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| **المملكة العربية السعودية**  **وزارة التعليم العالي**  **جامعة الملك فيصل**  **كلية علوم الحاسب وتقنية المعلومات** | A logo of a university  Description automatically generated | **KINGDOM OF SAUDI ARABIA**  **Ministry of Higher Education**  **King Faisal University**  **College of Computer Sciences & Information Technology** |

**Arduino-based Wireless Weather Station**

**Mobile and Wireless Networks**

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* **Introduction:**

think about As you are engineer at STC, you have been entrusted with the development project aimed at Benefit mobile and wireless technology. One of them Areas of interest in creating an Arduino based wireless weather station. Our project is designed to take real-time weather data using advanced sensors that project this information over the STC wireless network. The aim is to provide accurate, including climate monitoring.

* **Project Overview:**

In this project, we learn how to make a LoRa-based wireless weather station using an Arduino Pro Mini and an ESP32 Wi-Fi module. You can use sensors like the BME280 barometric pressure sensor along with a BH1750 light sensor and a rain sensor. Basically, this weather station can monitor environmental parameters like temperature, humidity, pressure, altitude, dew point, rainfall, and light intensity.

* **System Components:**

Hardware Components:

1. ESP32 Module

Model: ESP32 ESP-32S Development Board

1. Arduino Pro Mini

Model: Arduino Pro Mini 3.3V, 8MHz

1. LoRa Module

Model: Ra-02 SX1278

1. Sensors: Temperature, Humidity, and Pressure Sensor

Model: BME280

1. Light Sensor:

Model: BH1750

1. Rain Sensor:

Model: FC-37 Analog/Digital Rain Sensor

1. Power Supply: Battery.

* **Implementation :**

Sensor Connection: use SPI or I2C communication to link the ESP32 and BME280 sensor.

utilizing I2C connection, bind the BH1750 to ESP32.

Link the ESP32s analog or digital input to the FC-37 rain sensor.

Connect the Ra-02 SX1278 module to the ESP32 in order to configure the Lora module.

Set up the Lora parameters.

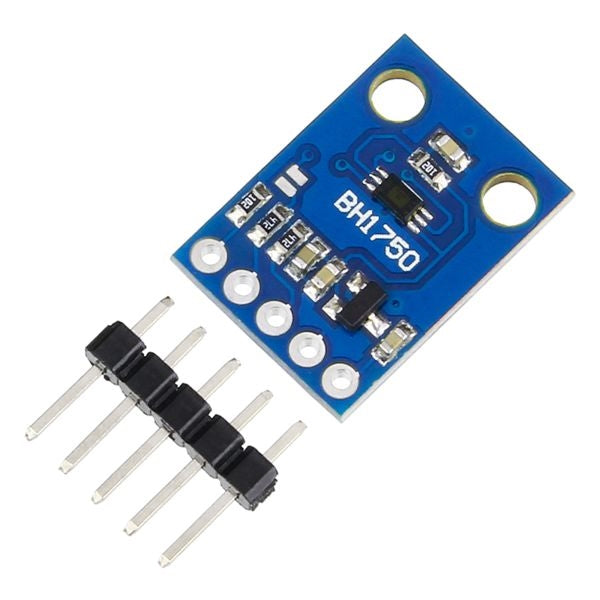
Setting Up the Power Supply: Attach the 3.7v Lithium ion battery to the ESP32.

Making sure there is enough power in the battery.

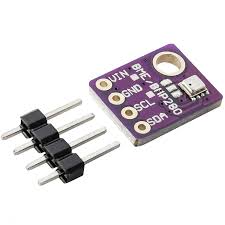
Software Setup:

Coding: writing a Arduino sketch to initialize sensors, read data, and send it to the LoRa module, Include error handling for sensor failures.

* Some figures for components;

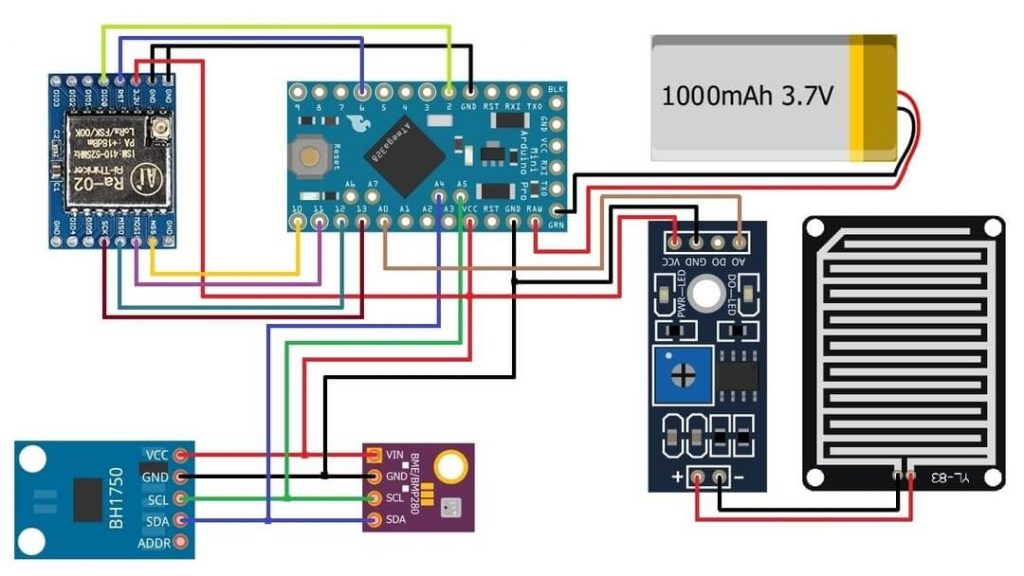
 

BH1750 Arduino Pro Mini

LoRa Module Sensors: BME280

* **Design :**



* **Conclusion:**

Finally, the Arduino-based wireless weather station with ESP32 and LoRa is a versatile and auxiliary system for monitoring environmental conditions. Its long-range communication capabilities and variety of sensors make it suitable for remote applications. Ensures proper setup, calibration, and integration with data visualization tools to produce reliable and useful weather data reports.

* **References:**
* STC Wireless Network Specifications. (2023). STC Technical Documentation.
* https://iotprojectsideas.com/lora-based-wireless-weather-station-using-arduino-esp32/