WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

WEATHER STATION FOR HOMES AND OFFICES

Manbir Kaur Brar, Ashish Garg, Lokesh Goutam

Chandigarh Engineering College, Jhanjeri, Mohali
Email Id: (manbirbrar90@gmail.com, agarg0409@gmail.com, lgoutam13@gmail.com)

ABSTRACT

Using an Arduino-based tiny weather station project, you can see the ambient temperature, humidity, pressure, and air quality in your home and use that information to anticipate the weather. This proposed model discussed in the paper may be useful for learning about local weather conditions and short-term changes if meteorology is your area of interest. There are no moving parts in the suggested project because it is solid state designed. This project can be set up inside or partially inside where the circuit will not be exposed to dampness, strong winds, or direct sunshine, which can damage the on-board sensors.

1. INTRODUCTION

The transient conditions of the atmosphere, the layer of air that surrounds the Earth, are referred to as "weather." The atmosphere in our own region of the world is typically how we conceive of weather. However, the way that weather operates is similar to how dropping a pebble in water; the ripples eventually affect water far from the original location. The weather occurs similarly everywhere around the world. Weather hundreds or thousands of kilometres away will eventually be impacted by the weather in your area.

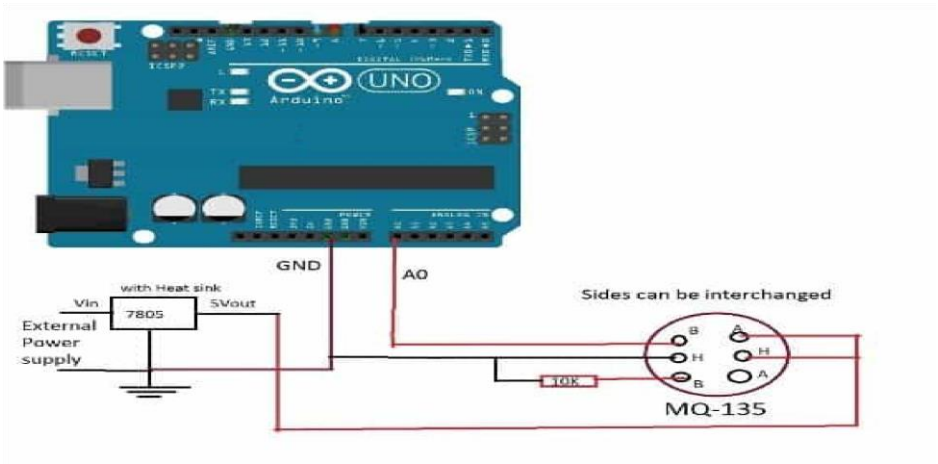
A weather station is a building, on land or at sea, equipped with tools for measuring atmospheric conditions, providing data for forecasts, and researching weather patterns. Temperature, air pressure, humidity, and wind speed are among the observations made.

Hardware description:

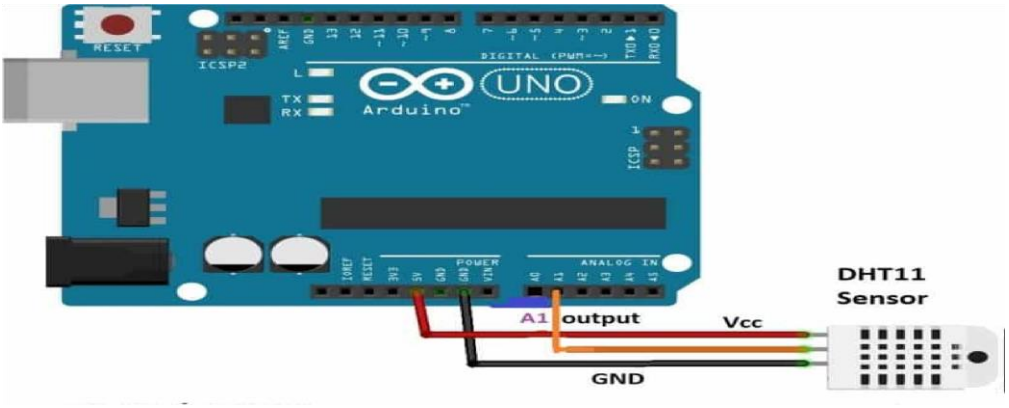
1. **Arduino UNO:** A popular open-source microcontroller board based on the ATmega328P Arduino.cc is the Arduino UNO. The main control system for detecting or warning when an accident happens is the Arduino. It gathers information from the GPRS, GSM, and vibration sensor modules and outputs it either through a message or a display system.

   Here, the vibration sensor is crucial. The vehicle's vibrations will be picked up by this vibration sensor, which doubles as an accident detection system. The GSM module on Arduino is used to transmit the message to the receiver after collecting data from all other modules.

2. **MQ-135 Sensor**: The MQ-135 is a sensor that measures air quality and can identify substances like carbon dioxide, alcohol, benzene, smoking, butane, and propane. We can argue that the air is polluted if the chemical concentration of these gases is excessive. The sensor can determine changes in the air pollution concentration and output the proper voltage level. The output voltage of the sensor is inversely proportional to the level of chemical concentration in the air. The Arduino receives the sensor's voltage variation, and our application has pre-set threshold values. The microcontroller tells us if the air is safe or not when it reaches the threshold level by converting the motion from the accelerometer into an electrical signal. Single crystals make up piezoelectric accelerometers.



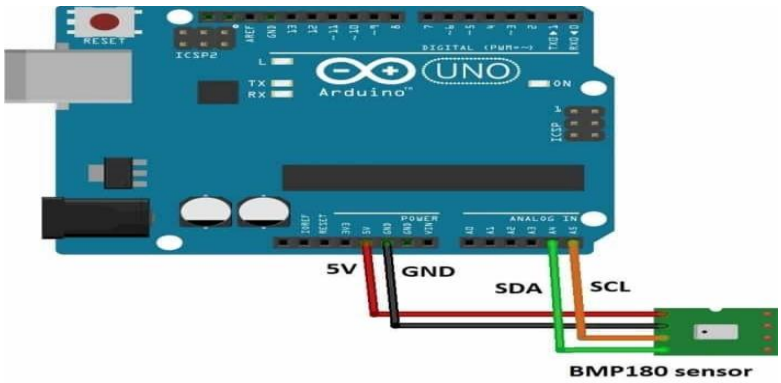
3. **DHT11 Sensor**: Popularly known as a temperature and humidity sensor, DHT11 as its name implies, it can measure the surrounding environment's temperature and humidity. Only three of the device's four pins are really in use. Although it may appear to be a relatively straightforward component, the sensor actually contains a microprocessor that transmits data to the Arduino board in digital form. Every second, it sends 8 bit data to Arduino; in order to decode the signal received, we must include a library intended to handle it in the code.



The sensor to Arduino circuit connection is fairly straightforward. The Arduino's A1 pin is connected to the sensor's output. The Arduino's power supply pins are connected to the supply Vcc and GND.

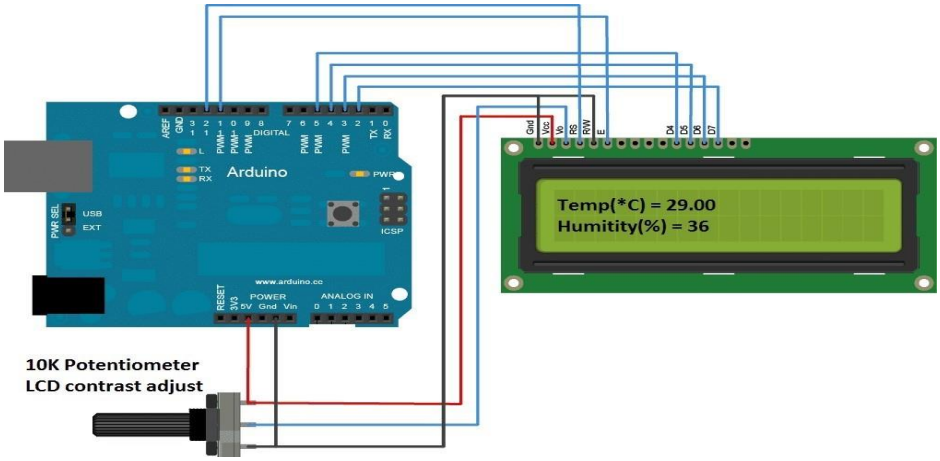
Please check to see if your sensor has a built-in pull-up resistor; if not, connect a 4.7K pull-up resistor to the DHT11 sensor's output pin.

4. **BMP180 sensor**: The BMP180 is a barometer sensor that can gauge temperature, altitude, and atmospheric pressure. Since we have a separate sensor for monitoring the ambient temperature, we ignore the temperature reading from this one. The sensor gauges the setup's height above sea level, making it one of the meteorological parameters.

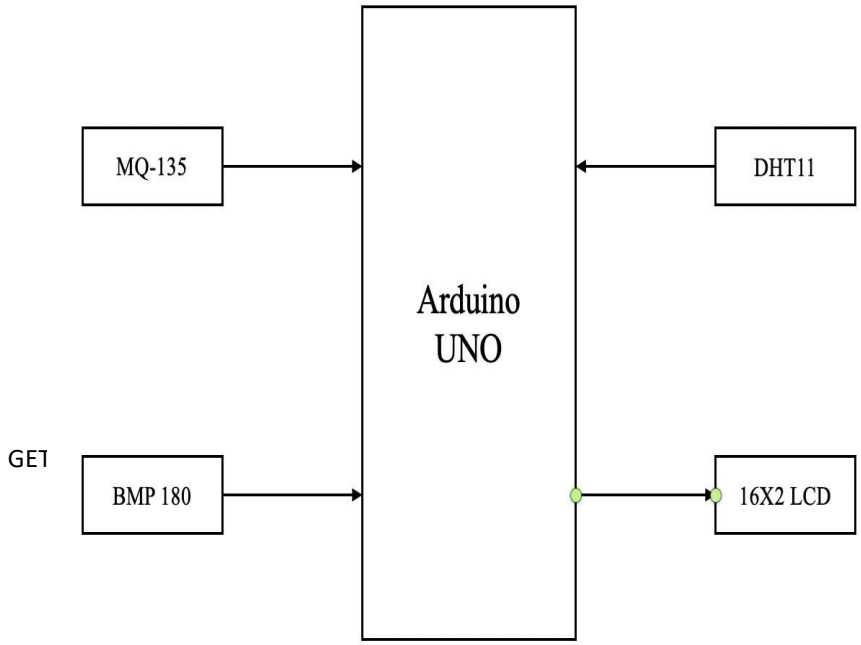


The SDA pin connects to Arduino pin A4 and the SCL pin to Arduino pin A5. It employs the I2C communication protocol. The power supply pins of Arduino are connected to the Vcc and GND.

5. **LCD connection**: All of the sensor data is displayed on the LCD screen. A similar connection may be seen on many other LCD-based projects. The connection between an LCD display and an Arduino is commonplace. To get the best visibility from the LCD display, adjust the 10K potentiometer.



Block Diagram:

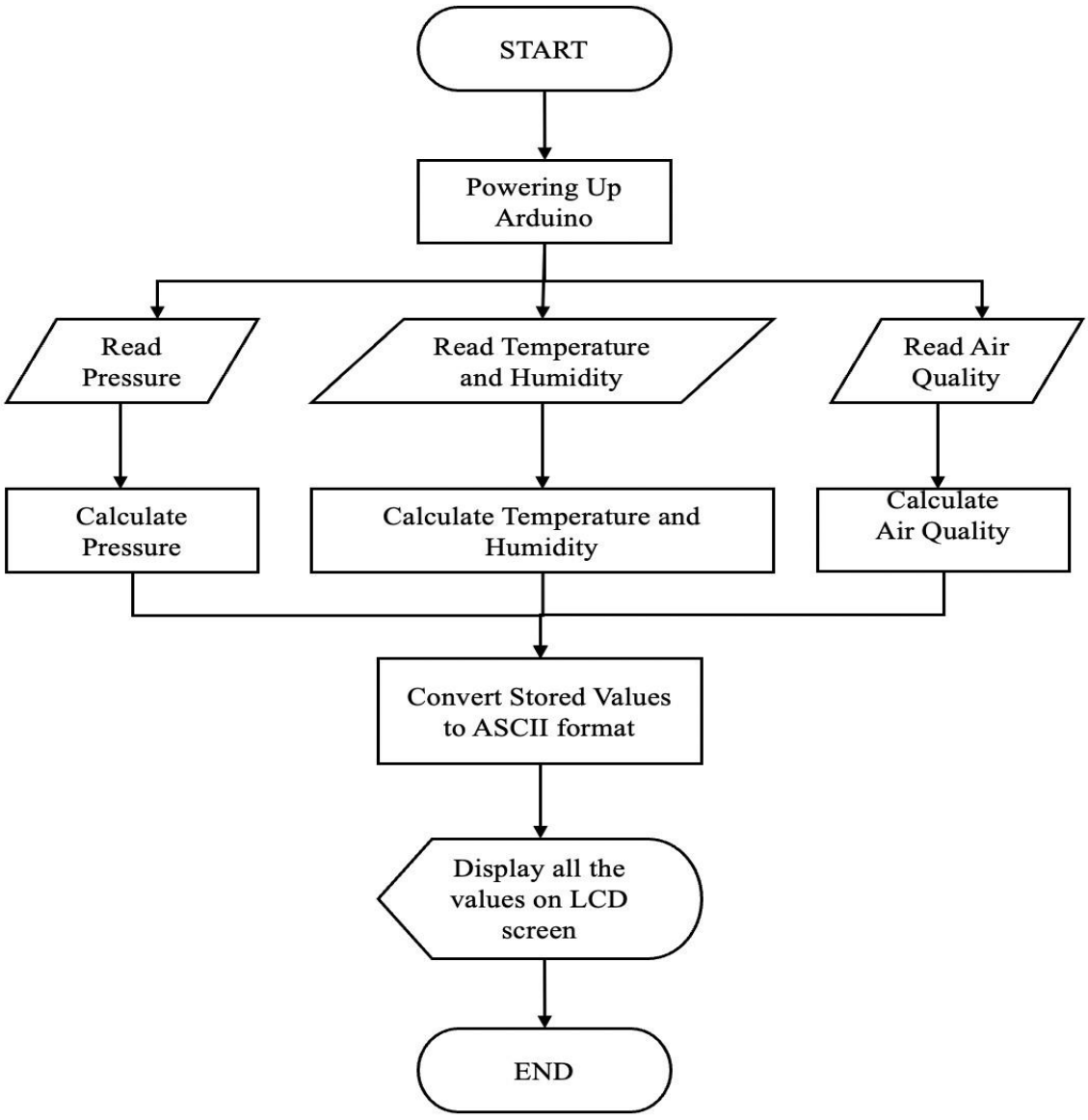


Block Diagram of Weather System

The brain of the proposed model is an Arduino board and the surrounding blocks are digital and analog sensors for acquiring local weather and environment data.

We are utilizing a 16 x 2 LCD display to showcase the sensor data so that we can observe real-time data locally.

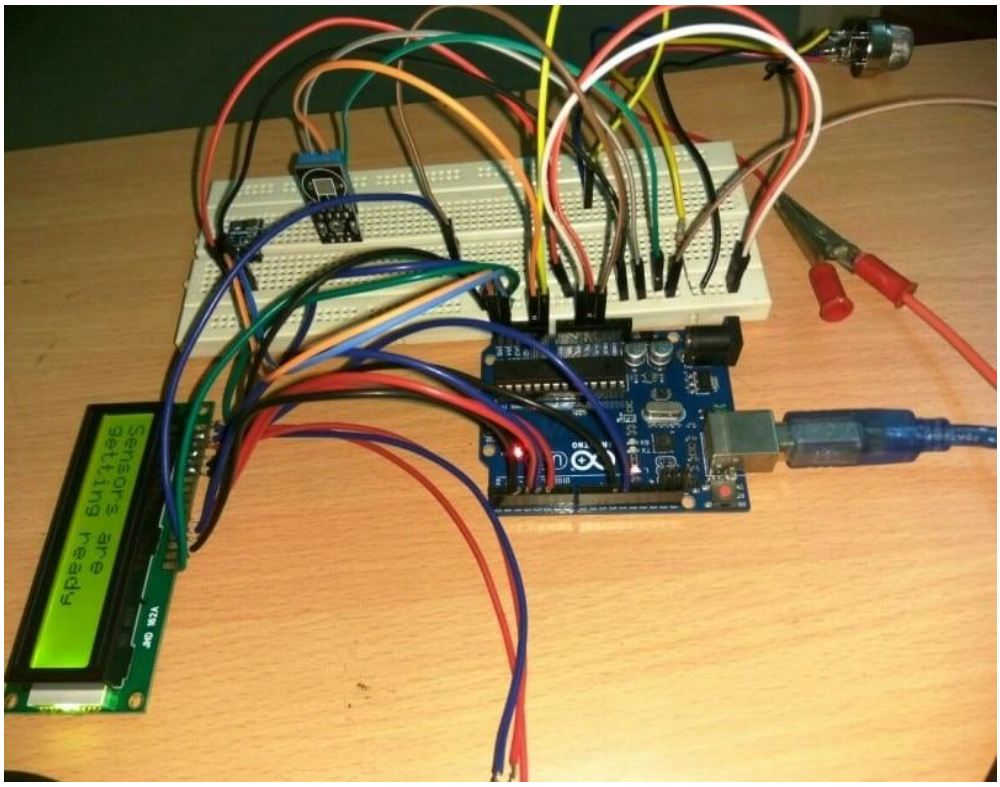
FLOW CHART



The flowchart for the development of the commands that operate the microcontroller is shown in Figure. The tools required to debug and upload the firmware to the microcontroller were provided by the Arduino IDE, which was used to create the firmware.

2. RESULT

We successfully get the desired result like pressure, humidity, temperature etc values but with a small delay than excepted.



Interfacing controller with all other module

3. FUTURE SCOPE

- With the future potential and benefits of IoT-based weather monitoring systems, several businesses can take advantage of the IoT technology, which has advanced across all industries.
- The IoT weather reporting system provides a use case for farmers where they can guarantee greater crop yield and reduce the danger of weather risks.
- The Internet of Things-based weather station is useful for tracking the weather in regions like volcanoes or rain forests. With the dramatic fluctuations in the weather that we are currently seeing, this is extremely crucial.
- The completely automated and effective IoT weather monitoring system uses IoT supporting controllers. With advance planning and notification, you can go anywhere at any time.

REFERENCES

[1] A. Hjort & M. Holmberg, “Measuring mechanical vibrations using an Arduino as a slave I/O to an EPICS control system.FREIA Report” 2015/04.

[2] Texas Instruments, LM35 Precision Centigrade Temperature Sensors.

[3] Digital relative humidity & temperature sensor AM2302/DHT22

[4] Bosch Sensortec. Datasheet BMP280, “ Digital Pressure Sensor.”

[5] Guangzhou HC Information Technology Co., Ltd. Product data sheet, model: HC-06.

[6] LM35 Higher Resolution. http://playground.arduino.cc/Main/ LM35HigherResolution