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Title of Lab Assignment: Programs based on interfacing DHT11/TMP36 temperature sensor Programs based on interfacing Passive infrared sensors (PIR), Ultrasonic of Arduino.		
DOP: 06-02-2024		DOS: 13-02-2024
CO Mapped: CO2, CO3	PO Mapped: PO1, PO2, PO5, PO7, PSO1	Signature:

Practical No. 5

Aim: Programs based on interfacing DHT11/TMP36 temperature sensor Programs based on interfacing Passive infrared sensors (PIR), Ultrasonic of Arduino.

Theory:**DHT11**

The DHT11 humidity and temperature sensor make it really easy to add humidity and temperature data to your DIY electronics projects. It's perfect for remote weather stations, home environmental control systems, and farm or garden monitoring systems. The DHT11 is a basic, ultra low-cost 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). It's fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, the sensor readings can be up to 2 seconds old.

The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet. The operation is not affected by sunlight or black material, Although acoustically, soft materials like cloth can be difficult to detect. It comes complete with an ultrasonic transmitter and receiver module.

The DHT11 is a commonly used Temperature and humidity sensor. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers. The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of $\pm 1^\circ\text{C}$ and $\pm 1\%$. So if you are looking to measure in this range then this sensor might be the right choice for you.

How to use DHT11 Sensor:

The DHT11 Sensor is factory calibrated and outputs serial data and hence it is highly easy to set it up. If you are trying to interface DHT11 with Arduino then there are ready-made libraries for it which will give you a quick start. If you are trying to interface it with some other MCU then the

datasheet given below will come in handy. The output given out by the data pin will be in the order of 8 bit humidity integer data + 8 bit the Humidity decimal data +8 bit temperature integer data + 8 bit fractional temperature data +8 bit parity bit.

Applications:

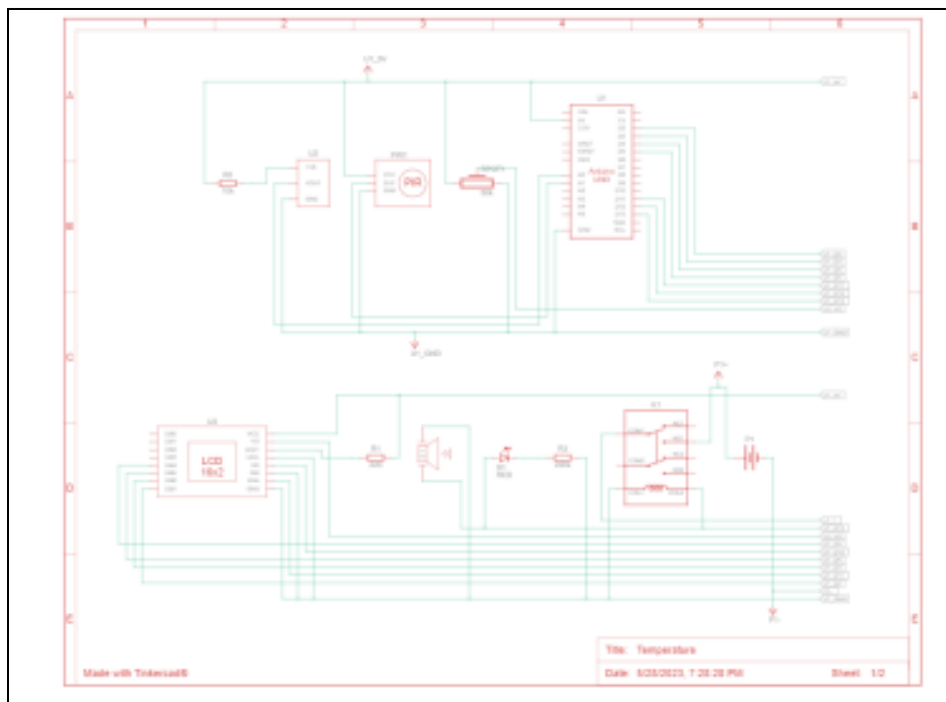
1. Measure temperature and humidity
2. Local Weather station
3. Automatic climate control
4. Environment monitoring

Code:

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(12,11,5,4,3,2);
int val;
int cel = 0;
int tempin = A0;
void setup() {
    lcd.begin(16,2);
    pinMode(13,OUTPUT);
    Serial.begin(9600);
}
void loop() {
    // For ultrasonic
    val = 30;
    cel = analogRead(A1);
    if(cel >= 100) {
        digitalWrite(13, HIGH);
        lcd.setCursor(0,1);
        lcd.print("Alert!!! Someone ");
    } else {
        digitalWrite(13, LOW);
        lcd.print(" Wait ");
    }
}
```

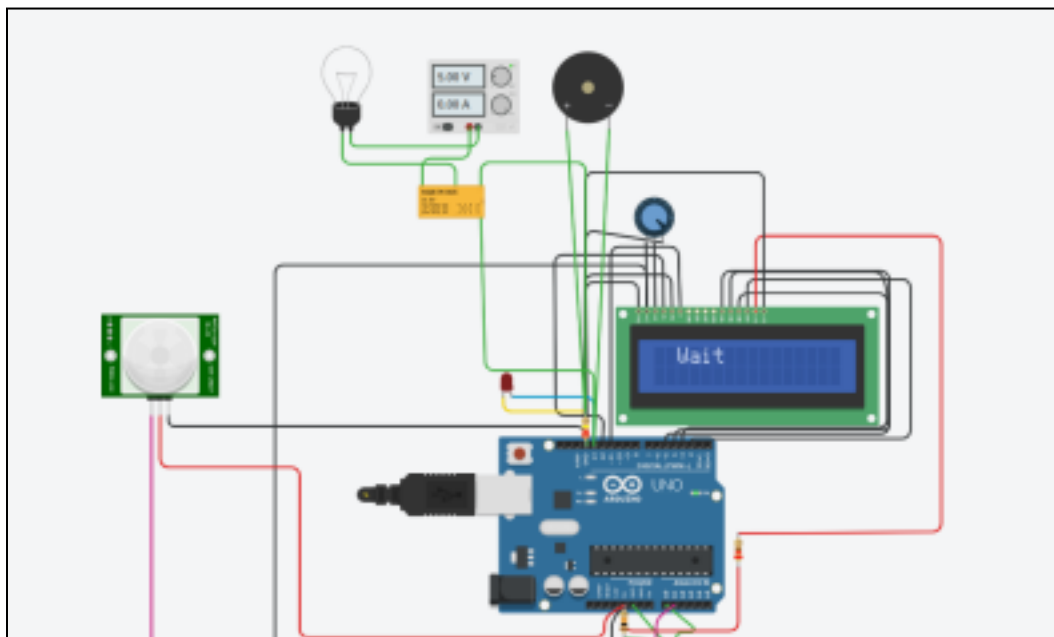
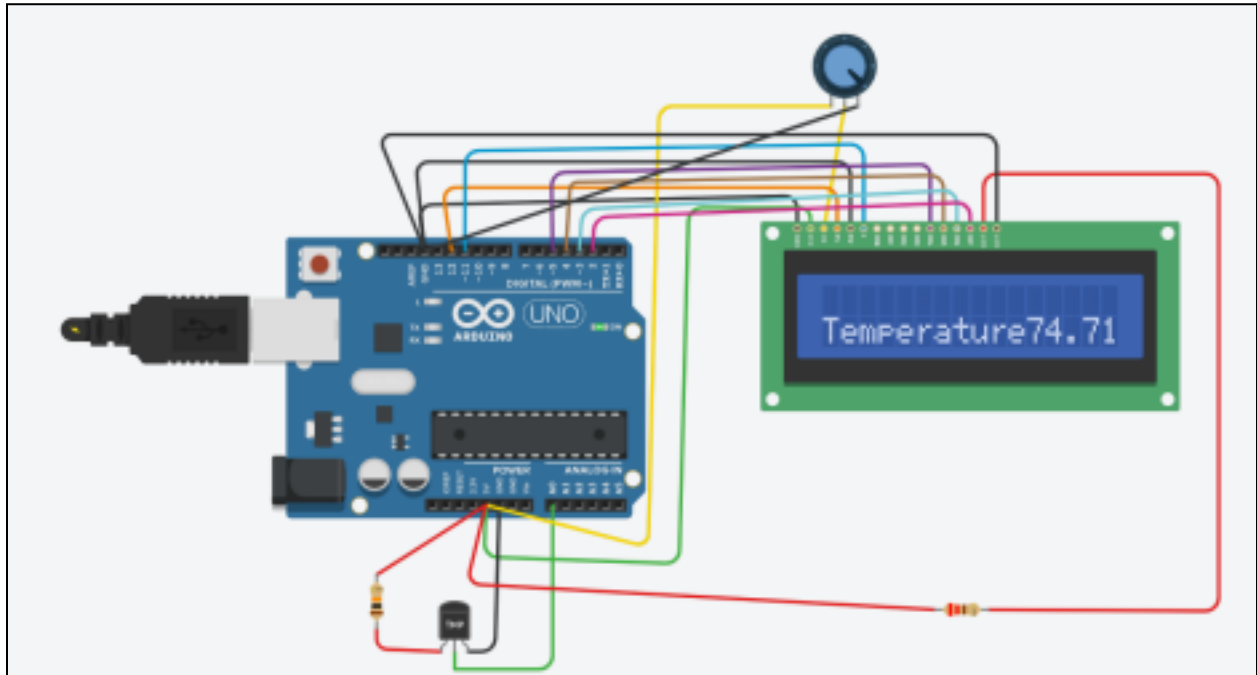
```
delay(100);  
lcd.clear();  
//For DHT11  
val = analogRead(tempin);  
float mv = ((val/1024.0)*5000);  
float cell = mv/10;  
float fh = cell*(9/5)+32;  
lcd.print("Temperature:");  
lcd.print(cell);  
Serial.println("Temperature");  
Serial.println(cell);  
digitalWrite(LED_BUILTIN, HIGH);  
delay(1000); // Wait for 1000 millisecond(s)  
digitalWrite(LED_BUILTIN, LOW);  
delay(1000); // Wait for 1000 millisecond(s)  
lcd.clear();  
}
```

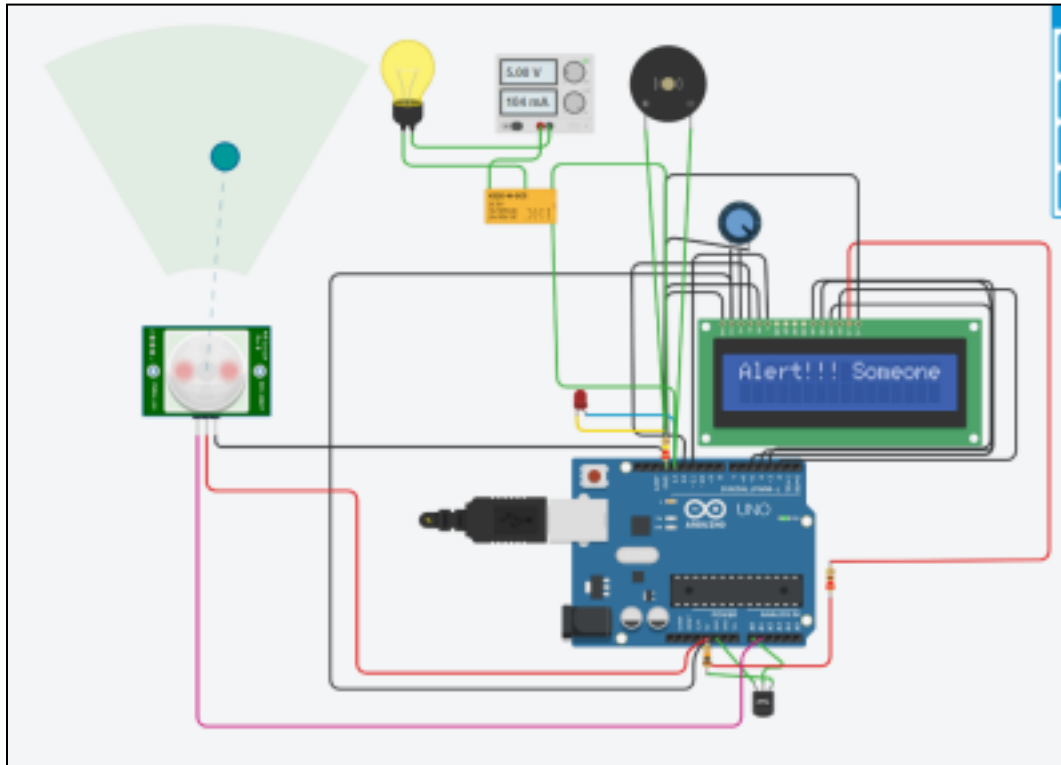
Circuit Diagram:



Output:

For DHT11:



**Conclusion:**

Hence, we have explored programs based on interfacing DHT11 temperature sensor Programs based on interfacing Passive infrared sensors (PIR), Ultrasonic of Arduino.