# Weather Monitoring IoT System

## Weather Monitoring System

The IoT Based Weather Monitoring System uses the following electronic sensors : **DHT11, MQ-135, LDR and rain sensor** to collect and report weather information to the ***Arduino Nano IoT 33 microcontroller***.

Current temperature, humidity, air quality, light intensity and rain conditions data from sensors being uploaded to the Arduino IoT Cloud, for monitoring and analysis.

This project uses Arduino Nano IoT 33 microcontroller to build an Internet of Things based weather monitor system that can report the current rain conditions, temperature, humidity, air quality, light intensity, in the area in real time, with data from sensors being uploaded to an IoT cloud service, Arduino IoT Cloud, for monitoring and analysis.

In many aspects, IoT-based weather monitoring technology has already surpassed the features and capabilities of traditional systems since it has grown swiftly. The use of technology in remote monitoring and advanced analytics is transforming numerous industries and providing a number of advantages.

Monitoring and observing various weather conditions has been the focus of weather monitoring innovations. IoT devices assist in measuring a location's physical characteristics and uploading them in real-time to cloud storage, where the data can be promptly examined.

## Components of IoT Based Weather Monitoring System

The components required to design and develop the weather-based monitoring system are:

### Arduino Nano IoT 33 microcontroller

This tiny, sturdy and efficient board features Wi-Fi and Bluetooth connectivity, which, in conjunction with its low power architecture, makes it a practical and cost-effective alternative for connected projects. Arduino Nano33 IoT is completely compatible with the Arduino IoT Cloud and offers full TLS secure transport: the ATECC608A crypto chip holds the cryptographic keys in hardware, providing a very high level of security for goods in this category. Integration with the Arduino IoT Cloud also provides a very quick method for creating online dashboards with minimal coding and minimal effort. The Arduino Nano 33 IoT features an Arm Cortex-M0+ SAMD21 processor, a Wi-Fi and Bluetooth module based on ESP32, a 6 axis Inertial Measurement Unit, and a crypto chip capable of securely storing certificates and pre shared keys.

The Arduino Nano 33 IoT's microcontroller runs at 3.3V, Nano 33 IoT has 14 digital pins and 8 analogue input pins. For 22 digital I/O pins, the analogue in pins can be used for digital in and out. The Nano 33 IoT has a USB port. This implies it can function as a variety of USB devices, including asynchronous serial, keyboard or mouse.

**DHT11 Temperature & Humidity Sensor**

The DHT11 is responsible for reading the temperature and the humidity in the project.

The DHT11 Temperature & Humidity Sensor is a temperature & humidity sensor with a calibrated digital signal output. Utilizing an innovative digital-signal-acquisition technique and temperature & humidity sensor technology, it offers a high level of dependability and an exceptional level of long-term stability. This sensor consists of a resistive-type humidity measurement component and an NTC temperature measurement component, and it links to a high-performance 8-bit microprocessor. It provides superior quality, rapid response, interference resistance, and cost-effectiveness.

**MQ-135 Gas Sensor**

MQ-135 gas sensor will provide the air quality of the surrounding area of the project.

MQ-135 is an analogue air quality sensor that captures ambient air samples and outputs an analogue voltage. MQ-135 is capable of detecting the following gases: Ammonia (NH3), sulfur (S), Benzene (C6H6), CO2, and other harmful gases and smoke.

The operating voltage of the MQ-135 sensor is 5V, and it consumes around 160mA. The sensor has an integrated heater for normal operation, and if the sensor is exposed to strong winds, we may receive inaccurate data.

**Photoresistors or LDR (light-dependent resistors)**

LRD will provide the light intensity readings of its surroundings.

LDR is a passive analogue sensor that collects information about the intensity of light in its surroundings. When light strikes a material, its resistance changes. The resistance of the LDR can vary over many orders of magnitude, with the resistance decreasing as the light level increases.

**Rain Sensor**

The rain sensor will provide rainfall data/precipitation.

The rain sensor is made of two components. The sensing pad acts like a variable resistor whose resistance is indirect proportional to the amount of water that comes in contact. The sensor's output voltage is linked to the resistance; this allows us to tell if rain is falling or not.

In addition to a sensing pad, the sensor comprises an electronic module that connects the sensing pad to the Arduino. The module generates an output voltage based on the resistance of the sensing pad, which is reachable via an Analog Output (AO) pin. The sensor has 4 pins to connect to the microcontroller, AO, DO, GND and VCC and requires between 3.3-5V power.

**Arduino IoT Cloud**

The project will use **Arduino IoT Cloud** application to receive data from sensors for monitoring and analysis. Arduino IoT Cloud facilitates the rapid, simple, and secure construction of connected things by users. Multiple devices can be linked in order for them to exchange real-time data. I can also monitor them remotely using a straightforward user interface. The Arduino IoT Cloud is a web-based platform that facilitates the creation, deployment, and monitoring of IoT projects.