Project Title:
Weather Station

Microprocessor and Computer Architecture Project

4rd Semester, Jan – May 2023

Title of Project: Weather Station					
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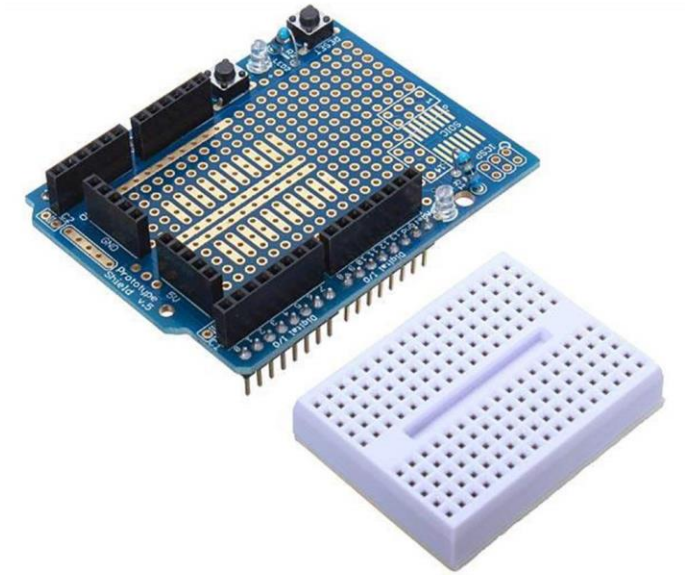
Provide the following information

I. Arduino Board
II. Sensors used in Project
III. Connections
IV. Output

Arduino UNO Board

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 Proto Shield 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 solder less operation.

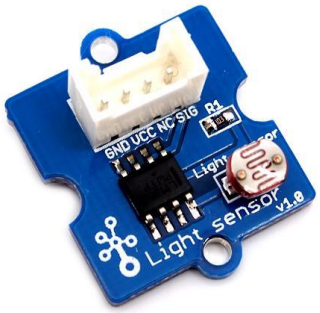
Sensors used in Project

TEMPERATURE AND HUMIDITY – DHT22 SENSOR

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

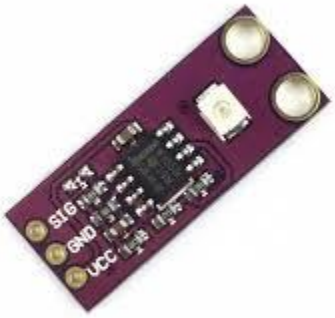
Atmospheric pressure: BAROMETER SENSOR - BMP 180

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



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.



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

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.

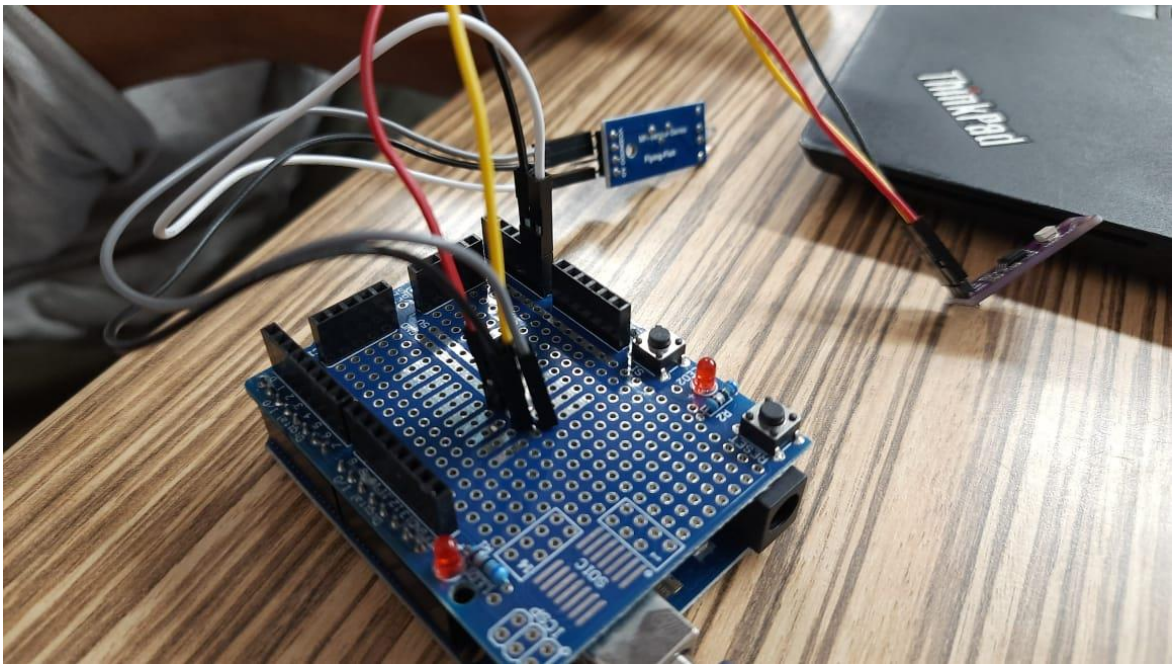
Rain Sensor

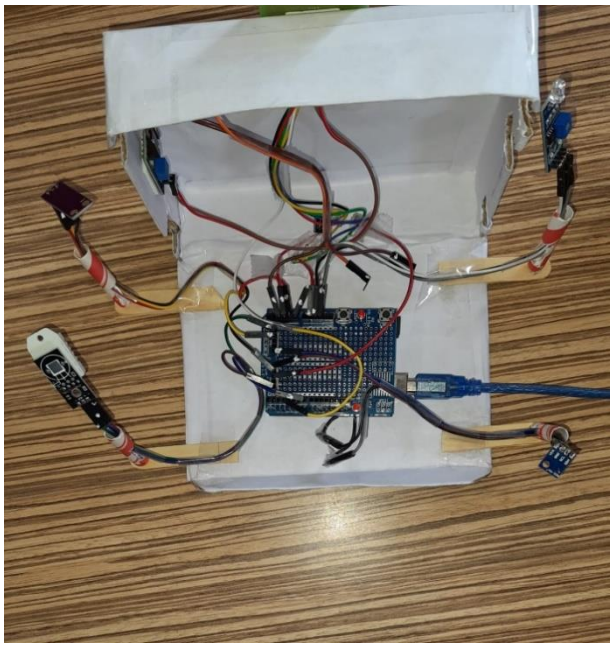
Rain sensor comes in two parts one is the plate PCB or the detector on which raindrops will fall and the other is the amplifier + comparator circuit which sends data to the sensor gives both digital and analog output. The microcontroller.

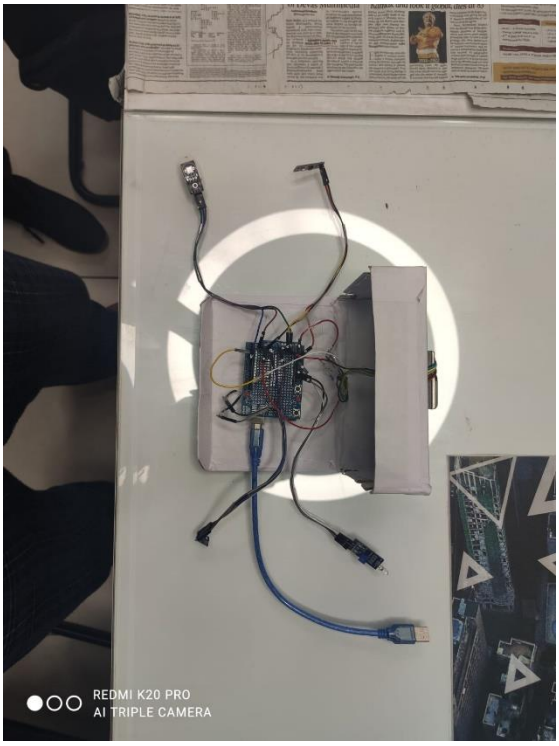
Connections

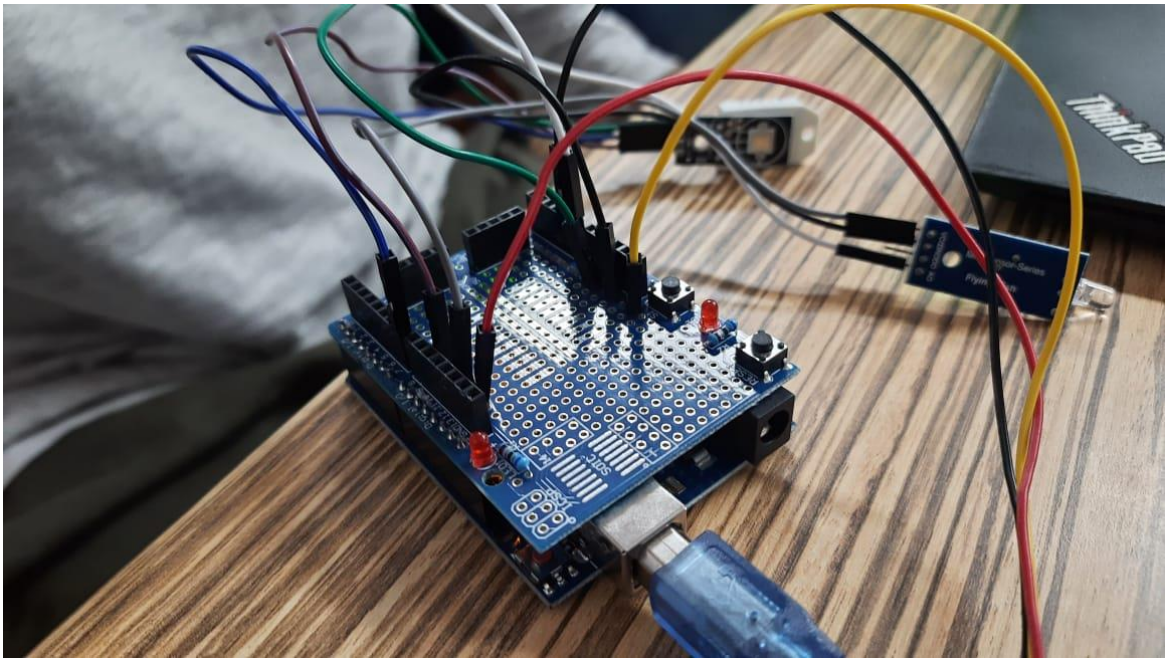
- The circuit is powered by the USB port (connected to a computer or a ordinary phone charger), but you may also add an external DC power supply or a battery connected to the Arduino power jack.
- Connecting the Parts :

  Connect all the components according to the schematic. You'll need some jumper wires to connect each sensor to the breadboard. You might use a proto shield (for a more compact circuit), an ordinary breadboard, or design you own Arduino shield.



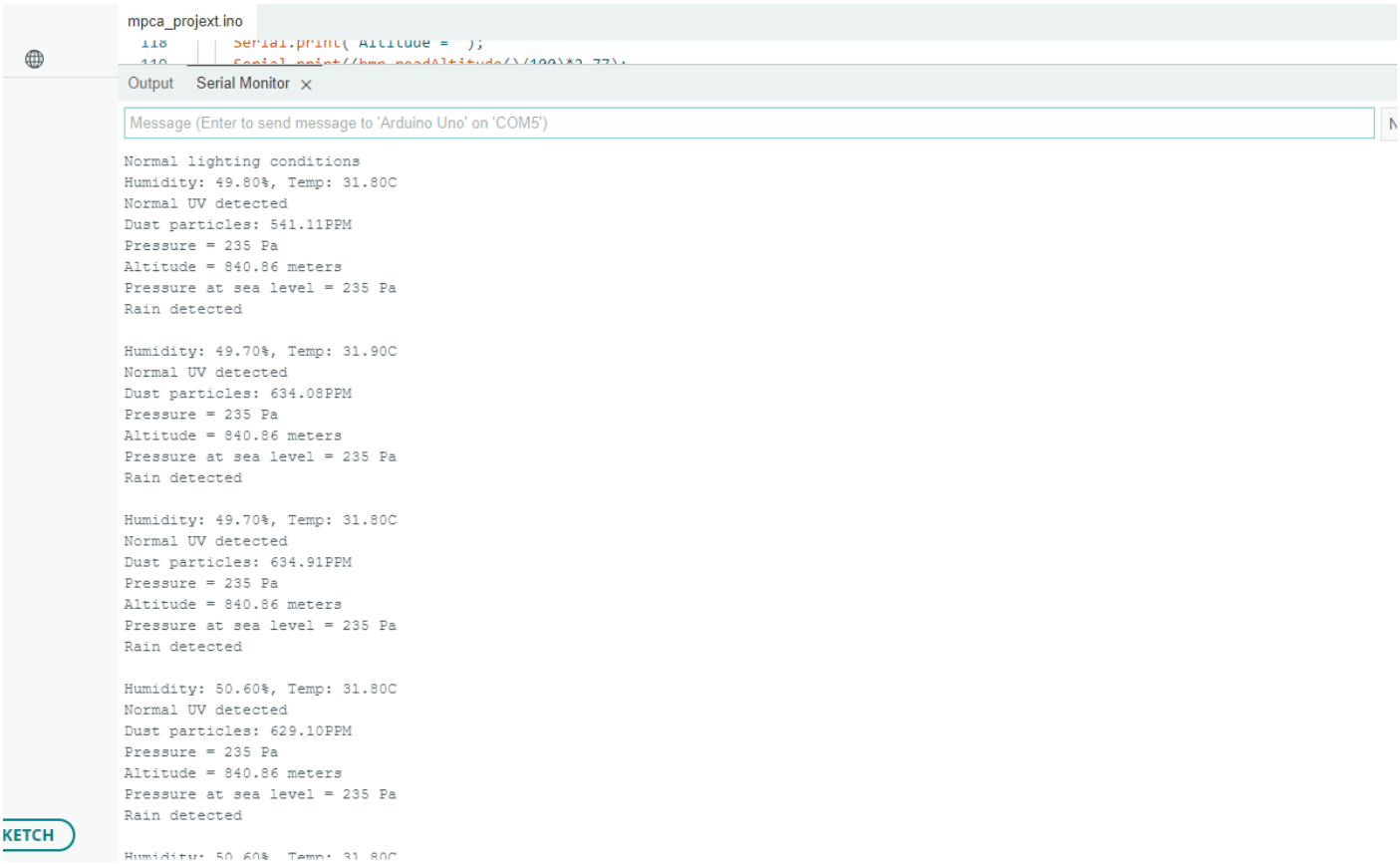


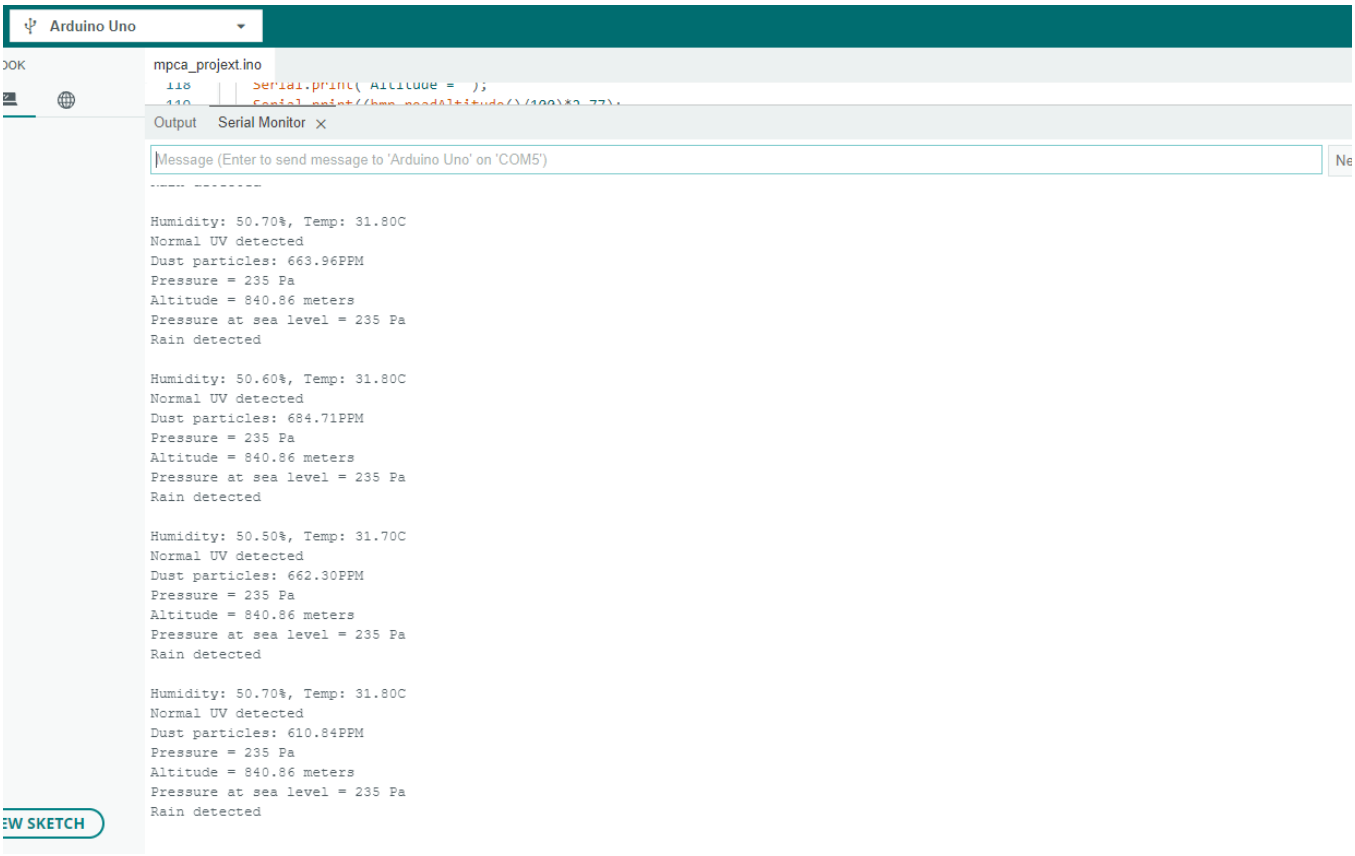




- Plug the USB cable to the Arduino Uno board and proceed to the next step.

Output:


mpca_project.ino
Output
Serial Monitor
Message (Enter to send message to 'Arduino Uno' on 'COM5')
Normal lighting conditions
Humidity: 49.80%, Temp: 31.80C
Normal UV detected
Dust particles: 541.11PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected
Humidity: 49.70%, Temp: 31.90C
Normal UV detected
Dust particles: 634.08PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected
Humidity: 49.70%, Temp: 31.80C
Normal UV detected
Dust particles: 634.91PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected
Humidity: 50.60%, Temp: 31.80C
Normal UV detected
Dust particles: 629.10PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected


Arduino Uno
mpca_projext.ino
Output
Serial Monitor
Message (Enter to send message to 'Arduino Uno' on 'COM5')
Humidity: 50.70%, Temp: 31.80C
Normal UV detected
Dust particles: 663.96PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected
Humidity: 50.60%, Temp: 31.80C
Normal UV detected
Dust particles: 684.71PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected
Humidity: 50.50%, Temp: 31.70C
Normal UV detected
Dust particles: 662.30PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected
Humidity: 50.70%, Temp: 31.80C
Normal UV detected
Dust particles: 610.84PPM
Pressure = 235 Pa
Altitude = 840.86 meters
Pressure at sea level = 235 Pa
Rain detected