

USING LIBRARIES

What are Arduino Libraries?

- Libraries are pre-written pieces of code that extend the functionality of your Arduino sketches.
- They help you work with sensors, displays, motors, communication modules, and other hardware easily—without writing everything from scratch.
- Libraries include functions, classes, and examples that simplify coding.

Example: To control an LCD display, instead of writing low-level code, you can use the LiquidCrystal library.

Types of Arduino Libraries

Type	Description	Examples
Built-in Libraries	Pre-installed with Arduino IDE	Servo.h, LiquidCrystal.h

Contributed Libraries	Installed by users from Library Manager	Adafruit_Sensor.h, DHT.h
Custom Libraries	User-created libraries	Self-made or downloaded from GitHub

How to Use a Library

Step 1: Include the Library in Your Sketch

Use `#include <LibraryName.h>` at the beginning of your code.

```
#include <Servo.h> // Include the Servo motor library
```

Step 2: Use the Functions Provided

Example using the Servo library:

```
#include <Servo.h>
```

```
Servo myServo;
```

```
void setup() {
```

```
  myServo.attach(9); // Connect servo to pin 9
```

```
}
```

```
void loop() {
```

```
  myServo.write(90); // Rotate to 90 degrees
```

```
  delay(1000);
```

```
  myServo.write(0); // Rotate to 0 degrees
```

```
  delay(1000);
```

```
}
```

How to Install a Library

There are 3 common methods to install libraries in Arduino IDE:

Method 1: Using Library Manager (Recommended)

Steps:

1. Open Arduino IDE
2. Go to Sketch > Include Library > Manage Libraries
3. The Library Manager window will open
4. Search for the desired library (e.g., DHT sensor)

5. Click Install

Example: Search for DHT sensor library and install it to use DHT11/DHT22 sensors.

Method 2: Installing ZIP Library

If you have a .zip file of the library (from GitHub or other sources):

Steps:

1. Download the .zip file of the library
2. Open Arduino IDE
3. Go to Sketch > Include Library > Add .ZIP Library
4. Select the downloaded .zip file
5. Library will be added automatically

Method 3: Manual Installation

If you want to install a library manually:

Steps:

1. Download and extract the library folder (should contain .h and .cpp files)

2. Move it to:

Documents > Arduino > libraries

Restart Arduino IDE

After restart, go to Sketch > Include Library, and you should see your library listed.

How to Upload a Sketch Using a Library

Once a library is included:

- Just write your code using the library functions
- Connect your Arduino board
- Click Verify to check for errors
- Click Upload to send the code to the board

Commonly Used Libraries in Arduino

Library Name	Used For
Servo.h	Controlling servo motors
LiquidCrystal.h	LCD display

Wire.h	I2C communication
SPI.h	SPI communication
DHT.h	DHT11/DHT22 humidity sensors
Adafruit_GFX.h	Graphics for displays
Ultrasonic.h	Ultrasonic sensors

Troubleshooting Library Issues

Problem	Solution
Library not found	Check if installed in the correct folder
Conflicting libraries	Remove duplicate or older versions
Error on include line	Check spelling, or reinstall library
Functions not working	Read examples and check pin connections

Real-life Example: DHT11 Sensor Code Using Library

```
#include "DHT.h" // Include the DHT sensor library
```

```
#define DHTPIN 2    // Sensor data pin connected to Arduino
pin 2

#define DHTTYPE DHT11 // DHT11 sensor type

DHT dht(DHTPIN, DHTTYPE);

void setup() {

  Serial.begin(9600);

  dht.begin();    // Start the sensor
}

void loop() {

  float h = dht.readHumidity();    // Read humidity
  float t = dht.readTemperature(); // Read temperature

  Serial.print("Humidity: ");

  Serial.print(h);

  Serial.print("% | Temperature: ");

  Serial.print(t);

  Serial.println("°C");
```

```
delay(2000);  
}
```

Summary

Step	Action
Include Library	#include <LibraryName.h>
Install via Library Manager	Sketch > Include Library > Manage Libs
Install ZIP File	Sketch > Include Library > Add ZIP
Use Library Functions	As per documentation/examples