

Grade 5

Manual: 1

Project: LED Control using Arduino

Theory

LED control using Arduino is a basic electronics project where a light (LED) is turned ON and OFF using a microcontroller.

It helps students understand how machines can control devices automatically.

Theory – 2 (Electronics Concept)

Arduino is a microcontroller used to control electronic devices.

It sends signals (HIGH/LOW) to control output devices like LED.

When the signal is HIGH, LED turns ON, and when LOW, LED turns OFF.

Aim / Objective

To control an LED using Arduino.

Components Required

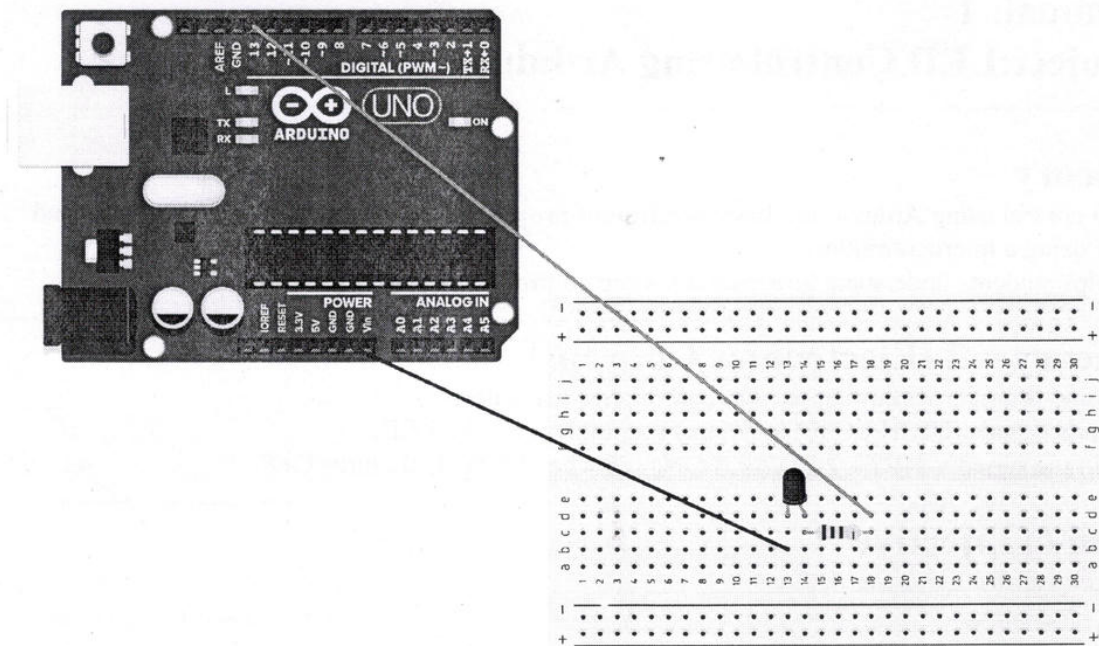
- Arduino UNO
 - LED
 - Resistor (220Ω)
 - Breadboard
 - Jumper Wires
 - USB Cable
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Procedure

- Connect LED to Arduino pin.
 - Connect resistor to LED.
 - Connect Arduino to computer.
 - Upload the program.
 - Observe LED blinking.
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Working Principle

- Arduino sends signals to LED.
- HIGH signal → LED ON
- LOW signal → LED OFF
- The process repeats continuously.



Result

LED blinks ON and OFF.

System Concept

Input: Program instructions

Process: Arduino processing

Output: LED ON/OFF

Grade 5

Manual: 2

Project: Smart Light System (LDR – AI)

Theory

A smart light system automatically controls light based on surrounding brightness. It helps in saving electricity by turning lights ON in darkness and OFF in brightness..

Theory – 2 (Electronics Concept)

An LDR (Light Dependent Resistor) is a sensor that detects light intensity. Arduino reads the sensor value and makes a decision using simple logic. If it is dark, the LED turns ON. If it is bright, the LED turns OFF. This is a basic example of Artificial Intelligence (decision making).

Aim / Objective

To control an LED automatically using an LDR sensor and Arduino.

Components Required

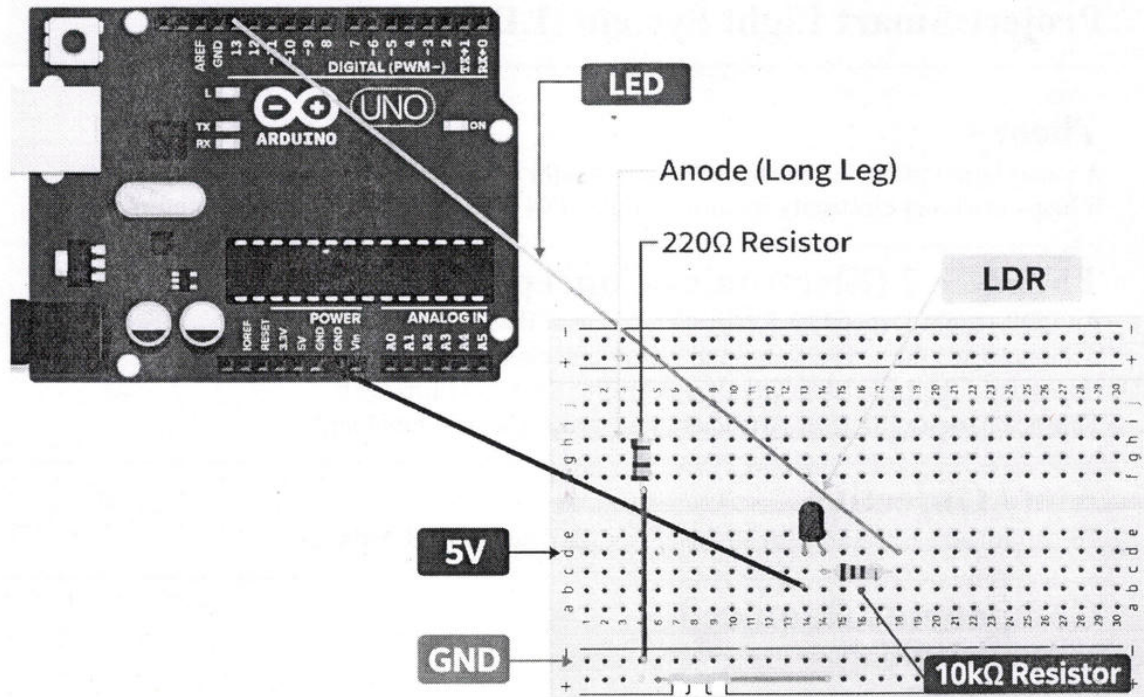
- Arduino UNO
 - LDR Sensor
 - LED
 - Resistor (220Ω / 10kΩ)
 - Breadboard
 - Jumper Wires
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Procedure

- Connect LDR to Arduino analog pin.
 - Connect LED to digital pin.
 - Connect all components properly.
 - Upload the program to Arduino.
 - Cover the LDR and observe LED.
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Working Principle

- LDR detects light intensity.
- Arduino reads the value from LDR.
- If light is low → LED ON
- If light is high → LED OFF



Result

LED turns ON in darkness and OFF in light.

System Concept

- **Input:** Light intensity
 - **Process:** Arduino decision making
 - **Output:** LED ON/OFF
-

Grade 5

Manual: 3

Project: Smart Distance Alert (Ultrasonic + Buzzer)

Theory

A smart distance alert system detects objects and gives an alert when something comes too close. It is useful for safety systems like parking sensors and obstacle detection.

Theory – 2 (Electronics Concept)

An ultrasonic sensor measures distance using sound waves.

Arduino reads the distance and makes a decision.

If an object is near, the buzzer turns ON. If far, the buzzer remains OFF.

This is an example of basic AI decision-making using conditions.

Aim / Objective

To detect distance using an ultrasonic sensor and alert using a buzzer.

Components Required

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

Procedure

- Connect ultrasonic sensor to Arduino.
 - Connect buzzer to digital pin.
 - Upload the program to Arduino.
 - Place an object near the sensor.
 - Observe buzzer sound.
-

Working Principle

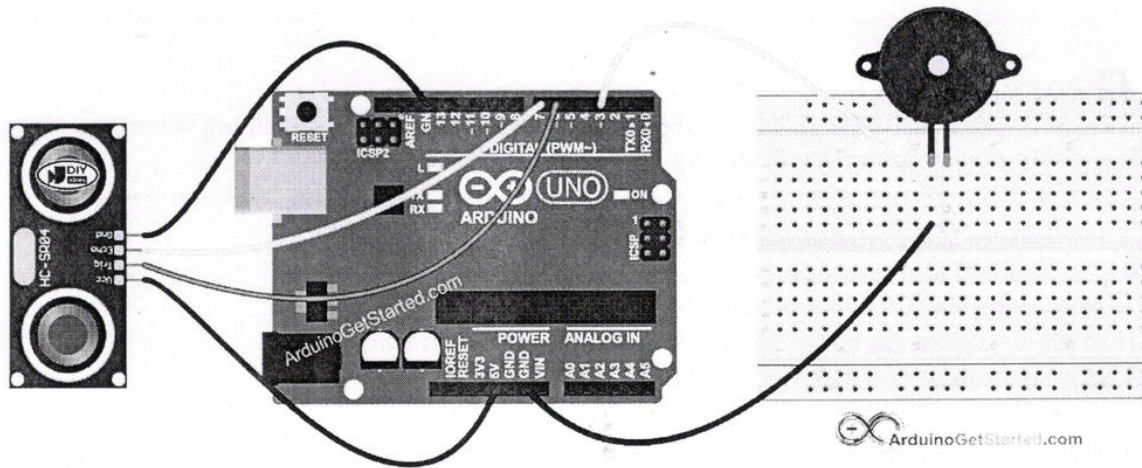
Ultrasonic sensor sends sound waves.

It receives the reflected waves and calculates distance.

Arduino checks the distance:

- If distance is less → Buzzer ON

- If distance is more → Buzzer OFF



Result

Buzzer turns ON when object comes close and OFF when far.

System Concept

- **Input:** Distance
 - **Process:** Arduino decision making
 - **Output:** Buzzer ON/OFF
-

Grade 5

Manual: 4

Project: Simple AI Decision System (IF-ELSE Logic)

Theory

A decision system allows a machine to take actions based on conditions. It helps devices respond differently in different situations.

Example:

If it is dark → light turns ON

If it is bright → light turns OFF

Theory – 2 (Electronics Concept)

Arduino uses programming logic like IF-ELSE to make decisions. It reads input from a sensor and decides what output should be. This is the basic concept of Artificial Intelligence (decision making).

Aim / Objective

To understand and implement decision making using IF-ELSE logic in Arduino.

Components Required

- Arduino UNO
 - LDR Sensor (or Push Button)
 - LED
 - Resistor
 - Breadboard
 - Jumper Wires
-

Procedure

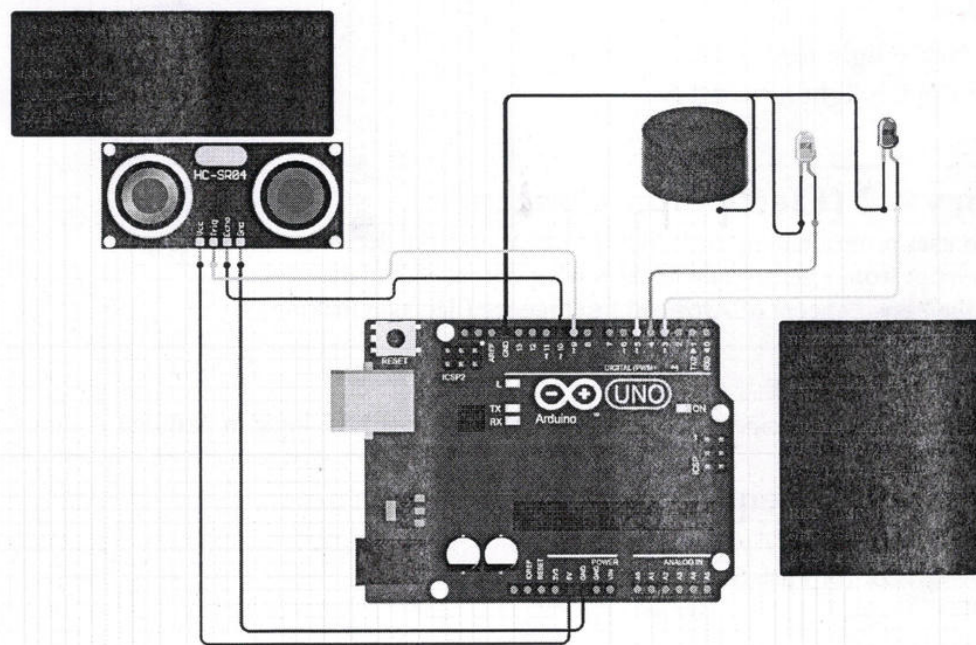
- Connect sensor to Arduino input pin.
 - Connect LED to output pin.
 - Upload the program using IF-ELSE logic.
 - Change input condition (light or button press).
 - Observe LED behavior
-

Working Principle

Sensor gives input to Arduino.

Arduino checks condition using IF-ELSE:

- If condition is true → LED ON
- Else → LED OFF



Result

LED changes state based on condition.

System Concept

- **Input:** Sensor value / Button
 - **Process:** Decision making (IF-ELSE)
 - **Output:** LED ON/OFF
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Grade 5

Manual: 5

Project: AI Project: Smart Safety Alarm (Mini AI Project)

Theory

A smart safety alarm system detects danger and gives an alert automatically. It is used to improve safety in homes, schools, and public places.

Example:

If someone comes near → alarm sounds

Theory – 2 (Electronics Concept)

An ultrasonic sensor detects the distance of objects.

Arduino reads the distance and makes a decision.

If an object is too close, the buzzer and LED turn ON.

This is a simple AI system where the machine takes action based on input.

Aim / Objective

To build a smart safety system using sensor, LED, and buzzer.

Components Required

- Arduino UNO
 - Ultrasonic Sensor (HC-SR04)
 - Buzzer
 - LED
 - Resistor
 - Breadboard
 - Jumper Wires
-

Procedure

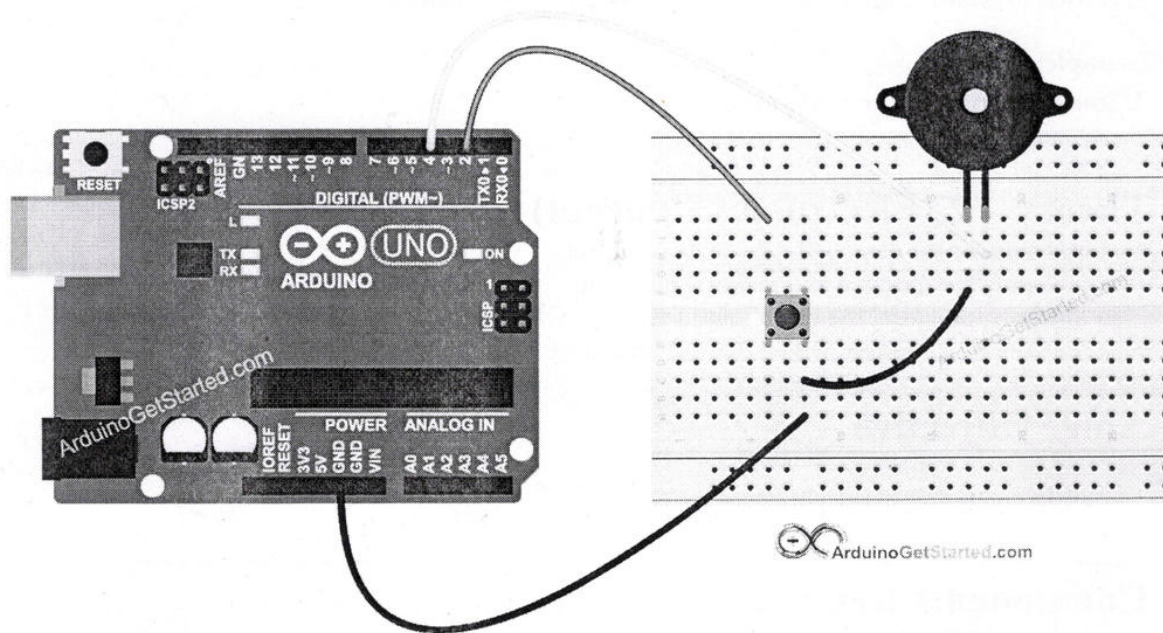
- Connect ultrasonic sensor to Arduino.
 - Connect LED and buzzer to output pins.
 - Upload the program.
 - Place an object near the sensor.
 - Observe LED and buzzer response.
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Working Principle

Ultrasonic sensor measures distance.

Arduino processes the value and checks condition:

- If object is near → LED ON + Buzzer ON
- If object is far → LED OFF + Buzzer OFF



Result

LED and buzzer activate when an object comes close.

System Concept

- **Input:** Distance
- **Process:** Arduino decision making
- **Output:** LED + Buzzer