🚦 Project 1: LED Blinking with Delay & Pattern

📘 Description

Students learn how to make an LED blink at regular intervals and then expand to different patterns (e.g., traffic light simulation or Morse code).

🔧 Components

- Arduino Uno
- 1 or 3 LEDs (Red, Yellow, Green)
- Resistors (220Ω)
- Breadboard
- Jumper wires

🧠 STEM Breakdown

STEM Area	Application
Science	Understanding electricity, resistance, and current flow.
Technology	Using Arduino to control timing and LED behavior.
Engineering	Designing and assembling the circuit.
Math	Using time delays (e.g., `delay(1000)`) and timing logic for patterns (e.g., 3s Red, 1s Yellow, 2s Green).

🔄 Expansion

- Create a **traffic light system**.
- Blink LED in **Morse code** for SOS (. . . --- . . .).

🚗 Project 2: Proximity Alert for Vehicles (Ultrasonic + Buzzer)

📘 Description

A safety system that triggers a buzzer when a vehicle gets too close to the next one, mimicking **anti-collision alert systems**.

🔧 Components:

- Arduino Uno
- Ultrasonic Sensor (HC-SR04)
- Buzzer
- Breadboard
- Jumper Wires

🧠 STEM Breakdown

STEM Area	Application
Science	Understanding how sound waves can measure distance (sonar principle).
Technology	Reading sensor data and triggering outputs (buzzer).
Engineering	Building a system that reacts in real time for safety.
Math	Calculating distance using the formula: `Distance = (Time × Speed of Sound) / 2`

🔄 Expansion

- Add LEDs to indicate distance range (green: safe, yellow: caution, red: danger).
- Integrate with a small LCD or serial monitor to display exact distance.
- Apply to smart parking or robotic navigation.