

GROUP 5

DHT-11: Digital Temperature and Humidity Sensor



Overview of DHT11:

The DHT11 is an entry-level digital temperature and humidity sensor renowned for its simplicity and affordability. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc... to measure humidity and temperature instantaneously. It employs a capacitive humidity sensor and a thermistor to gauge the ambient conditions. Additionally, it features an 8-bit microcontroller for serial data output. Despite its basic design, precise timing is crucial for data retrieval, with updates available approximately every two seconds.

Components and Functionality:

The DHT11 comprises a capacitive humidity sensor, a thermistor, an 8-bit microcontroller, and a resistor for pull-up functionality.

The capacitive humidity sensor measures humidity by detecting capacitance changes.

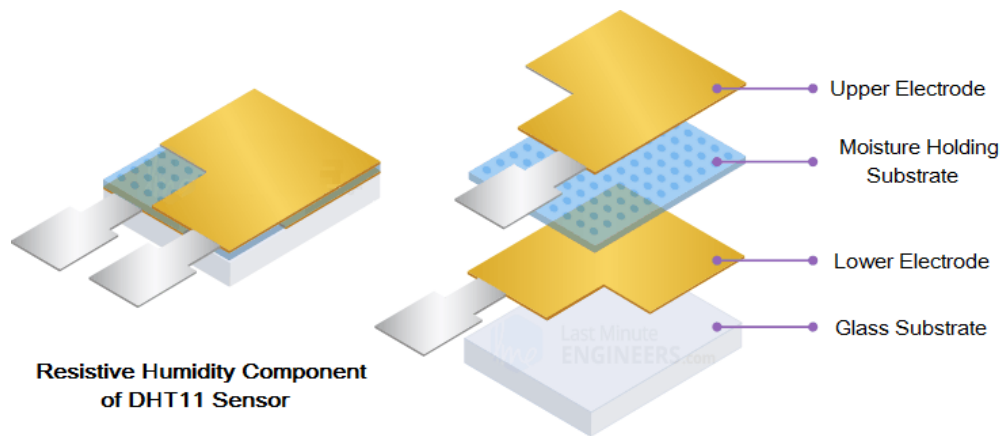
The thermistor detects temperature variations by monitoring electrical resistance.

An 8-bit microcontroller processes sensor data and facilitates serial data transmission.

A pull-up resistor ensures stable data communication.

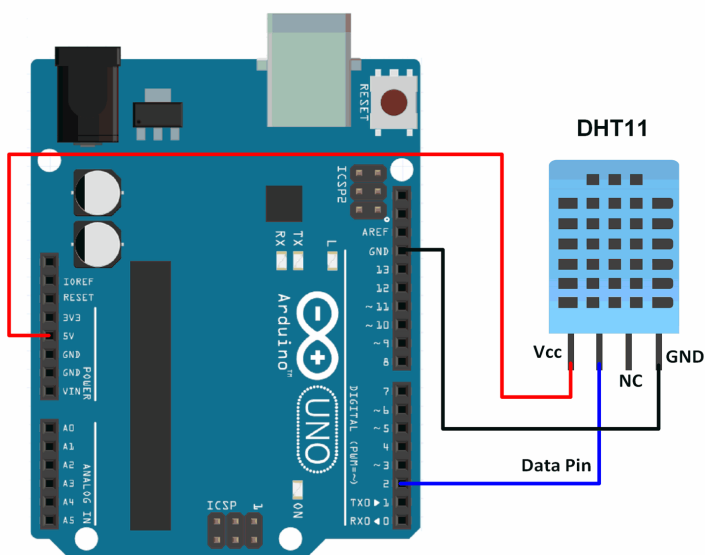
Operation Principle:

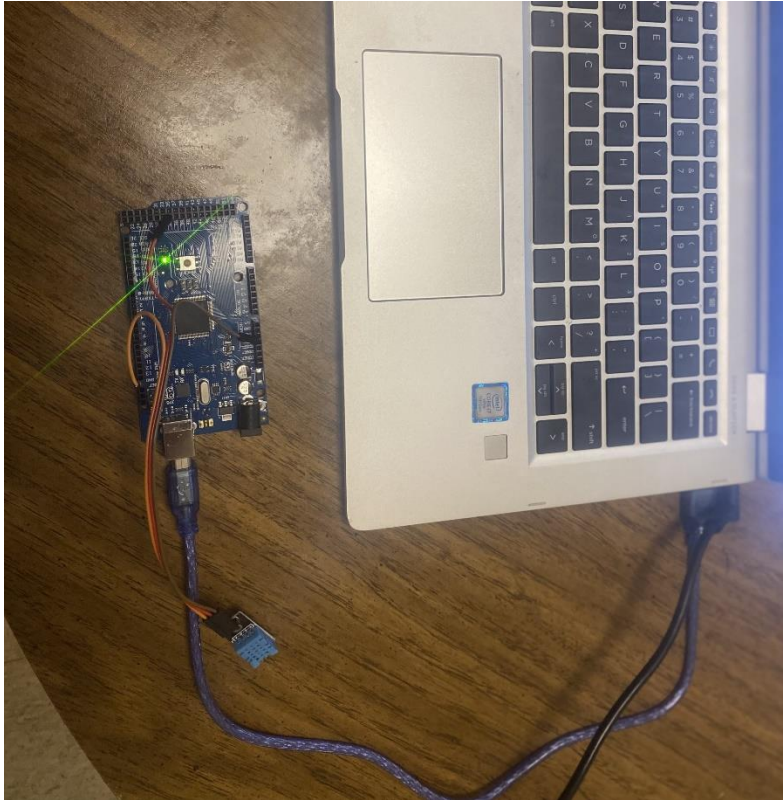
The DHT11 sensor comprises a capacitive humidity sensing element and a thermistor for temperature detection. Within the humidity sensing component, two electrodes sandwich a moisture-holding substrate, acting as a dielectric, leading to changes in capacitance relative to humidity fluctuations. The integrated circuit (IC) processes these alterations in resistance, converting them into digital signals.



For temperature measurement, the sensor utilizes a Negative Temperature Coefficient (NTC) thermistor, characterized by a decrease in resistance with rising temperatures. To enhance sensitivity, semiconductor ceramics or polymers are commonly employed to construct the sensor, ensuring substantial resistance variations even with minimal temperature changes.

Data transmission relies on a single-bus format, with 8-bit segments for humidity and temperature readings, along with a checksum for data integrity.





Positive and negative are connected to 5v and ground and digital(data) pin is connected to any digital pin on the Arduino board.

It is a library-based code, so first we need to install the library for dht sensor.

In the DHT sensor library open DHT tester and set pin number to the pin you put it on `{#define DHTPIN 2}`.