



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 4, April 2025

Real-Time Animal Detection and Alert System

Prof. Puneet Patel, Nikita Shantaram Bankar, Karuna Ramdas Bidve, Aditi Dutta,
Huzaifa Ayaz Mondhe

Dept. of IT, MET Institute of Engineering, Bhujbal Knowledge City Adgaon, Nashik, Maharashtra, India
Student, Dept. of IT, MET Institute of Engineering, Bhujbal Knowledge City Adgaon, Nashik, Maharashtra, India
Student, Dept. of IT, MET Institute of Engineering, Bhujbal Knowledge City Adgaon, Nashik, Maharashtra, India
Student, Dept. of IT, MET Institute of Engineering, Bhujbal Knowledge City Adgaon, Nashik, Maharashtra, India
Student, Dept. of IT, MET Institute of Engineering, Bhujbal Knowledge City Adgaon, Nashik, Maharashtra, India

ABSTRACT: Human-wildlife conflicts are increasing due to urban expansion into natural habitats, leading to threats to both humans and animals. Real time Animal Detection addresses this challenge by providing a real-time detection and alert system that uses advanced technologies to promote safer coexistence. The primary aim of this project is to minimize harmful human-animal interactions by detecting wildlife and sending timely alerts. The system uses YOLOv8 (You Only Look Once), a high-speed, accurate object detection algorithm, to identify animal species in real-time through video feeds captured by cameras. A Raspberry Pi processes the images and triggers alerts via a Mobile application using the flutter. Findings show that Wild Guard AI effectively detects animals near human activity and sends notifications through the system, ensuring public safety and conservation. The system is especially useful in farms, highways, and forested areas. The conclusion is that this technology offers a scalable and efficient solution for reducing human-wildlife conflicts, enhancing both personal safety and wildlife conservation.

KEYWORDS: YOLOv8, Raspberry Pi, Flutter, Internet of Things (IoT)

I. INTRODUCTION

The rapid expansion of human activities into previously untouched wildlife habitats has caused a significant increase in conflicts between humans and wildlife. These conflicts can lead to dangerous encounters, property damage, and fatalities for both animals and humans. For example, animals may wander onto highways, causing accidents, or enter farmlands, leading to crop damage. As natural habitats shrink due to deforestation, urbanization, and agricultural expansion, the frequency of such encounters continues to rise. This ongoing problem highlights the urgent need for solutions that promote peaceful coexistence between humans and wildlife. To address these challenges, modern technology offers a promising way forward. In particular, Artificial Intelligence (AI) and the Internet of Things (IoT) have revolutionized how we monitor and manage wildlife interactions. These technologies enable the creation of smart, automated systems that can detect, track, and respond to animal presence in real time. Such systems serve as early warning mechanisms, alerting humans to potential dangers and preventing harmful encounters before they occur.

One innovative solution is the Real-Time animal Detection and Alert System. This system is designed to protect both animals and humans by detecting animal species in sensitive areas like forests, highways, and agricultural lands. The system relies on cameras that continuously capture images, sending them to a processing unit for analysis. The effectiveness of this system hinges on the use of the YOLOv8 (You Only Look Once) model, a highly advanced object detection algorithm renowned for its speed and accuracy in identifying objects within images.

The Wild Guard AI system not only detects animals but also takes proactive measures to prevent conflicts. If an animal is detected near humans, it can trigger a buzzer to scare the animal away and alert nearby individuals. Additionally, proximity sensors help determine whether both humans and animals are present in the same vicinity, enabling the system to take appropriate action based on the level of threat. The system communicates detection results and safety information to users through a backend server and web-based application, allowing real-time monitoring of animal activity and providing timely safety recommendations.

Beyond its role in preventing conflicts, the Smart Animal Detection and Intrusion Alert System contributes to wildlife conservation efforts. Continuous monitoring allows the collection of valuable data on animal movements and behaviours, which can inform conservation strategies. The system's flexible architecture permits future improvements, such as adding sensors or updating detection algorithms. By integrating AI, IoT, and real-time data processing, this system represents a significant advancement in wildlife protection, reducing human-wildlife conflicts and enhancing safety for all involved.

II. RELATED WORK

(1)The paper "An Accurate and Fast Animal Species Detection System for Embedded Devices" by Mai Ibraheam et al. (2023) presents a system designed to detect animals efficiently using an improved version of the YOLOv2 model. The authors modified the YOLOv2 architecture to enhance both speed and accuracy, which is essential for real-time detection on embedded devices. They added deformable convolutional layers (DCLs) to the model, which help it adapt to variations in the shapes and positions of animals in the images. This allows the system to better identify animals in challenging environments like highways and remote wilderness areas, where animal-human interactions can be dangerous. The system also focuses on reducing the complexity of the model by removing unnecessary convolutional layers, which decreases the computational load and makes the detection process faster. As a result, the system achieves a 5% increase in accuracy and a 12% improvement in speed compared to the original YOLOv2, making it well-suited for real-time applications on devices with limited processing power.

Key Features:

- Optimized YOLOv2 model for faster detection.
- Deformable convolutional layers (DCLs) to handle geometric variations in animals.
- Designed for real-time performance on embedded devices.
- 5% improvement in accuracy and 12% increase in speed over standard YOLOv2

(2)The paper "AI Surveillance for Animal Intrusion Detection in Man-Made Environments" by M. Logaprakash et al. (2024) presents a solution for detecting animals in urban and industrial areas using artificial intelligence (AI). With increasing urbanization, human- wildlife encounters have become more frequent, posing risks to both animals and humans. To tackle this, the authors propose a surveillance system that uses advanced deep learning techniques, specifically YOLOv8 and Convolutional Neural Networks (CNNs), to identify animals from footage captured by cameras. The system is designed to detect and classify different animals in real- time, providing timely alerts to authorities or residents. By integrating this AI model into existing surveillance networks, the system enhances the ability to monitor large areas efficiently. The goal is to reduce potential conflicts between humans and wildlife, promote safety, and improve the coexistence of both in evolving urban settings.

Key Features:

- Uses YOLOv8 for real-time detection of animals.
- Focuses on urban and industrial environments.
- Provides high accuracy with low latency for large- scale monitoring.
- Integrates AI into existing surveillance systems for continuous monitoring and alerts.

(3)The paper titled "Reviewing the Role of AI in Environmental Monitoring and Conservation" by Onyebuchi Nneamaka Chisom et al. (2024) explores how artificial intelligence (AI) is revolutionizing environmental conservation efforts. The authors highlight that AI plays a significant role in tracking wildlife, assessing habitats, analyzing biodiversity, and predicting natural disasters. By using tools such as camera traps, drones, and environmental DNA (eDNA), AI helps monitor animal movements and detect changes in ecosystems more efficiently than traditional methods. The paper also addresses the challenges faced in applying AI, such as ensuring high-quality data and preventing algorithmic bias, which can affect the accuracy of conservation efforts. Despite these challenges, the authors emphasize AI's potential to improve decision- making in conservation strategies, allowing for more informed and timely interventions to protect the environment.

Key Features:

- AI is used for wildlife tracking, habitat assessment, biodiversity analysis, and disaster prediction.
- Utilizes data from camera traps, drones, and environmental DNA (eDNA) to monitor ecosystems.
- Highlights the need to overcome challenges such as data quality issues and algorithmic bias.
- Emphasizes AI's potential to enhance environmental conservation and decision-making.

(4)The AI-Based Wildlife Conservation System, developed by V. R. Palandurkar, Aditya Gholap, Ayush Kulal, and Brijesh Ingavale in 2024, aims to protect wildlife by using artificial intelligence for species identification. The system uses Python programming and advanced image recognition technology, specifically convolutional neural networks (CNN), to identify various animal species from images. A key part of the system is its easy-to-use interface, which allows people to upload their own photos for identification. This encourages public involvement in conservation efforts. In addition to identifying species, the system promotes awareness of ethical data usage in public spaces and fosters ecological education. By combining technology with community engagement, the system plays an essential role in supporting global biodiversity and wildlife protection.

Key Features:

- Uses Python and CNN technology for accurate species identification.
- Provides a user-friendly interface to engage the public in conservation.
- Focuses on ethical data usage and environmental awareness.
- Supports detailed species identification to enhance conservation efforts.

(5)The paper "Detection and Alerting Animals in Forest using Artificial Intelligence and IoT" by Girish H., Manjunath T. G., and Vikramathithan A. C. (2022) presents a system aimed at reducing accidents on forest highways caused by vehicles colliding with animals. The system uses the Internet of Things (IoT) along with artificial intelligence to detect animals near roads and alert drivers in real-time. It operates by using a Raspberry Pi computer connected to sensors that detect movement or presence of animals. Once an animal is detected, the YOLO (You Only Look Once) algorithm processes the image to identify the animal. The system then sends out alerts through lights and sound signals to warn drivers to slow down, reducing the risk of accidents. This technology is beneficial for both protecting wildlife and ensuring the safety of humans driving on forest roads.

Key Features:

- Integration of Raspberry Pi and sensors to detect animals in real-time.
- Use of the YOLO algorithm for accurate image detection and identification.
- Alerts drivers with visual and sound signals to avoid collisions.
- Focus on improving safety for both animals and drivers on forest highways.

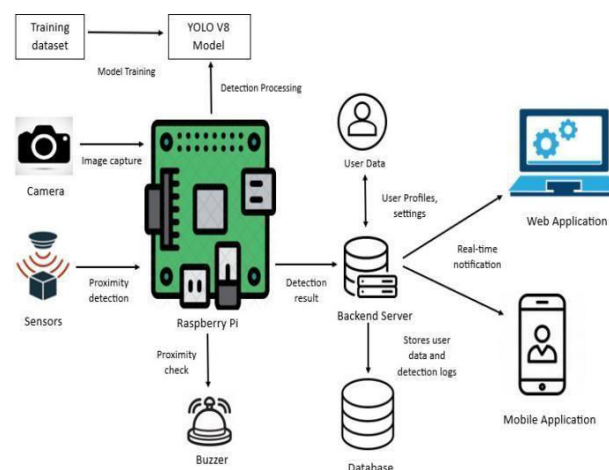


Fig. 1 Architecture Diagram

III. METHODOLOGY

The system is designed to enhance safety in forest or jungle environments by utilizing a camera that continuously captures real-time images or videos. These images are processed by a Raspberry Pi running a pre-trained YOLOv8 model, which identifies various animal species. To ensure safety, the system includes a proximity check that determines whether a human and an animal are nearby, either through a dedicated proximity sensor or by analyzing the camera data. If both a human and an animal are detected within a specified range, a buzzer is activated to alert people in the vicinity, thereby preventing potentially dangerous encounters.

The system begins with Image Capture, where a camera continuously records real-time images or videos in environments like forests or jungles. This capability is essential for monitoring wildlife activity in areas where animals are abundant. The captured image data is then transmitted to a Raspberry Pi, which serves as the processing unit for Animal Detection. Here, a pre-trained YOLOv8 model is employed to identify various animal species within the images, enabling quick and accurate recognition of wildlife. To enhance safety, the system includes a Proximity Check mechanism. This can utilize either a physical proximity sensor or analyze the camera data to determine whether a human and an animal are close to each other. If both are detected within a specified range, a Buzzer Activation feature is triggered, emitting an alert to notify people nearby and potentially prevent dangerous encounters with wildlife.

Additionally, there is an option for Data Transfer to a Back-end system, allowing for the storage and processing of detection results. This includes crucial information such as the species of animals detected, time-stamps, and GPS locations, which can be valuable for research and conservation efforts. The entire system integrates seamlessly with a Web Application, where users can monitor real-time data. The application displays detected animal species, their locations (with GPS data when available), the status of the buzzer, and safety recommendations based on the identified species. Users can log in to access this information and stay informed about their surroundings.

Finally, the Notification System serves as an alert mechanism, sending notifications to users whenever an animal is detected near a human. These alerts contain essential details such as the type of animal detected, its location, and pertinent safety tips, ensuring that users are equipped with the information necessary to respond appropriately to potential risks. Overall, this integrated system is designed to enhance safety and promote wildlife conservation in areas where human-wildlife interactions are likely to occur.

IV. EXPECTED OUTCOME

The expected output of the system includes several important features designed to help manage interactions between humans and wildlife effectively. The system will provide real-time detection of animals, identifying them from the live camera feed and displaying the species to the user. This immediate feedback allows people to stay aware of their surroundings. If an animal is spotted near human activity, the system will automatically send alerts and notifications to a connected web or mobile application, informing users about the species and its approximate location. To further prevent conflicts, the system will activate a buzzer if an animal is detected close to a human, using proximity sensors or video feeds to scare the animal away and reduce the chances of dangerous encounters. In addition, the web application will offer a user-friendly interface that shows detection results, including the type of animal and its location, while also providing alerts and practical safety suggestions. The system will maintain a data log of all detected animals and triggered alerts, storing this information in a database for future analysis and tracking. This logged data can be invaluable for researchers and wildlife managers, helping them understand animal behaviours and movement patterns, which is essential for effective wildlife conservation strategies. Overall, these features work together to create a safer environment for both people and wildlife, promoting coexistence while minimizing conflicts.

V. CONCLUSION

The Real-Time Animal Detection System represents a significant advancement in wildlife management and human safety in environments where human-animal interactions are frequent, such as forests and jungles. By integrating cutting-edge technologies—image processing through a YOLOv8 model, proximity detection, and a responsive alert system—the project addresses critical challenges associated with human encounters with wildlife. This system not only helps prevent dangerous situations but also educates users about local wildlife, fostering a greater understanding and

respect for nature. It empowers communities by providing real-time information, allowing people to make informed decisions when they encounter wildlife. Additionally, the data collected can contribute to research and conservation efforts, helping to protect endangered species and preserve natural habitats. The Real-Time Animal Detection System is not just a technological innovation; it is a tool for promoting coexistence between humans and wildlife. By prioritizing safety and harnessing the power of data, this project offers a proactive solution to one of the pressing issues in human-wildlife interactions. As we look to the future, the potential for further development and enhancement of this system is vast. With ongoing improvements, we can expand its capabilities to cover more areas, integrate additional sensors, and refine the detection algorithms. This promises a safer and more informed relationship with the natural world, where humans and wildlife can thrive together harmoniously.

REFERENCES

- [1] Ibraheam, M., Li, K. F., & Gebali, F. (2023). "An Accurate and Fast Animal Species Detection System for Embedded Devices." IEEE Access. DOI:10.1109/ACCESS.2023.3252499
- [2] Logaprakash, M., Srinivas, R., Dharmesh, P., & Baashkar, K. H. (2024). "AI Surveillance for Animal Intrusion Detection in Man-Made Environments." International Journal of Creative Research Thoughts (IJCRT), Volume 12, Issue 4, ISSN: 2320-2882. URL: www.ijcrt.org
- [3] Chisom, O. N., Biu, P. W., Umoh, A. A., Obaedo, B. O., Adegbite, A. O., & Abatan, A. (2024). "Reviewing the Role of AI in Environmental Monitoring and Conservation: A Data-Driven Revolution for Our Planet." World Journal of Advanced Research and Reviews, Volume 21, Issue 1, 161–171. DOI: 10.30574/wjarr.2024.21.1.2720
- [4] Palandurkar, V. R., Gholap, A., Kulal, A., & Ingavale, B. (2024). "AI-Based Wildlife Conservation System." International Journal of Research Publication and Reviews, Volume 5, Issue 1, pp. 5542-5546, ISSN: 2582-7421. URL: www.ijrpr.com
- [5] Girish, H., Manjunath, T. G., & Vikramathithan, A. C. (2022). Detection and Alerting Animals in Forest using Artificial Intelligence and IoT. International Conference on Advances in Electronics, Communication and Computer Technology, January 2022. DOI : 10.1109/ICAIECC54045.2022.9716679. Retrieved from <https://www.researchgate.net/publication/358820239>



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details