Experiment 6

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1. Aim:

Interfacing of Arduino/Raspberry Pi with temperature and humidity sensor with real time application.

2. Objective:

- To demonstrate the ability to interface an Arduino/Raspberry Pi with a temperature and humidity sensor and obtain real-time readings of the environment.
- To develop a practical application for the sensor data, such as controlling an HVAC system or alerting users to potential environmental hazards.

3. Components Required:

- Raspberry Pi3 Model B`s with installed Raspbian or Arduino Board
- 8 GB microSD cards
- Internet connection (Wired or Wireless) to access Pi Desktop
- VNC client on a wired or wireless device
- Breadboard
- Jumper Wires
- DH11 Temperature and Humidity Sensor
- USB or 5V Power Supply

4. Script and Output:

About DH11 Sensor:

DHT11 Module features a temperature & humidity sensor complex with a calibrated digital signal output. The exclusive digital-signal-acquisition technique and temperature & humidity sensing technology ensure high reliability and excellent long-term stability. This sensor includes an NTC for temperature measurement and a resistive-type humidity measurement component for humidity measurement. These are connected to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability, and cost-effectiveness.

DHT11 Module Pinout:

The DHT11 module has a total of 3 pins. In which two are for power and one is for communication. The pinout of a DHT11 Sensor module is as follows:

- DATA Data pin for 1-wire communication.
- GND Ground Connected to Ground pin of the Arduino.
- VCC Provides power for the module, Connect to the 5V pin of the Arduino.

5. Code:

```
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#define DHTTYPE    DHT11     // DHT 11
#define DHTPIN 2

DHT_Unified dht(DHTPIN, DHTTYPE)
uint32_t delayMS;

void setup() {

  Serial.begin(9600);
  dht.begin();
  sensor_t sensor;
  delayMS = sensor.min_delay / 1000;

}
void loop()
{
 sensors_event_t event;
  dht.temperature().getEvent(&event);
  Serial.print(F("Temperature: "));
  Serial.print(event.temperature);
  Serial.println(F("°C"));
  dht.humidity().getEvent(&event);
  Serial.print(F("Humidity: "));
  Serial.print(event.relative_humidity);
  Serial.println(F("%"));
  delay(delayMS);

}
```

6. Figure/Screenshots:

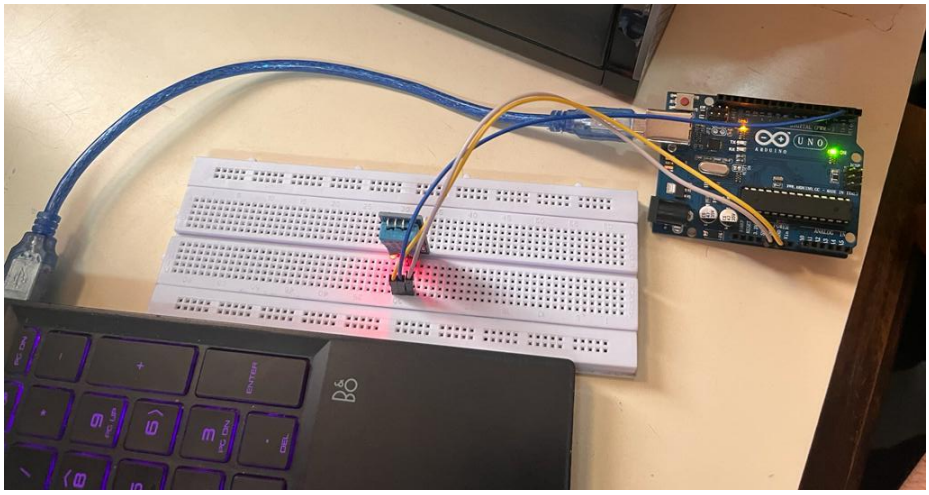

Fig1: Temperature and humidity sensor connected with breadboard, Arduino, jumper wires and connecting cables with laptop real time application.

7. Result/Output:

The experiment successfully demonstrated the ability to interface an Arduino/Raspberry Pi with a temperature and humidity sensor, obtain real-time readings, and use the data for practical applications such as environmental control or hazard detection.

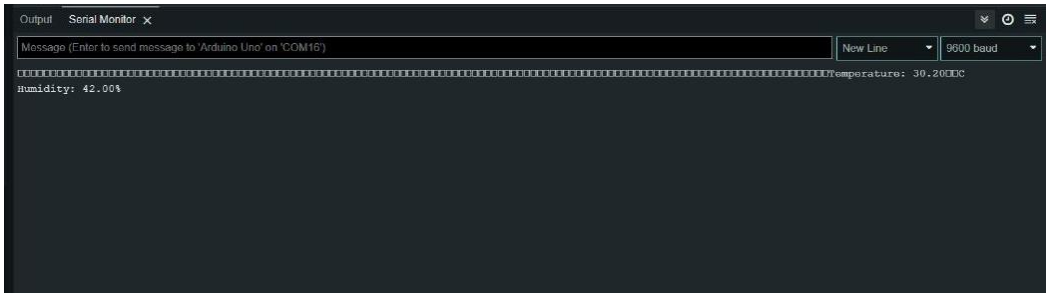

Fig.2: Reading of humidity and temperature through temperature sensor

8. Analysis of the experiment:

The experiment involved connecting a temperature and humidity sensor to an Arduino/Raspberry Pi to collect and process data in real-time. The results demonstrated the feasibility of practical applications for this type of sensor integration.