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IOT EDGE NODES AND ITS APPLICATIONS CSE4034 (L55+L56)

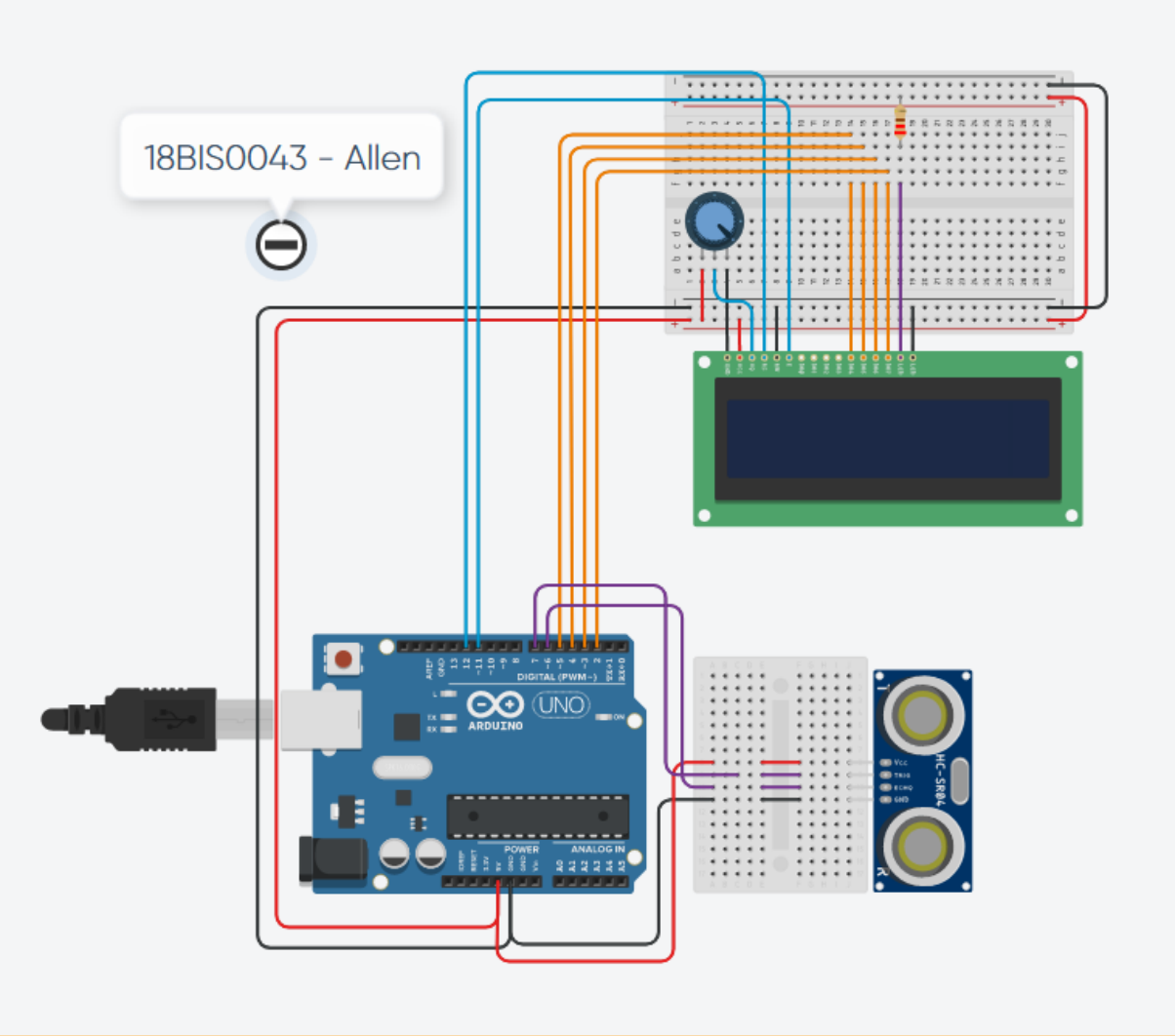
Allen Ben Philipose – 18BIS0043 – Task 5

TASK – 5
SMART RAINFALL

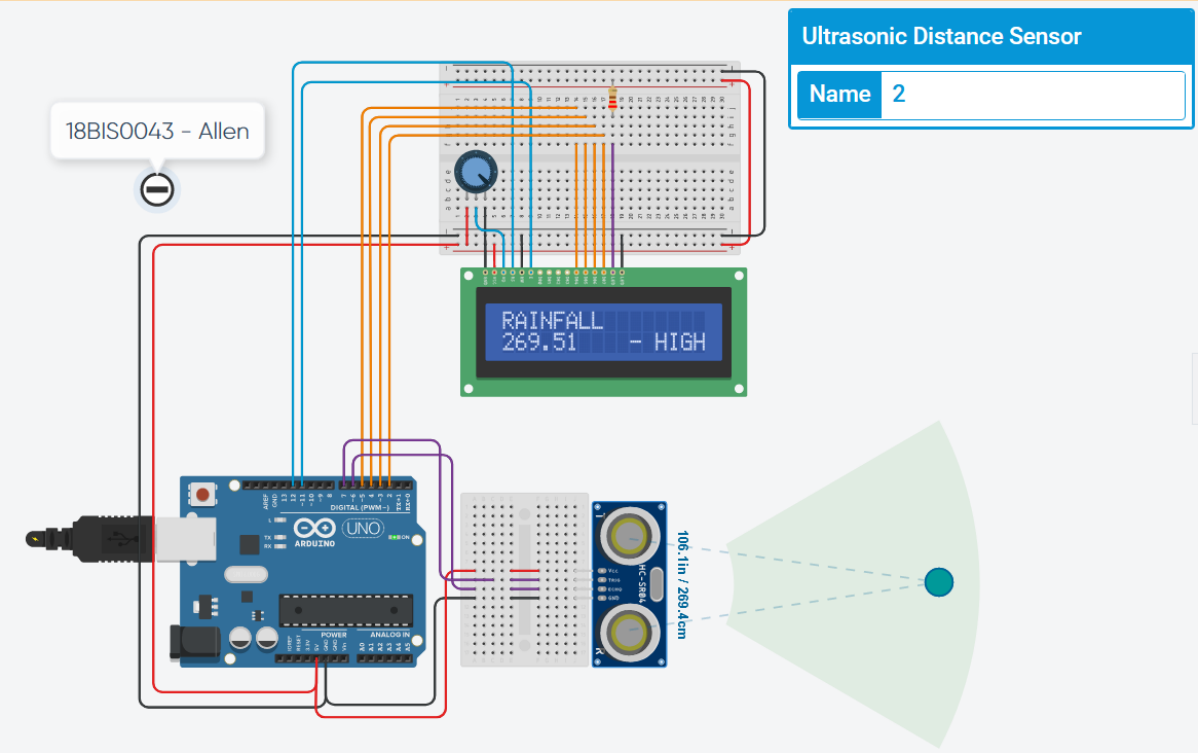
Aim

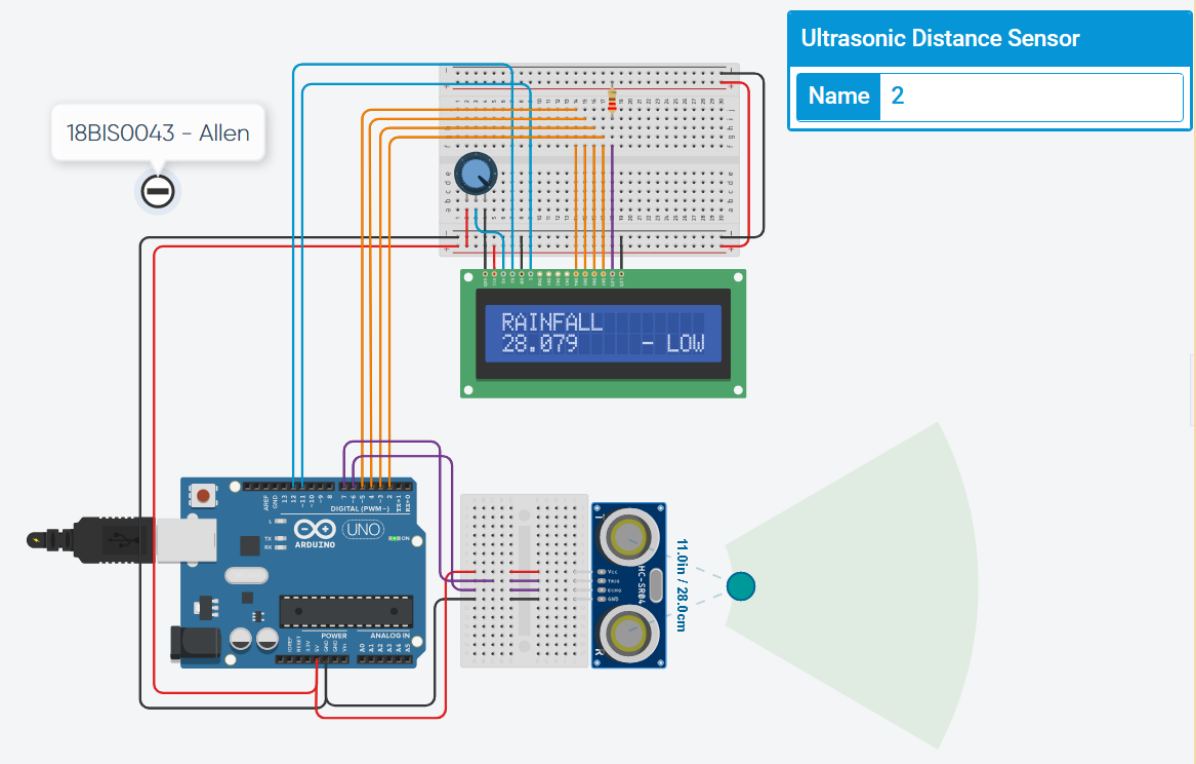
To design a circuit using Arduino for measuring rainfall and to display the rising water levels using an LCD display.

Circuit Diagram



Output from Tinkercad





The input value can be found near the ultrasonic sensor and the output value at the LCD monitor.

Tools Required

Tinkercad – for simulating the connection and coding of the Arduino circuit.

Code

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

long readUltrasonicDistance(int triggerPin, int
echoPin) {
  pinMode(triggerPin, OUTPUT);
  digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin, LOW);
  pinMode(echoPin, INPUT);
  return pulseIn(echoPin, HIGH);
}
void setup() {
  lcd.begin(16, 2);
  lcd.print("RAINFALL");
```

```
}
void loop() {
  float temp = 0.01723 * readUltrasonicDistance(7,6);
  lcd.setCursor(0, 1);
  lcd.print(temp);
  if (temp>=30) {
    if (temp>=100) {
      lcd.setCursor(10,1);
      lcd.print("- HIGH");
    }
    else {
      lcd.setCursor(9,1);
      lcd.print(" - HIGH");
    }
  }
  else if (temp<30) {
    lcd.setCursor(10,1);
    lcd.print(" - LOW");
  }
}
```

Components

1. **ESP8266** – Connection between the local system to cloud services for data analysis, visualization, and other forms of alerting methods. This could not be used since the usage was revoked by TinkerCad software platform. ThingSpeak integration was depending on this component and hence the integration was not successful for this experiment.
2. **Ultrasonic Sensor** – For detecting proximity of the object at water level. The ultrasonic sensor should be implanted at the bottom of the measuring container, and an endpoint object should be allowed to float on the water collected. As the distance between these two increases (when the water level increases), the ultrasonic sensor will return the value of proximity, which can be assessed to measure the amount of rainfall received.
3. **LCD Monitor** – This helps in displaying the values received by Arduino and if the rainfall exceeds 30cm, it will also indicate that the rainfall is heavy. The ultrasonic sensor input data is sent to the Arduino, is processed, and then displayed in this LCD display.
4. **Potentiometer** – The device for regulating the voltage that flows into the LCD screen, which in turn maintains the brightness of the device.

Usage Scenario

Program working as expected – minimal latency and accuracy of detecting the level of water collected, makes the application effective for analysis and for proactive response of the alert system, in a real-world scenario. The response time of this system is short

as the processing is done on the edge node even though cloud storages can be integrated.

This developed circuit can be used for measuring rainfall levels in a location using the standard ultrasonic sensor, which will be placed at the bottom of the container measuring the rainfall intensity.

The measurement will be transmitted live to the output peripheral and when the input value rises above a certain threshold value, 30cm in this case, the microcontroller connected to the sensor gives an alternative display statement to the LCD display which can also act as a real time alert to the person monitoring.

Alerting segment has 2 major components –

i. LCD Display to show details in a clean readable format, which can be easily understood by any layman.
ii. ThingSpeak collecting all the data produced if ESP32 or ESP8266 can be connected to the microcontroller.

Conclusion

Therefore, by using Tinkercad, we simulated a circuit for detecting the rainfall levels in a location using the ultrasonic sensor and Arduino microcontroller. This system also displays the received value to the user via an LCD display and shows the alert if the rainfall intensity is high. The values have been adjusted corresponding to the real-world scenarios and the system simulation can be assembled and deployed as is.