

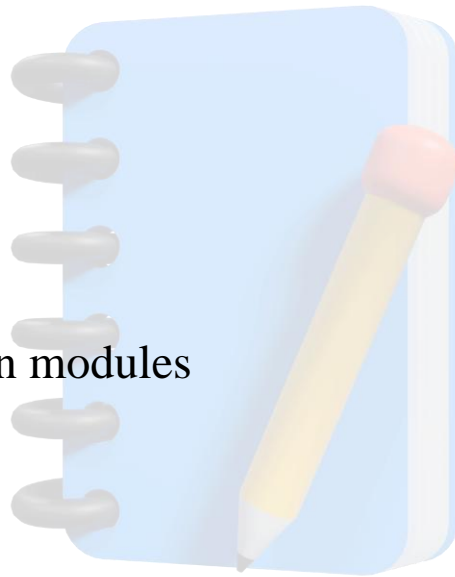
# ADDITIONS IN ARDUINO

## 1. What Are Additions in Arduino?

Additions refer to any external components or modules that enhance the Arduino's ability to interact with the environment or perform specific tasks.

**They include:**

- Sensors
- Actuators
- Displays
- Communication modules
- Shields
- Libraries
- Expansion boards



## 2. Common Additions in Arduino Projects

### A. Sensors (Input Devices)

Used to sense physical parameters:

Sensor Type	Example	Used For
Temperature	DHT11, LM35	Monitoring heat/temp
Light	LDR (Light Sensor)	Auto light systems
Distance	Ultrasonic (HC-SR04)	Proximity detection
Gas	MQ2, MQ135	Smoke/gas leakage detection
Motion	PIR Sensor	Intruder detection

## B. Actuators (Output Devices)

Used to perform actions based on Arduino outputs:

Device	Use Case
Servo Motors	Robotics, precise movement
DC Motors	Cars, fans
Buzzers	Alarms, notifications
Relays	Switching high-voltage devices

## C. Displays

To display data from Arduino:

<b>Display Type</b>	<b>Description</b>
<b>LCD 16x2</b>	Alphanumeric display
<b>OLED Display</b>	Graphical output, 0.96" screens
<b>7-Segment</b>	Displaying numbers

## D. Communication Modules

For wireless or wired communication:

<b>Module</b>	<b>Function</b>
<b>Bluetooth (HC-05/06)</b>	Wireless control via phone
<b>WiFi (ESP8266, NodeMCU)</b>	IoT, online data transfer
<b>RF Module (433 MHz)</b>	Long-range wireless comm
<b>GSM Module (SIM800L)</b>	Send SMS, make calls
<b>I2C/SPI</b>	Interfacing multiple devices

## E. Shields

Pre-made boards that stack on top of Arduino for plug-and-play functionality:

Shield Type	Purpose
Motor Driver Shield	Controlling multiple motors
Ethernet Shield	Internet connectivity
Sensor Shield	Easy sensor connections
LCD Keypad Shield	Display + input buttons

## F. Expansion Boards

Other microcontroller-based boards to extend Arduino:

- NodeMCU (WiFi)
- ESP32 (WiFi + Bluetooth)
- Arduino Mega (more I/O pins)

## G. Libraries (Software Additions)

- Help interact with sensors, displays, and modules

- Examples: DHT.h, Servo.h, Wire.h, LiquidCrystal.h

## Real-World Example: Adding DHT11 Sensor and Display

Components Added:

- DHT11 Sensor
- 16x2 LCD Display

Function: Read temperature & humidity, display on LCD.

```
#include <DHT.h>
```

```
#include <LiquidCrystal.h>
```

```
#define DHTPIN 2
```

```
#define DHTTYPE DHT11
```

```
DHT dht(DHTPIN, DHTTYPE);
```

```
LiquidCrystal lcd(7, 8, 9, 10, 11, 12);
```

```
void setup() {
```

```
lcd.begin(16, 2);  
  
dht.begin();  
  
}  
  
void loop() {  
    float h = dht.readHumidity();  
    float t = dht.readTemperature();  
  
    lcd.setCursor(0, 0);  
    lcd.print("Temp: ");  
    lcd.print(t);  
    lcd.print(" C");  
  
    lcd.setCursor(0, 1);  
  
    lcd.print("Humidity: ");  
  
    lcd.print(h);  
  
    lcd.print("%");
```

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

### Summary Table: Additions in Arduino

Type	Examples	Use
Sensors	DHT11, LDR, Ultrasonic	Data input
Actuators	Servo, Relay, Buzzer	Action output
Displays	LCD, OLED, 7-Segment	Display data
Communication	HC-05, ESP8266, GSM	Send/receive data
Shields	Motor, LCD, Ethernet	Plug-and-play functions
Libraries	Servo.h, DHT.h, LiquidCrystal.h	Code support
Boards	NodeMCU, Arduino Mega	More power/features