



# Introduction to Arduino Kit and Robotics

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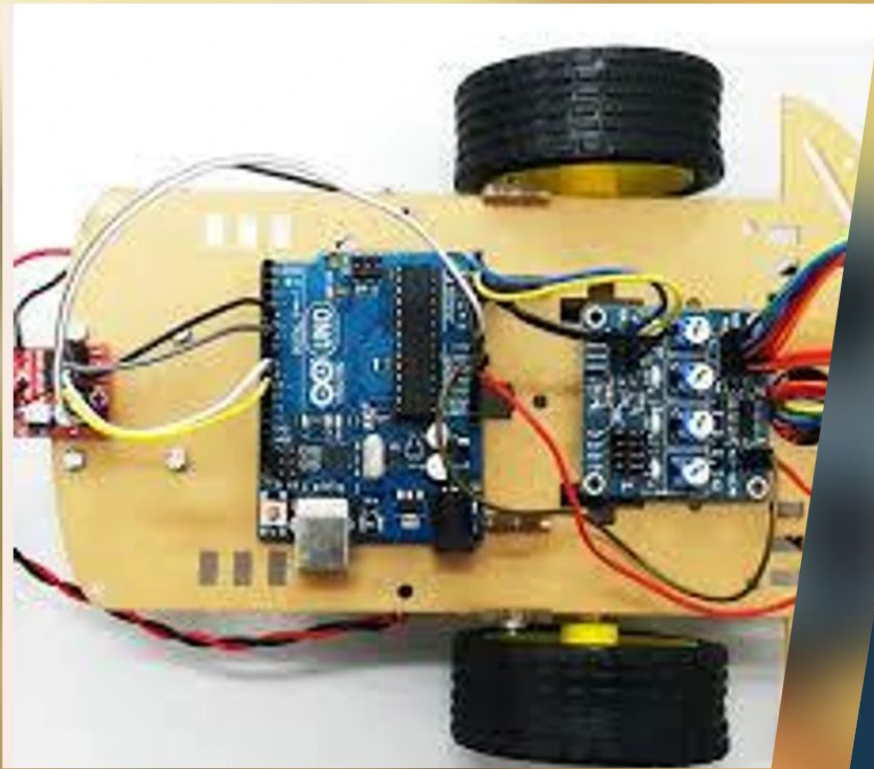
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What Is a Robot?

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# What Is a Robot?

## Definition

A robot is a machine that can sense, think, and act.

## Automation

It follows programs (code) to perform tasks automatically or with guidance.

Key idea: robots = hardware + software working together.



# ROBOTICS

Robotics is a study of science that studies the design, construction operation and control of robots using appropriate software.

It combines electronics Mechanical engineering and computer science

Rapid advancement of Artificial intelligence technology is also driving significant progress in the field of robotics today

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Core Parts of a Robot

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# Core Parts of a Robot

## Sensors

Cameras, microphones, distance sensors, and touch sensors that help robots perceive their environment.

## Controller/Brain

A microcontroller or computer (Arduino, Raspberry Pi) that processes information and makes decisions.

## Actuators

Motors, servos, wheels, arms, and grippers that allow robots to move and interact with the world.

## Power

Batteries or external power sources that provide the energy needed for operation.

## Frame/Chassis

The physical structure that holds all components together and gives the robot its form.

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## Arduino Kit Components

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# Arduino Kit Components

Component Types	Description
Connectors	Jumper wires (various types)
Sensors	IR sensor, LDR sensor, Push button

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Arduino (Nano, UNO, Mega)

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# Arduino: The Robot's Brain

## 1 Definition

Small, low-cost microcontroller board.

## 2 Function

Acts as the "brain" of many DIY robots and projects.

## 3 Connections

Connects to sensors (inputs) and motors/LEDs (outputs).

## 4 Programming

Programs can be written in C/C++, Python, or block coding in PictoBlox.

## 5 Popular Models

Arduino Uno, Nano, Mega.

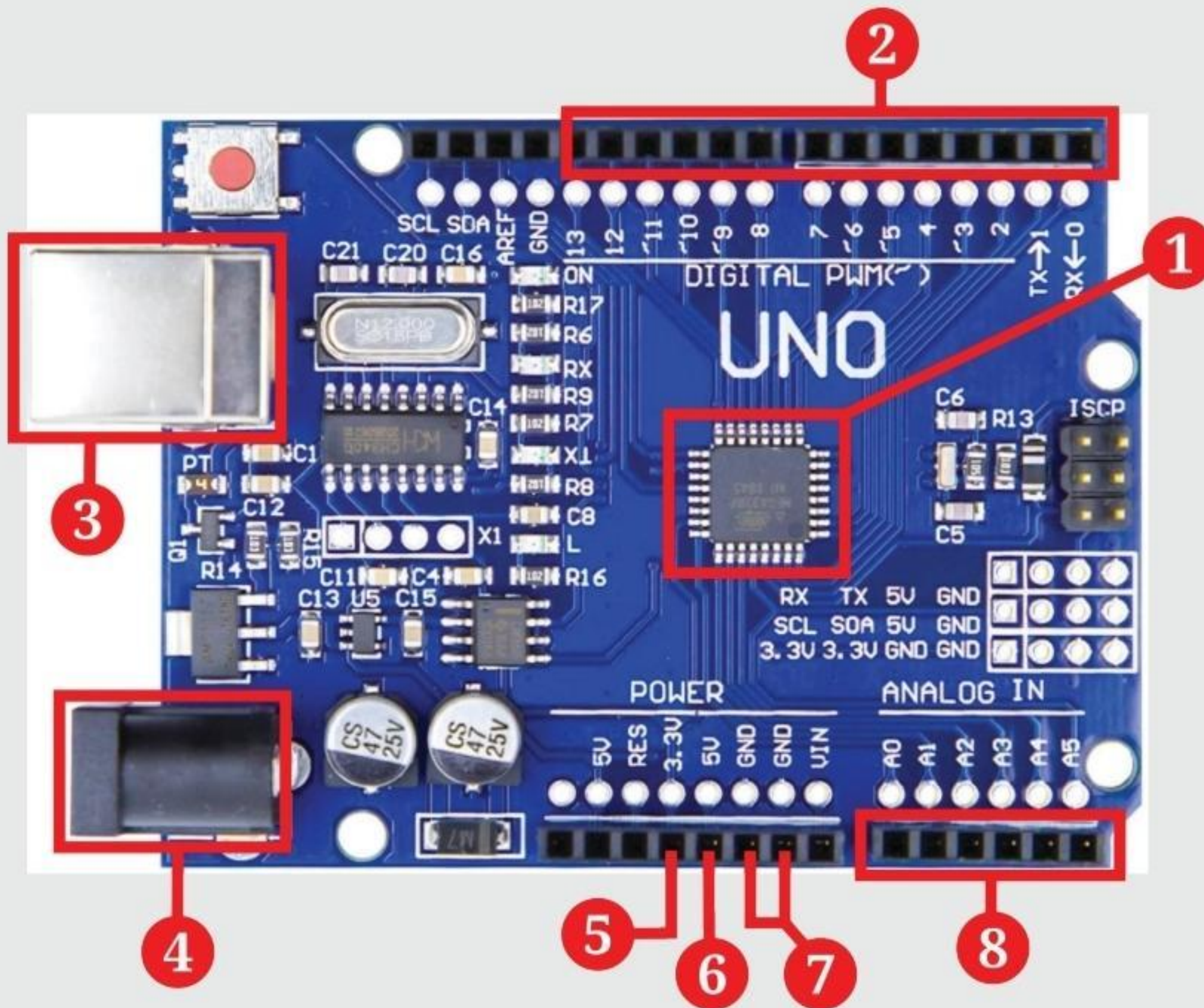
## 6 Learning

Great for beginners → simple, hands-on robotics learning.

The Arduino platform provides an accessible entry point to electronics and programming, making it ideal for learning robotics.







1. Atmega328P

2. DIGITAL I/O PINS

3. USB PORT

4. External Power Supply

5. 3.3V DC OUT Pin

6. 5V DC OUT Pin

7. GND

8. Analog Output

1

It is the micro controller present in arduino R3. Called as the brain of Arduino. Collects informations and controls devices.

2

Collects data from input devices. controls output devices the pins. marked with tiled ( ~ ) symbol can also be used for pwm.

3

It connects arduino to computer and helps in uploading programs and transferring data. also used as a source to give power to arduino.

4

It is only used to power the Arduino either through a battery or any other external power source

5

This provides a study 3.3 volt it is mainly used in sensors for giving power

6

This provides a study 5 volt this power is mainly used in servo motors and sensors like LDR and IR sensor

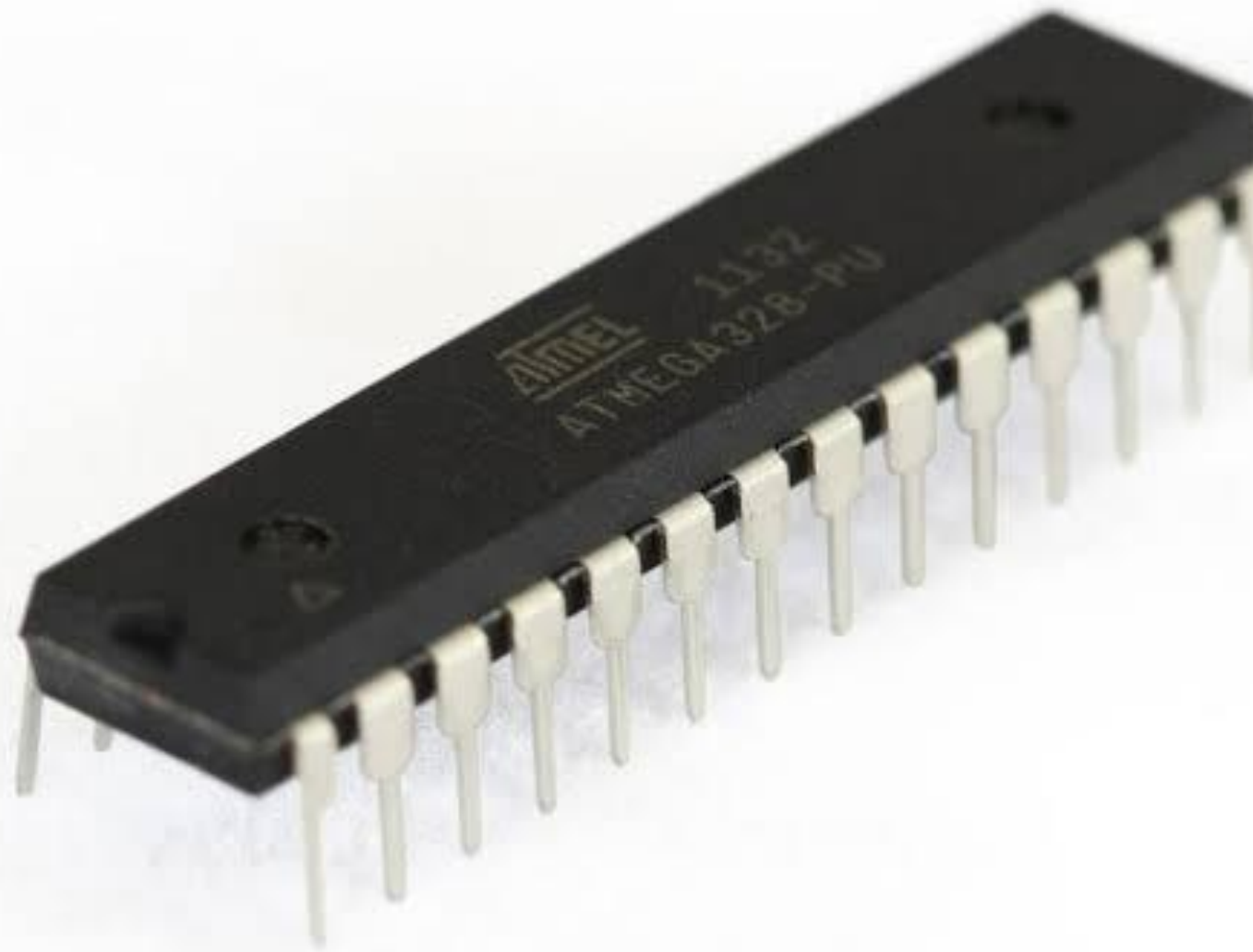
7

This provides thee ground potential zero volt to the arduino it is essential in making circuits with arduino

8

It is mainly used for measuring analogue voltage and it reads the readings from sensors in a special range.





# Microcontroller chip

- A microcontroller is a small computer integrated into a single chip.
- It contains the main components of a computer system including processor Ram Rom and input output interfaces all within the microcontroller chip
- In daily life there abundantly seen in washing machine cars remote control etc
- They are also seen inside devices like calculator and mobile phone for making them more efficient.

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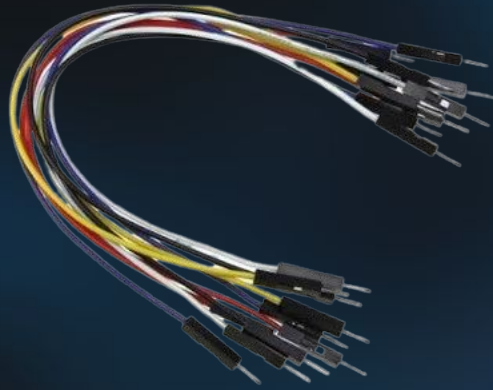
## Jumper Wires: Making Connections

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# Jumper Wires: Making Connections







## Male-to-Male Jumper Wires

Male-to-Male Jumper Wires: Used to connect two female header pins directly (e.g., on a breadboard or BIOS pins). They have metal pins on both ends that plug into sockets or connectors.



## Male-to-Female Jumper Wires

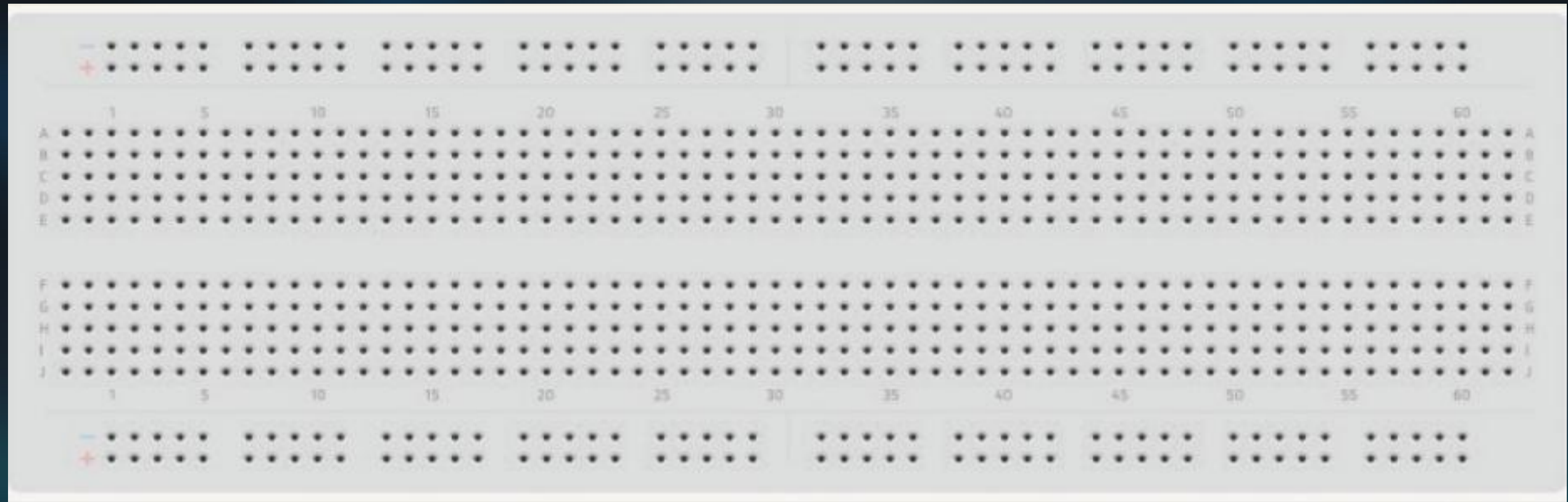
One end has a pin (male), and the other has a socket (female). Commonly used for linking boards to modules, sensors, or other jumper wires.



## Female-to-Female Jumper Wires

Both ends has sockets. Commonly used for connecting two male header (pins).

Jumper wires are essential for creating electrical connections between components in your robotics projects.



# BREADBOARD

## CONNECTING DEVICES

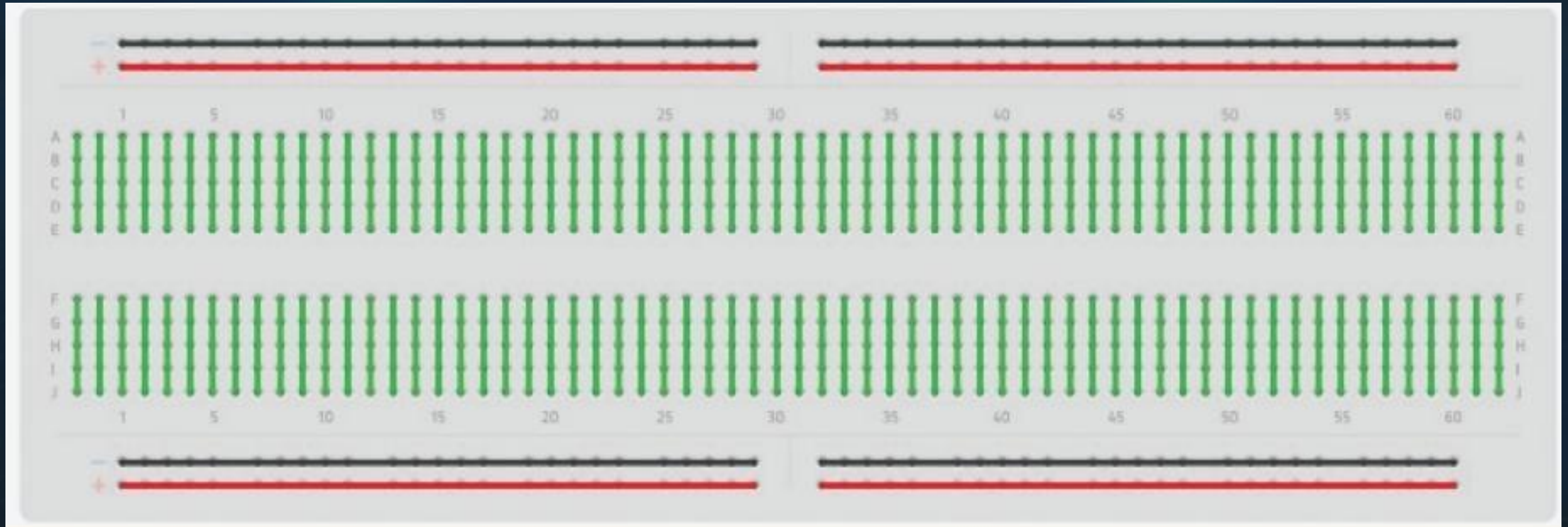


# Breadboard

It is a device that allows you to build and reuse circuits by connecting electronic components to each other without soldering.

The terminals of electronic components can be attached to the holes in the breadboard

These holes are internally connected to each other using conductive wires



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Sensors : input devices

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# IR Sensor: Detecting Objects

## What is an IR Sensor?

1

### Function

Uses infrared light to detect objects or distance.

2

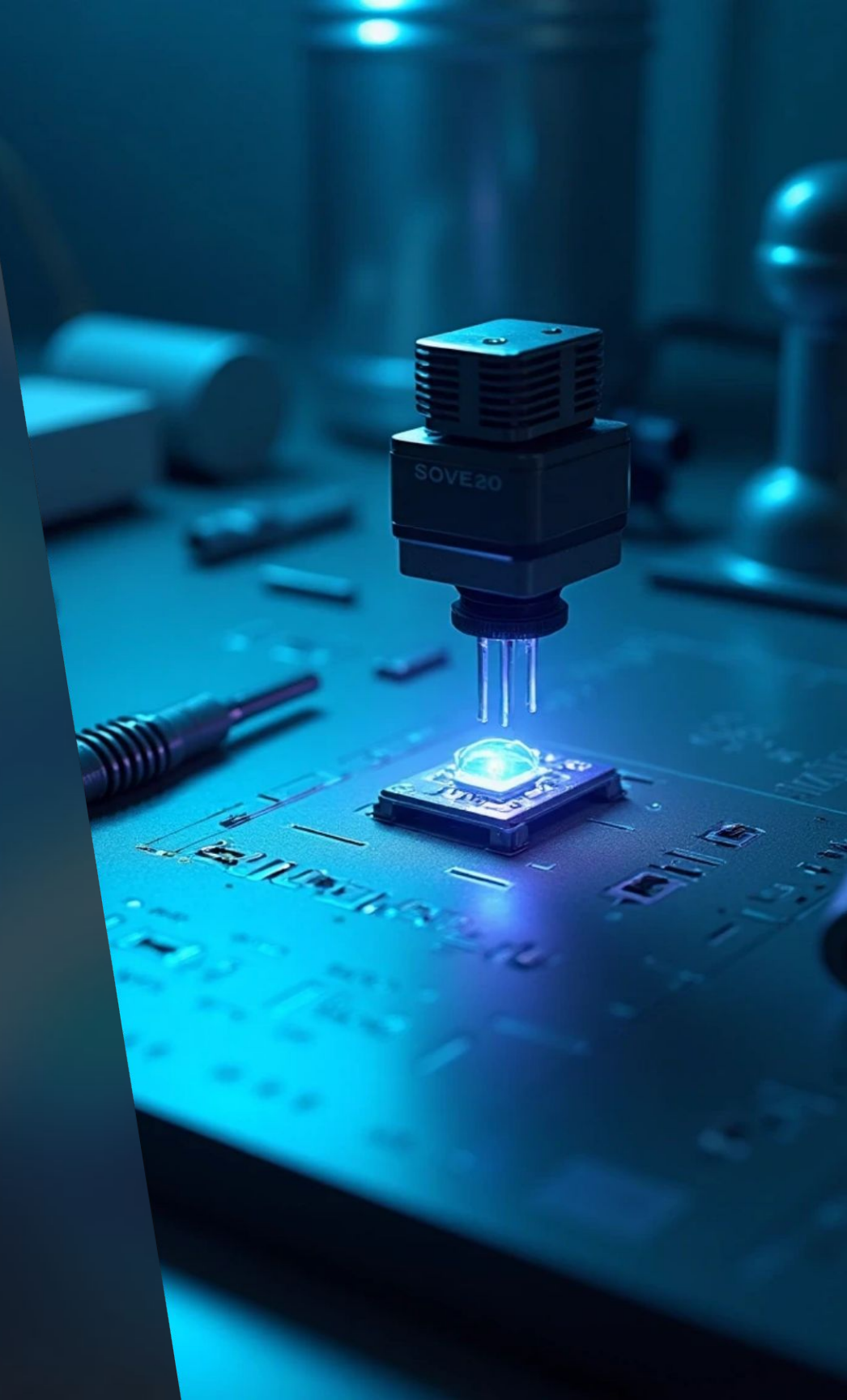
### Components

Consists of an IR LED (emitter) and a photodiode (receiver).

3

### Detection

Output changes when an object reflects IR light back to the sensor.







# IR Sensor: Detecting Objects

## Applications

IR sensors are widely used in obstacle detection, line-following robots, and remote controls. They allow your robot to "see" objects without physical contact, making them essential for navigation and interaction with the environment.

# LDR Sensor: Detecting Light



Component Type	Function
What is an LDR?	An electronic component that changes resistance based on light intensity.
How it Works	High resistance in darkness, low resistance in bright light.
Connection	Used with microcontrollers to measure light levels (analog input).





# LDR Sensor: Detecting Light

## Applications

LDR sensors are common in street lights, solar trackers, and light-sensitive robots. They enable your robot to respond to changes in ambient light, allowing for behaviors like following light sources or activating in darkness.

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SERVO MOTOR

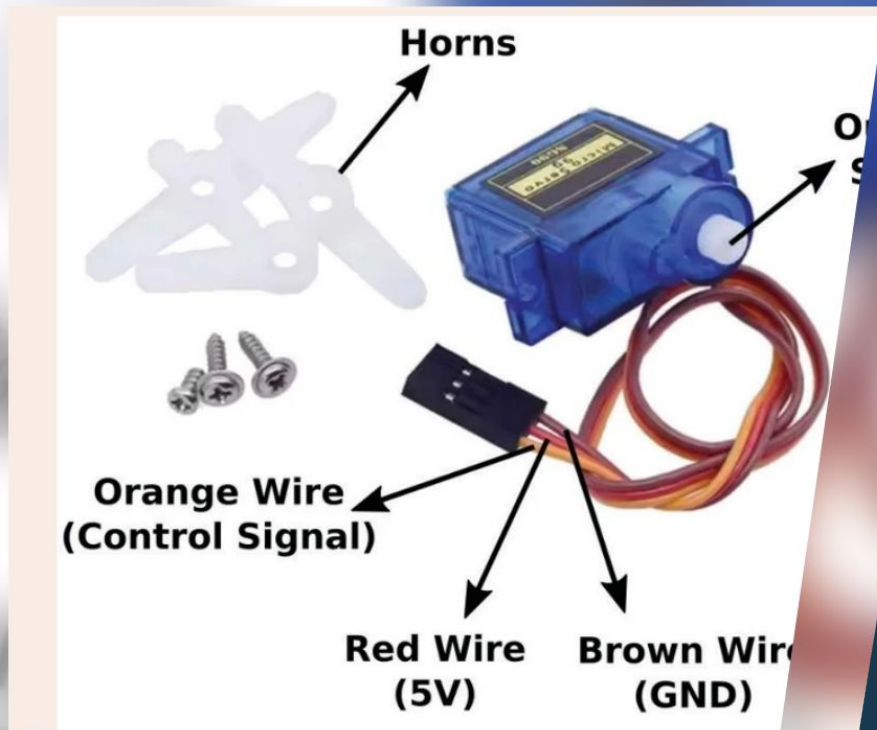
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# SERVO MOTOR

What is a servo motor? How it Works

The server motors shaft rotates through angles from 0 to 180 in accordance with the signal voltage supply. control wires in server motors are usually controlled by arduino using pwm pins

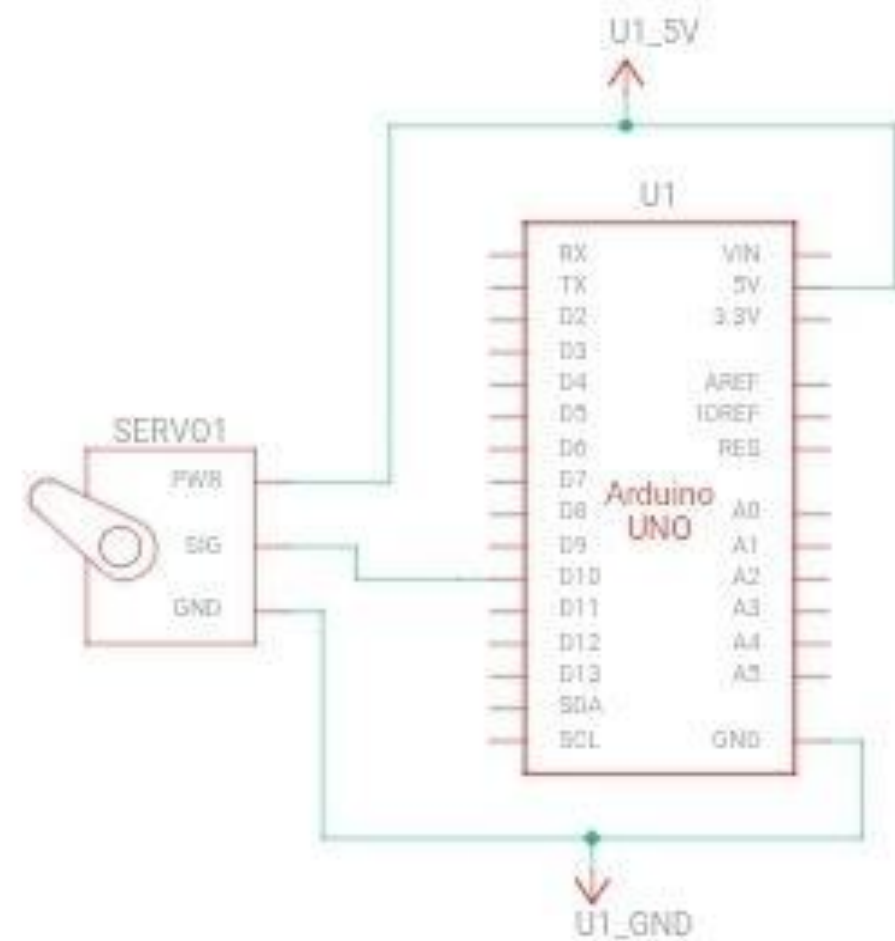
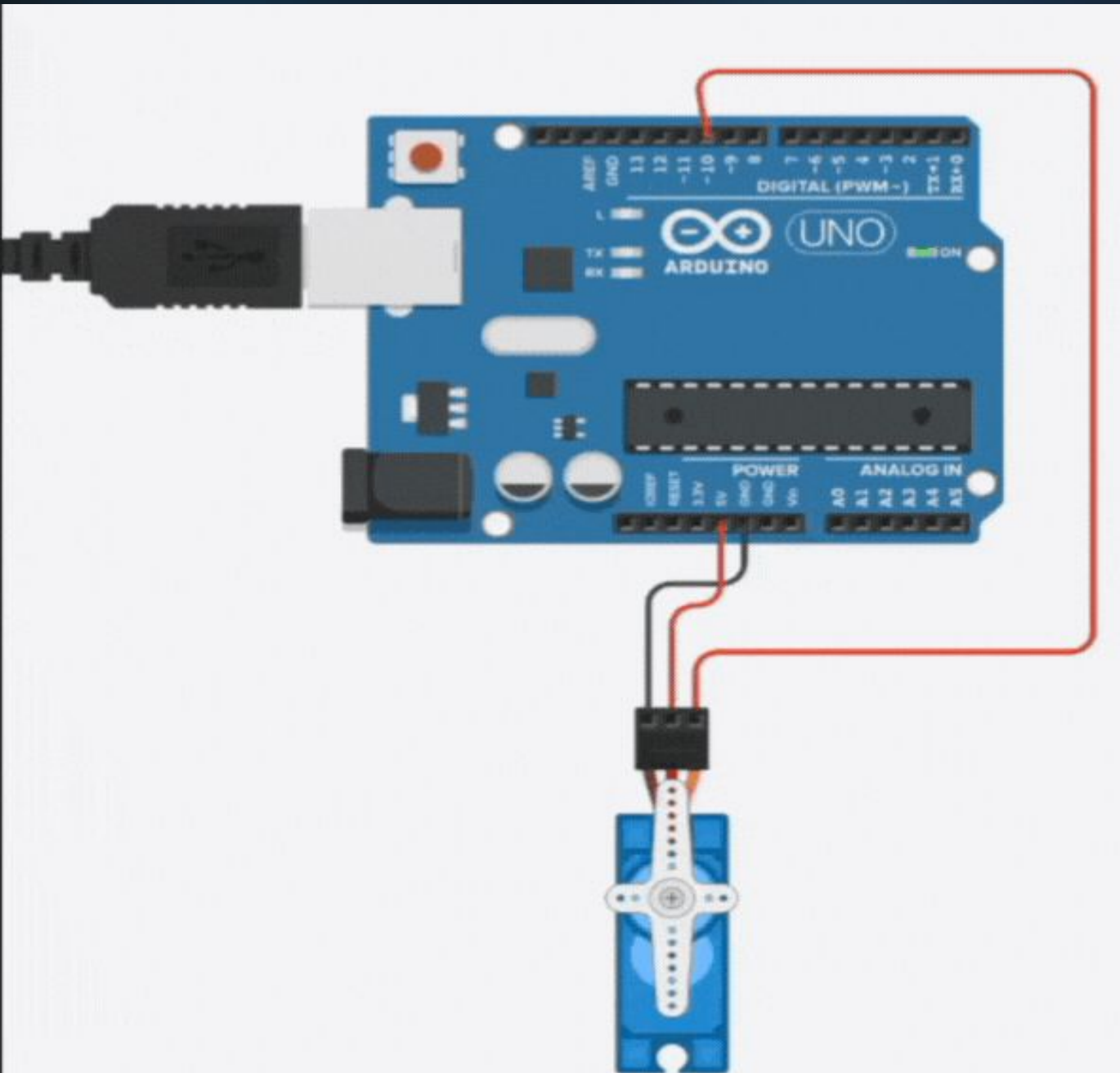
Connection	Description
Used with microcontrollers	Makes physical changes in response to control signals.



# Applications

Common in robotic arms, automation systems, and other precise control tasks.

# Servo Motor Circuit Diagram





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Push Button

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# Push Button



1

A simple switch used to control circuits manually.

2

Completes the circuit only when pressed (momentary switch).

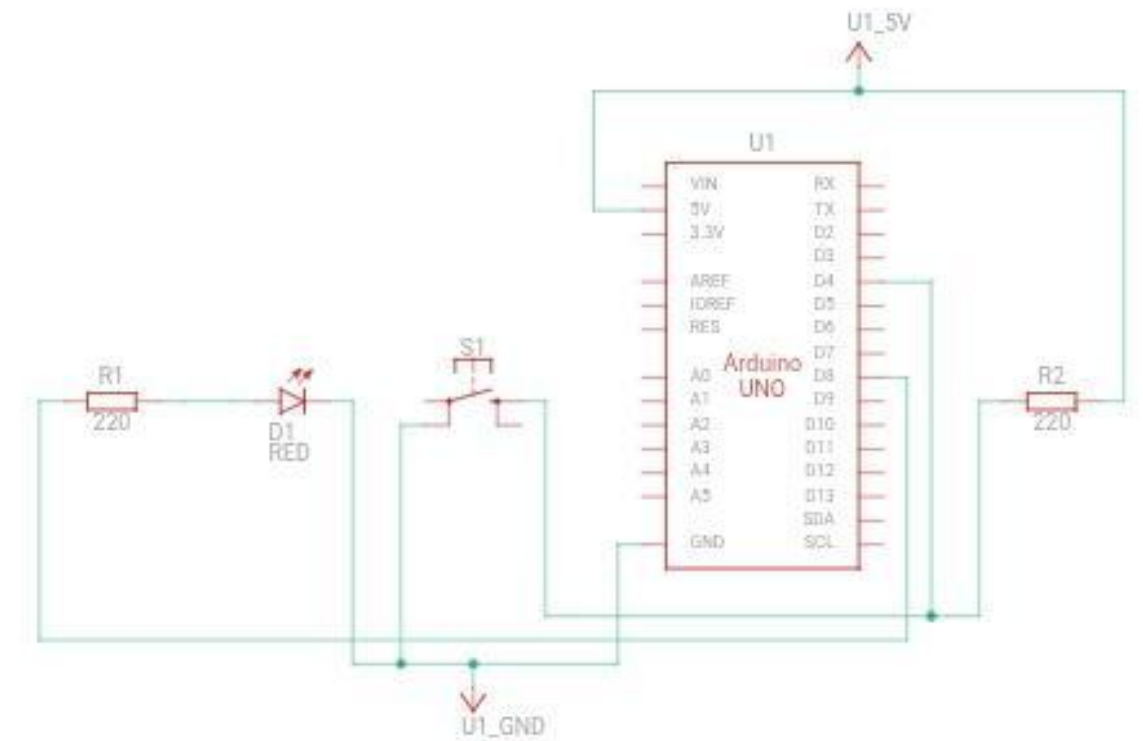
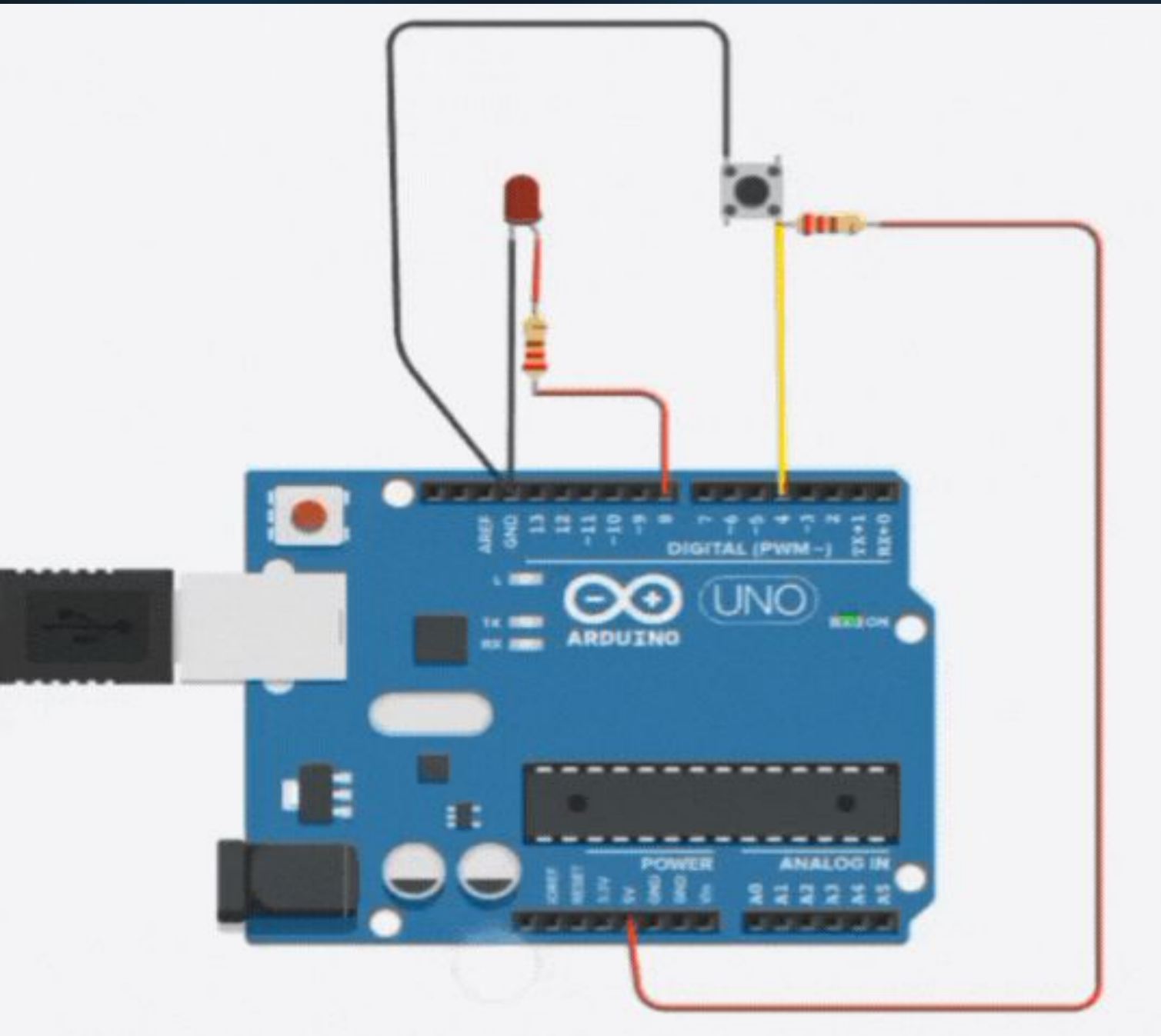
3

Connected as a digital input to microcontrollers like Arduino.

4

Commonly found in start/stop controls, resets, and interactive robot projects.

# Button Circuit Diagram



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Output Devices

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# Output Devices

## LED

Red, yellow, green; used in various signaling and lighting applications.

## Buzzer

Used for sound alerts and notifications.

These components will form the building blocks of your robotics projects, allowing you to create interactive systems that can sense and respond to their environment.

# LEDs (Light Emitting Diodes)



1

Diodes that emit visible light when current passes through them.

2

Available in many colors (red, green, blue, white, RGB, etc.).

3

Require correct polarity and usually a current-limiting resistor.

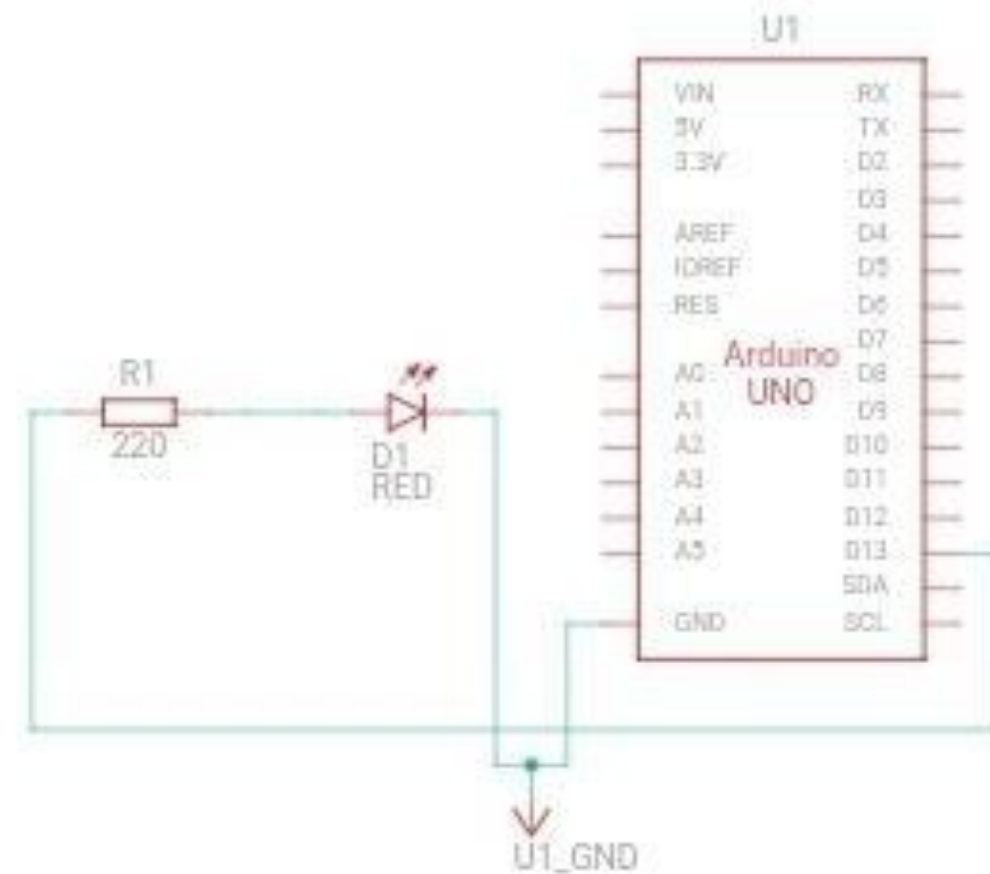
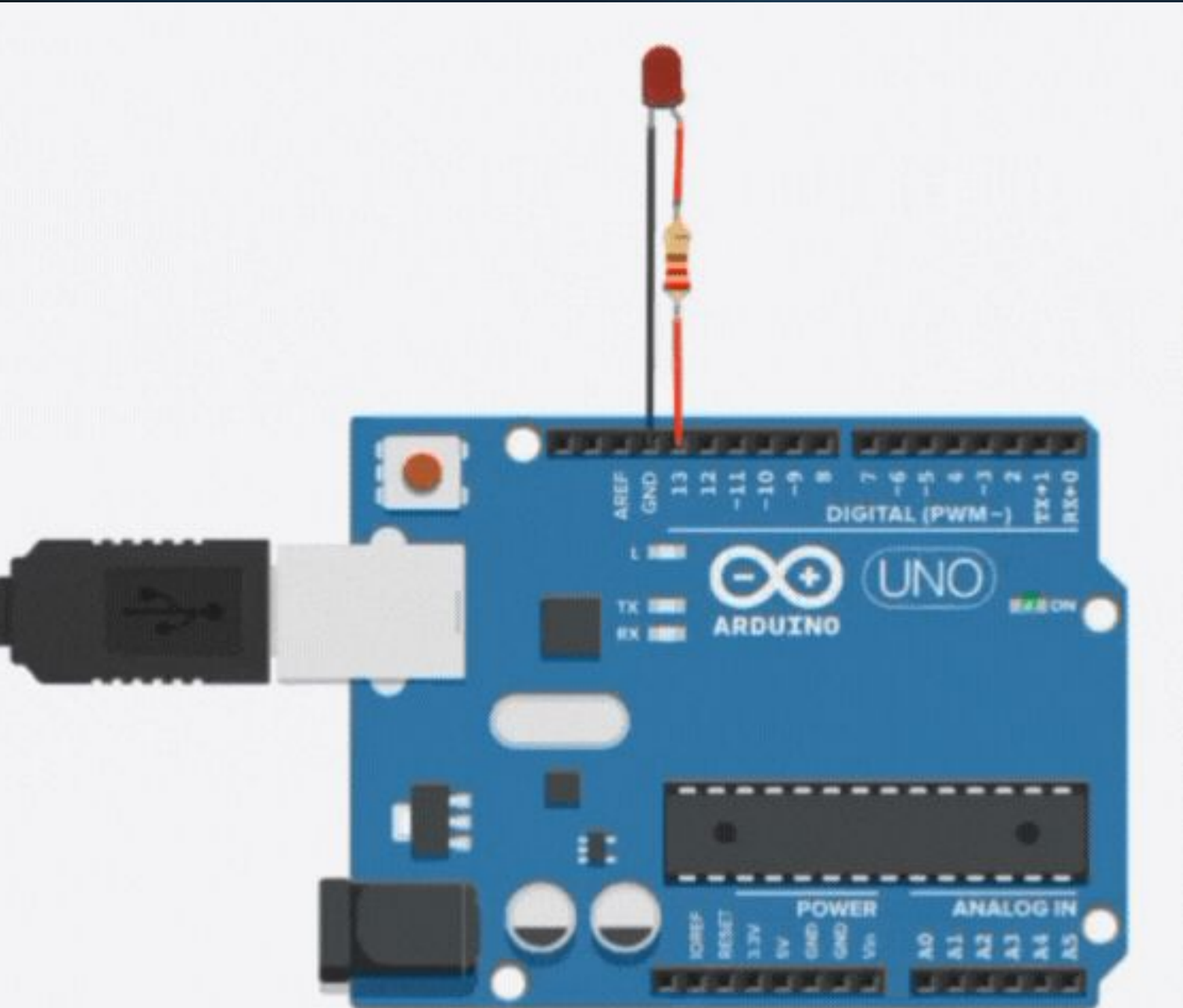
4

Used in indicators, displays, lighting, and robotics projects.

5

Three colors (red, yellow, green) in our kit.

# LED Circuit Diagram





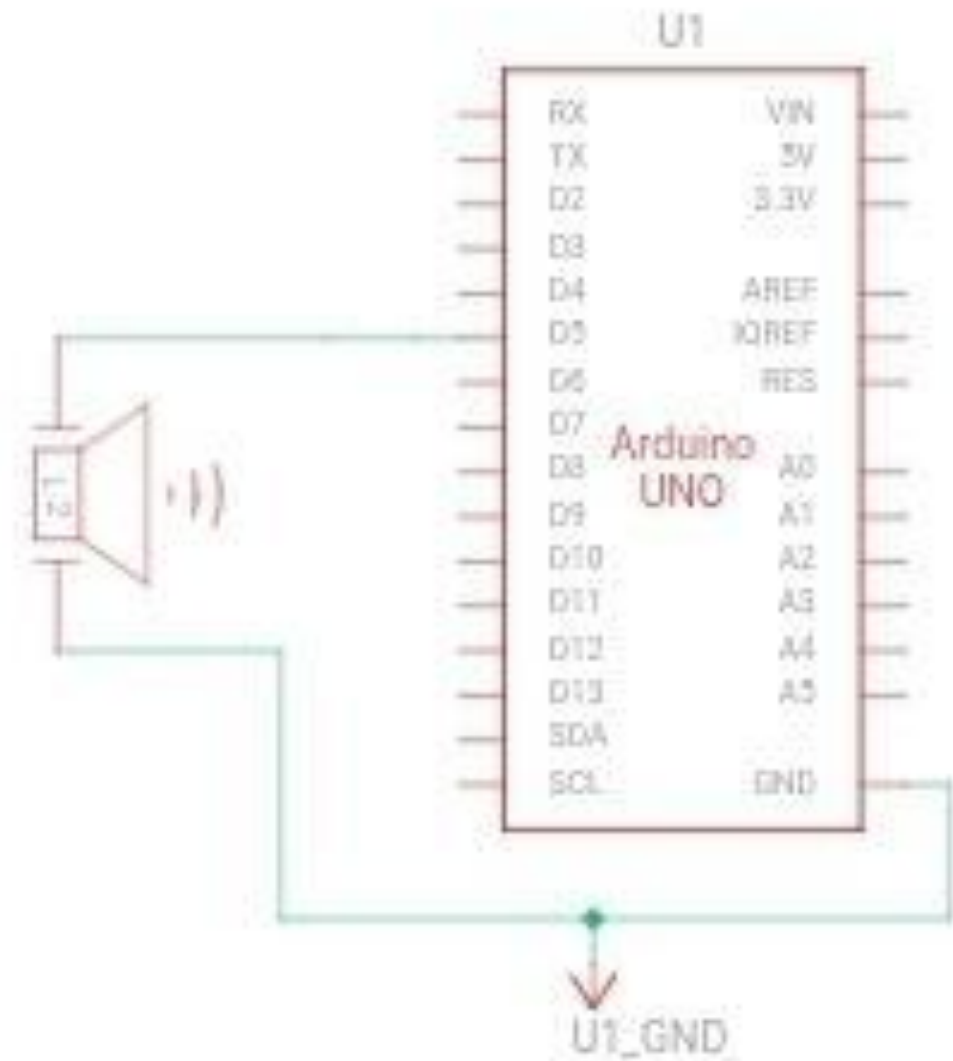
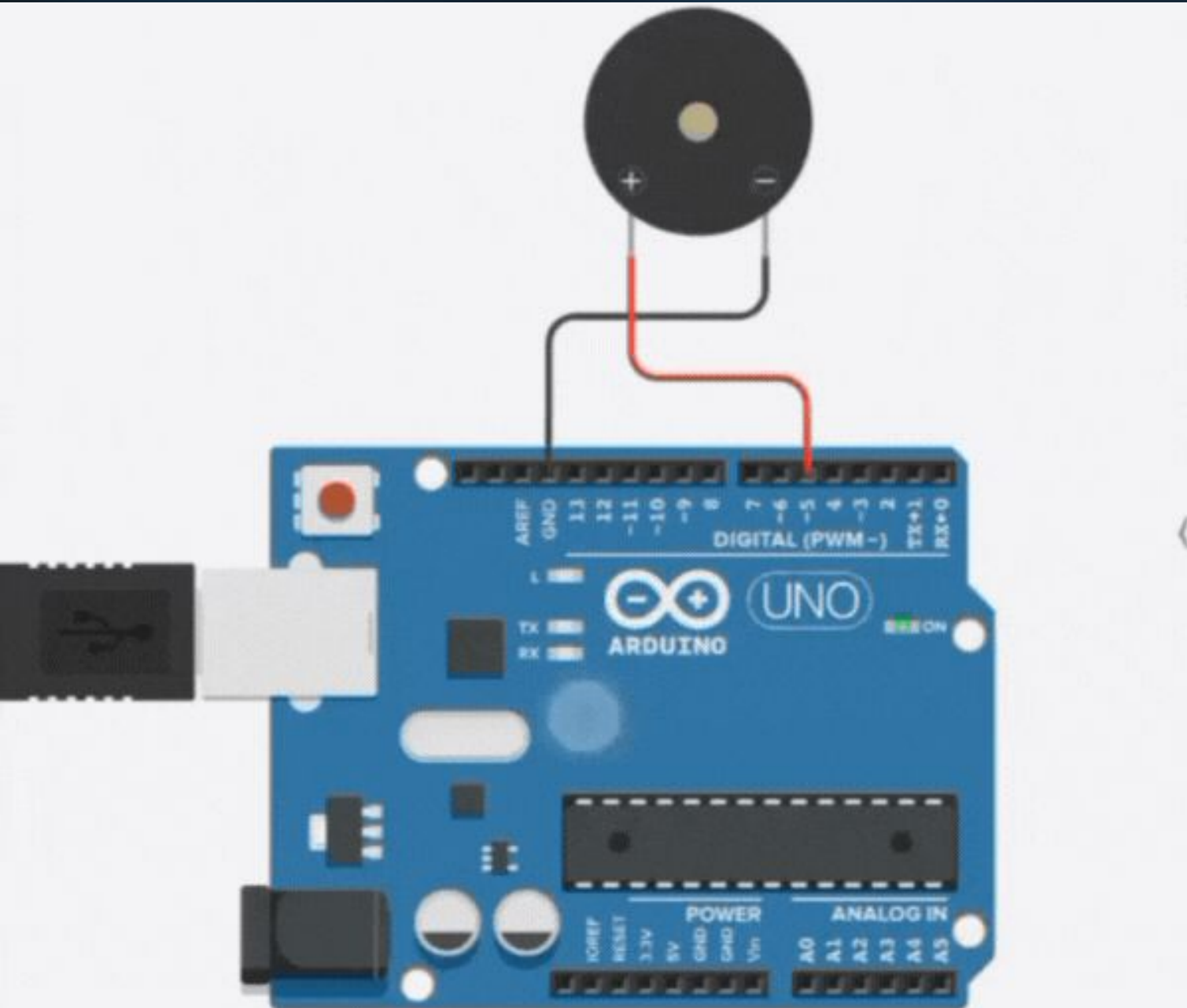
# Buzzer: Adding Sound to Your Robot

- An electronic component that produces sound when powered
- Two main types:
  - Active (makes sound with just power)
  - Passive (needs signal/pulses)
- Can be driven by microcontrollers like Arduino for alerts or tones
- Commonly used in alarms, timers, notifications, and robot sound signals

Adding a buzzer to your robot allows it to communicate through sound, providing feedback or alerts to users.



# Buzzer Circuit Diagram



Thank You