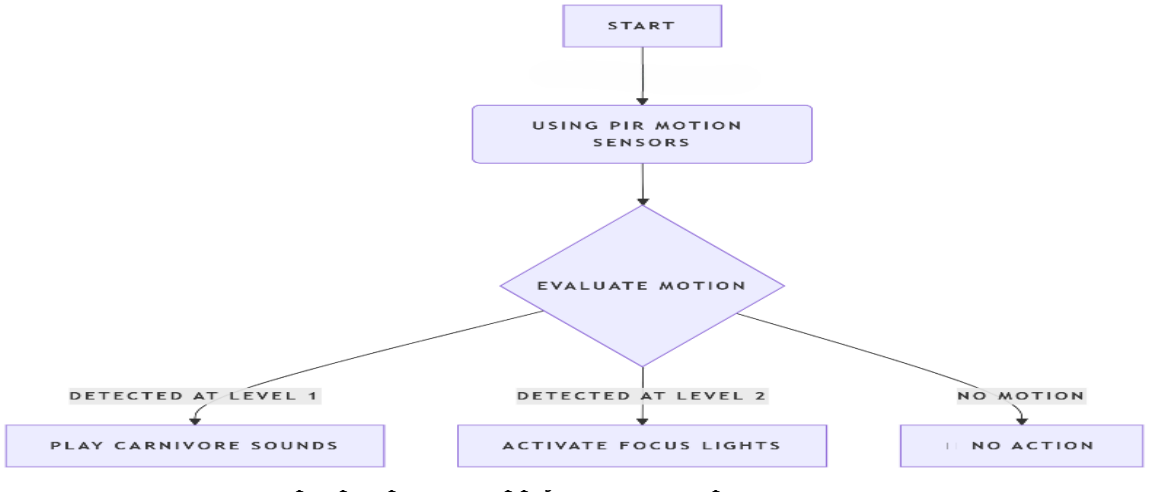
Step By step Execution



io

4.1.2 Firmware Development

- Program microcontroller using Arduino IDE or similar platform.
- Implement:
    - Motion detection logic.
    - Randomized predator sound playback.
    - Light activation.

4.1.3 System Deployment

- Install sensors at strategic field points (outer and inner layers).
- Mount speakers and lights securely.
- Test coverage area and adjust orientation if needed.

4.1.4Testing and Validation

- Perform functional and integration testing.
- Validate detection accuracy and system response.
- Simulate animal intrusions and observe deterrent effect.

4.1.5 Optimization and Feedback

- Tune sensor sensitivity and response timings.
- Collect farmer feedback.
- Plan enhancements (e.g., camera integration, AI-based detection).

4.2 Modules Used in Project :-

4.2.1. Motion Detection Module

- Components: PIR motion sensors (outer and inner layer).
- Function: Detects movement based on infrared radiation (heat signatures).
- Levels:
  - First-Level Detection: Outer field – detects initial entry.
  - Second-Level Detection: Inner field – detects persistent intrusion.

4.2.2. Audio Deterrent Module

- Components: Audio playback device (e.g., DFPlayer Mini, speaker).
- Function: Plays randomized pre-recorded predator sounds (e.g., lion, wolf) when first-level motion is detected.
- Goal: Scare off animals before they proceed further.

4.2.3. Visual Deterrent Module

- Components: High-intensity focus lights (LED or floodlights).
- Function: Activated by second-level motion detection.
- Goal: Startle animals visually, especially effective at night.

4.2.4. Control Module

- Components: Microcontroller (e.g., Arduino, ESP32, Raspberry Pi).
- Function: Central processor that:
  - Receives sensor input.
  - Triggers sound/light modules.

4.3 INSTALLATION OF ARDUINO UNO

Step 1: Gather Required Components

- Arduino Uno board
- USB cable (Type A to B)
- Computer (Windows, macOS, or Linux)
- PIR Sensor
- LED lights or speaker module
- Jumper wires and breadboard
- Power source (USB or external power supply)

Step 2: Download and Install Arduino IDE

- Go to the official Arduino website: https://www.arduino.cc/en/software
- Choose the correct version for your operating system (Windows/macOS/Linux).
- Download and run the installer.
- Follow the on-screen instructions to complete the installation.

Step 3: Connect Arduino Uno to Your PC

- Plug the Arduino Uno into your computer using the USB cable.
- Wait for the system to recognize the device.
- If drivers aren't installed automatically:
  - For Windows: Use Device Manager → Update Driver.
  - For macOS/Linux: Usually no driver needed for official boards.

Step 4: Launch Arduino IDE and Set Up Board

- Open the Arduino IDE.
- Go to **Tools** > **Board** > Select **Arduino Uno**.
- Go to **Tools** > **Port** > Select the correct COM port (e.g., COM3 or ttyUSB0).

Step 5: Write or Load Your Code

Step 6: Upload the Code to Arduino

1. Click the ✓ **Verify** button to compile the code.
2. Click the → **Upload** button to transfer the code to the Arduino Uno.
3. The onboard LED (pin 13) will light up when motion is detected.

Step 7: Test Your Setup

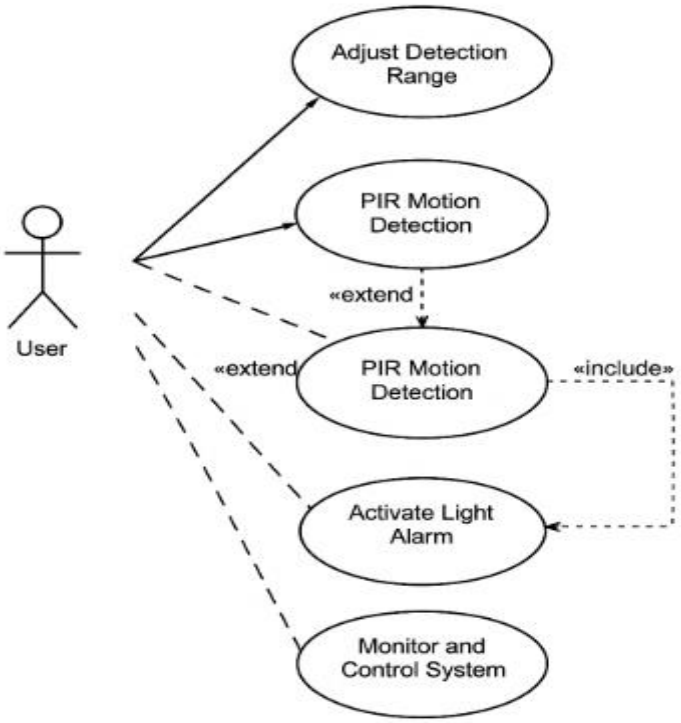
- Move your hand in front of the PIR sensor.
- Observe the LED or speaker activating.
- Monitor the **Serial Monitor** (Tools > Serial Monitor) for output logs.

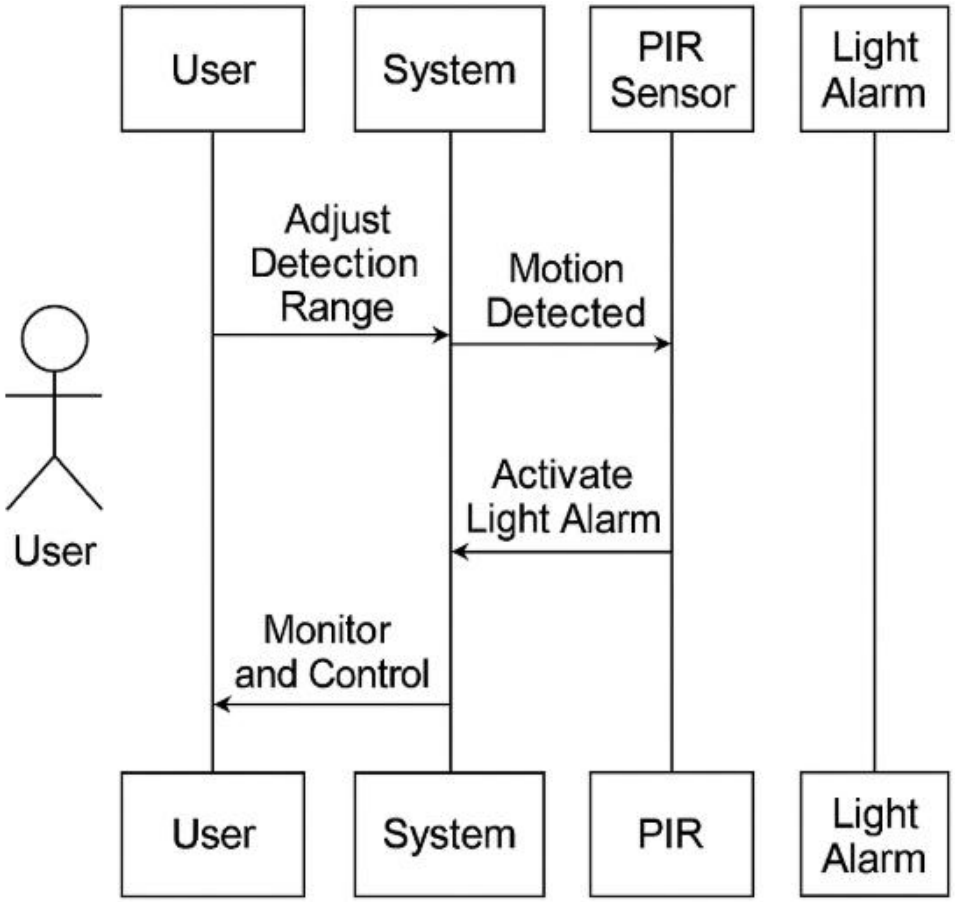
Step 8: Expand the Project

Now that the Arduino is running, you can:

- Add the speaker module.

Trigger lights or alarms.


Adjust Detection Range
PIR Motion Detection
«extend
User
«extend
PIR Motion Detection
«include»
Activate Light Alarm
Monitor and Control System


User
System
PIR Sensor
Light Alarm
Adjust Detection Range
Motion Detected
User
Activate Light Alarm
Monitor and Control
User
System
PIR
Light Alarm

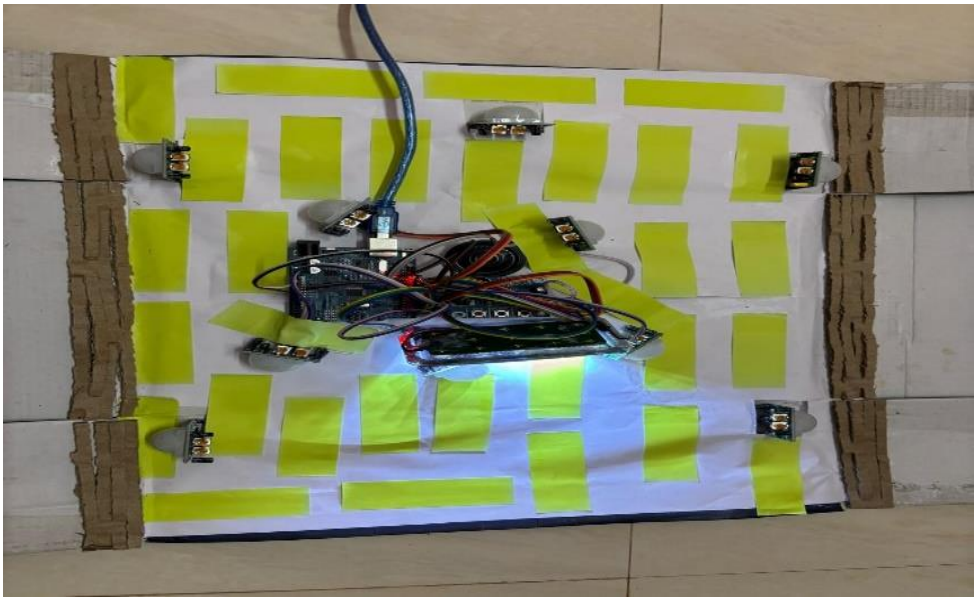


Fig: output Image