDE	Integrated Development Environment
DHT11	Digital Humidity and Temperature Sensor
BMP280	Barometric Pressure and Temperature Sensor

CHAPTER 1

INTRODUCTION

Fig 1.1 Smart weather station

The Smart Weather Station with GPS Integration is an innovative system designed to monitor and analyze environmental conditions in real-time. By combining modern sensor technology with IoT capabilities, this project provides accurate measurements of temperature, humidity, atmospheric pressure, and rainfall while also tracking the exact location using GPS. With the growing demand for personalized weather insights, this system caters to a wide range of applications, including agriculture, disaster management, and smart cities.

The motivation for this project stems from the need for accessible, portable, and cost-effective weather monitoring systems. Traditional weather stations are often fixed, expensive, and limited to specific areas, making them unsuitable for small-scale or localized monitoring. By integrating compact sensors with GPS and Bluetooth, the Smart Weather Station bridges this gap and delivers real-time data tailored to the user's location. This portability and precision make it ideal for individual and small-scale users.

The project employs cutting-edge IoT components like the DHT11 for temperature and humidity, the BMP280 for pressure, a rain sensor for precipitation detection, and a GPS module for location tracking. All collected data is displayed on an I2C LCD for on-site viewing and transmitted via Bluetooth for remote access. This integration of hardware and wireless communication ensures that the system is not only reliable but also user-friendly.

This system also lays the groundwork for future advancements in weather monitoring. The data collected can be used to analyze trends and predict weather patterns using machine learning algorithms. Furthermore, the project's modular design allows for the addition of features like solar-powered operation and cloud storage, making it scalable and adaptable to evolving user requirements. The Smart Weather Station thus represents a significant step towards leveraging IoT for environmental monitoring and real-world problem-solving.

CHAPTER 2

LITERATURE SURVEY

The advent of the Internet of Things (IoT) has revolutionized environmental monitoring by enabling smart and efficient weather systems. A GPS-based Smart Weather System leverages IoT technologies, GPS modules, and sensors to provide real-time, location-specific weather data. The following survey summarizes relevant literature that supports the design and development of such a system.

1. **IoT-Based Weather Prediction Systems** Sadhukhan et al. (2021) [1] proposed an intelligent weather prediction system utilizing IoT-enabled devices to collect and analyze environmental data. Their system highlights the integration of various sensors and advanced algorithms to forecast weather conditions effectively. This research underscores the role of IoT in real-time data acquisition, which is critical for GPS-based applications.
2. **Environmental Monitoring and Alerts** Zeeshan et al. (2020) [2] introduced a wireless sensor network for environmental monitoring, emphasizing real-time data processing and alert systems. Their work demonstrates how IoT-based solutions can enhance responsiveness to changing environmental conditions, which is crucial for the development of smart weather systems.
3. **Weather Monitoring in Agriculture** Utama et al. (2019) [3] designed a weather monitoring system with soil humidity sensors for agricultural applications. The study highlights the importance of integrating IoT with environmental sensors to provide location-specific data, emphasizing its relevance to precision agriculture and GPS-based systems.
4. **Geoalert: IoT-Based Weather Stations** The Geoalert system (2024) [4] employs IoT for weather monitoring and alert generation. The research explores the use of cloud platforms for data storage and analysis, a feature that can be adapted for GPS-based weather monitoring systems to enhance scalability and data accessibility.
5. **Automatic Environmental Monitoring** Bhardwaj et al. (2024) [5] proposed an IoT-integrated automatic environmental monitoring system, focusing on real-time data

collection and remote access. This work provides insights into the design of user-friendly interfaces and data visualization techniques, which are essential for smart weather systems.

6. **Satellite-Based Weather Information Retrieval** Yahya et al. (2008) [6] explored the potential of continuous satellite networks for retrieving weather data. This research emphasizes the accuracy and reliability of satellite-based systems, which can be integrated with GPS modules for enhanced weather monitoring.
7. **LBS-Based Context-Aware Platforms** Song and Kim (2011) [7] investigated location-based services (LBS) for weather information systems. Their platform integrates GPS and contextual data, offering valuable insights for designing a smart weather system with location-specific capabilities.
8. **Air Quality and Weather Monitoring** Bibi and Khan (2023) [8] developed an IoT-based weather and air quality monitoring station. The study focuses on integrating air quality sensors with weather monitoring, showcasing how a comprehensive system can be achieved for real-time environmental analysis.
9. **Cloud-Powered Weather Stations** Firdhous and Sudantha (2020) [9] proposed a cloud and IoT-powered weather station for microclimate monitoring. Their work illustrates the benefits of cloud computing for data storage and remote access, which are integral to smart weather systems.
10. **Water Level and Flow Detection** Mamat et al. (2022) [10] designed a weather station with water level and flow detection capabilities using Arduino. This research highlights the use of microcontrollers and sensors for real-time data collection, which can be adapted for GPS-based systems.

CHAPTER 3

BLOCK DIAGRAM

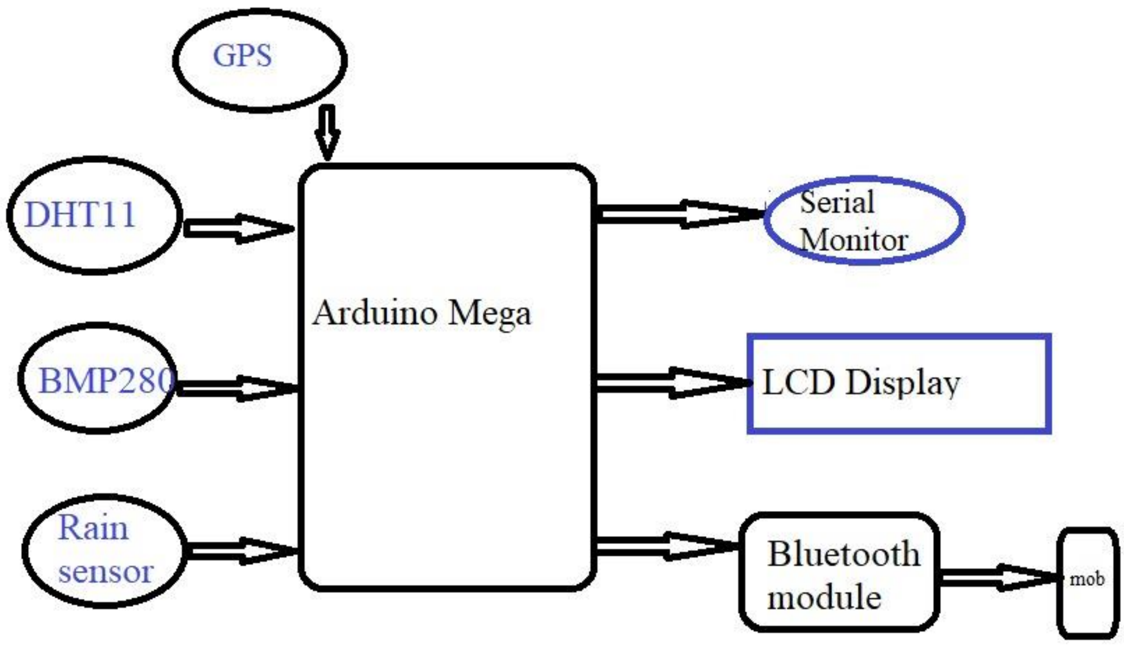


Fig 3.1 Weather Station Block Diagram

Here is a block diagram illustrating the step-by-step process for implementing the Smart Weather Station project. It provides a visual representation of the project's methodology, from start to deployment.

CHAPTER 4

METHODOLOGY

The methodology for the Smart Weather Station with GPS Integration involves a structured approach to designing, developing, and testing the system. The project is divided into several phases to ensure efficient execution:

1. Requirement Analysis: Identify the necessary components, such as sensors (DHT11, BMP280, rain sensor), GPS module, I2C LCD, and Bluetooth module, based on the desired functionality.
2. System Design: Develop a block diagram to outline the interconnections between the microcontroller (Arduino), sensors, and peripheral devices. Ensure compatibility of all components.
3. Hardware Integration: Assemble and connect the components, ensuring proper wiring and pin assignments. Verify the power requirements and signal compatibility of the sensors and modules.
4. Software Development: Write the firmware using Arduino IDE, incorporating libraries for the sensors, GPS module (TinyGPS++), and I2C LCD. Implement data acquisition, processing, and communication protocols.
5. Testing and Calibration: Test individual sensors and modules to verify functionality. Calibrate sensors for accurate readings and troubleshoot any hardware or software issues.
6. Deployment: Combine all components into a cohesive system, enabling real-time monitoring, location tracking, and wireless data transmission.

4.1 Implementation

1. **Hardware Setup**:
   - Connect the DHT11, BMP280, and rain sensor to the Arduino’s digital and analog pins.
   - Wire the GPS module to the Arduino’s RX/TX pins for serial communication.

- Connect the I2C LCD to the Arduino's SDA and SCL pins.
    - Ensure proper power supply (3.3V or 5V) for each component.
2. **Software Development**:
    - Use Arduino libraries such as Adafruit_Sensor, Adafruit_BMP280, DHT, and TinyGPS++ for sensor and GPS integration.
    - Program the microcontroller to read sensor data, process GPS coordinates, and display the results on the LCD.
    - Implement Bluetooth communication to transmit weather data to remote devices for real-time monitoring.
3. **Data Processing and Display**:
    - Acquire sensor data and GPS coordinates in regular intervals.
    - Format the data for easy interpretation and display it on the I2C LCD in real-time.
4. **Wireless Communication**:
    - Pair the Bluetooth module with a smartphone or computer to send weather data wirelessly.
5. **Testing and Validation**:
    - Test the system in various environments to validate its performance and accuracy.
    - Make adjustments to improve reliability and optimize power consumption.

By following this methodology and implementation plan, the Smart Weather Station is developed as a fully functional system for monitoring real-time weather conditions and GPS-based location tracking.

4.2 Hardware Requirements:

Arduino MEGA 2650 Board: The Arduino Mega 2560 is a microcontroller board based on the ATmega2560, offering 54 digital I/O pins (15 PWM), 16 analog inputs, and multiple communication protocols (4 UARTs, I2C, SPI). It features 256 KB flash memory, 8 KB SRAM, 4 KB EEPROM, and operates at 16 MHz. With a 5V operating voltage and support for 7-12V input, it is ideal for complex projects like robotics and IoT, requiring high pin counts and advanced functionality.

Fig 4.2.1 ARDUINO MEGA 2560 Microcontroller Board

BMP280 sensor:

Fig 4.2.2 BMP280

The BMP280 sensor is an advanced barometric pressure sensor used for weather monitoring and altitude detection. The hardware setup involves connecting the BMP280 to a microcontroller, such as an Arduino, via the I2C communication protocol. The sensor's VCC pin is connected to a 3.3V power source, while the GND pin is connected to the ground. The SCL and SDA pins of the sensor are linked to the respective I2C pins of the microcontroller. Pull-up resistors may be required for stable communication. Once connected, the BMP280 communicates precise pressure and temperature readings, which can be processed for various applications, including altitude estimation and weather analysis.

DHT11 Sensor: The DHT11 sensor is a cost-effective digital sensor used to measure **temperature** and **humidity**, making it widely popular in embedded systems and IoT applications. It consists of a capacitive humidity sensor and a thermistor for temperature measurement, coupled with an integrated IC that processes the signals and outputs a digital data stream. The temperature measurement range is from **0°C to 50°C**

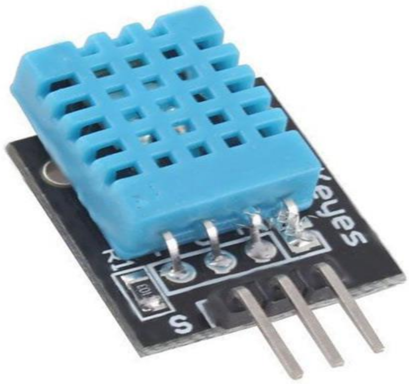
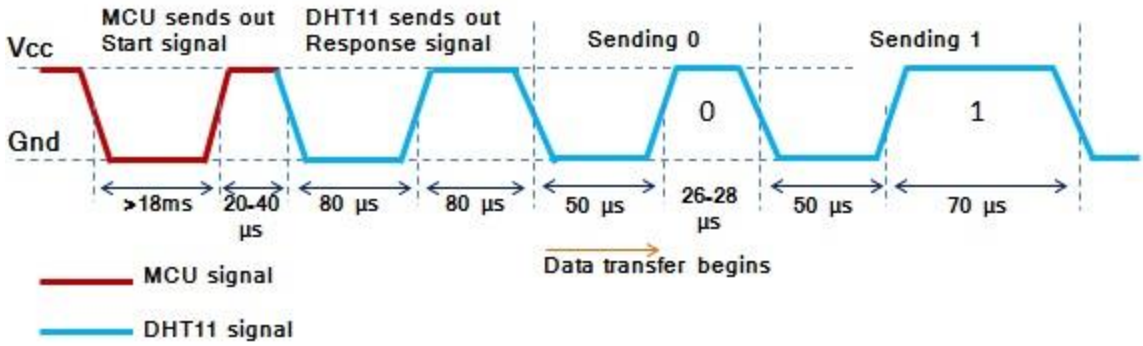


Fig 4.2.3 DHT11 Sensor



with an accuracy of ±2°C, while the humidity range is **20% to 90%** with an accuracy of ±5%. The sensor operates on a voltage supply of **3.3V to 5.5V** and has a sampling rate of **1 Hz** (one reading per second).

Communication with the DHT11 is established using a **single-wire protocol**, which requires minimal GPIO pins for interfacing. The microcontroller initiates communication by sending a start signal, and the sensor responds with a 40-bit data packet containing the integer and decimal parts of humidity and temperature values, along with an 8-bit checksum for data validation. The sensor is compact and easy to use, requiring a pull-up resistor on the data pin for stable communication.

Rain Sensor: The rain sensor is a simple yet effective tool for detecting the presence of rain, often used in weather monitoring systems. It consists of a rain-sensing plate and a control module. The sensing plate detects rain through the conductivity of water, generating signals based on the amount of rainfall. The control module processes these signals and provides a digital or analog output to the microcontroller. In the hardware setup, the sensor’s VCC is connected to a 5V power source, GND to ground, and . Fig 4.2.4 Rain sensor both the digital or analog output to an input pin of the microcontroller. This sensor is ideal for determining rainfall intensity or triggering automated systems like closing windows or alerts during rain.

GPS NEO-6M 0 001: The GPS NEO-6M 0-001 module is a reliable and compact GPS receiver used to obtain real-time latitude, longitude, and other location data. The hardware setup involves connecting the module to a microcontroller, such as an Arduino, via UART communication. The VCC pin is connected to a 3.3V or 5V power source, while the GND pin is connected to ground. The TX (transmit) pin of the GPS module is connected to the RX (receive) pin of the microcontroller, and the RX pin of the module is connected to the TX pin of the microcontroller. An external active antenna can also be connected to enhance signal reception. Once powered and connected, the GPS module communicates with satellites to provide accurate location data for navigation, weather systems, or IoT applications.

Fig 4.2.5 GPS NEO 6M 0 001

LCD: An LCD **(Liquid Crystal Display)** is used in this project to display the measured distance, providing a clear visual output. It typically operates with a microcontroller via GPIO pins, requiring control signals like RS (Register Select), RW (Read/Write), and E (Enable) along with data lines. For this project, a 16x2 LCD is commonly used, capable of displaying two lines with 16 characters each. The LCD is interfaced using register-level programming to send commands.

Fig 4.2.6 LCD

(e.g., initialization, cursor position) and data (distance values). Proper timing delays and configuration are critical for its seamless operation.

HC-06 Bluetooth : The HC-06 Bluetooth module is a widely used wireless communication device that enables data exchange between a microcontroller and a Bluetooth-enabled device, such as a smartphone. The hardware setup involves connecting the HC-06 module to the microcontroller using UART communication. The VCC pin is connected to a 3.3V or 5V power source (depending on the module version), and the GND pin is connected to ground. The TX (transmit) pin of the module is connected to the RX (receive) pin of the microcontroller, and the RX pin of the module is connected to the TX pin of the microcontroller, often through a voltage divider if the microcontroller operates at 5V logic. Once connected and paired with a device, the module allows seamless wireless data transmission, making it ideal for controlling or monitoring devices via mobile applications.

Fig 4.2.7 HC 06 Bluetooth

Bread Board: A breadboard was utilized in this project as a versatile and reusable platform for building the circuit without soldering. It served as an essential tool for testing and prototyping the connections between the Temperature sensor, Vibration Sensor, LCD, and microcontroller. The breadboard allowed easy placement and modification of components, ensuring a quick setup and seamless debugging process.

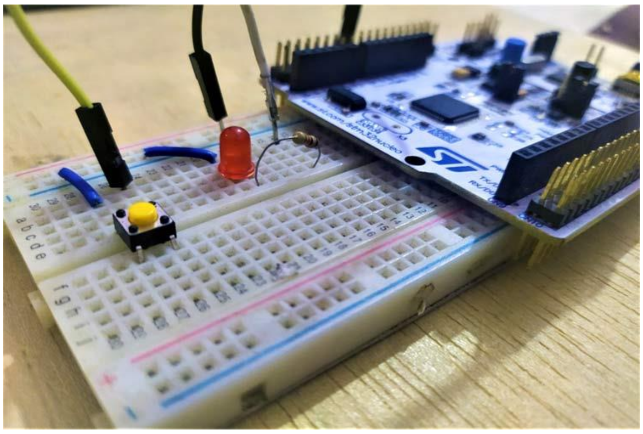


Fig 4.2.8 Bread Board

Jumper wires: Jumper wires are a vital component in this project, used to create temporary, flexible connections between the microcontroller, Temperature Sensor, LCD, and other components on a breadboard. These insulated wires are available in three types—male-to-male, male-to-female, and female-to-female—allowing seamless connection between headers, pins, and bread board.

Fig 4.2.9 Jumper wires

4.3 Software Requirements:

Arduino IDE: Arduino IDE is an open-source software platform used for writing, compiling, and uploading code to Arduino microcontrollers. It provides a simple and user-friendly interface with support for multiple programming languages, primarily C and C++. The software includes a built-in code editor, a serial monitor for debugging, and a vast library collection to interface with various sensors and modules. It is compatible with Windows, macOS, and Linux, allowing easy integration with hardware. The IDE supports board management, making it suitable for multiple microcontroller platforms. Additionally, it provides an extensive online community and resources, making development and troubleshooting efficient for both beginners and advanced users.

Fig 4.2.10 Arduino IDE

Serial Bluetooth Terminal: Serial Bluetooth Terminal is an Android application used for wireless communication between a microcontroller and a Bluetooth-enabled device. It allows users to send and receive data via Bluetooth modules like HC-06, enabling real-time monitoring and control of embedded systems. The software features a user-friendly interface, customizable baud rates, and data logging capabilities. It supports various communication protocols, including ASCII and hexadecimal formats. This application is essential for debugging, testing, and wirelessly interfacing microcontrollers in IoT, automation, and sensor-based projects.

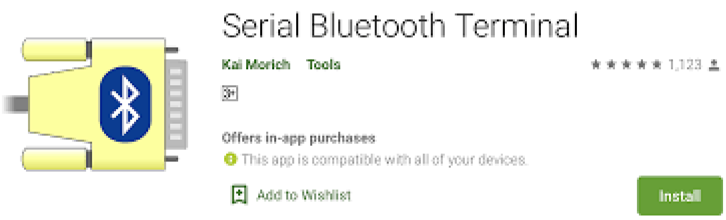


Fig 4.2.11 Serial Bluetooth Terminal

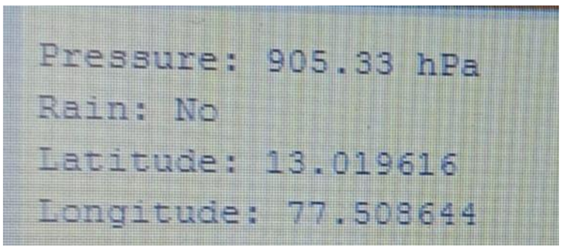
CHAPTER 5

RESULTS AND DISCUSSION

The GPS-based smart weather station successfully collects and transmits real-time weather data, demonstrating its utility in monitoring environmental conditions accurately. The integration of GPS ensures that the weather data is tagged with precise location information, allowing for localized weather monitoring. Sensors such as temperature, humidity, and pressure modules provide accurate and consistent readings, which are displayed on an LCD screen and can also be transmitted to a connected mobile device via Bluetooth for remote access.

Detailed Working

The system operates by continuously reading environmental data through connected sensors. These sensors include a DHT11/DHT22 for temperature and humidity, a BMP180 for barometric pressure, and a GPS module for location data. The Arduino Mega 2560 serves as the central controller, processing the sensor inputs and formatting the data for output. Once the data is processed, it is displayed on an LCD in real-time for local monitoring. Simultaneously, the GPS module provides longitude and latitude coordinates, which are appended to the sensor data for geo-referencing.



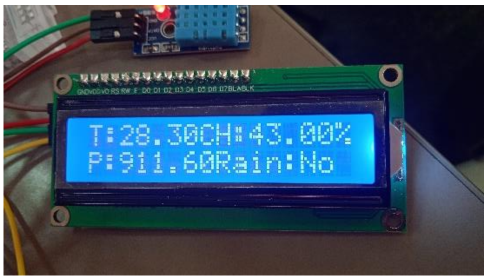


Fig 5.1 and Fig 5.2 Data obtained on serial monitor and I2C LCD respectively

For remote applications, the system employs a Bluetooth module (such as HC-05) to transmit the data to a nearby mobile device. This feature allows users to monitor weather parameters on their smartphones or tablets within the Bluetooth range. Additionally, the inclusion of an SD card module ensures data logging, enabling historical analysis of weather trends for the specific location. The modular design of the system ensures scalability, allowing for the addition of sensors like a rain gauge or air quality monitor for extended functionality.

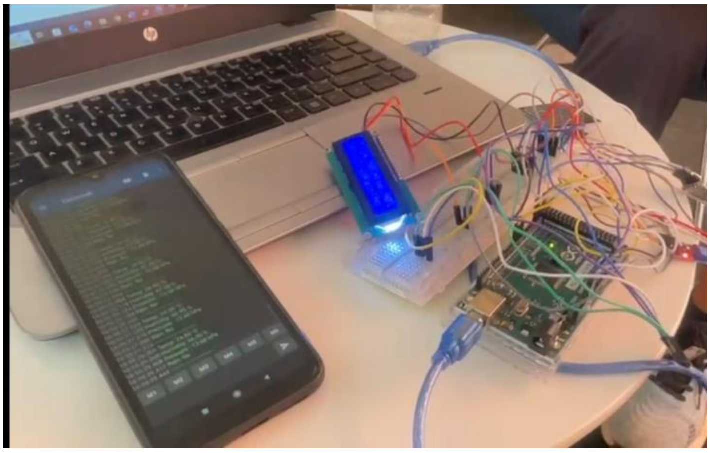


Fig 5.3 Readings from sensors obtained on Bluetooth connected device

This project highlights the potential for using Bluetooth technology in IoT-enabled weather monitoring, offering a cost-effective and localized solution for real-time environmental data tracking.

CHAPTER 6

CONCLUSION

The GPS-based smart weather station has significant potential for future development and scalability. By integrating advanced sensors and IoT capabilities, the system can expand its application in various industries, including precision agriculture, disaster management, and environmental monitoring. Future enhancements could include the addition of air quality sensors, UV index measurement, and rainfall detectors, further increasing its utility in tracking climate changes and environmental patterns. The incorporation of machine learning algorithms could enable predictive analysis, providing insights into weather trends and early warnings for extreme conditions.

Furthermore, integrating the weather station with cloud-based platforms and mobile applications would allow real-time data sharing and remote accessibility, broadening its reach to users worldwide. Solar-powered or energy-efficient designs can make the system sustainable for deployment in remote and off-grid locations. With advancements in communication technologies, such as 5G, data transmission can become faster and more reliable, enhancing the performance of the system. These future improvements will position the GPS-based smart weather station as a versatile and robust solution for addressing global weather and environmental challenges.

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APPENDIX

(1) Temperature Sensor [DHT11]

Specifications

Item	Measurement Range	Humidity Accuracy	Temperature Accuracy	Resolution	Package
DHT11	20-90%RH 0-50 ℃	±5%RH	±2℃	1	4 Pin Single Row

Parameters	Conditions	Minimum	Typical	Maximum
Humidity				
Resolution		1%RH	1%RH	1%RH
			8 Bit	
Repeatability			±1%RH	
Accuracy	25℃		±4%RH	
	0-50℃			±5%RH
Interchangeability	Fully Interchangeable			
Measurement Range	0℃	30%RH		90%RH
	25℃	20%RH		90%RH
	50℃	20%RH		80%RH
Response Time (Seconds)	1/e(63%)25℃, 1m/s Air	6 S	10 S	15 S
Hysteresis			±1%RH	
Long-Term Stability	Typical		±1%RH/year	
Temperature				
Resolution		1℃	1℃	1℃
		8 Bit	8 Bit	8 Bit
Repeatability			±1℃	
Accuracy		±1℃		±2℃
Measurement Range		0℃		50℃
Response Time (Seconds)	1/e(63%)	6 S		30 S

Item	Condition	Min	Typical	Max	Unit
Power supply	DC	3	5	5.5	V
Current supply	Measuring	0.5		2.5	mA
	Stand-by	100	Null	150	uA
	Average	0.2	Null	1	mA

(2) Pressure Sensor [BMP280]

BMP280

DIGITAL PRESSURE SENSOR

Key parameters

• Pressure range	300 … 1100 hPa (equiv. to +9000…-500 m above/below sea level)
• Package	8-pin LGA metal-lid Footprint : 2.0 × 2.5 mm², height: 0.95 mm
• Relative accuracy (950 … 1050hPa @25°C)	±0.12 hPa, equiv. to ±1 m
• Absolute accuracy (950 …1050 hPa, 0 …+40 °C)	typ. ±1 hPa
• Temperature coefficient offset (25 … 40°C @900hPa)	1.5 Pa/K, equiv. to 12.6 cm/K
• Digital interfaces	I²C (up to 3.4 MHz) SPI (3 and 4 wire, up to 10 MHz)
• Current consumption	2.7µA @ 1 Hz sampling rate
• Temperature range	-40 … +85 °C
• RoHS compliant, halogen-free	
• MSL 1	

Typical applications

- Enhancement of GPS navigation
  (e.g. time-to-first-fix improvement, dead-reckoning, slope detection)
- Indoor navigation (floor detection, elevator detection)
- Outdoor navigation, leisure and sports applications
- Weather forecast
- Health care applications (e.g. spirometry)
- Vertical velocity indication (e.g. rise/sink speed)

Target devices

- Handsets such as mobile phones, tablet PCs, GPS devices
- Navigation systems
- Portable health care devices
- Home weather stations
- Flying toys
- Watches

(3) Rain Sensor

Specifications:

- Adopts high quality of RF-04 double sided material.
- Area: 5cm x 4cm nickel plate on side,
- Anti-oxidation, anti-conductivity, with long use time;
- Comparator output signal clean waveform is good, driving ability, over 15mA;
- Potentiometer adjust the sensitivity;
- Working voltage 5V;
- Output format: Digital switching output (0 and 1) and analog voltage output AO;
- With bolt holes for easy installation;
- Small board PCB size: 3.2cm x 1.4cm;
- Uses a wide voltage LM393 comparator

Pin Configuration:

1. VCC: 5V DC
2. GND: ground
3. DO: high/low output
4. AO: analog output

(4) Bluetooth [HC-06]

Specifications:

- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation ,1.8 to 3.6V I/O
- PIO control
- UART interface with programmable baud rate
- With integrated antenna
- With edge connector

Software features:

- Default Baud rate: 38400, Data bits:8, Stop bit:1,Parity:No parity, Data control: has. Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.
- Given a rising pulse in PIO0, device will be disconnected.
- Status instruction port PIO1: low-disconnected, high-connected;
- PIO10 and PIO11 can be connected to red and blue led separately.
- When master and slave are paired, red and blue led blinks 1time/2s in interval, while disconnected only blue led blinks 2times/s.
- Auto-connect to the last device on power as default.
- Permit pairing device to connect as default.
- Auto-pairing PINCODE:”0000” as default
- Auto-reconnect in 30 min when disconnected as a result of beyond the range of connection.

(5) GPS [Neo 6m-0-001]

Receiver performance data

Receiver type	50-channel u-blox 6 engine GPS L1 C/A code SBAS: WAAS, EGNOS, MSAS		
Navigation update rate	up to 5 Hz		
Accuracy[1]	Position SBAS	2.5 m CEP 2.0 m CEP	
Acquisition[1]		NEO-6G/Q	NEO-6M
	Cold starts: Aided starts[2]: Hot starts:	26 s 1 s 1 s	27 s < 3 s 1 s
Sensitivity[3]		NEO-6G/Q	NEO-6M
	Tracking: Cold starts: Hot starts:	–162 dBm –148 dBm –157 dBm	–161 dBm –147 dBm –156 dBm

[1] All SV @ –130 dBm
[2] Dependent on aiding data connection speed and latency
[3] Demonstrated with a good active antenna

Electrical data

Power supply	2.7 V – 3.6 V (NEO-6Q/6M) 1.75 V – 2.0 V (NEO-6G)
Power consumption	111 mW @ 3.0 V (continuous) 33 mW @ 3.0 V Power Save Mode (1 Hz) 68 mW @ 1.8 V (continuous) 22 mW @ 1.8 V Power Save Mode (1 Hz)
Backup power	1.4 V – 3.6 V, 22 µA
Supported antennas	Active and passive

Interfaces

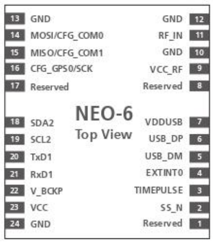
Serial interfaces	1 UART 1 USB V2.0 full speed 12 Mbit/s 1 DDC (I²C compliant) 1 SPI	
Digital I/O	Configurable timepulse 1 EXTINT input for Wakeup	
Serial and I/O	Voltages	2.7 – 3.6 V (NEO-6Q/6M) 1.75 – 2.0 V (NEO-6G)
Timepulse	Configurable	0.25 Hz to 1 kHz
Protocols	NMEA, UBX binary, RTCM	

Specification applies to FW 7

Package

24 pin LCC (Leadless Chip Carrier): 12.2 x 16.0 x 2.4 mm, 1.6 g

Pinout



Environmental data, quality & reliability

Operating temp.	–40° C to 85° C
Storage temp.	–40° C to 85° C

RoHS compliant (lead-free)

Qualification according to ISO 16750

Manufactured in ISO/TS 16949 certified production sites

Support products

u-blox 6 Evaluation Kits:

Easy-to-use kits to get familiar with u-blox 6 positioning technology, evaluate functionality, and visualize GPS performance.

EVK-6H:	u-blox 6 Evaluation Kit with TCXO, suitable for NEO-6G, NEO-6Q
EVK-6P:	u-blox 6 Evaluation Kit with crystal, suitable for NEO-6M

Ordering information

NEO-6G-0	u-blox 6 GPS Module, 1.8V, TCXO, 12x16mm, 250 pcs/reel
NEO-6M-0	u-blox 6 GPS Module, 12x16mm, 250 pcs/reel
NEO-6Q-0	u-blox 6 GPS Module, TCXO, 12x16mm, 250 pcs/reel

Available as samples and tape on reel (250 pieces)

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