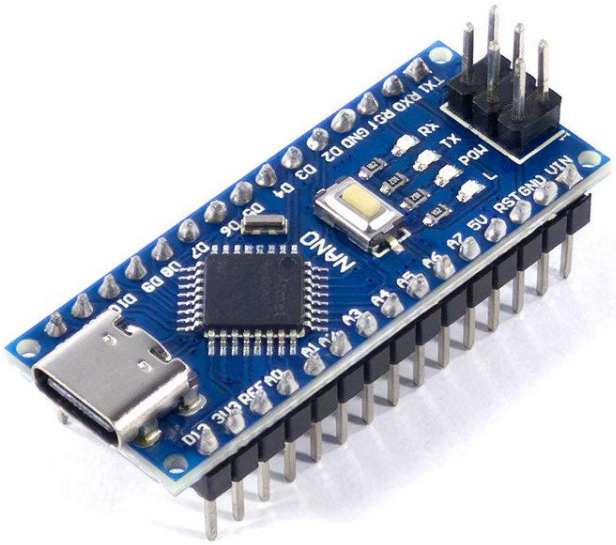
GETTING STARTERD WITH ROBOTICS

Course Information and Resources

Board Architecture and Overview

Introduction

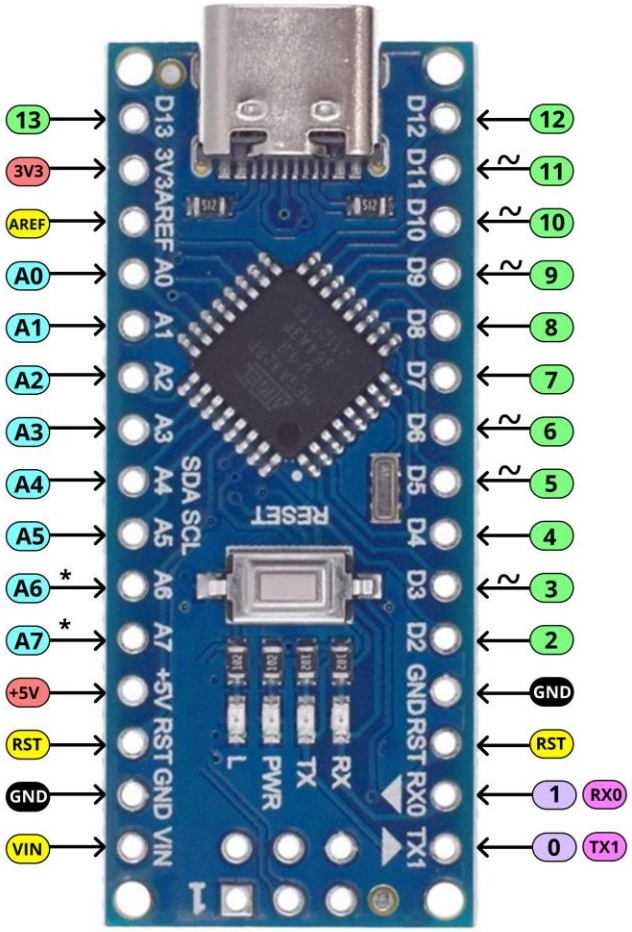
Welcome to Getting Started with Robotics — your entry into the world of robotics and embedded systems. This beginner-focused course uses the popular Arduino Nano board, known for its compact size, affordability, and versatility. You'll learn to interface it with sensors, LEDs, displays, and motors through practical experiments.



Arduino Nano Pin Functions

The image shows the Arduino Nano microcontroller with all digital and analog pins labeled. Programs are uploaded via USB, and the board automatically begins execution immediately after transfer.

Important to know: The Arduino Nano has 14 digital pins (D0–D13) that can be used as input or output. Six of them (D3, D5, D6, D9, D10, D11) can also do PWM. It also has 8 analog input pins (A0–A7) for 0–5V signals and (A0-A5) can also be used as digital input or output.



PIN	DIGITAL IN	DIGITAL OUT	DIGITAL PWM	ANALOG INPUT
12	✓	✓		
11	✓	✓	~	
10	✓	✓	~	
9	✓	✓	~	
8	✓	✓		
7	✓	✓		
6	✓	✓	~	
5	✓	✓	~	
4	✓	✓		
3	✓	✓	~	
2	✓	✓		
1	DO NOT USE FOR I/O			
0	DO NOT USE FOR I/O			
A7				✓
A6				✓
A5	✓	✓		✓
A4	✓	✓		✓
A3	✓	✓		✓
A2	✓	✓		✓
A1	✓	✓		✓
A0	✓	✓		✓

What is a Digital Input or Output Pin?

Digital input reads ON/OFF signals (like a button), and digital output sends ON/OFF signals (like turning an LED on or off). You can configure each pin in your code depending on what task it needs to perform. This simple binary control forms the foundation of most basic Arduino projects.

What is an Analog Input Pin?

Analog input pins on the Arduino Nano (A0 to A7) read varying voltage levels between 0 and 5 volts. They convert these voltages into numbers (0–1023) using a built-in ADC (Analog-to-Digital Converter). This lets you measure sensors like temperature, light, or potentiometers that output variable signals.

Pin Assignments for the Getting Started with Robotics Board

For now, this isn't very important, but once we start programming, this information will be essential to control components, sensors, motors, and displays.

DIGITAL OUT	
LED GREEN	A4
LED YELLOW	A5
LED RED	13
BUZZER	9
WS2812B LED	8

DIGITAL IN	
SWITCH 1	6
SWITCH 2	7
PIR	A2

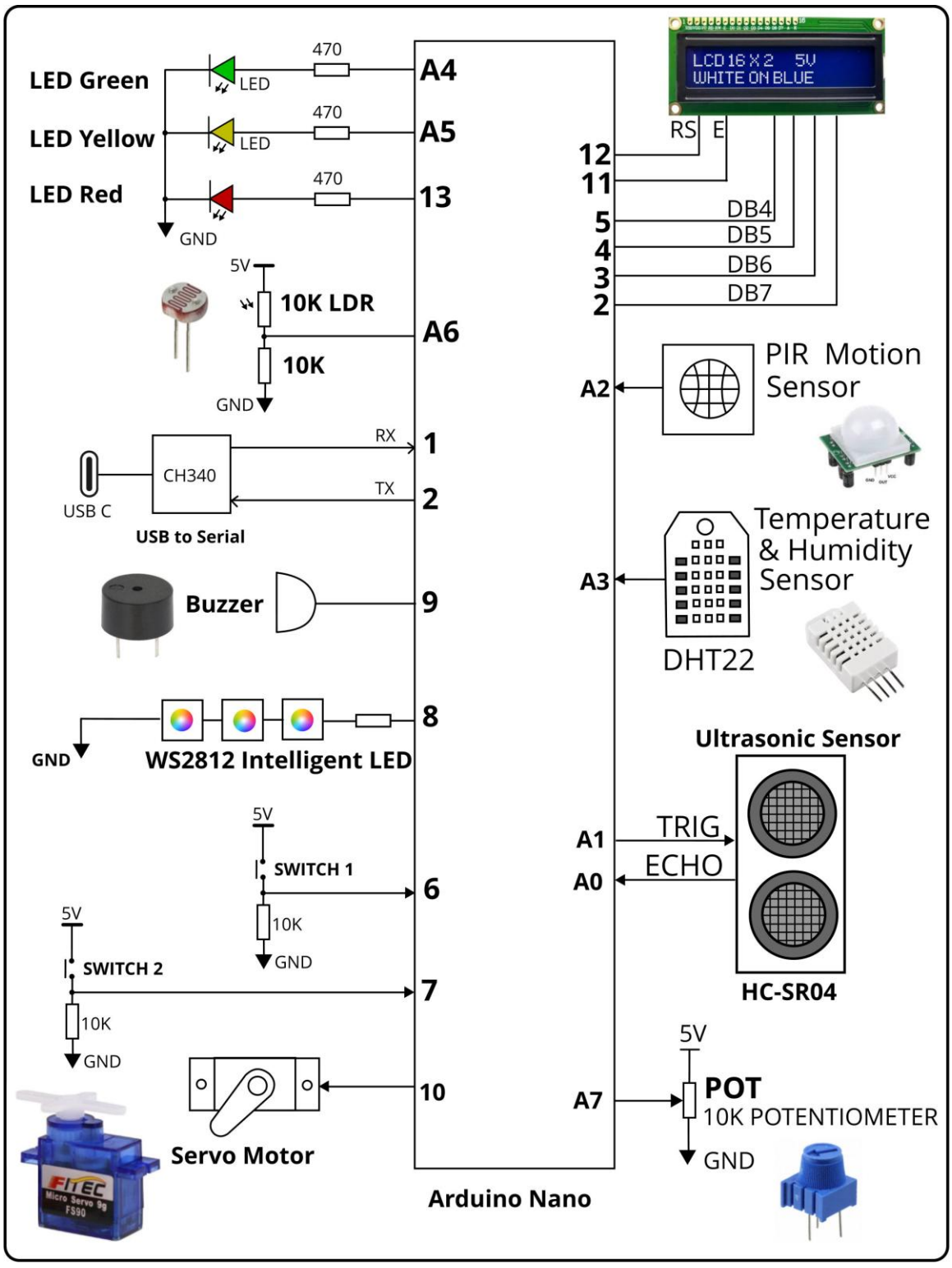
HC-SR04 (DISTANCE)	
TRIG	A1
ECHO	A0

MOTOR	
SERVO MOTOR	10

ANALOG IN	
POT	A7
LDR	A6

LCD DISPLAY	
RS	12
E	11
DB4	5
DB5	4
DB6	3
DB7	2

TEMP & HUM	
DHT22	A3


LED Green
LED Yellow
LED Red
LED
470
GND
A4
A5
13
5V
10K LDR
10K
A6
RX
TX
1
2
CH340
USB C
USB to Serial
Buzzer
9
8
GND
WS2812 Intelligent LED
SWITCH 1
SWITCH 2
6
7
10K
10
Servo Motor
Arduino Nano
LCD16X2 5V
WHITE ON BLUE
RS
E
12
11
DB4
DB5
DB6
DB7
5
4
3
2
A2
PIR Motion
Sensor
A3
Temperature
& Humidity
Sensor
DHT22
Ultrasonic Sensor
A1
TRIG
A0
ECHO
HC-SR04
A7
POT
10K POTENTIOMETER

Power Requirements

During this course, the Mainboard is powered via the USB-C port. Alternative power options are available and will be covered in the Advanced Course.

Abbreviations and Terms

LED	**Light Emitting Diode**
LDR	**Light Dependent Resistor**
USB	**Universal Serial Bus**
LCD	**Liquid Crystal Display**
PIR	**Passive Infrared Sensor (Detect Movement)**
POT	**Potentiometer (Variable Resistor)**
DHT22	**Temperature and Humidity Sensor**
HC-SR04	**Ultrasonic Distance Sensor**
WS2812B	**A smart RGB LED with a built-in controller**
PWM	**Puls Width Modulation Signal**
SERVO	**Servo motor controlled with PWM Signal**