



Animal Detection And Alerting System

Ashik KJ, ASI20CA016

Edwin Martin, ASI20CA028

Gauri A, ASI20CA030

Table of Contents

1. Introduction

2. Benefits of Animal Detection Systems

3. Existing System

4. Proposed System

5. Application Areas for the System

6. Hardware and Software Specifications

7. Features of Our Animal Detection System

8. Block/Architecture Diagram

9. UML Diagram/DFD

10. Test Cases

11. Sample Output Pages

12. Conclusion

13. Future Developments and Future Scope

14. Reference

Introduction

The Animal Detection and Alerting System is a computer-based technology designed to detect and alert users about the presence of wild animals in order to mitigate potential risks and prevent human-animal conflicts. As human settlements expand into wildlife habitats, the need for effective systems to monitor and mitigate such conflicts has become crucial. This system utilizes advanced algorithms, such as the YOLOv5 algorithm, to accurately detect and recognize specific animals from images or video captured by cameras. When an animal is detected, the system triggers an alerting mechanism, which can include audible sounds and visual notifications, to notify users and prompt them to take necessary precautions. By providing timely warnings, this system aims to minimize the chances of accidents or harm caused by unexpected encounters with wildlife. The Animal Detection and Alerting System represents a significant advancement in wildlife conservation and human safety, facilitating coexistence between humans and animals in shared environments.

Benefits of Animal Detection Systems

1 Enhanced Safety

Avoidance of human-animal conflicts, enabling timely evacuation of places with animal presence.

2 Reduced Losses

Effective early warning systems help farmers protect their livestock from predators.

3 Promotes ecological sustainability

Technology can be integrated with wildlife conservation programs to promote peaceful coexistence of wildlife and humans.

4 Prevents Road Accidents

Animal detection systems installed near roads and highways can significantly reduce the risk of collisions between vehicles and wildlife.

5 Integration with Existing Infrastructure

Animal detection systems can be integrated with existing surveillance or security systems, enhancing their functionality and providing an additional layer of protection

6 Conservation and Research

Animal detection systems contribute to wildlife conservation by providing valuable data on animal movement, behavior, and habitat usage.

Existing System

The existing animal detection and alerting systems are proprietary and lack standardization. Their sensitivity & accuracy vary widely, making it difficult for end-users to maintain them also are expensive.



Warning Signs

Warning signs are a common approach to caution drivers about the potential animal crossing. Although they require low maintenance, the effectiveness of warning signs can be limited, especially at higher speeds.



Surveillance

Camera

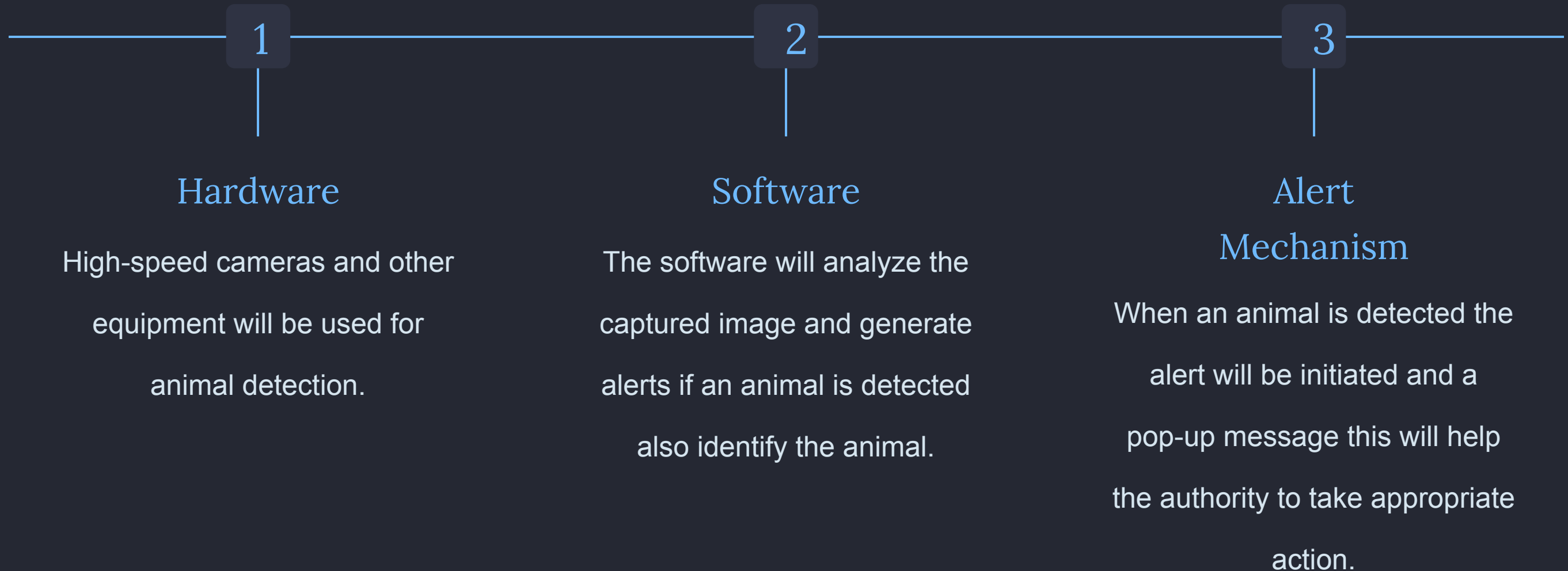
Surveillance camera with no detection system so it require a additional staff to watch live feed to find the presence of a animal.



GPS

Connecting GPS to all animals is an impossible task. And it will destroy the natural beauty of an animal.

Proposed System



Application Areas for the System

Farms and Ranches

Farmers can use the system to protect their livestock from predators.

Residential Areas

The system protects households from wildlife break-ins, e.g., snakes and other reptiles.

Wildlife Reserves

Park rangers and researchers can use the system to track animal activity and avoid disturbing wildlife while collecting data.

Road Safety

Animal detection systems can alert drivers of wandering wildlife along highways.

Hardware and Software Specifications

Hardware

- High-speed camera
- Power supply
- System to receive notification and view the live feed

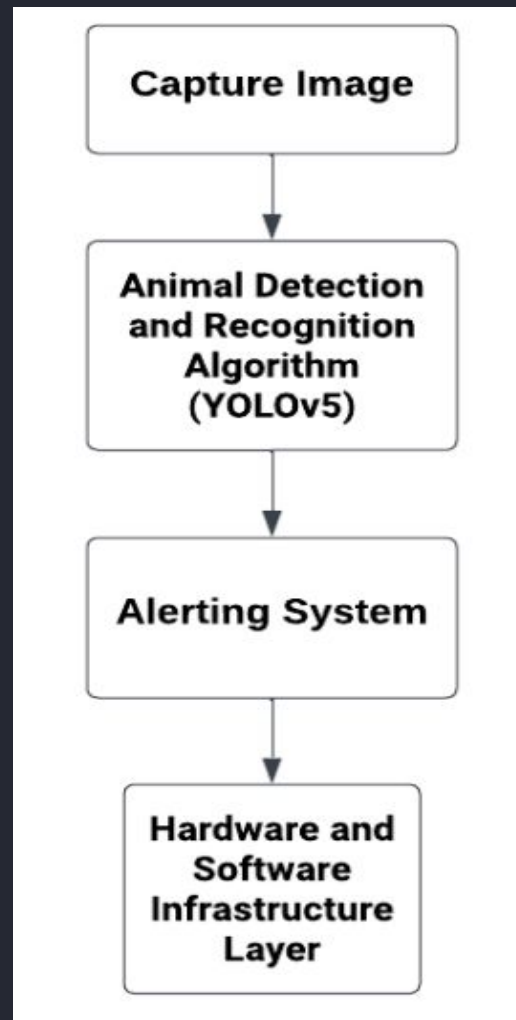
Software

- Image processing software
- Machine learning algorithms
- Alarm system
- Pop-up system
- Live Prediction system

Features of Our Animal Detection System

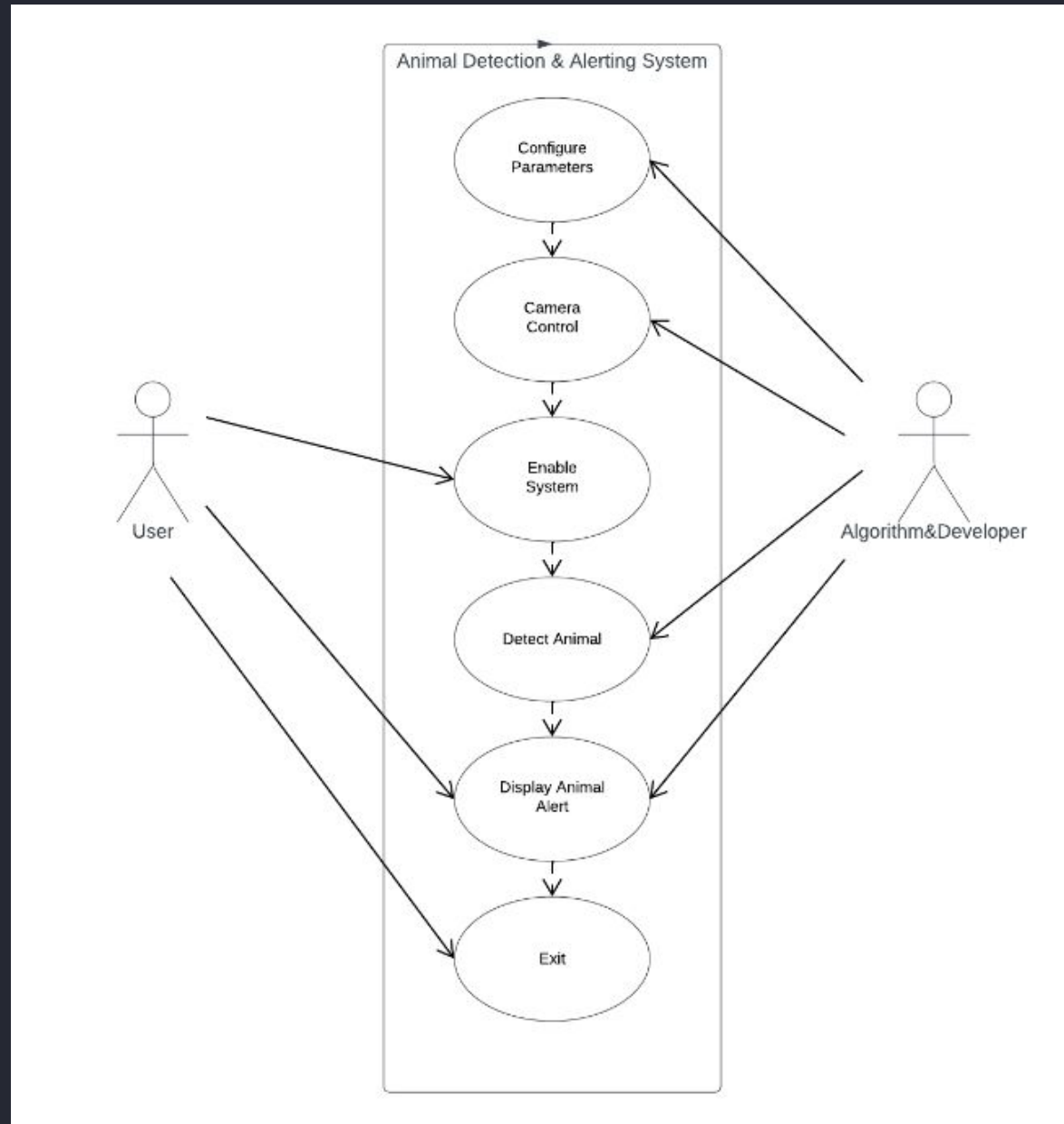
- Automatic detection of animal presence
- Species Identification
- Advanced algorithms to avoid false alarms
- Alarm systems which produces sound when an animal is detected
- The system will also produces a pop up message while an animal is detected
- Integration with Existing Security Systems

Block/Architecture Diagram

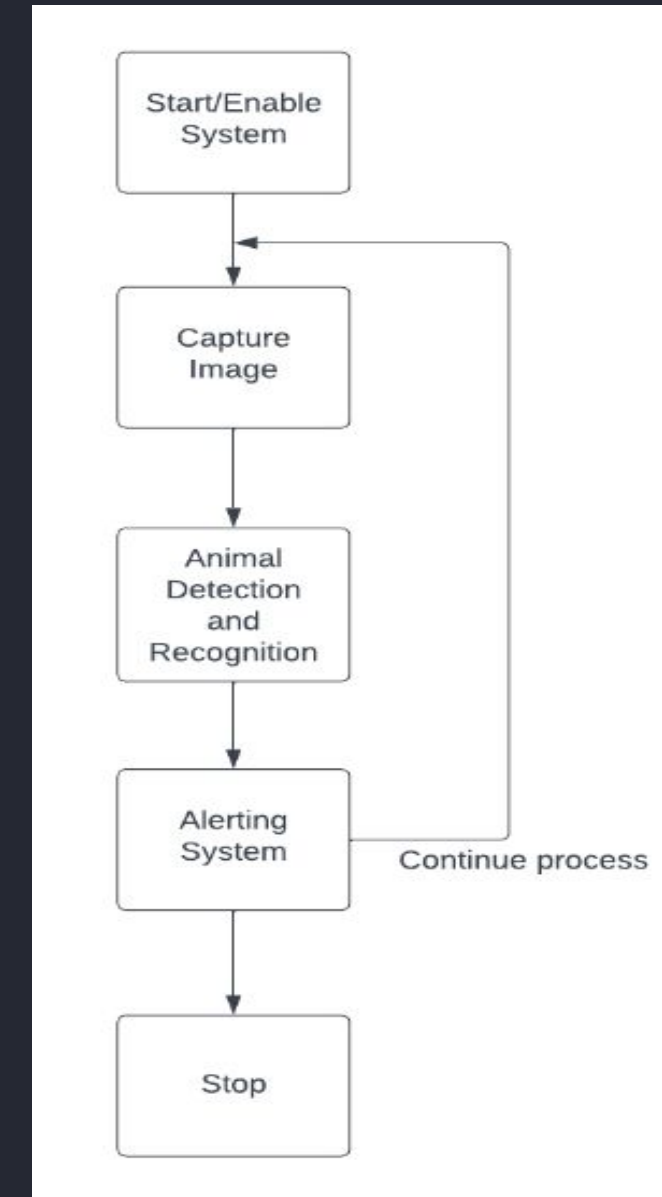


- **Capture Image:** This block captures images or video frames using a camera device. It provides the input feed to be processed by the Animal Detection and Recognition Algorithm.
- **Animal Detection and Recognition Algorithm (YOLOv5):** This block utilizes the YOLOv5 algorithm or similar techniques to detect and classify animals in the input images or video frames. It provides information about the detected animals in the scene.
- **Alerting System block** is responsible for determining if an alert needs to be triggered based on the information provided by the Animal Detection and Recognition Algorithm.
- **Hardware and Software Infrastructure Layer:** This block encompasses the necessary hardware and software components to support the entire system. It includes camera or image/video input devices, processing units, storage devices, and the required software infrastructure. These components provide the computational resources and storage capacity needed to run the Animal Detection and Recognition Algorithm, as well as support the Alerting System and overall system operations.

UML Diagram/DFD



Use Case Diagram

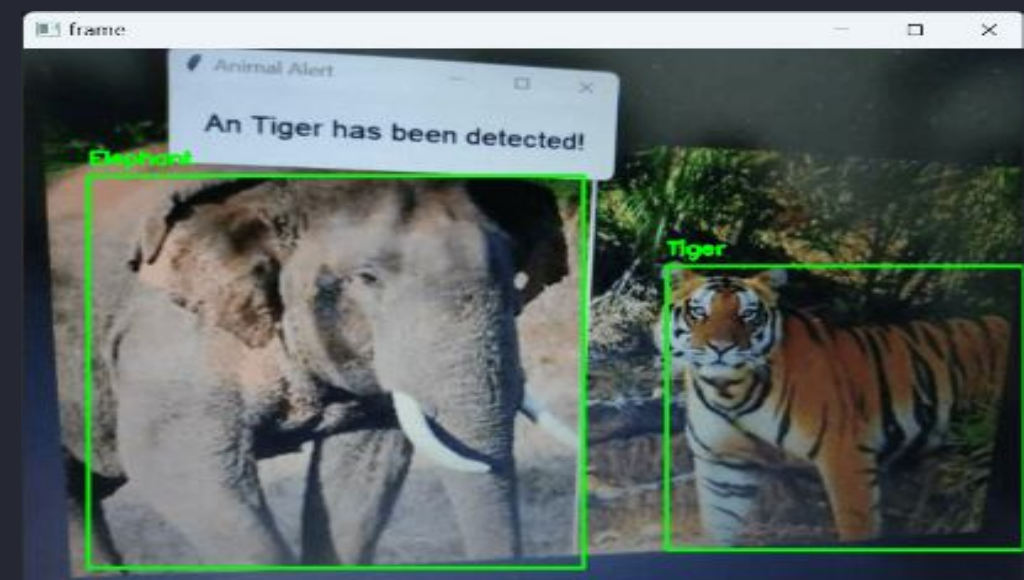
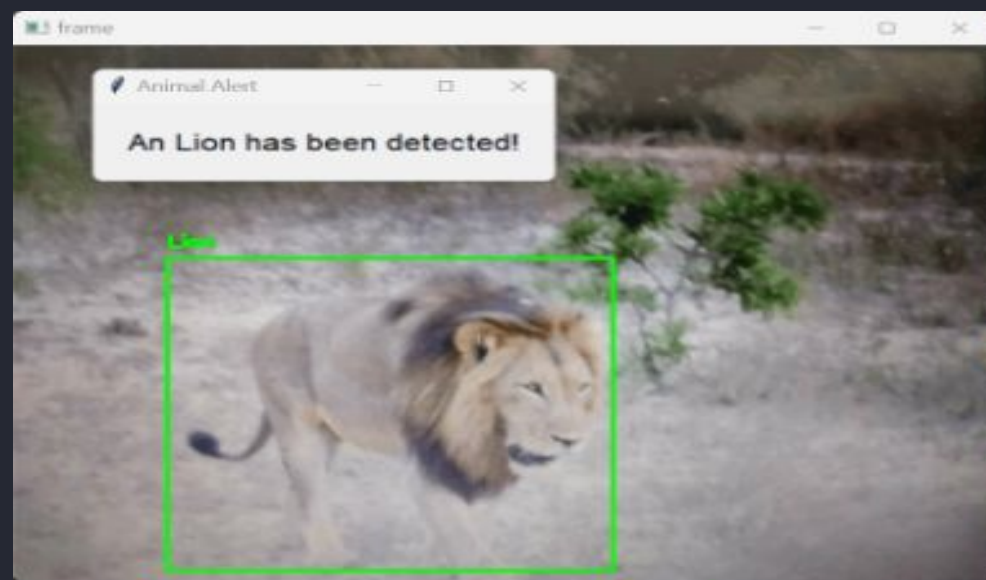
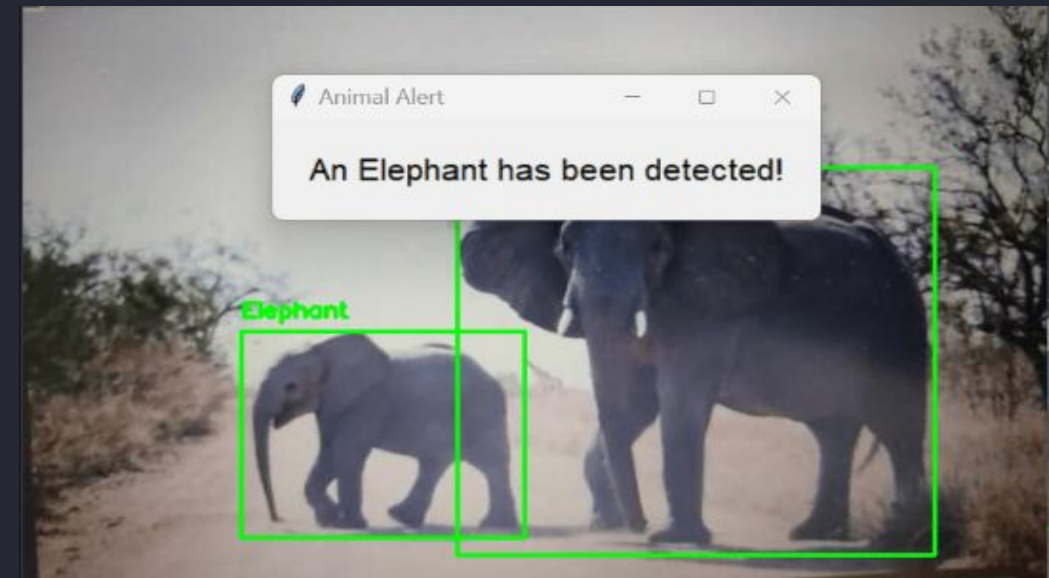
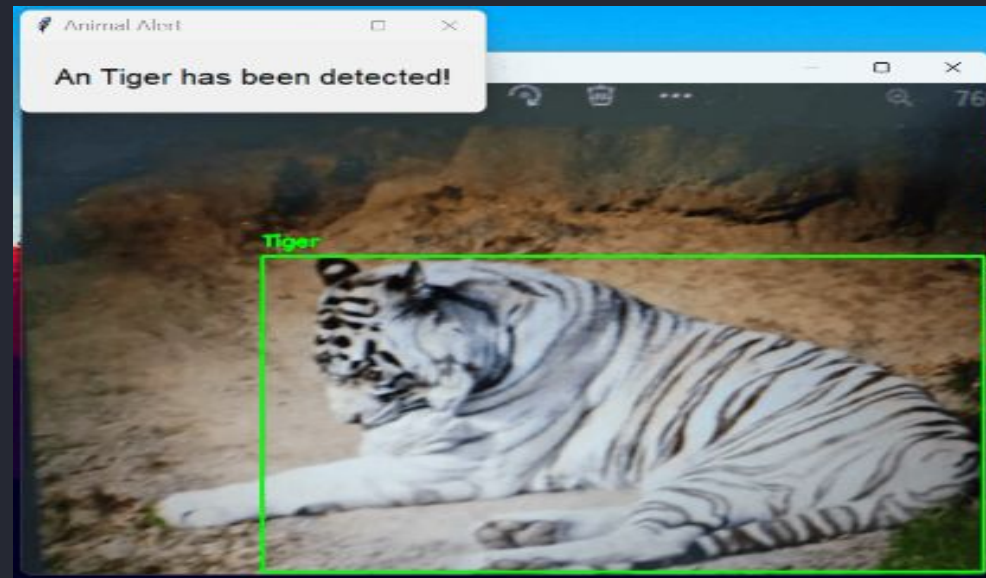


Data Flow Diagram

Test Cases

1. Verify accurate detection of animals in various scenarios.
2. Evaluate detection accuracy against ground truth data.
3. Assess real-time processing performance and speed.
4. Validate robustness in different lighting and environmental conditions.
5. Verify appropriate and timely generation of alarms/alerts.
6. Test integration with existing infrastructure or third-party systems.
7. Evaluate system resilience in handling failures/disruptions.

Sample Output Pages



Conclusion

Animal Detection and Alerting Systems are a crucial technology that can significantly reduce the number of road accidents and protect vulnerable wildlife. The proposed system uses the YOLOv5 algorithm to detect animals in real time. The system is highly accurate and can detect a wide variety of animals. Through the utilization of visual cues, such as alerting sounds and pop-up notifications, we provide immediate alert to the authorities and take appropriate action.

The proposed system has the potential to make a significant impact on road safety and wildlife conservation. The system could be used to install in areas where there is a high risk of animal-vehicle collisions.

Future Developments and Future Scope

- 1 In Future, the system can be integrated with drones, allowing real-time tracking, and data gathering to monitor animal movements and behavior patterns continuously.
- 2 Regularly update the system with new algorithms, technological advancements, and user feedback to enhance its performance, accuracy, and usability.
- 3 Create a mobile application that allows users to receive animal detection alerts on their smartphones.

Reference

- <https://ieeexplore.ieee.org/document/10040337>
- <https://github.com/ultralytics/yolov5> Algorithm used for detection
- <https://ijarcce.com/upload/2017/march-17/IJARCCE%20137.pdf>
- <https://elibrary.khwopa.edu.np/bitstream/123456789/407/1/Animal%20Intrution%20Detection%20%26%20Alert%20System.pdf>
- <https://www.kaggle.com/datasets/antoreepjana/animals-detection-images-dataset>