Phase 2: Innovation

Real-Time Environmental Monitoring

Objective:

To implement a system for Real-Time Environmental monitoring within the park.

Principle Components Used:

- **MQ135 sensor** [interference with Arduino] – To check the daily air quality around the park with specifications of detecting **Air Humidity, Ammonia gas, Smoke** and **Other toxic Gases**.
- **Water Quality Sensor** - To monitor the quality of water, and can be modified to monitor various aspects such as the temperature of the water and its surrounding, the turbidity of the water (how clean the water is) as well as the PH levels of the Water.
- **Weather Monitoring System** - To monitoring the temperature and humidity and to calculate & display the information in the display.

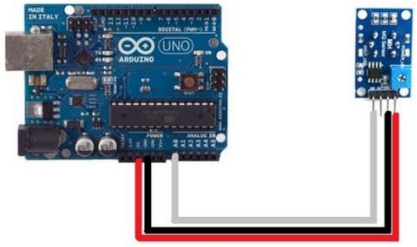
MQ135 Air Sensor with Arduino:

- MQ135 Sensor has high sensitivity to *ammonia gas, sulphide, benzene series stream, also can monitor smoke and other toxic gases well.*
- It can detect kinds of toxic gases and is a kind of low-cost sensor for kinds of applications.

Feature: It has good sensitivity to toxic gas in wide range, and has advantages such as long lifespan, low cost and simple drive circuit &etc.

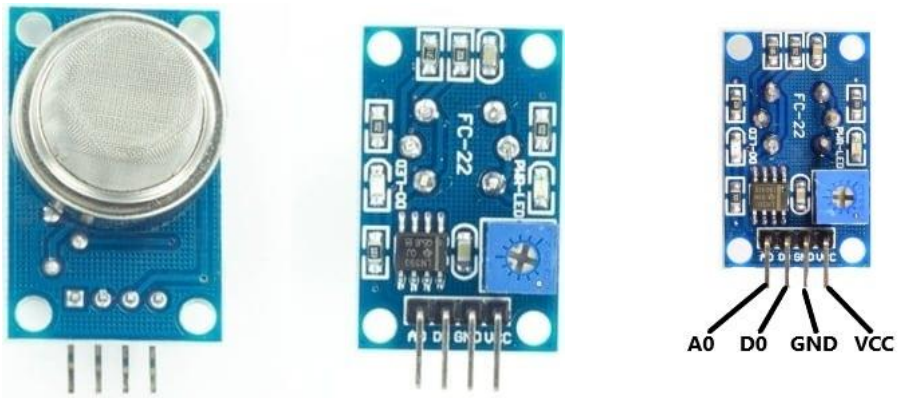
Main application: It is widely used in domestic gas alarm, industrial gas alarm and portable gas detector.

Circuit Diagram:



Arduino Specification:

- A0 – Analog output of the Sensor
- D0 – Digital output of the sensor
- GND – Ground
- VCC – 5V

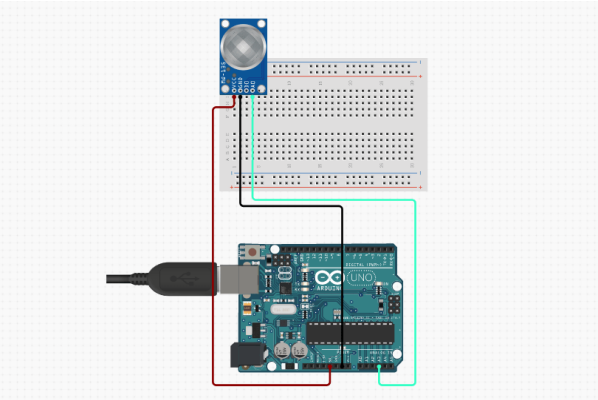


Components Required:

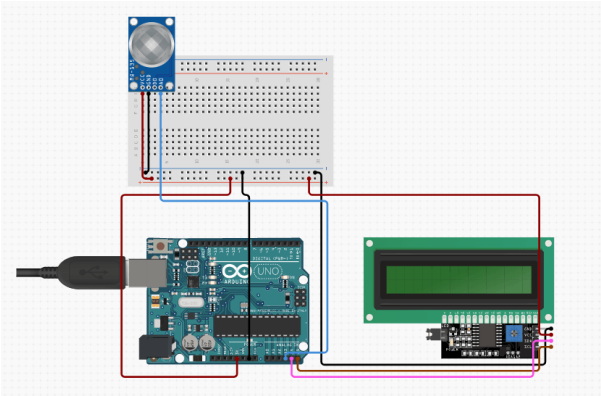
- Arduino Uno
- USB Cable
- LCD Display screen
- Gas sensor – MQ-135
- Bread Board
- Jumper wires Pack

Connections:

Step 1: MQ-135 sensor with Arduino.

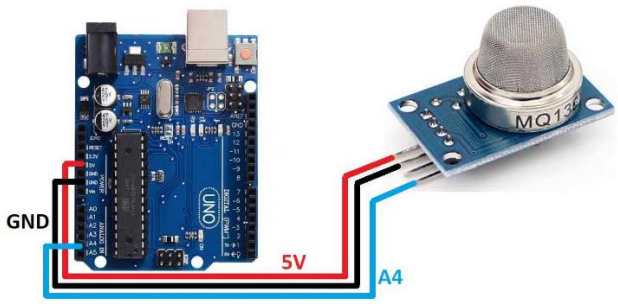


Step 2: MQ-135 Gas Sensor with LCD and Arduino.



Pin connection of MQ135 Air Quality Sensor with Arduino:

- Connect the VCC pin of the sensor to the 5V pin of the Arduino UNO board.
- Connect the GND pin of the sensor to the GND pin of the Arduino UNO board.
- Connect the AO pin of the sensor to the A4 pin of the Arduino UNO board.



Wiring MQ-135 sensor with Arduino UNO:

Step 1: First, place a 16×2 LCD on the breadboard, then connect A to +5V with a 220-ohm resistor and K to Ground. To vary the contrast of a 16×2 LCD, connect the VO to the middle pin of the potentiometer and VDD to +5V, VSS & RW to Ground. Also, provide +5V and Ground to the potentiometer.

Step 2: The MQ-135 module connects to the A0 pin of an Arduino Uno and connects GND to Ground, providing +5V to VCC.

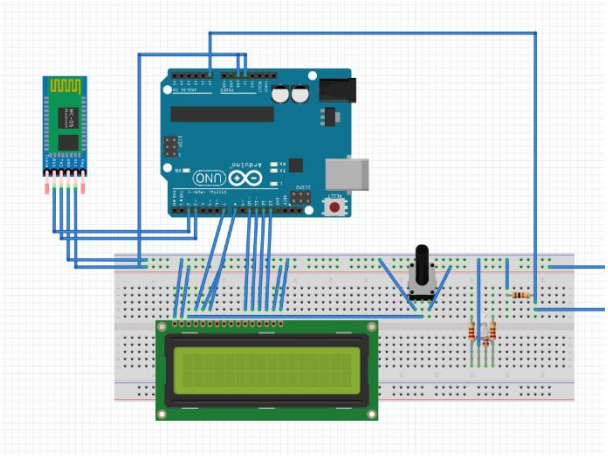
Step 3: Connect Anode (+) of Green LED to digital pin 8 of Arduino; Blue LED to digital 9 pin of Arduino and Red LED to digital pin 10 of Arduino and all LEDs Cathode (-) Ground with 220-ohm resistor.

Step 4: Connect the buzzer's positive terminal to digital pin 11 of Arduino and the negative terminal to the ground.

Water Quality sensor:

- This method uses Arduino to monitor the quality of water, and can be modified to monitor various aspects such as the temperature of the water and its surrounding, the turbidity of the water (how clean the water is) as well as the PH levels of the Water.
- This system monitors all of these aspect and finally when all checks have been completed, the information or data can be sent to the user.

Circuit Diagram:



Components Required:

- Arduino UNO
- Resistor 330 ohm
- Jumper Wires
- RGB Diffused Common Cathode
- Rotary potentiometer
- Alphanumeric LCD
- HC-05 Bluetooth Module
- Resistor

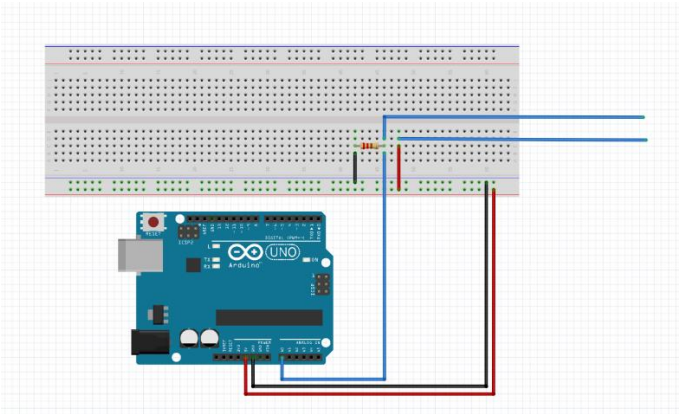
Pin Connections:

With Arduino:

Step 1: Connect 5V of Arduino to one power rail of the breadboard

Step 2: Connect the ground of Arduino to the other power rail of the breadboard

Step 3: Connect one end of a 1k-ohm resistor to the ground and the other end to the breadboard. Connect the analog pin A0 on the Arduino to the resistor. Finally, connect a wire to the resistor and another wire to 5V. Connect the free ends of these wires to the crocodile clips.



With LCD Display:

Step 1: Connect VSS pin to the ground rail

Step 2: Connect VDD pin to 5V rail

Step 3: Connect V0 to the centre pin of the potentiometer

Step 4: Connect ends of the potentiometer to 5V and ground

Step 5: Connect RS pin to Arduino pin 7

Step 6: Connect R/W pin to the ground rail

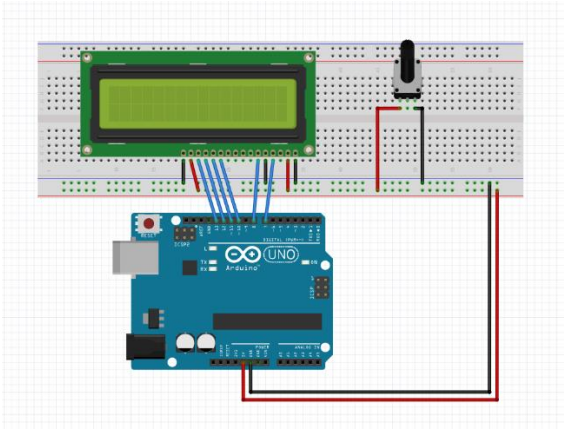
Step 7: Connect E pin to Arduino pin 8

Step 9: Connect D4 to Arduino pin 10

Step 10: Connect D5 to Arduino pin 11

Step 11: Connect D6 to Arduino pin 12

Step 12: Connect D7 to Arduino pin 13



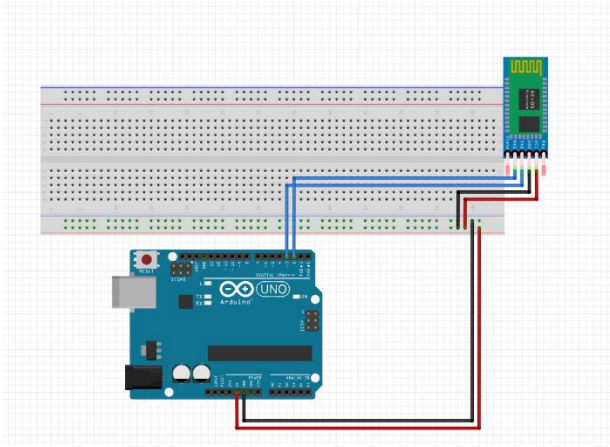
HC-05 Bluetooth Module:

Step 1: Connect VCC pin to 5V rail

Step 2: Connect GND pin to ground

Step 3: Connect TX pin to Arduino pin 3 (Serves as RX)

Step 4: Connect RX pin to Arduino pin 2 (Serves as TX)



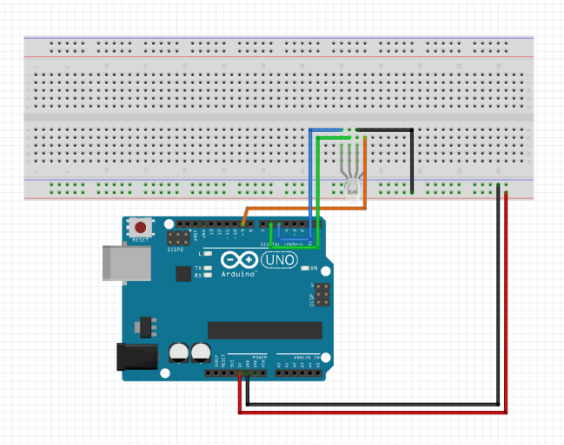
With RGB LED:

Step 1: Connect the common cathode (longest pin) to ground

Step 2: Connect the red pin (right of cathode pin) to PWM pin 9 on Arduino through a 330-ohm resistor

Step 3: Connect green pin (left of cathode pin) to PWM pin 6 on Arduino through a 330-ohm resistor

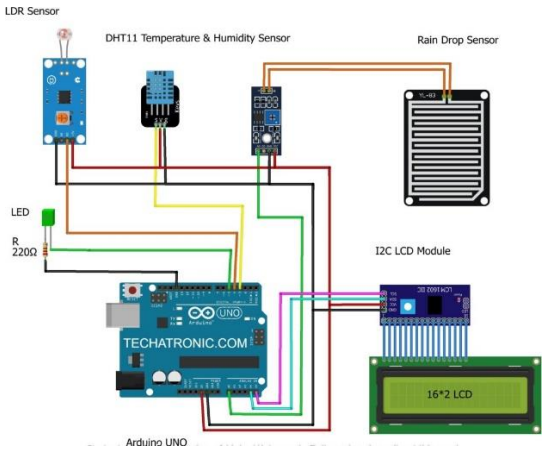
Step 4: Connect blue pin (extreme left) to PWM pin 5 on Arduino through a 330-ohm resistor



Weather Monitoring System with Arduino:

- Weather monitoring system using Arduino can help us to monitoring the temperature and humidity by using one sensor.
- The DH11 Sensor is easily capable to measure the temperature and humidity.
- The Arduino uno help to calculate & display the information to the display.
- nrf have good range for data transmission that's why we are using nrf module for communication.
- At the side of transmitter there are dht11 sensor which gives the output to the transmitter microcontroller and transmitter microcontroller of **weather monitoring system** send this information to the receiver via transmitter nrf.

Circuit Diagram:



Components Required:

- Arduino UNO
- LCD Display
- DHT11 Sensor

- Rain Sensor
- LDR Sensor
- Breadboard
- Jumper wires
- LED
- 220-ohm Resistor

Connection:

Step 1: Connect the LCD I2C (SCL) –> A5

Step 2: Connect the LCD I2C (SDA) –> A4

Step 3: Connect the RAIN SENSOR (A0) –> A0

Step 4: Connect the DHT11 (OUT) –> PIN 3

Step 5: Connect the LDR MODULE (D0) –> PIN 4

Step 6: Connect the GREEN LED (ANODE) –> PIN 5

Conclusion:

By fixing the sensor to their relative location can work efficiently towards the Environment monitoring around the park. With these IOT based models smart Environmental monitoring can be easily achieved.