Controlling NeoPixel with Arduino Uno

Objective:
Control colorful RGB LEDs (NeoPixels) using an Arduino to create dynamic lighting effects.

Components Required:

- Arduino Uno

- NeoPixel strip or ring (WS2812/WS2812B)

- External power supply (if using many LEDs)

- 1 Resistor (330Ω for data line)

- 1 Capacitor (1000μF, 6.3V or higher – optional, for stability)

- Jumper wires & breadboard

Circuit Overview:

- **NeoPixel has 3 main connections:**

  - **VCC** → 5V power (Arduino or external supply)

  - **GND** → GND of Arduino and power supply

  - **DIN (Data In)** → Digital pin on Arduino (e.g., D6) through a 330Ω resistor

- If powering many LEDs, use an external 5V power supply and connect all grounds together.

Working Principle:

- NeoPixels are **addressable RGB LEDs**, meaning each LED can show any color independently.

- Arduino sends data through a single **data pin** to control color, brightness, and effects.

- Each LED reads its part of the data and passes the rest along the strip.

Use Cases:

- Colorful LED displays

- Animations and lighting effects

- Wearable tech and decorations

- Mood lighting and status indicators