

Arduino projects ideas

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1. **LED Blinking Traffic Light**

- **Description:** Build a simple traffic light simulation with red, yellow, and green LEDs that cycle in sequence.
- **Learning Objectives:** Digital output, basic timing with `delay()`, and code structure (`setup/loop`).
- **Components:** 3 LEDs, resistors, breadboard, jumper wires.
- **Suggested Board:** Arduino UNO R4 Minima.
- **Code Concept:** Use `digitalWrite()` to turn LEDs on/off with timed delays.
- **Challenge:** Build a second traffic light that interacts with the first and emulates a real crossing.

2. **Button-Controlled Buzzer**

- **Description:** Press a button to make a buzzer play a tone; press again to stop it.
- **Optional:** add a led that shows when the buzzer is playing.
- **Learning Objectives:** Digital input, conditional statements (`if`), basic sound generation.
- **Components:** Pushbutton, buzzer, resistor, breadboard.
- **Suggested Board:** Arduino Nano Every.
- **Code Concept:** Read button state with `digitalRead()` and use `tone()` for sound.

3. **Temperature Monitor with LCD**

- **Description:** Display room temperature on an LCD screen using a temperature sensor.
- **Learning Objectives:** Analog input, sensor interfacing, LCD output.

- **Components:** TMP36 or DHT11 sensor, 16x2 LCD, breadboard.
- **Suggested Board:** Arduino UNO R4 Minima.
- **Challenge:** add a led and/or buzzer that switches on when the temperature is outside of a preset range.

4. **Auto lock PC/Laptop**

- **Description:** Build a system that detects if a user is present at a computer using a motion or distance sensor. If no one is detected for a set time (e.g., 5 minutes), it sends a signal to shut down the PC.
- **Learning Objectives:** Sensor interfacing (analog/digital), timing logic, serial communication, basic PC interaction.
- **Components:** HC-SR04 ultrasonic sensor (distance) or PIR sensor (motion),
- **Suggested Board:** Arduino UNO R4 Minima (simple) or Arduino Nano 33 IoT (for added connectivity).
- **Code Concept:**
 - Use `pulseIn()` (for HC-SR04) or `digitalRead()` (for PIR) to detect presence.
 - Implement a timer with `millis()` to track inactivity.
 - Send a lock command via Serial (software) or toggle a relay (hardware simulation).

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