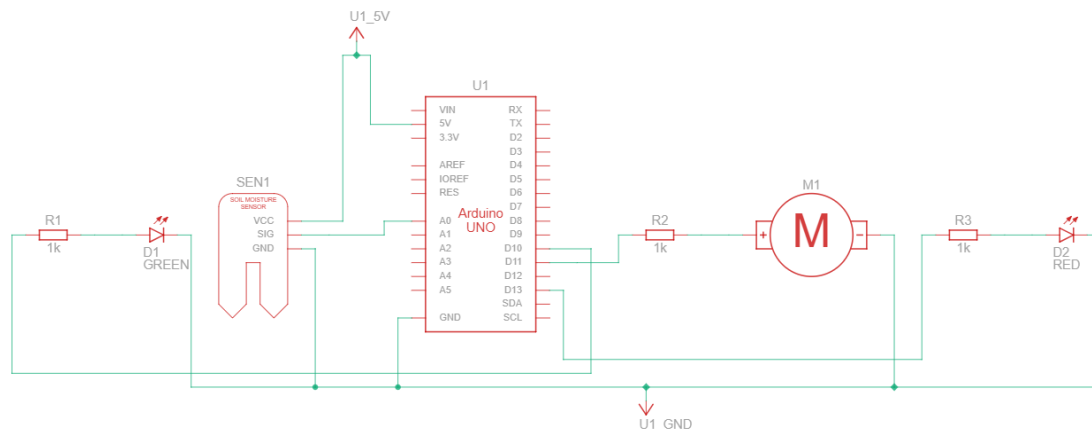


Assignment 3

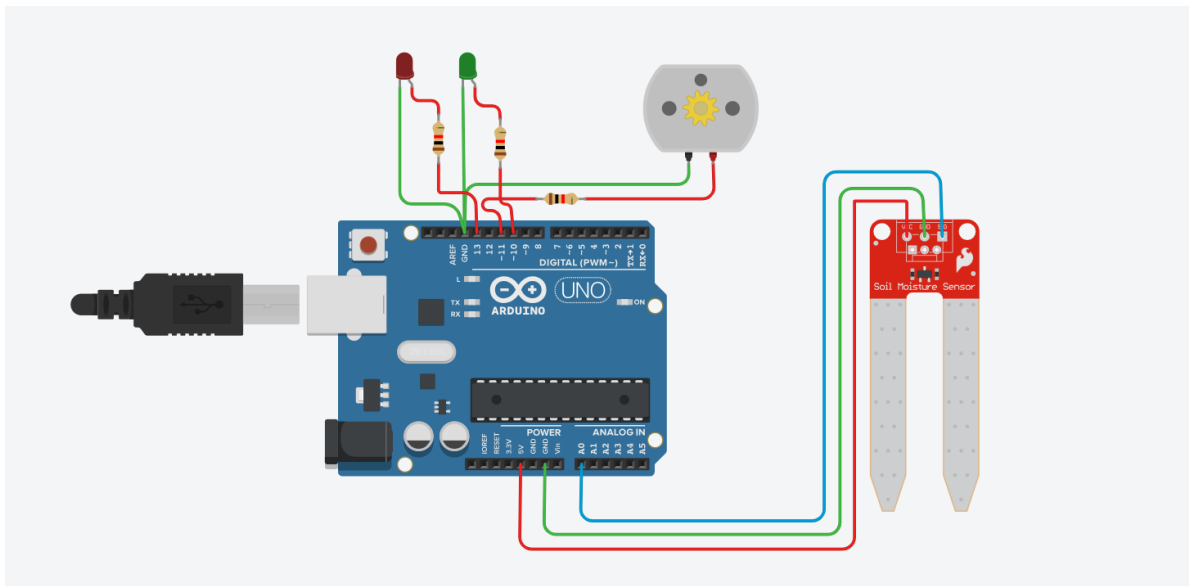
Title: Interfacing a Soil Moisture Sensor with Arduino to Control Motor and LEDs

Aim: To interface a soil moisture sensor with an Arduino to monitor soil moisture levels and control a motor to water the soil. The system should light a green LED and start the motor when moisture is low, and turn off the motor and glow a red LED when the moisture level becomes normal.

Schematic View:



Circuit View:



Procedure:

1. Open Tinkercad and Create a New Project:

- Go to [Tinkercad](https://www.tinkercad.com).
- Sign in to the account.
- Click on “Create New Project” and select “Circuits.”
- Click on “Create New Circuit.”

2. Add Components:

Add the following components from the right-side panel:

- **Arduino Uno R3**
- **Soil Moisture Sensor**
- **2 LEDs** (1 Green, 1 Red)
- **3 Resistors (1k Ω each)**
- **Motor (DC Motor)**

3. Circuit Connections:

Soil Moisture Sensor:

- Connect the **VCC** of the soil moisture sensor to the **5V pin** on the Arduino.
- Connect the **GND** of the soil moisture sensor to the **GND** of the Arduino.
- Connect the **Analog output (A0)** of the sensor to **Analog Pin A0** on the Arduino.

LED Connections:

- Connect the **Green LED (LED1)**:
 - Anode (+) to **Pin 10** of Arduino through a **1k Ω resistor**.
 - Cathode (-) to **GND**.
- Connect the **Red LED (LED2)**:
 - Anode (+) to **Pin 13** of Arduino through a **1k Ω resistor**.
 - Cathode (-) to **GND**.

Motor/Water Pump:

- Connect the **positive terminal** of the motor to **Pin 11** on the Arduino with a **1k Ω resistor**.
- Connect the **negative terminal** to **GND**.

4. Set Up the Code in Tinkercad:

- Click on the **“Code”** button in Tinkercad (top-right).
- Select **“Text”** to switch from block-based coding to text-based coding.
- Write the following code:

```
int MOTOR=11;
int LED1=10;
int LED2=13;
int sensor=A0;
void setup()
{
    pinMode(sensor,INPUT);
    pinMode(MOTOR, OUTPUT);
}
```

```

    pinMode(LED1, OUTPUT);
    pinMode(LED2, OUTPUT);
    Serial.begin(9600);
}

void loop()
{
    int val=analogRead(sensor);
    float Moisture=val*100.0/1023.0;
    Serial.print("\nMoisture Value: ");
    Serial.println(Moisture);

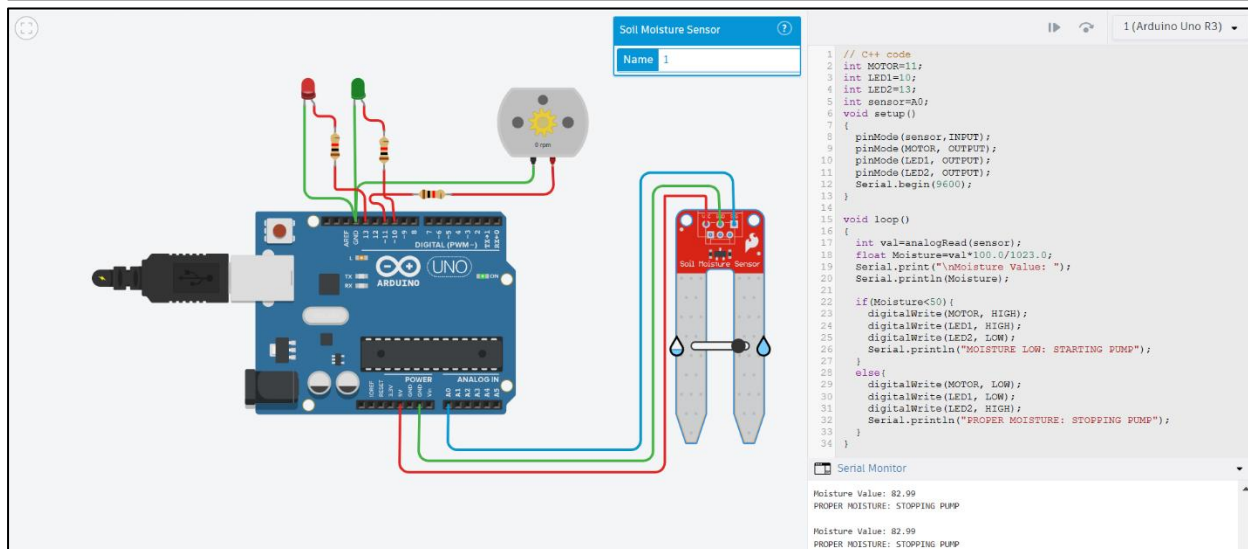
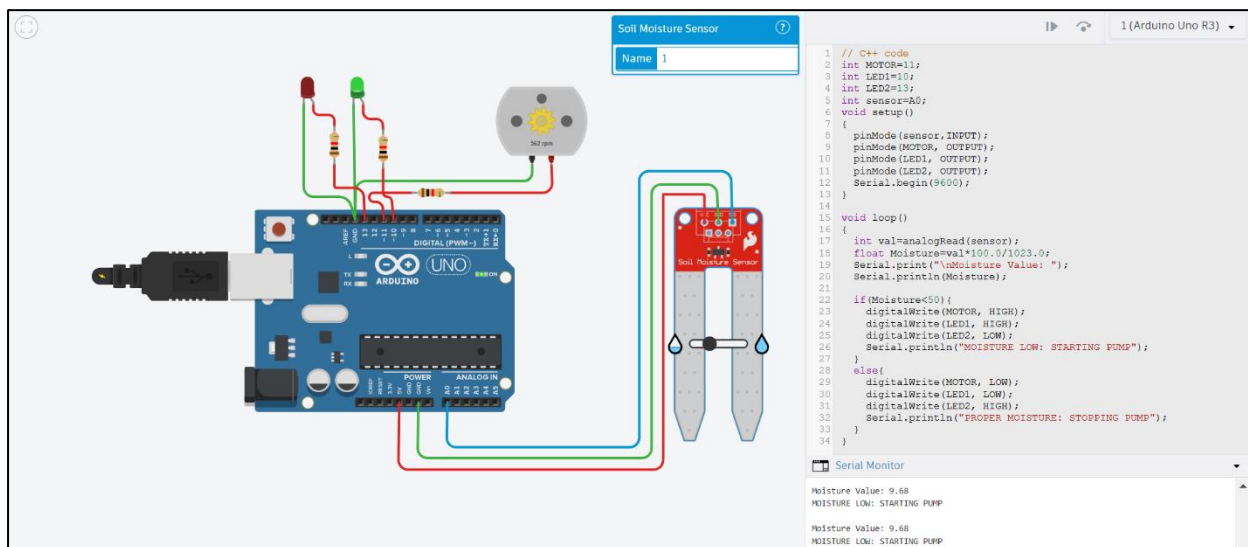
    if(Moisture<50){
        digitalWrite(MOTOR, HIGH);
        digitalWrite(LED1, HIGH);
        digitalWrite(LED2, LOW);
        Serial.println("MOISTURE LOW: STARTING PUMP");
    }
    else{
        digitalWrite(MOTOR, LOW);
        digitalWrite(LED1, LOW);
        digitalWrite(LED2, HIGH);
        Serial.println("PROPER MOISTURE: STOPPING PUMP");
    }
}

```

5. Simulate the Circuit:

- Click on the “**Start Simulation**” button.
- Open the **Serial Monitor** by clicking on the small box at the bottom of the simulation window to see real-time moisture values.
- Observe the behavior:
 - When the soil is **dry** (Moisture < 50%), the motor starts, the **Green LED** lights up, and the **Red LED** turns off.
 - When the soil is **moist** (Moisture >= 50%), the motor stops, the **Red LED** lights up, and the **Green LED** turns off.

Working Model Simulation Screenshots:

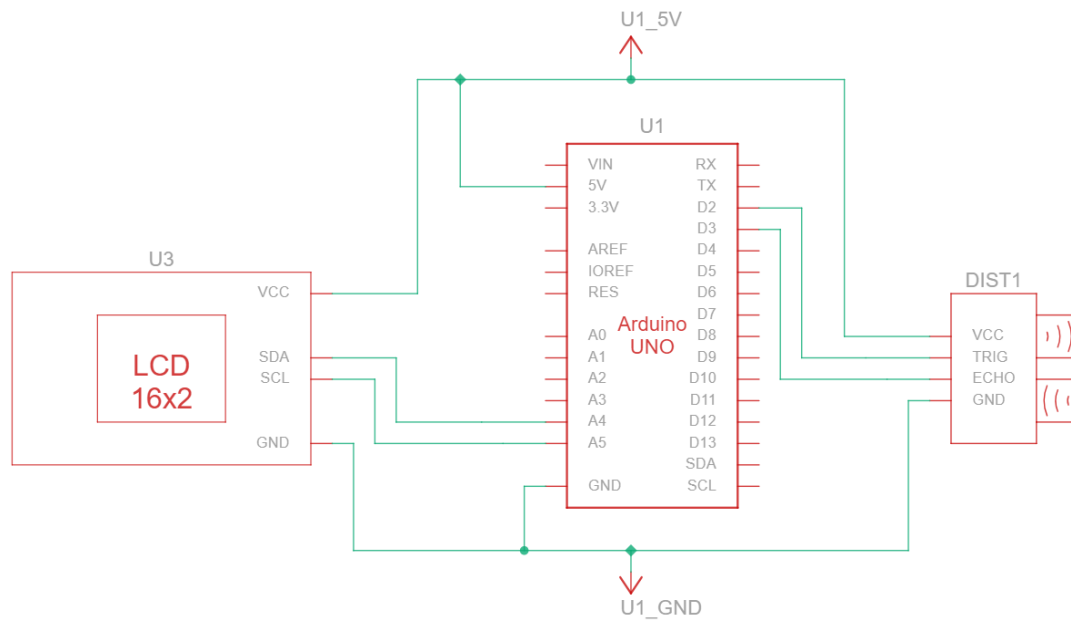


Assignment 5

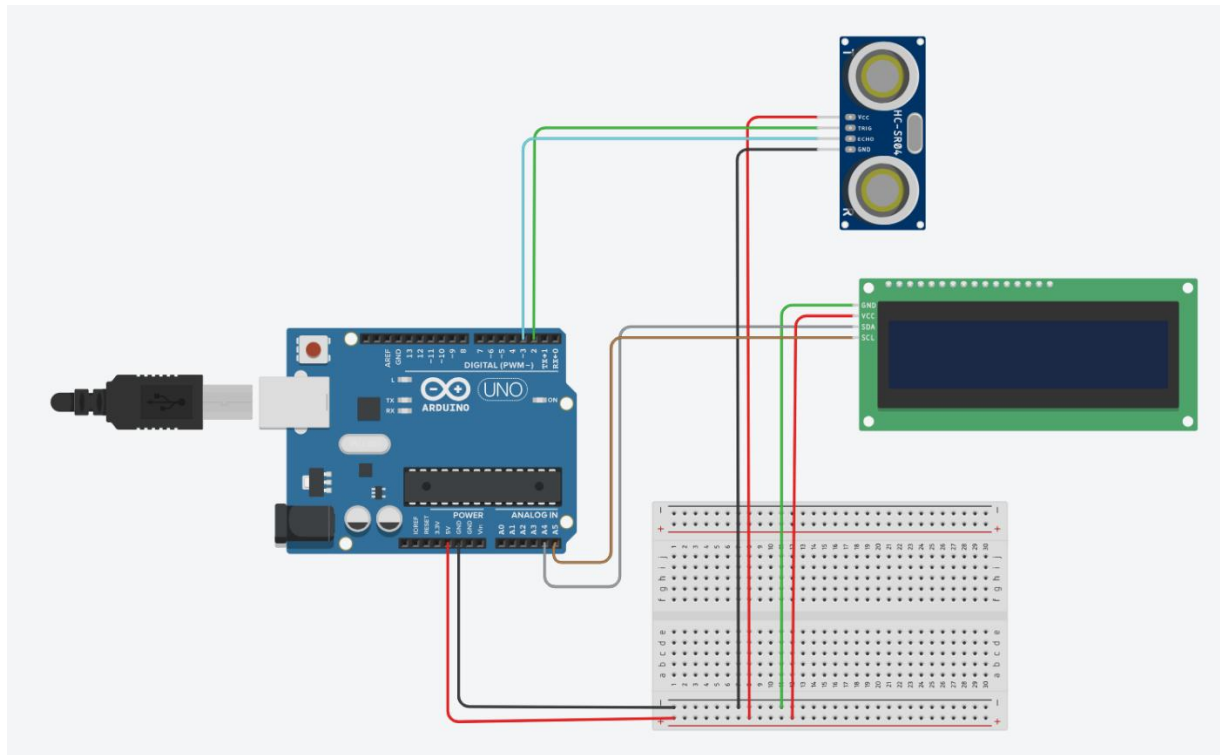
Title: Interfacing HC-SR04 Ultrasonic Sensor with Arduino to Measure Distance and Display on LCD

Aim: To interface an HC-SR04 ultrasonic sensor with Arduino to measure the distance of an object and display the results on the serial monitor and a 16x2 LCD.

Schematic View:



Circuit View:



Procedure:

1. Open Tinkercad:

- Open [Tinkercad](#) and log in to the account.

2. Create a New Project:

- Select "Create New Circuit" and add the necessary components (Arduino Uno, HC-SR04 sensor, 16x2 LCD, and breadboard).

3. Connect the Components:

- **HC-SR04 Sensor Connections:**
 - **Vcc:** Connect to the 5V pin of the Arduino.
 - **Trigger (Trig):** Connect to digital pin **2** of the Arduino.
 - **Echo:** Connect to digital pin **3** of the Arduino.
 - **GND:** Connect to the GND pin of the Arduino.
- **16x2 LCD Connections (I2C Interface):**
 - **Vcc:** Connect to the 5V pin of the Arduino.
 - **GND:** Connect to the GND pin of the Arduino.
 - **SDA:** Connect to analog pin **A4** of the Arduino.
 - **SCL:** Connect to analog pin **A5** of the Arduino.

4. Write the Code:

```
#include <Adafruit_LiquidCrystal.h>
#define trigPin 2
#define echoPin 3
long duration;
int distance;
Adafruit_LiquidCrystal lcd_1(0);
void setup() {
    pinMode(trigPin, OUTPUT);
    pinMode(echoPin, INPUT);
    Serial.begin(9600);
    lcd_1.begin(16,2);
    lcd_1.print("Distance in cm :");
}
void loop() {
    digitalWrite(trigPin, LOW);
    delayMicroseconds(5);
    digitalWrite(trigPin, HIGH);
```

```

delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = duration * 0.034 / 2;
lcd_1.setCursor(0,1);
lcd_1.print(distance);
Serial.print("Distance (in cm)=");
Serial.println(distance);
lcd_1.print("cm ");
delay(50);
}

```

5. Simulate the Model:

- Run the simulation to measure the distance and observe the output on the LCD and serial monitor.

Working Model Simulation Screenshots:

