Grade 3

Manual: 1

AI Project: Object Recognition

Theory

Object recognition is a system where a computer identifies objects.
It uses a camera to capture images of objects.
The system processes the image to recognize and name the object.

Theory – (AI Concept)

Artificial Intelligence (AI) helps the computer recognize objects.
The computer is trained using different images of objects.
When a new object is shown, the system compares it with stored data and identifies it.

Aim / Objective

To create a system that recognizes objects.

Components Required

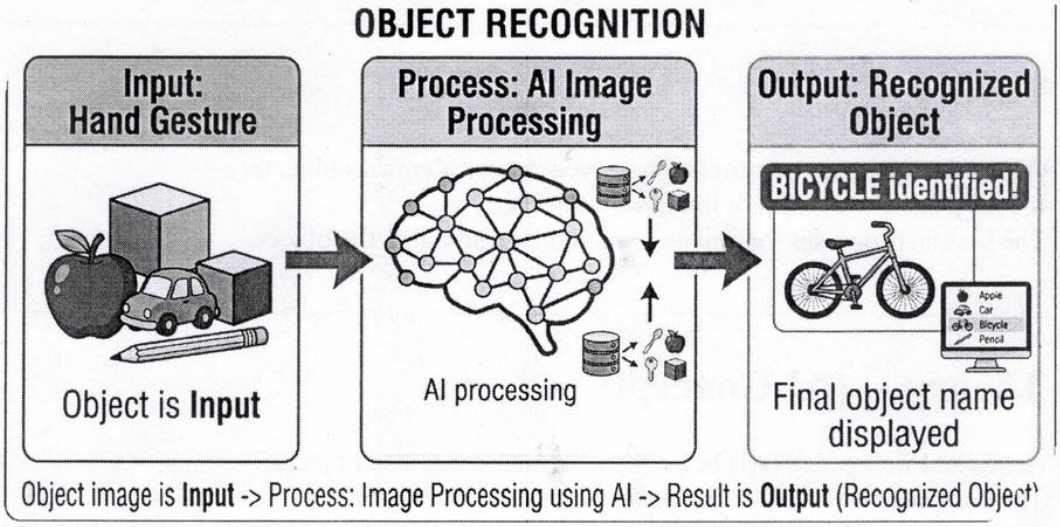
- Computer / Laptop
- Camera (Webcam)
- AI software / application

Procedure

1. Open the AI object recognition application.
2. Show different objects in front of the camera.
3. Observe how the system identifies the objects.

Working Principle

- The camera captures the image of the object.
- The AI system processes the image and identifies the object.
- The system compares the object with stored data and displays the result.



Result

The computer recognizes and displays the object.

System Concept

- Input: Object image
- Process: Image processing using AI
- Output: Recognized object

Grade 3

Manual: 2

AI Project:Object Recognition

Theory

A clap controlled fan is a system where a fan turns ON or OFF using sound.
When we clap, the sound is detected by the system.
The system processes the sound and controls the fan.

Theory – 2 (Electronics Concept)

A microcontroller is used to control the system.
The sound signal from the clap is detected and sent to the microcontroller.
The motor driver helps in running the DC motor based on the signal received.

Aim / Objective

To create a fan that can be controlled using clap sound.

Components Required

- DC Motor
- Motor Driver
- Microcontroller
- Sound Sensor (Clap Sensor)
- Power Supply

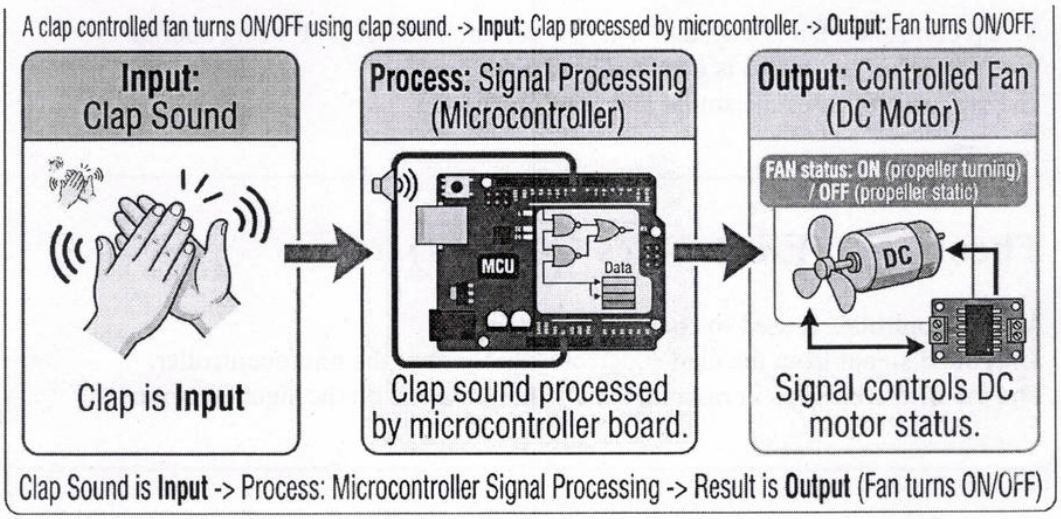
Procedure

- Connect the sound sensor to the microcontroller.
- Connect the motor driver to the microcontroller.
- Attach the DC motor (fan) to the motor driver.
- Power ON the system.

- Clap near the sensor and observe the fan turning ON/OFF.

Working Principle

- The sound sensor detects the clap sound.
- The microcontroller processes the signal.
- The motor driver receives the signal and controls the DC motor.
- The fan turns ON or OFF based on the clap.



Result

The fan turns ON and OFF when a clap sound is detected.

System Concept

- Input: Clap sound
- Process: Signal processing using microcontroller
- Output: Fan ON/OFF

Grade 3

Manual: 3

AI Project:Animal Detector Alarm

Theory

An animal detector alarm is a system that detects animals and gives an alert.
It uses sensors to identify the presence of an animal.
When an animal is detected, the system activates an alarm.

Theory – 2 (Electronics Concept)

A microcontroller is used to control the system.
The sensor detects the movement or presence of an animal and sends a signal.
The microcontroller processes the signal and activates the buzzer to give an alert.

Aim / Objective

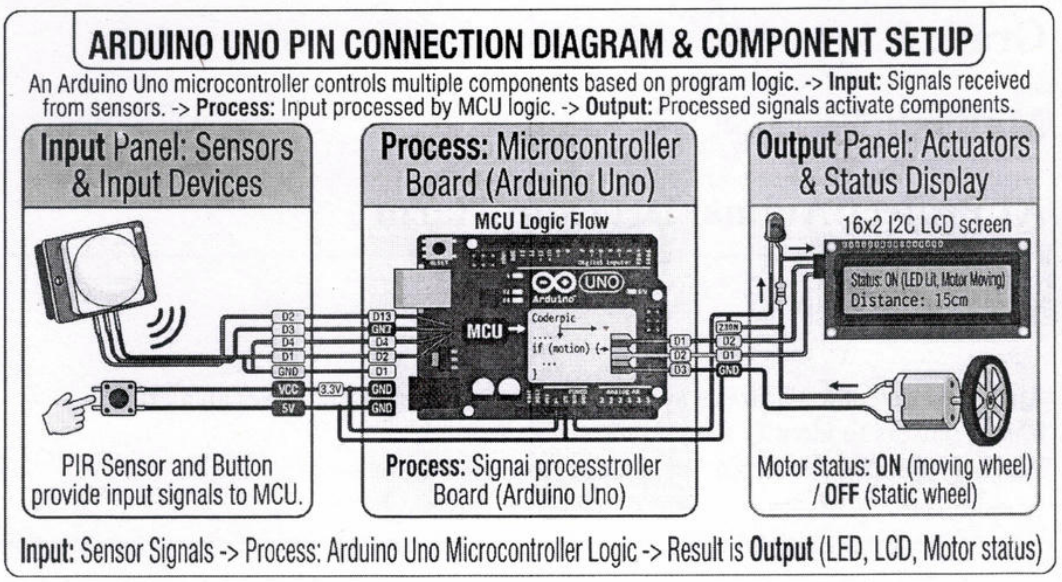
To create a system that detects animals and gives an alarm.

Components Required

- Buzzer
- Microcontroller
- Sensor (Motion/IR Sensor)
- Power Supply

Procedure

- Connect the sensor to the microcontroller.
- Connect the buzzer to the microcontroller.
- Power ON the system.
- When an animal comes near the sensor, observe the buzzer sound.



Working Principle

- The sensor detects the presence of an animal.
- The microcontroller processes the signal.
- The buzzer is activated to give an alarm.

Result

The buzzer sounds when an animal is detected.

System Concept

- Input: Animal movement
- Process: Signal processing using microcontroller
- Output: Alarm sound (buzzer)

Grade 3

Manual: 4

AI Project:Hand Gesture Recognition

Theory – 1 (Basic Concept)

Hand gesture recognition is a system where a computer understands hand movements. It uses a camera or sensor to detect hand gestures.

The system captures the image of the hand and processes it to recognize the gesture.

Theory – 2 (AI Concept)

Artificial Intelligence (AI) is used to identify and understand gestures.
The computer is trained to recognize different hand signs.

When a gesture is shown, the system compares it with stored data and gives the correct output.

Aim / Objective

To create a system that recognizes hand gestures.

Components Required

- Computer / Laptop
- Camera (Webcam)
- AI software / application

Grade 3

Manual: 1

IoT Project:Smart Led

Theory – 1 (Basic Concept)

A Smart LED system is used to control a light using WiFi.
An LED is connected to a small device called ESP8266.

The LED can be turned ON and OFF using a mobile phone or computer.
This helps in understanding how devices can be controlled wirelessly.

Theory – 2 (Smart Concept)

The ESP8266 is a WiFi-enabled microcontroller.
It connects to the internet and receives commands.

When a command is sent, the ESP8266 processes it and controls the LED.
This shows how IoT (Internet of Things) devices work in real life.

Aim / Objective

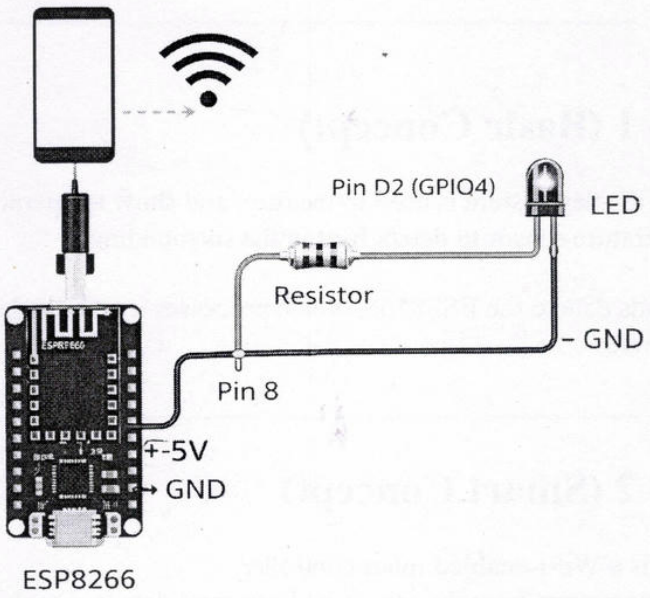
To create a system that controls an LED using WiFi.

Components Required

- ESP8266
- LED
- Resistor
- Connecting wires

Connections

- LED (+) → Digital Pin (e.g., D2) through resistor
- LED (–) → GND
- ESP8266 powered using USB



Working Principle

The ESP8266 connects to WiFi.
A command is sent from a mobile or computer.

The ESP8266 receives the signal and processes it.
It then turns the LED ON or OFF based on the command.

Result

The LED can be controlled using WiFi.

Grade 3

Manual: 2

IoT Project:Temperature Display

Theory – 1 (Basic Concept)

A temperature display system is used to measure and show temperature.
It uses a temperature sensor to detect heat in the surroundings.

The sensor sends data to the ESP8266, which processes it and displays the temperature value.

Theory – 2 (Smart Concept)

The ESP8266 is a WiFi-enabled microcontroller.
It reads the temperature from the sensor and can send data to a mobile or computer.

This shows how IoT devices can monitor real-world conditions and display information.

Aim / Objective

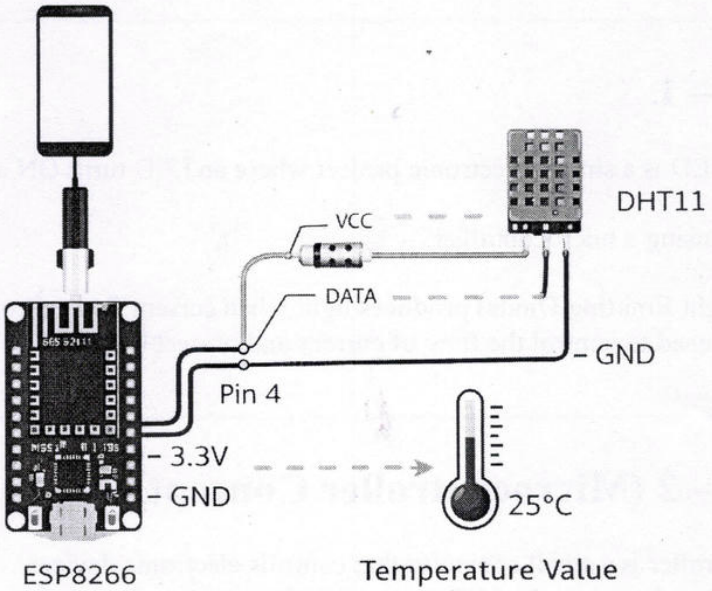
To create a system that measures and displays temperature.

Components Required

- ESP8266
- Temperature sensor (e.g., DHT11)
- Connecting wires

Connections

- Temperature Sensor VCC → 3.3V (ESP8266)
- Temperature Sensor GND → GND
- Temperature Sensor Data → Digital Pin (e.g., D4)



Working Principle

The temperature sensor detects the surrounding temperature.
It sends this data to the ESP8266.

The ESP8266 processes the data and shows the temperature value.
This value can also be viewed on a mobile or computer.

Result

The system displays the temperature value.

System Concept

- Input: Temperature from sensor

Grade 3

Manual: 1

Robotics Project:Blinking Led

Theory – 1

A blinking LED is a simple electronic project where an LED turns ON and OFF repeatedly.
This is done using a microcontroller.

An LED (Light Emitting Diode) produces light when current flows through it.
A resistor is used to control the flow of current and protect the LED.

Theory – 2 (Microcontroller Concept)

A microcontroller is a small computer that controls electronic devices.
It can send signals to turn the LED ON and OFF automatically.

This shows how machines can control output devices using programming.

Aim / Objective

To create a blinking LED using a microcontroller.

Components Required

- Microcontroller
- LED
- Resistor
- Connecting wires

Procedure

1. Connect the LED and resistor to the microcontroller.

2. Upload a simple program to make the LED blink ON and OFF.

Connections

- Microcontroller output pin → Resistor
- Resistor → LED (+)
- LED (–) → Ground

Step 1: Connect LED to Resistor

- Take the **long leg of LED (+)**
- Connect it to **one end of the resistor**

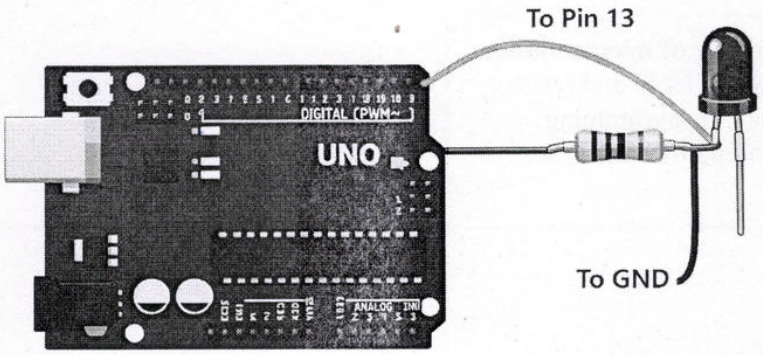
Step 2: Connect Resistor to Microcontroller

- Connect the **other end of resistor** to a **digital pin (like Pin 13)** on the microcontroller

This pin will control ON/OFF

Step 3: Connect LED to Ground

- Take the **short leg of LED (–)**
- Connect it to **GND (Ground)** on the microcontroller



System Concepts

- **Input:** Program in microcontroller
- **Process:** Signal processing
- **Output:** LED blinks

Working Principle

The microcontroller sends signals to the LED through a resistor.
The resistor controls the current.

The LED turns ON when current flows and turns OFF when the current stops.
This process repeats, making the LED blink.

Result

The LED blinks continuously.

Learning Outcomes

- Understanding of microcontroller
- Knowledge of LED and resistor
- Basic idea of programming
- Understanding of output devices

Grade 3

Manual: 2

Robotics Project:Buzzer Alarm

Theory – 1

A buzzer alarm is an electronic system that produces sound as an alert.
It uses a microcontroller to control when the buzzer should make sound.

The buzzer converts electrical energy into sound energy.

Theory – 2

A microcontroller acts like a small computer.
It sends signals to control devices like a buzzer.

In this project, the microcontroller sends signals to the buzzer to create sound alerts automatically.

Aim / Objective

To create a buzzer alarm using a microcontroller.

Components Required

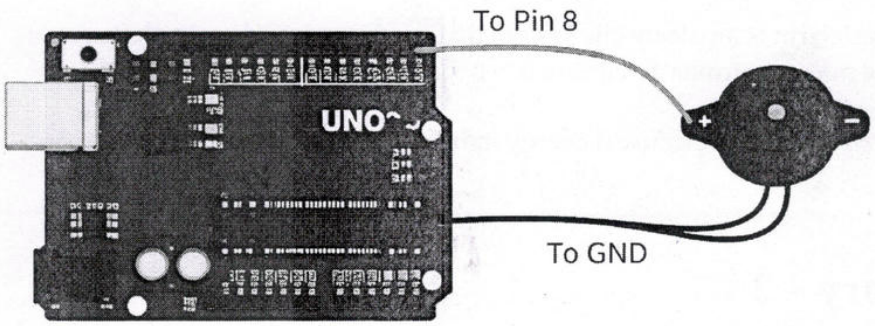
- Microcontroller (Arduino Uno)
- Buzzer
- Connecting wires

Procedure

1. Connect the buzzer to the microcontroller.
2. Upload a program to produce sound from the buzzer.

Connections

- Microcontroller Pin (e.g., Pin 8) → Buzzer (+)
- Buzzer (–) → GND



System Concepts

- **Input:** Program in microcontroller
- **Process:** Signal processing
- **Output:** Buzzer produces sound

Working Principle

The microcontroller sends an electrical signal to the buzzer.
When the signal is received, the buzzer produces sound.

The sound can be controlled (ON/OFF) using programming.

Result

The buzzer produces sound when controlled by the microcontroller.

Learning Outcomes

- Understanding of microcontroller
- Knowledge of buzzer working
- Basic idea of sound alerts
- Introduction to robotics systems

Grade 3

Manual: 3

Robotics Project:Light Detecting System

Theory – 1

A light detecting system is used to sense light in the surroundings.
It can turn devices ON or OFF depending on light conditions.

An LDR (Light Dependent Resistor) is used to detect light.
It changes its resistance based on the amount of light falling on it.

Theory – 2 (Smart Concept)

A microcontroller reads the signal from the LDR sensor.
When it becomes dark, the microcontroller turns ON the LED.

This shows how automatic lighting systems work in real life (like street lights).

Aim / Objective

To create a system where LED turns ON automatically when it is dark.

Components Required

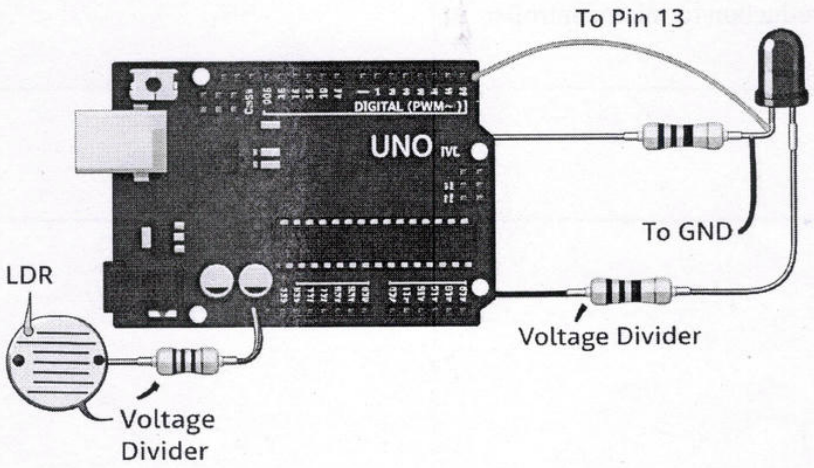
- Microcontroller (Arduino Uno)
- LDR sensor
- LED
- Resistor
- Connecting wires

Procedure

1. Connect the LDR and LED to the microcontroller.
2. Upload a program to detect light and control the LED.

Connections

- LDR → Analog pin (A0)
- LED (+) → Digital pin (e.g., Pin 13) through resistor
- LED (–) → GND
- LDR connected with resistor (voltage divider)



System Concepts

- **Input:** Light detected by LDR
- **Process:** Microcontroller processes signal
- **Output:** LED turns ON/OFF

Working Principle

The LDR detects the amount of light.
When it is bright, resistance is low; when it is dark, resistance increases.

The microcontroller reads this change and turns the LED ON when it is dark.

Result

The LED turns ON automatically when it is dark.

Learning Outcomes

- Understanding of sensors
- Knowledge of automatic systems
- Basic idea of smart lighting
- Introduction to microcontroller

Grade 3

Manual: 4

Robotics Project:Distance Alert System

Theory – 1 (Basic Concept)

A distance alert system is used to detect how close an object is.
It uses an ultrasonic sensor to measure distance.

When an object comes near, the system gives an alert using a buzzer.
This helps in understanding how machines detect surroundings.

Theory – 2 (Smart Concept)

A microcontroller controls the system.
It reads the distance from the ultrasonic sensor.

If the object is too close, the microcontroller sends a signal to the buzzer to produce sound.
This shows how automatic alert systems work in real life.

Aim / Objective

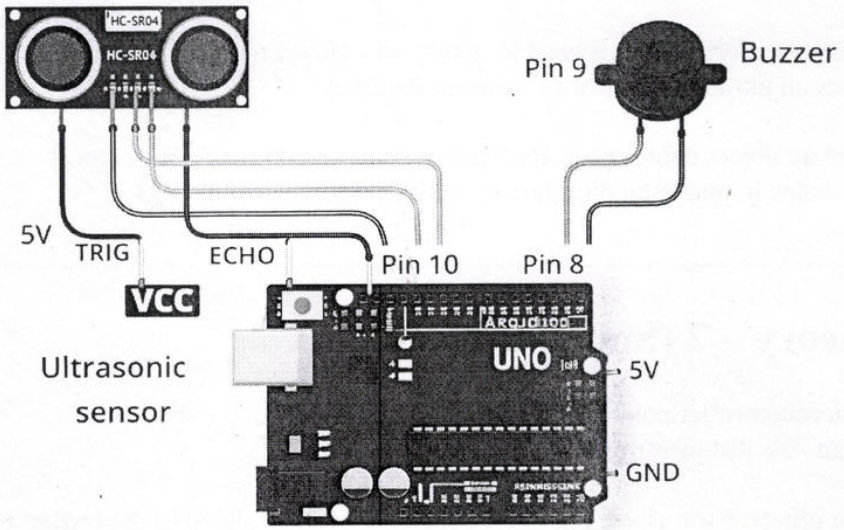
To create a system that produces sound when an object comes close.

Components Required

- Microcontroller (Arduino Uno)
- Ultrasonic sensor
- Buzzer
- Connecting wires

Connections

- Ultrasonic Sensor VCC → 5V (Arduino)
- Ultrasonic Sensor GND → GND
- Ultrasonic Sensor TRIG → Digital Pin (e.g., Pin 9)
- Ultrasonic Sensor ECHO → Digital Pin (e.g., Pin 10)
- Buzzer (+) → Digital Pin (e.g., Pin 8)
- Buzzer (–) → GND



Working Principle

The ultrasonic sensor sends sound waves and waits for them to return.
It calculates the distance based on the time taken by the waves.

The microcontroller reads this distance.If the object is close, it activates the buzzer.

The buzzer produces sound as an alert.

Result

The buzzer produces sound when an object comes close.

System Concept

- **Input:** Distance detected by sensor
- **Process:** Microcontroller processes signal
- **Output:** Buzzer produces sound
