

Lab Report

Course Name: Internet of Things

Course Code: CSE 406

Section No: 01

Lab Exercise No: 01

Submitted To:

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Date of submission: 30 June 2025

Experiment Name: Introduction to Arduino IDE, DHT11 Sensor, and Water Level Sensor.

Objective:

- To install and set up the Arduino Integrated Development Environment (IDE).
- To understand the basic working principles of the DHT11 temperature and humidity sensor.
- To explore the functionality of a basic water sensor.

Apparatus and Components Required:

- Computer with internet access
- Arduino UNO board
- USB cable
- DHT11 Sensor
- Water Level Sensor (analog)
- Jumper wires

Theory:

1.Arduino IDE:

The Arduino IDE, an open-source environment for creating and uploading programs to boards that are compatible with Arduino. It enables serial connectivity for testing and debugging and supports C/C++.

2. DHT11 Sensor:

The DHT11 is a simple digital sensor for humidity and temperature. It measures the ambient air using thermistor and a capacitive humidity sensor before sending a digital signal to a single data pin. Indoor monitoring systems, smart agriculture, and weather stations all make extensive use of it.

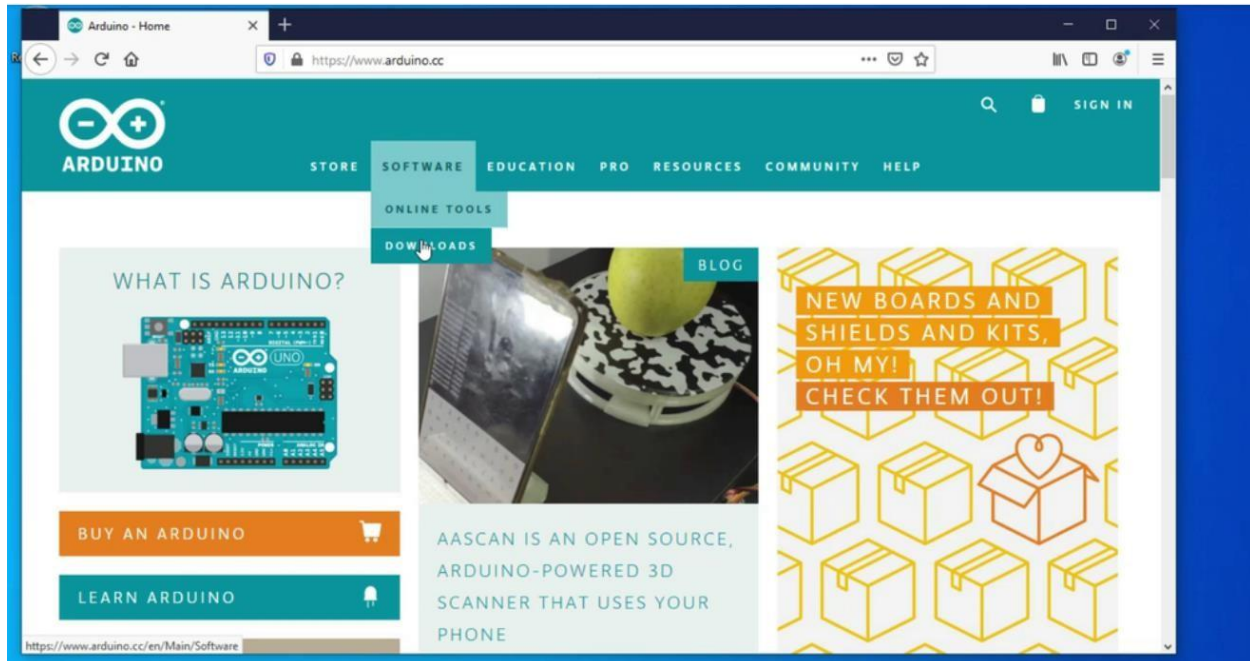
3. Water Level Sensor:

A water sensor measures the water level or its presence. Based on the amount of water sensed, it generates an analogue signal using the conductivity principle. It is frequently utilized in automated irrigation systems, flood detection, and tanks.

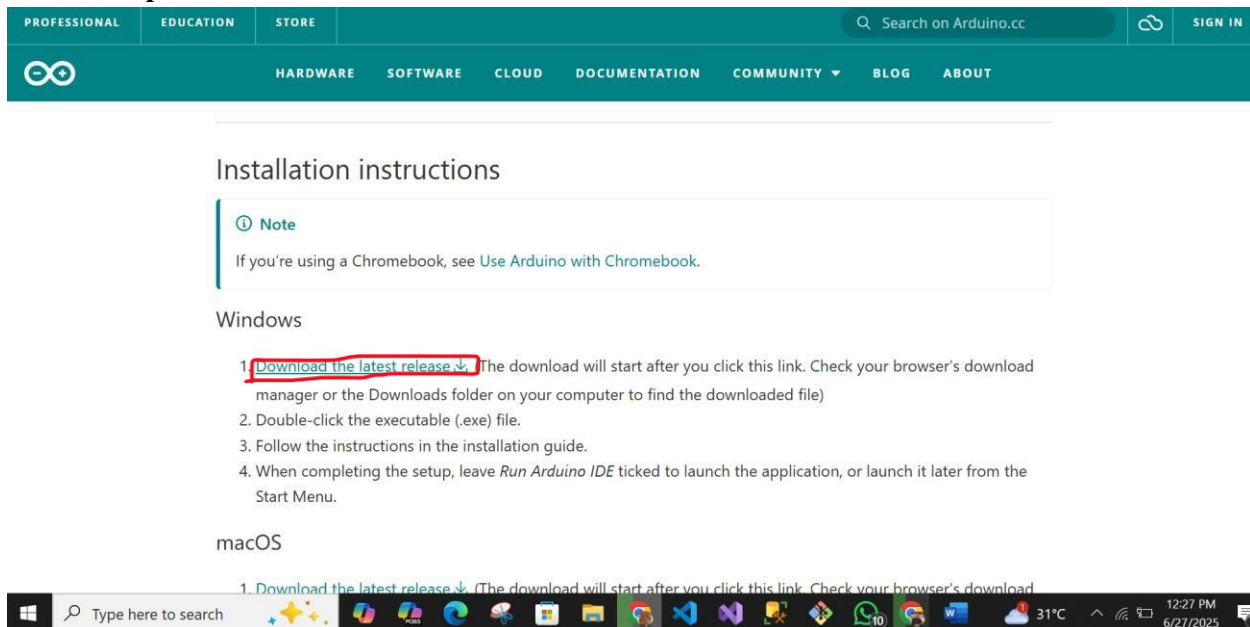
Lab Activities:

❖ Arduino IDE installation

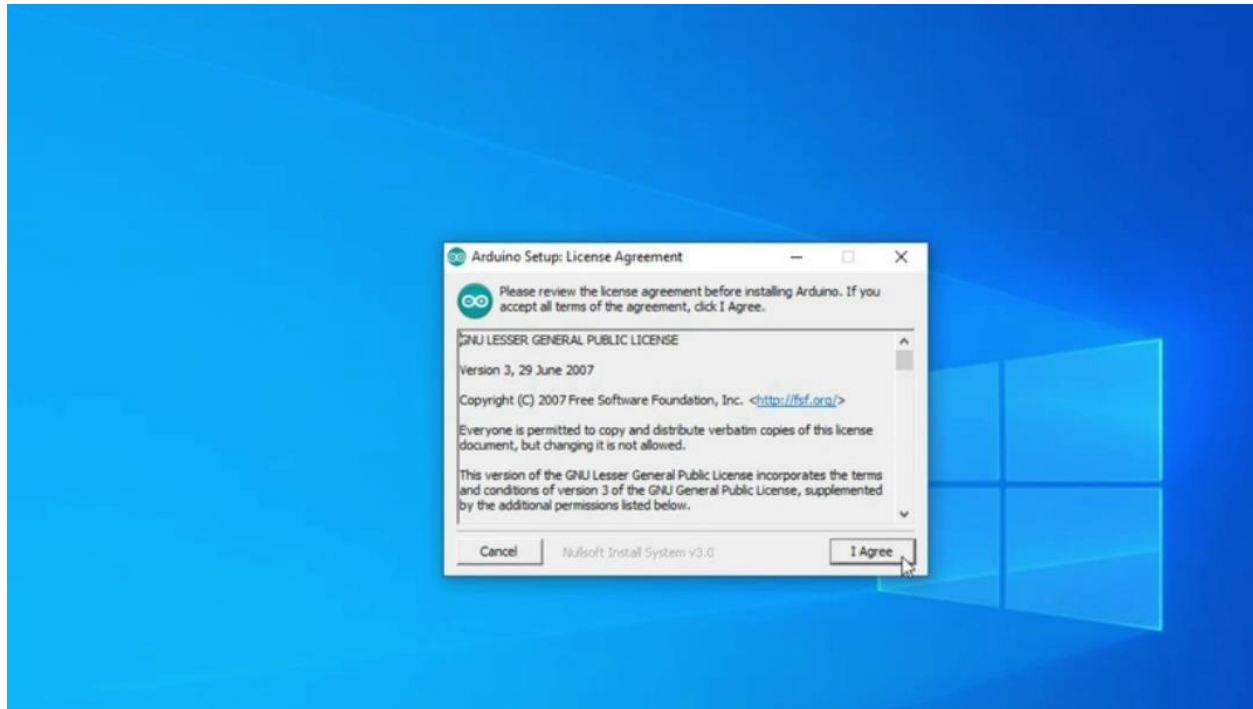
Step 1: Go to the Arduino.cc Website



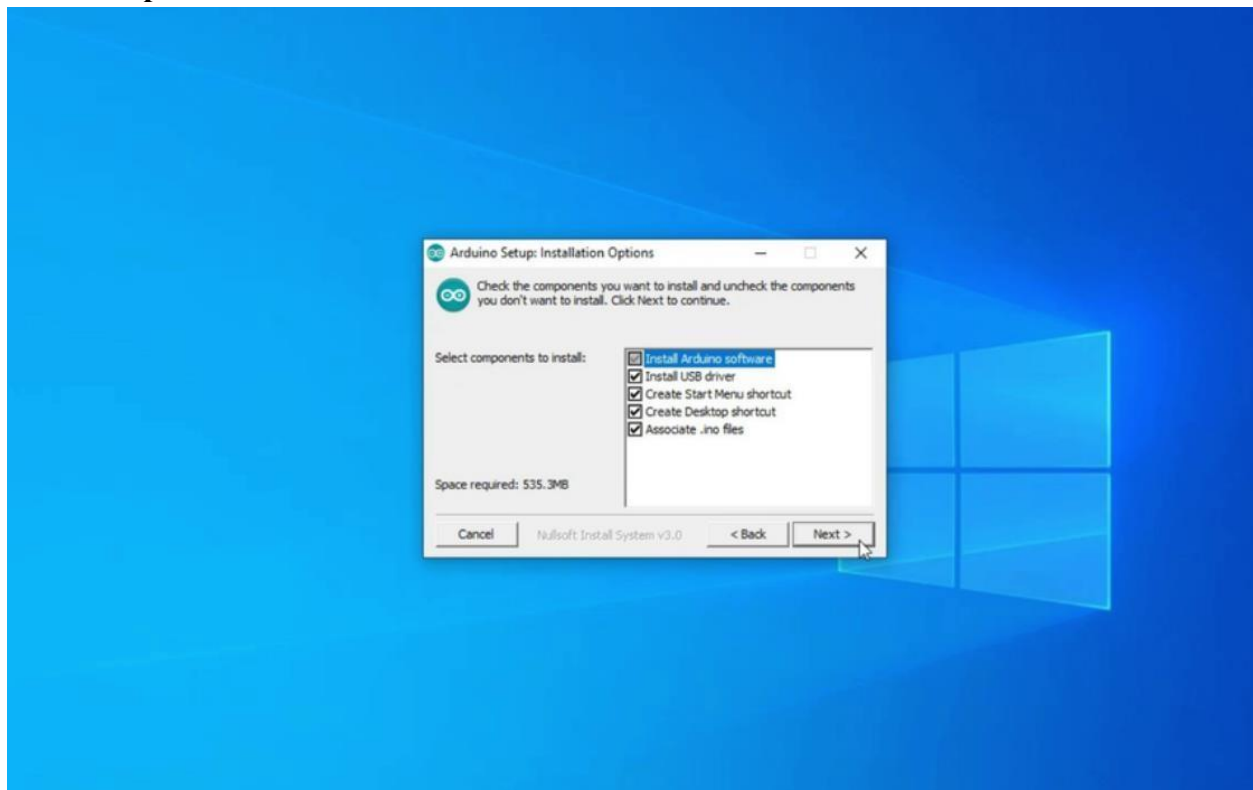
Step 2: Click on the Download Link



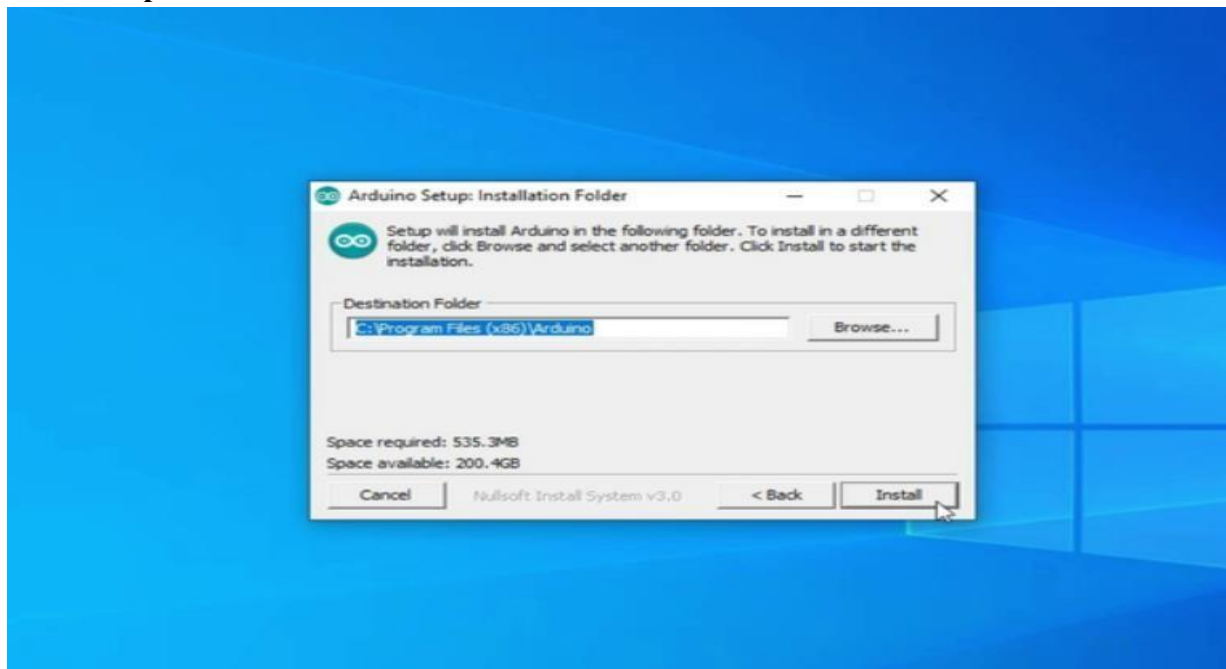
Step 3: Begin the Installation Process



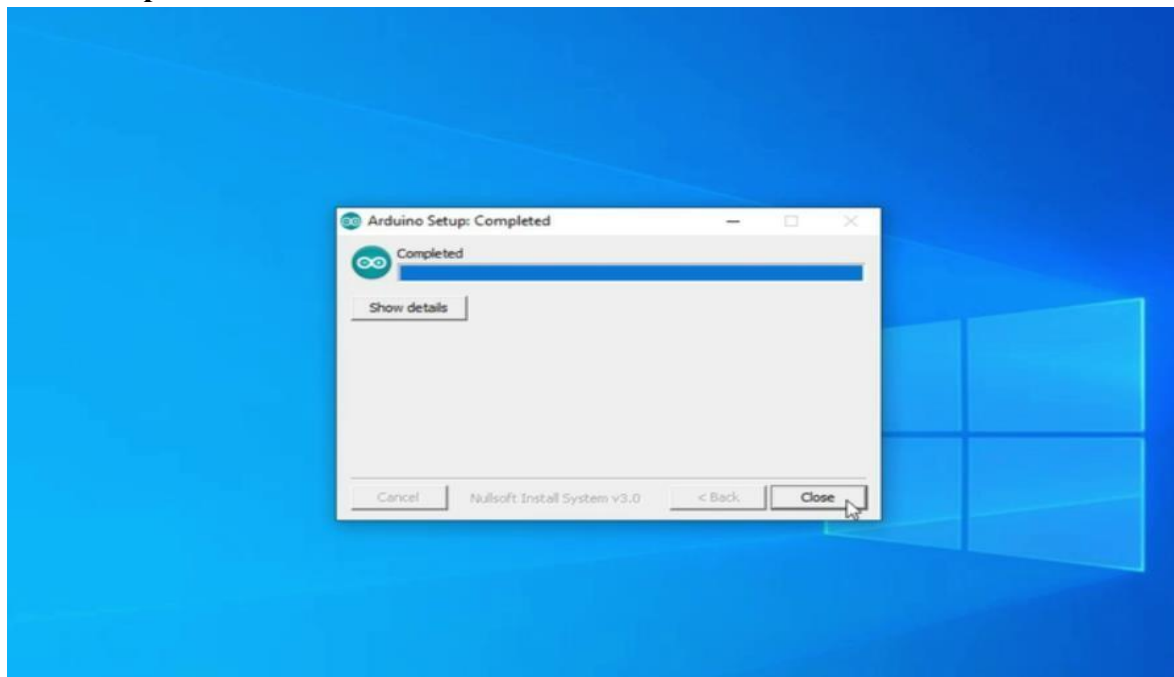
Step 4: Select What to Install



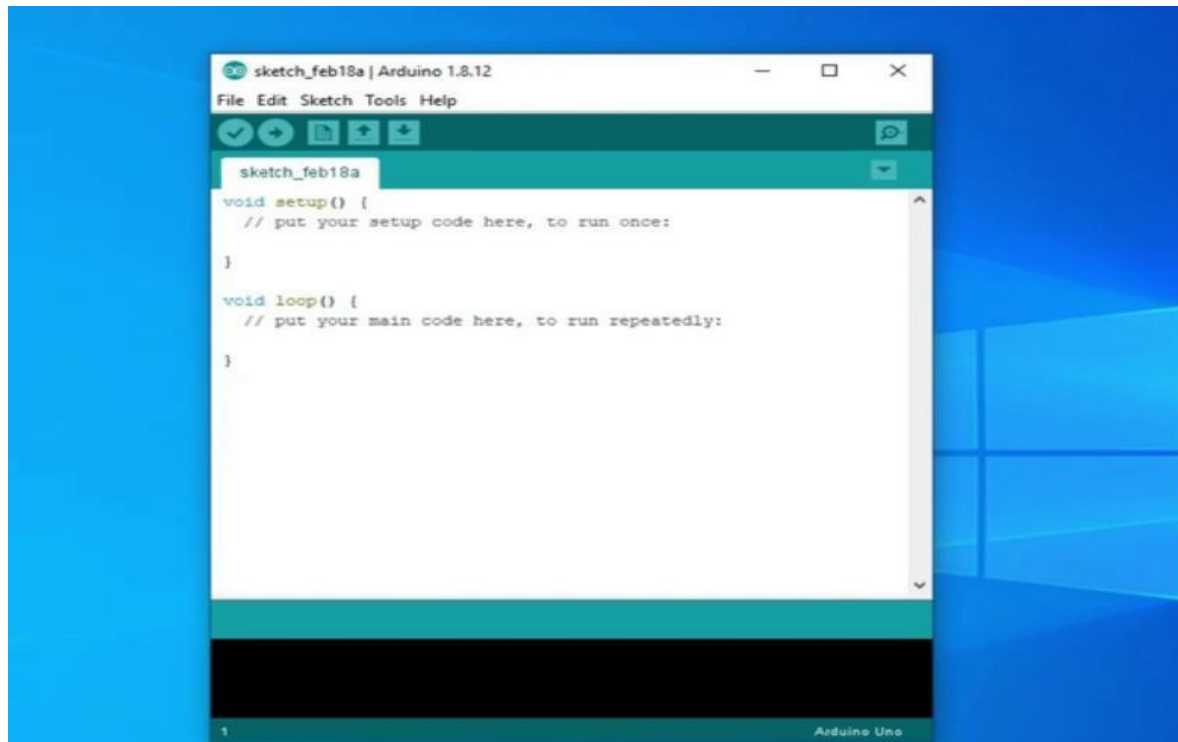
Step 5: Choose the Installation Path



Step 6: Finish the Installation

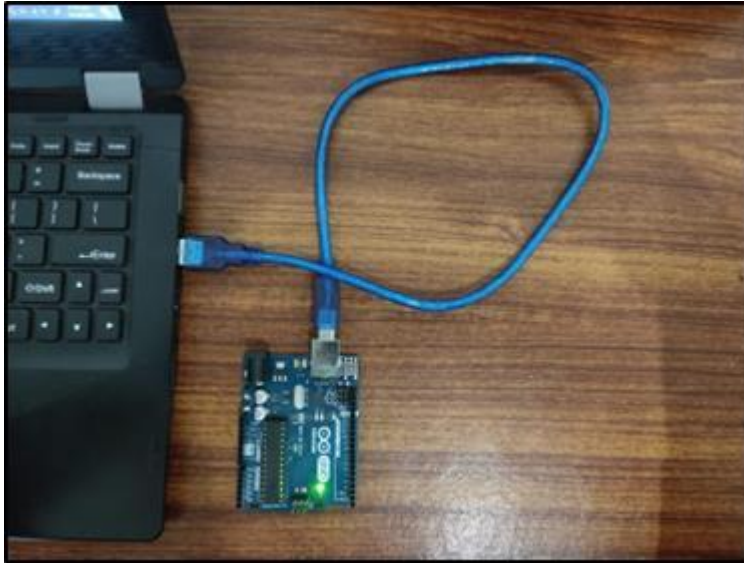


Step 7: Launch the Arduino IDE



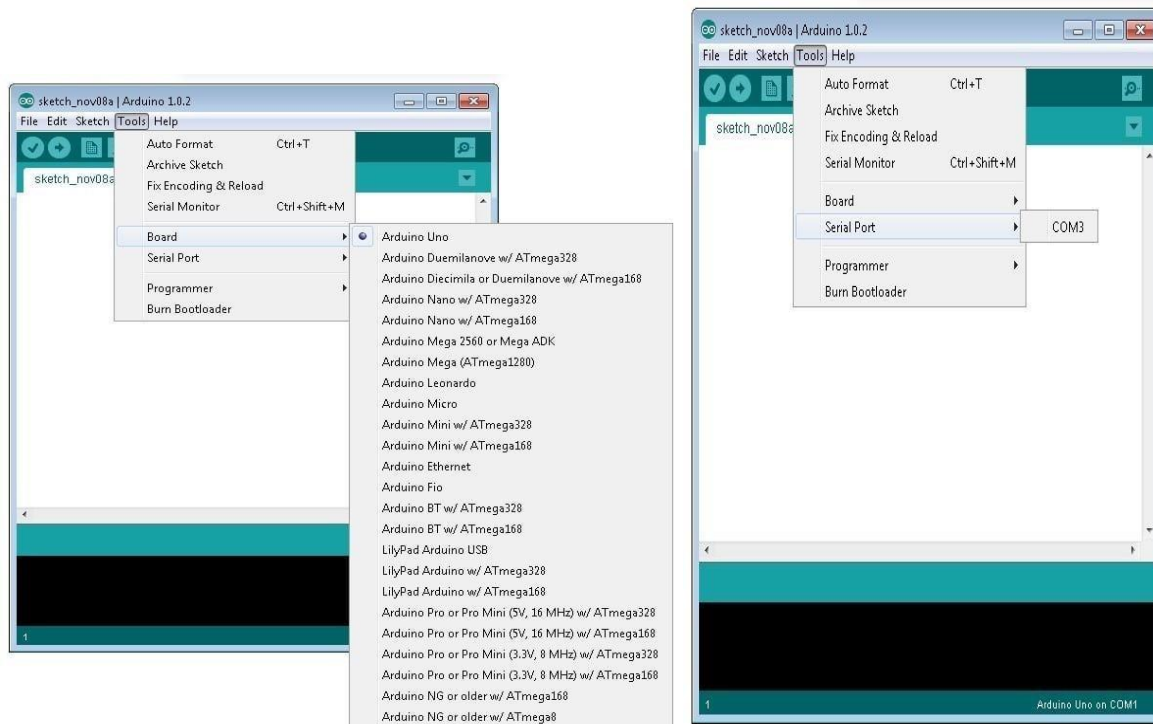
Connect Arduino UNO Board

1. Connect your **Arduino UNO** board to your computer using a **USB Type-A to Type-B cable**.
2. The power LED (green) on the board should light up.



Select Arduino Board and Port

1. Open the Arduino IDE.
2. Go to Tools > Board > Arduino AVR Boards > Arduino Uno
3. Go to Tools > Port o It will show a port like COM3 or COM4 (it depends on the PC).
4. Select the COM port that appears after plug in the Arduino.

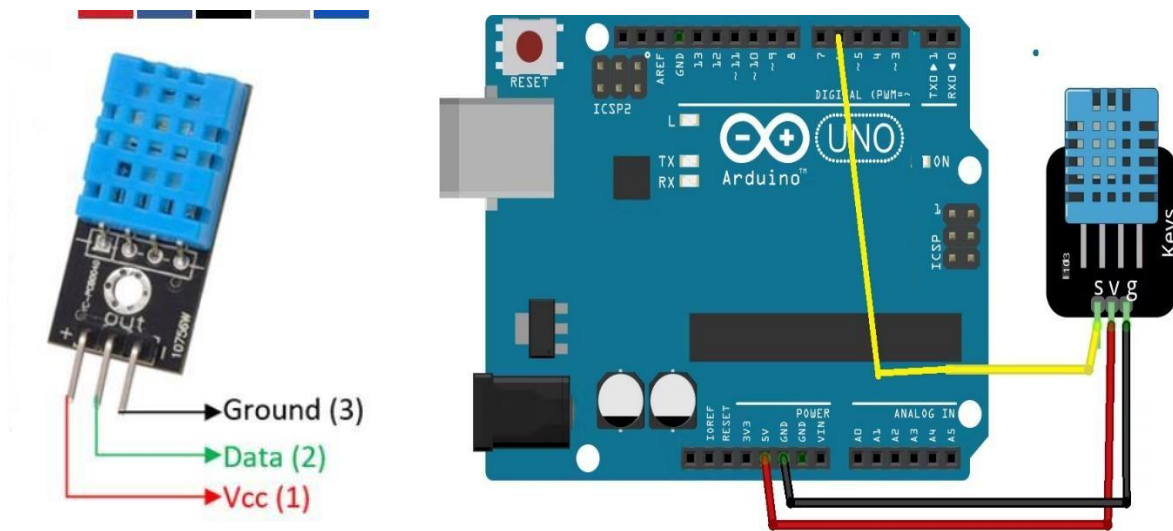


Upload the Blink Program

1. Go to File > Examples > 01.Basics > Blink This code will blink the built-in LED on pin 13.
2. Click the Upload (→) button at the top left.
3. After compiling, the IDE will upload the code and show “Done uploading”.
4. Then the onboard LED will start blinking every 1 second.

DHT11 Sensor Demonstration:

✦ DHT11 Pin Configuration:



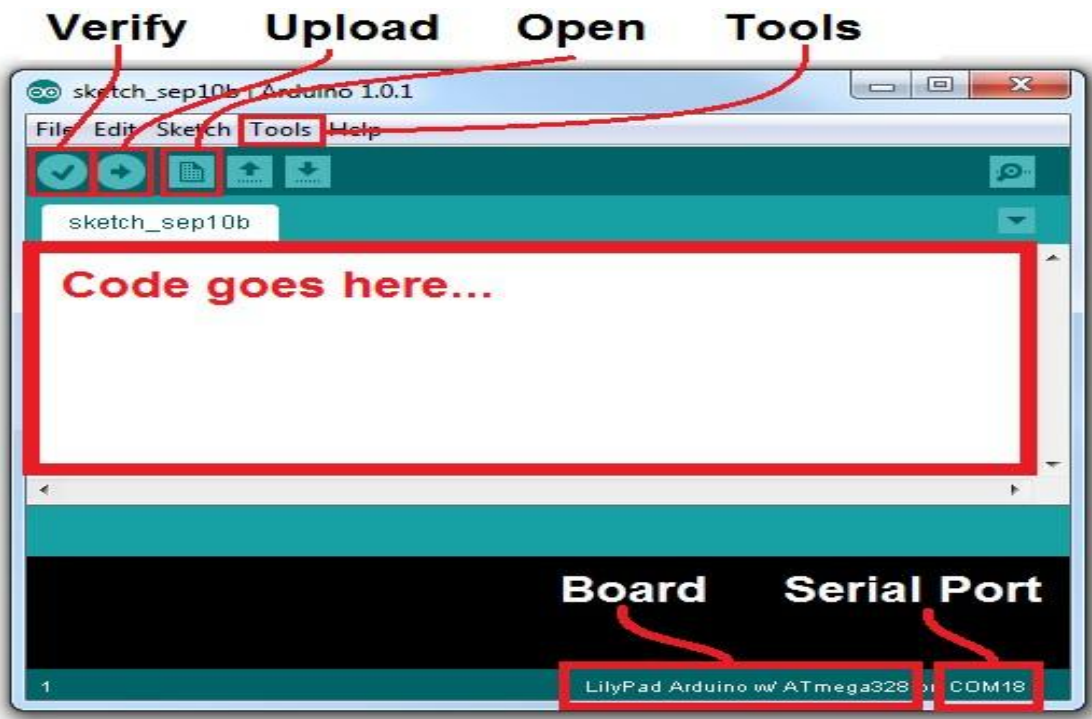
❖ Installing the DHT Library:

1. Open Arduino IDE.
2. Go to Sketch > Include Library > Manage Libraries...
3. In the Library Manager, search for “DHT sensor library”.
4. Install the one by Adafruit (it's very popular and well-maintained).
5. It will auto-install required dependencies (like Adafruit Unified Sensor Library).

Then paste the sample code of DHT11 sensor and upload the code.

❖ Upload the Code:

1. Go to Tools > Board > Arduino Uno
2. Go to Tools > Port and select the correct COM port
3. Paste the code.
4. Click the verify (☑) button
5. Click the Upload (→) button

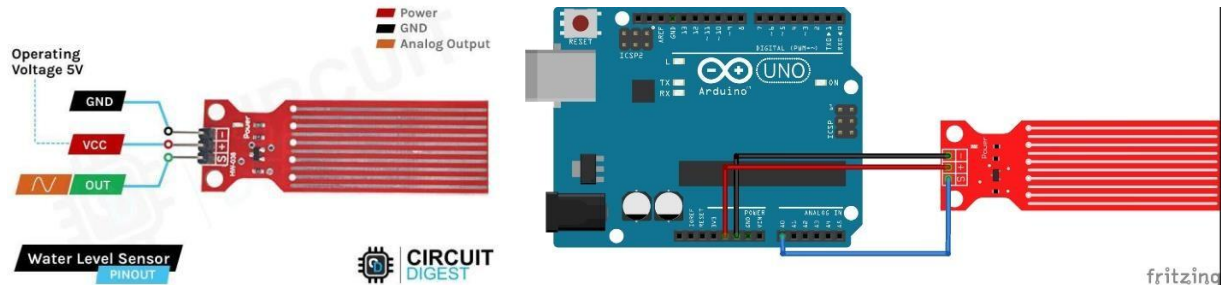


The output will be like,

```
Humidity: 55.00 %   Temperature: 27.00 *C
Humidity: 56.00 %   Temperature: 27.10 *C
```

Water Sensor with Arduino

❖ Pin Configuration Of water sensor



❖ Then similarly upload the sample code for water sensor.

View Output in Serial Monitor

1. Open Arduino IDE
2. Go to Tools > Serial Monitor
3. Set baud rate to 9600
4. Place the sensor on different water levels

It will show the output like,

```
Water level: 0
Water level: 0
Water level: 0
Water level: 0
Water level: 80
Water level: 130
Water level: 260
Water level: 390
Water level: 411
Water level: 420
Water level: 435
Water level: 448
Water level: 485
Water level: 511
Water level: 521
Water level: 524
Water level: 533
```

The sensor was dry

The sensor was partially immersed in water

The sensor was fully immersed in water

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