Course Name: Internet of Things Lab **Course code:** 21CSP-344

Experiment 2.2

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Subject Name: Internet of Things Lab **Subject Code:** 21CSP-344

Aim: To investigate real-time relationship between humidity and temperature in IoT.

Objectives:
- Learn about temperature sensor.

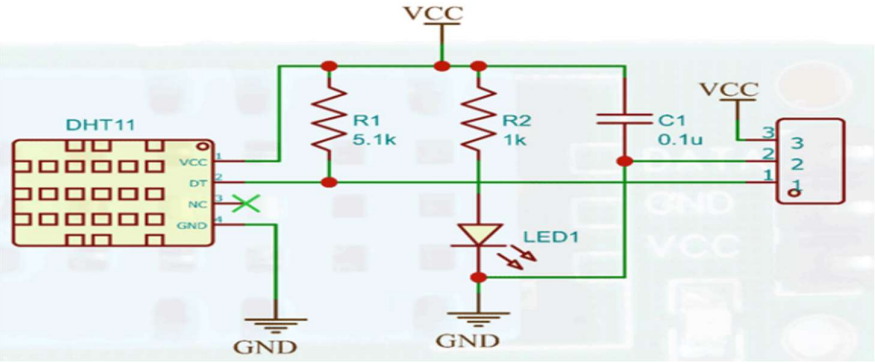
Software used: Arduino UNO

Hardware used:
- Arduino Board
- Breadboard
- Jumper Wires
- DH11 Temperature and Humidity Sensor

Theory:

DHT11 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 Circuit Diagram: The schematic diagram for the DHT11 module is given below. As mentioned earlier, the board has a very low components count. The VCC and GND are directly connected to the DHT11 and a pull-up resistor is added to the DATA pin. Sufficient filtering is provided with the tantalum and multilayer capacitors. An LED with a current limit resistor is used as a power indicator.



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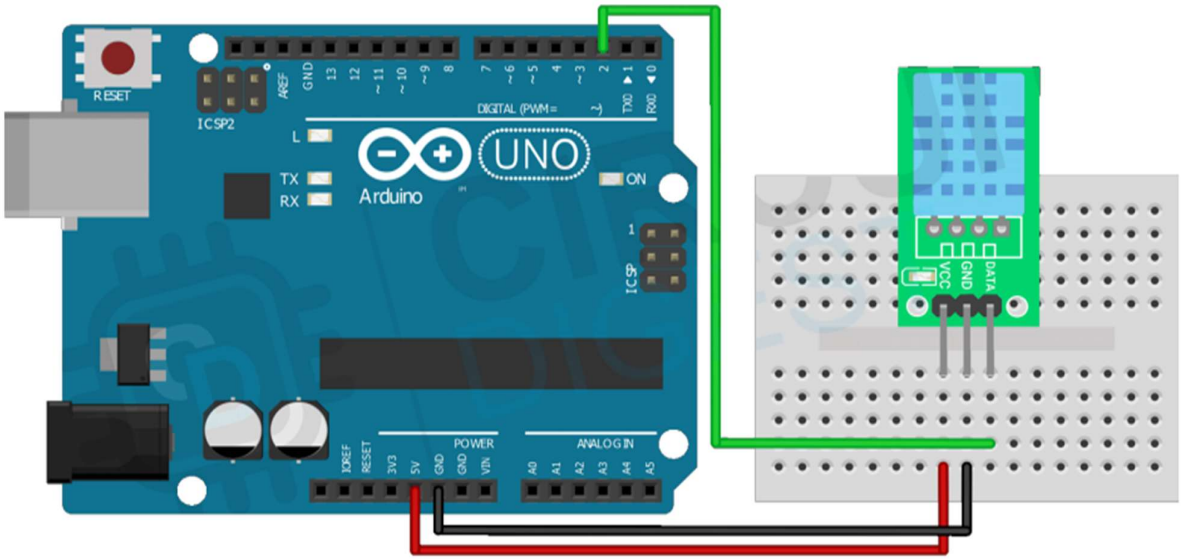
Circuit Diagram:



Code:

```
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#define DHTTYPE DHT11 // DHT 11
#define DHTPIN 8
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);
```

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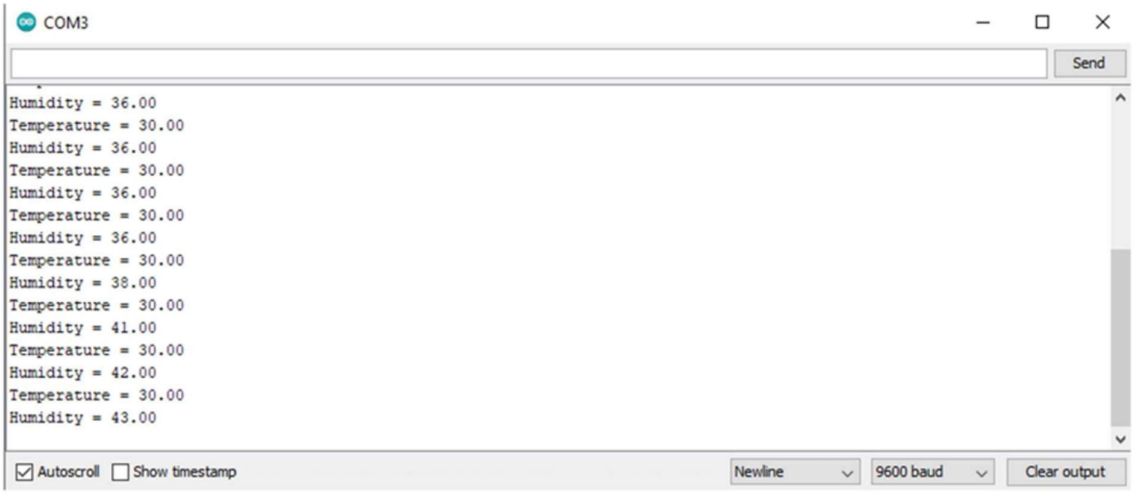
```
 Serial.print(F("Temperature: "));
 Serial.print(event.temperature);
 Serial.println(F("°C"));
 dht.humidity().getEvent(&event);
 Serial.print(F("Humidity: "));
 Serial.print(event.relative_humidity);
 Serial.println(F("%"));
 delay(delayMS);
}
```

Result/Conclusion:

The DHT11 sensor is capable of measuring Temperature and Humidity of the surrounding air which can be printed to the serial monitor in the Arduino IDE.



Learning Outcomes:

- Learned about IOT applications.
- Learned about different types of sensors and their uses.
- Learned about DHT11 sensors.
- Learned about advantages and limitations of DHT11 sensors.