

## EXPERIMENT NO. 8 (Group B)

- **Aim:** Write a program so it displays the temperature in Fahrenheit as well as the maximum and minimum temperatures it has seen.
- **Outcome:** Understanding working principle of DHT11, Relationship between different temperature scales.
- **Hardware Requirement:** Arduino, DHT11, etc
- **Software Requirement:** Arduino IDE
- **Theory:**

DTH 11 sensor is used to measure the temperature and humidity. It has a relative Humidity sensing component & a negative temperature. An 8 bit MCU is also Connected in it which is responsible for its Fast response. It is very inexpensive but gives values of both temp and humidity at a time.

### Specification of DHT11:

1. It has humidity range from 20% to 90% RH
2. It Has temperature range From 0-50 °C
3. Inexpensive
4. Fast responsive and durable

### DHT11 pin out:

1. First pin = VCC
2. 2nd pin = DHT is Datapin
3. 3rd pin = DHT pin sensor is ground

### DHT 11 interfacing with arduino:

Connect the ground & VCC of DTH11 temperature and humidity sensor to ground and 5V of arduino, then Connect the datapin of DTH11 sensor to pin 2 of Arduino.

### Component required:

1. Arduino UNO
2. DHT11 Temperature and Humidity sensor

### • Temperature Scale:

There are three temperature scales in use today, Fahrenheit, Celsius and Kelvin.

The most commonly used temperature scale is the Celsius (also called Centigrade) scale. In this scale, water freezes at 0 degrees and boils at 100 degrees.

Another common scale is the Fahrenheit scale, abbreviated F. In this scale, water freezes at 32 degrees and boils at 212.

The Kelvin temperature scale uses the same size degree as Celsius, but has its zero set to absolute zero. To convert from Celsius to Kelvin, add 273.15 to the Celsius reading.

There are also temperature scales in which zero is absolute zero, the lowest possible temperature. (People have gotten close to absolute zero, but have never reached it. According to theory, we never will.) Absolute zero is at -273.15 Celsius, or -459.67 Fahrenheit.

### **Relationship between Different temperature Scales**

Here are formulas to convert temperatures from Kelvin degrees to Fahrenheit and other scales, and vice versa:

Conversion	Equation
Celsius To Fahrenheit	$T (^{\circ}\text{F}) = 9/5 T (^{\circ}\text{C}) + 32$
Fahrenheit – Celsius	$T (^{\circ}\text{C}) = 5/9 (T (^{\circ}\text{F}) - 32)$
Celsius – Kelvin	$T (\text{K}) = T (^{\circ}\text{C}) + 273.15$
Kelvin – Celsius	$T (^{\circ}\text{C}) = T (\text{K}) - 273.15$
Fahrenheit – Kelvin	$T (\text{K}) = 5/9 (T (^{\circ}\text{F}) - 32) + 273.15$
Kelvin – Fahrenheit	$T (^{\circ}\text{F}) = 9/5 (T (\text{K}) - 273.15) + 32$

**Conclusion :-** Thus, we studied the conversion of temperature in Fahrenheit as well as Max and min temperature it has seen.

## **Experiment No. 8**

```
#include <DHT.h>

// Define the DHT11 sensor type and pin
#define DHTPIN 2    // Pin where the DHT11 is connected
#define DHTTYPE DHT11 // DHT 11

// Initialize the DHT sensor
DHT dht(DHTPIN, DHTTYPE);

// Variables to store the current, maximum, and minimum temperatures
float currentTemperatureF = 0.0;
float maxTemperatureF = -1000.0;
float minTemperatureF = 1000.0;

void setup() {
    // Start the serial communication
    Serial.begin(9600);

    // Initialize the DHT sensor
    dht.begin();
}

void loop() {
    // Read temperature as Celsius
    float temperatureC = dht.readTemperature();

    // Check if the reading is valid (non-NAN)
    if (isnan(temperatureC)) {
        Serial.println("Failed to read from DHT sensor!");
        return;
    }

    // Convert the temperature to Fahrenheit
    currentTemperatureF = (temperatureC * 9.0 / 5.0) + 32.0;
```

```
// Update the maximum and minimum temperatures
if (currentTemperatureF > maxTemperatureF) {
    maxTemperatureF = currentTemperatureF;
}

if (currentTemperatureF < minTemperatureF) {
    minTemperatureF = currentTemperatureF;
}

Serial.print("Current Temperature degree celsius : ");
Serial.print(temperatureC);
Serial.println(" °C");

// Display the current, maximum, and minimum temperatures
Serial.print("Current Temperature: ");
Serial.print(currentTemperatureF);
Serial.println(" °F");

Serial.print("Max Temperature: ");
Serial.print(maxTemperatureF);
Serial.println(" °F");

Serial.print("Min Temperature: ");
Serial.print(minTemperatureF);
Serial.println(" °F");

// Wait for 4 seconds before taking another reading
delay(4000);
}
```