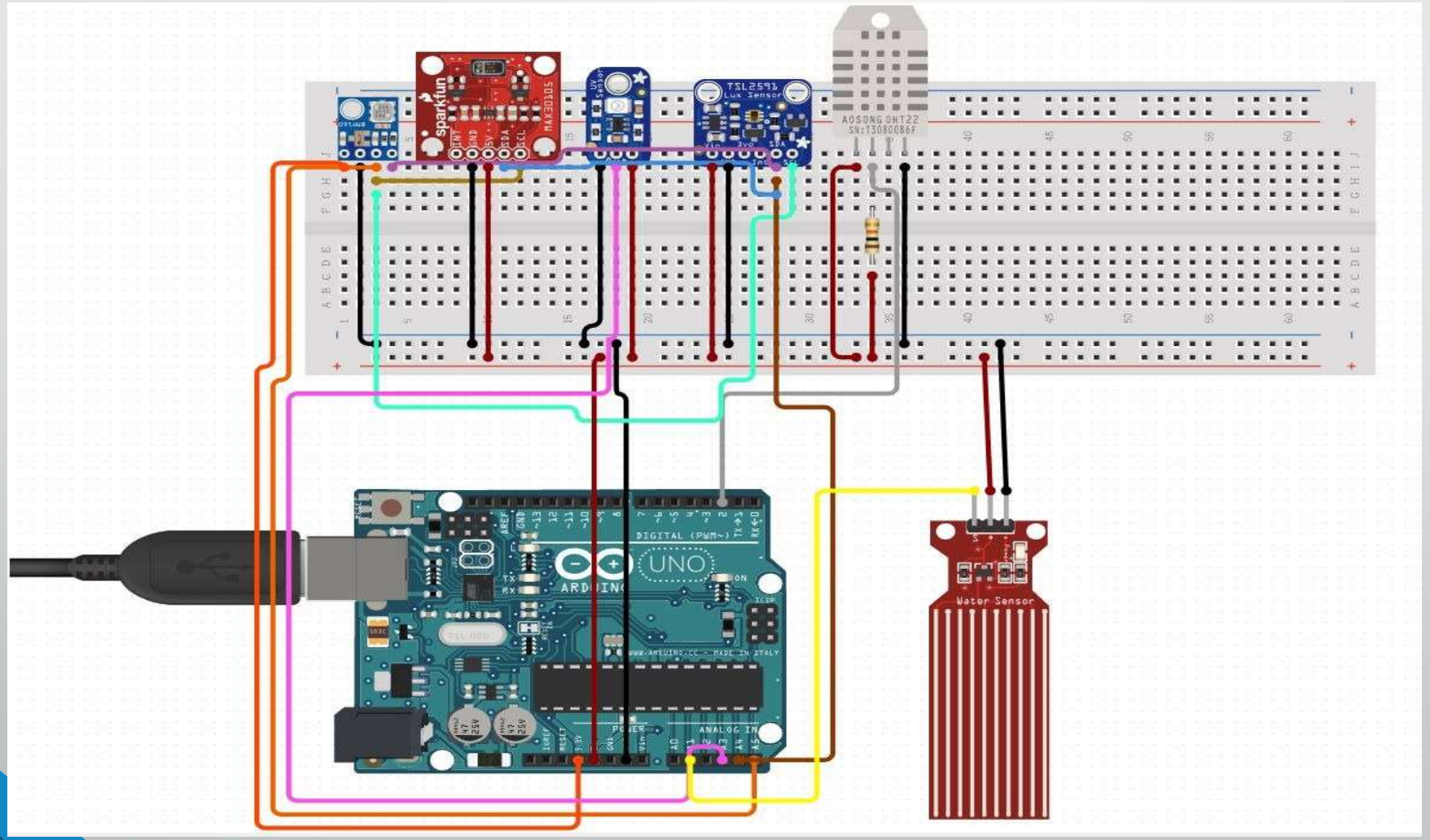
MPCA PROJECT
WEATHER STATION MODULE USING ARUDUINO

ABSTRACT

- The weather station collects the following data related to the weather and environment using different sensors:
- Temperature : SENSOR USED : DHT22 DIGITAL TEMPERATURE & HUMIDITY SENSOR
- Humidity : SENSOR USED : DHT22 DIGITAL TEMPERATURE & HUMIDITY SENSOR
- Atmospheric pressure : SENSOR USED : BAROMETER SENSOR BMP 180
- Light intensity : SENSOR USED : LIGHT SENSOR LDR (MH SERIES)
- UV index : SENSOR USED : U V SENSOR (HW-837)
- Dust concentration : SENSOR USED : SHARP GP2Y10 DUST SENSOR
- Rainfall quantity : SENSOR USED : RAIN SENSOR
- The aim is to make a small and simple weather station, using open hardware.
- Also Arduino IDE is used for the entire simulation by displaying the values in serial monitor.
- Arduino UNO is the primary MICROCONTROLLER used which powers and operates the entire weather station.

CIRCUIT DIAGRAM

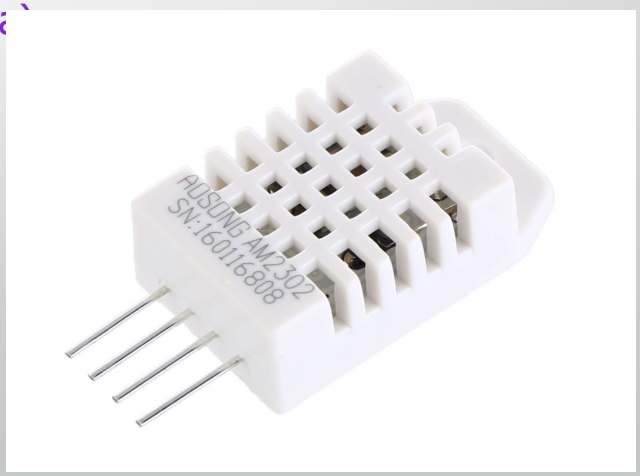


TEMPERATURE AND HUMIDITY – DHT22 SENSOR (DIGITAL)

The DHT22 is a basic digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin, no analog input pins needed. This sensor is more precise, more accurate, and works in a bigger range of temperature/humidity

TECHNICAL DETAILS:-

- 3 to 5V power and I/O
- 2.5mA max current use during conversion (while requesting data)
- Good for 0-100% humidity readings with 2-5% accuracy
- Good for -40 to 80°C temperature readings ±0.5°C accuracy
- No more than 0.5 Hz sampling rate (once every 2 seconds)
- Body size 27mm x 59mm x 13.5mm (1.05" x 2.32" x 0.53")
- 4 pins, 0.1" spacing
- Weight (just the DHT22): 2.4g
- Uses **Polymer capacitor.**



BAROMETER SENSOR : BMP 180

- **BMP180** is one of sensor of BMP XXX series. They are all designed to **measure Barometric Pressure** or **Atmospheric pressure**. BMP180 is a high precision sensor designed for consumer applications. Barometric Pressure is nothing but weight of air applied on everything. The air has weight and wherever there is air its pressure is felt. **BMP180 sensor** senses that pressure and provides that information in digital output

BMP180 MODULE Features

- Can measure pressure and altitude.
- Pressure range: 300 to 1100hPa
- High relative accuracy of ±0.12hPa
- Can work on low voltages
- 3.4Mhz I2C interface
- Low power consumption (3uA)
- Pressure conversion time: 5msec

Potable size

BMP180 MODULE Specifications

- Operating voltage of BMP180: 1.3V – 3.6V
- Input voltage of BMP180MODULE: 3.3V to 5.5V
- Peak current : 1000uA
- Consumes 0.1uA standby
- Maximum voltage at SDA , SCL : VCC + 0.3V
- Operating temperature: -40ºC to +80ºC

LIGHT SENSOR(LDR)-MH SERIES

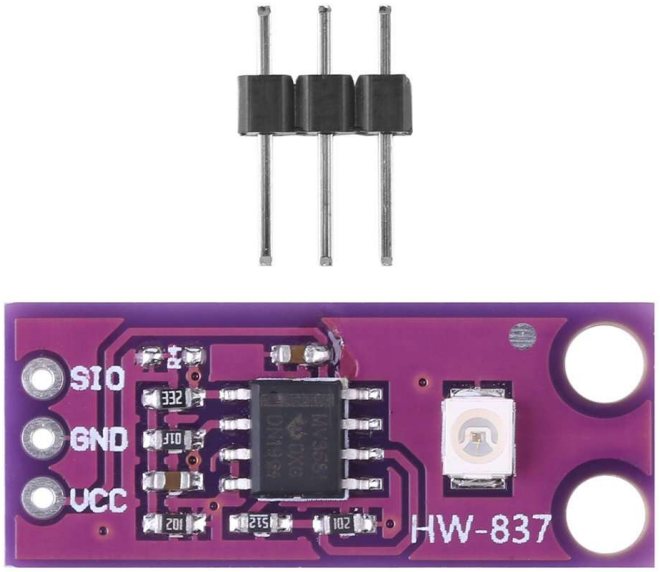
- A **Light Sensor** generates an output signal indicating the intensity of light by measuring the radiant energy that exists in a very narrow range of frequencies basically called “light”, and which ranges in frequency from “Infra-red” to “Visible” up to “Ultraviolet” light spectrum.
- The light sensor is a passive device that convert this “light energy” whether visible or in the infra-red parts of the spectrum into an electrical signal output. Light sensors are more commonly known as “Photoelectric Devices” or “Photo Sensors” because the convert light energy (photons) into electricity (electrons).

UV SENSOR : HW-837

- HW-837 GUVA-S12SD UV Detection Sensor Module
  240nm-370nm Ultraviolet Intensity Sensor
  Feature:
  1. Good linearity
  2. High sensitivity
  3. High stability
  4. Low power consumption
  5. Wide detection range
  6. Schottky type photodiode, suitable for photoelectric mode

  Specification:
  Power consumption: power supply voltage

  2.5V ~ 5V, working current is micro-amp
  Detection range: 240-370 nm
  Angle: 130 degrees
  Size: 27 * 11mm/1.06*0.43\"



DUST SENSOR : GP2Y10

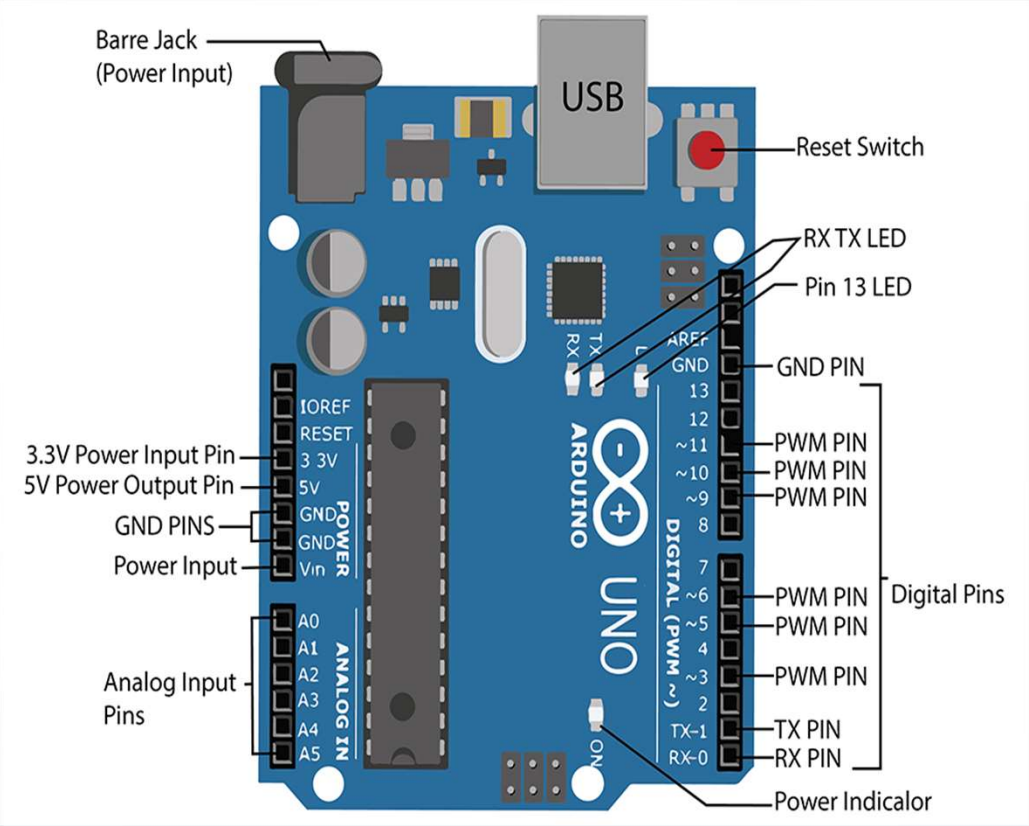
- GP2Y1010AU0F Module is used to Sense Dust Particles in air and also called as an optical air quality sensor. It is very much Smaller in size. It detects the reflected light of dust in air. Especially, it is effective to detect very fine particle like the cigarette smoke. In addition it can distinguish smoke from house dust by pulse pattern of output voltage and is commonly used in air purifier systems.
- The sensor has a very low current consumption (20mA max, 11mA typical), and can be powered with up to 7VDC. The output of the sensor is an analog voltage proportional to the measured dust density, with a sensitivity of 0.5V/0.1mg/m3.

RAIN SENSOR

- **Rain sensor** comes in two parts one is the plate PCB or the detector on which raindrops will fall and the other is the amplifier + comparator circuit which sends data to
- The sensor gives both digital and analog output. the microcontroller.
- The sensor is built out of LM393 IC which has an inbuilt amplifier that amplifies the voltage signal to a detectable range. Also, it has voltage comparators for efficient amplification. The amount of amplification can be adjusted with the help of potentiometers given on the sensor.

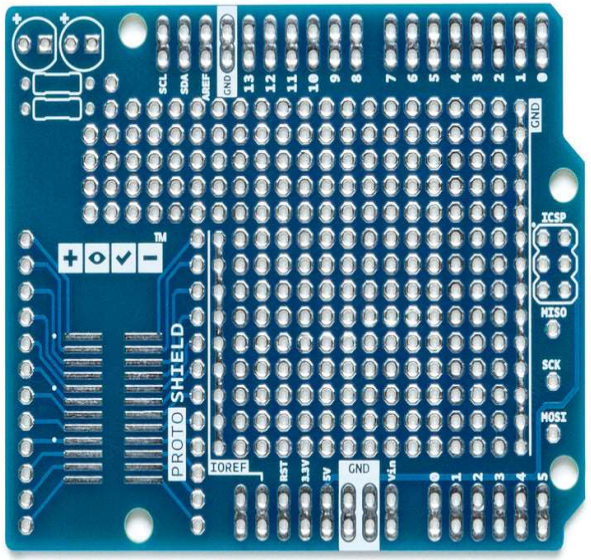
ARDUINO UNO

- **Arduino Uno** is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



ARDUINO PROTO SHIELD

- The **ProtoShield** makes it easy to design custom circuits. We can easily solder TH or SMD ICs on the prototyping area to test them with the Arduino board. The SMD area is designed for a maximum of 24 pins SOIC integrated circuit and the TH area contains a lot of space for the needed components around the project. We can even stick a mini on the proto area for solderless operation.



THANK YOU