

ANIMAL INTRUSION IN FARM AREA

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ABSTRACT

Animal intrusion is a serious issue for farmers as it can result in significant damage to their crops and livestock, leading to economic losses and decreased productivity. Wildlife such as deer, raccoons, squirrels, and birds can cause harm to crops and livestock, and in some cases, can spread diseases that affect both animals and humans. For instance, deer can destroy corn, soybeans, and fruits, while raccoons can damage vegetable gardens, cornfields, and fruit orchards. Birds can consume or harm crops such as berries, grapes, and nuts, resulting in lower yields and economic losses for farmers. Although farmers use different methods like fencing, scare tactics, and repellents to prevent animal intrusion, these methods are not always effective, and some animals may become habituated to them, resulting in continued intrusion. Thus, farmers need to stay informed about the latest research and best practices in animal intrusion prevention to safeguard their crops and livestock and maintain a sustainable farming operation.

I. INTRODUCTION

The project is based on image processing and analysis from a video that is captured from the camera in real-time. This system in farm areas is designed to detect and deter animals from entering the farm area. This systems typically use a combination of sensors and alarms to detect when an animal is approaching or has entered the farm area.

Some common sensors used in animal intrusion systems include infrared motion sensors and vibration sensors. These sensors can detect movement and other changes, which can indicate that an animal is nearby.

When an animal is detected, the system will activate an alarm, a loud noise or flashing lights, to deter the animal from entering further. this system is also connected to a camera, allowing the farmer to monitor the farm area remotely and identify any potential threats.

Overall, an animal intrusion system will help to protect the crops and livestock on a farm by preventing damage from wild animals. It can also improve safety for both the animals and the farmers by reducing the risk of animal attacks or accidents.

II. OBJECTIVE

The aim of this project is to create a system to detect and deter animals from entering farm areas using real-time sound and notification alarms. The objectives include identifying common farm area intruders, developing a real-time detection system, assessing its effectiveness in preventing intrusions, and evaluating farmer acceptance and feasibility.

- Develop a real-time animal detection and alarm system for sound and notification to prevent animal intrusion in farm areas.
- Identify the most common animals causing intrusion in farm areas.
- Develop a sound and notification system that can detect animal intrusion in real-time.
- Evaluate the effectiveness of the sound and notification system in preventing animal intrusion.
- Assess the acceptability and feasibility of the sound and notification system among farmers.

III. SCOPE

Crop damage caused by wildlife is a major concern, and as cultivated land expands into previous wildlife habitats, crop raiding is becoming increasingly problematic. Farmers in India face significant threats from pests, natural disasters, and animal damage resulting in lower yields. Traditional methods followed by farmers are not effective, and it is not feasible to hire guards to prevent wild animals from damaging crops. It is essential to protect crops from animal damage and divert animals without harming them, while also ensuring the safety of

both humans and animals. Thus, to overcome these challenges, machine learning is used to detect animals entering the farm area.

This project aims to develop a real-time animal detection and alarm system that uses deep neural networks to detect animals entering the farm area. The system uses a camera to monitor the surrounding area and records it throughout the day. A machine learning model detects the entry of animals, and appropriate sounds are played to drive the animal away. Various libraries and concepts of convolutional neural networks are used to create the model.

This system will be helpful in reducing the problems faced by farmers due to animal intrusion on a large scale. Initially, the system will be implemented with a few farmers, and it can be scaled up to the entire country. The system will bring a remarkable change in the agriculture sector as farmers can sleep peacefully without fearing for their crops' deterioration. The system is scalable, reliable, easy to use, fast, and efficient, making it suitable for a large database.

The animal intrusion detection system will reduce the damage done to crops by wild animals, saving the cultivation and avoiding losses for farmers. It will also save time as compared to manually watching over the fields all the time during crop cultivation. As the expansion of cultivated land into wildlife habitats continues, the animal intrusion detection system can serve as a sustainable solution to prevent crop damage caused by animals.

IV. REQUIREMENT ANALYSIS

1. 132-bit, x86 Processing system High processing computer system with GPU
2. Windows 7 or later operating system

V. DESIGN / FLOW DIAGRAMS

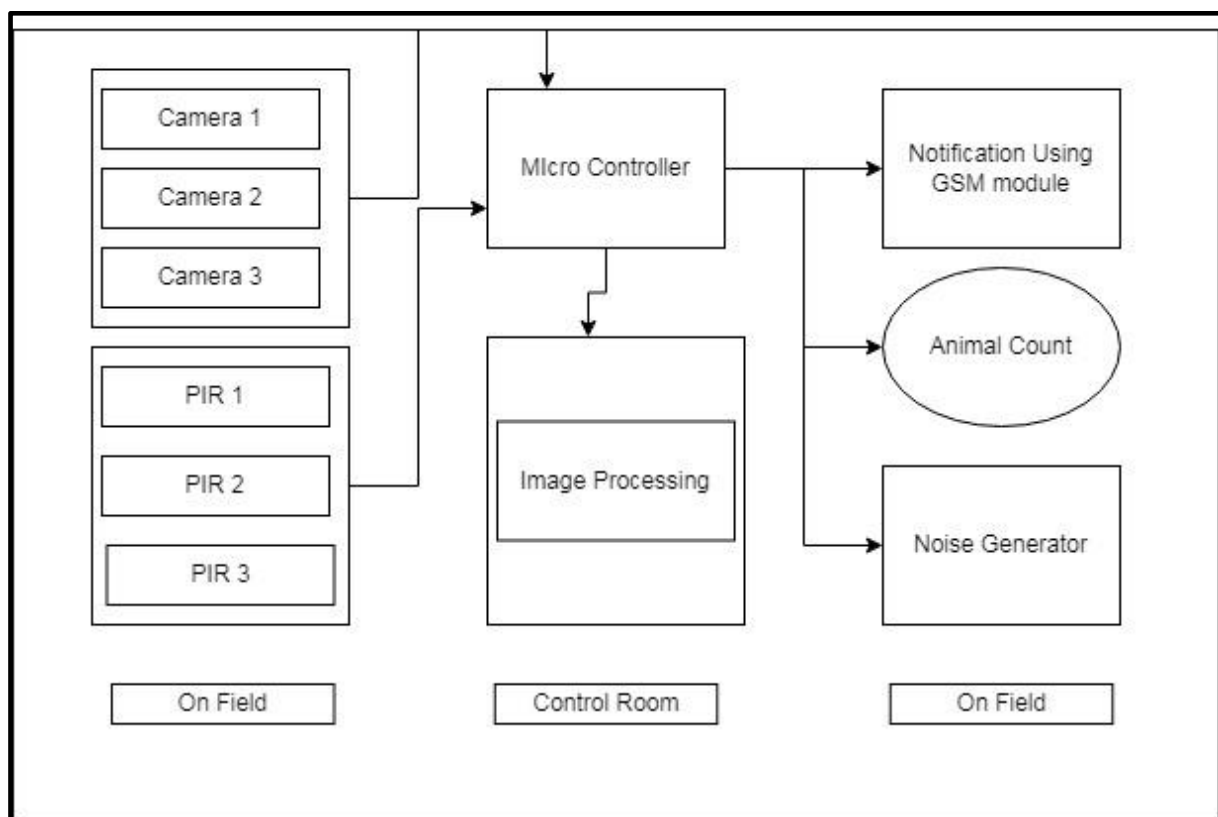


Fig. 1 Block Diagram

Activity Diagram

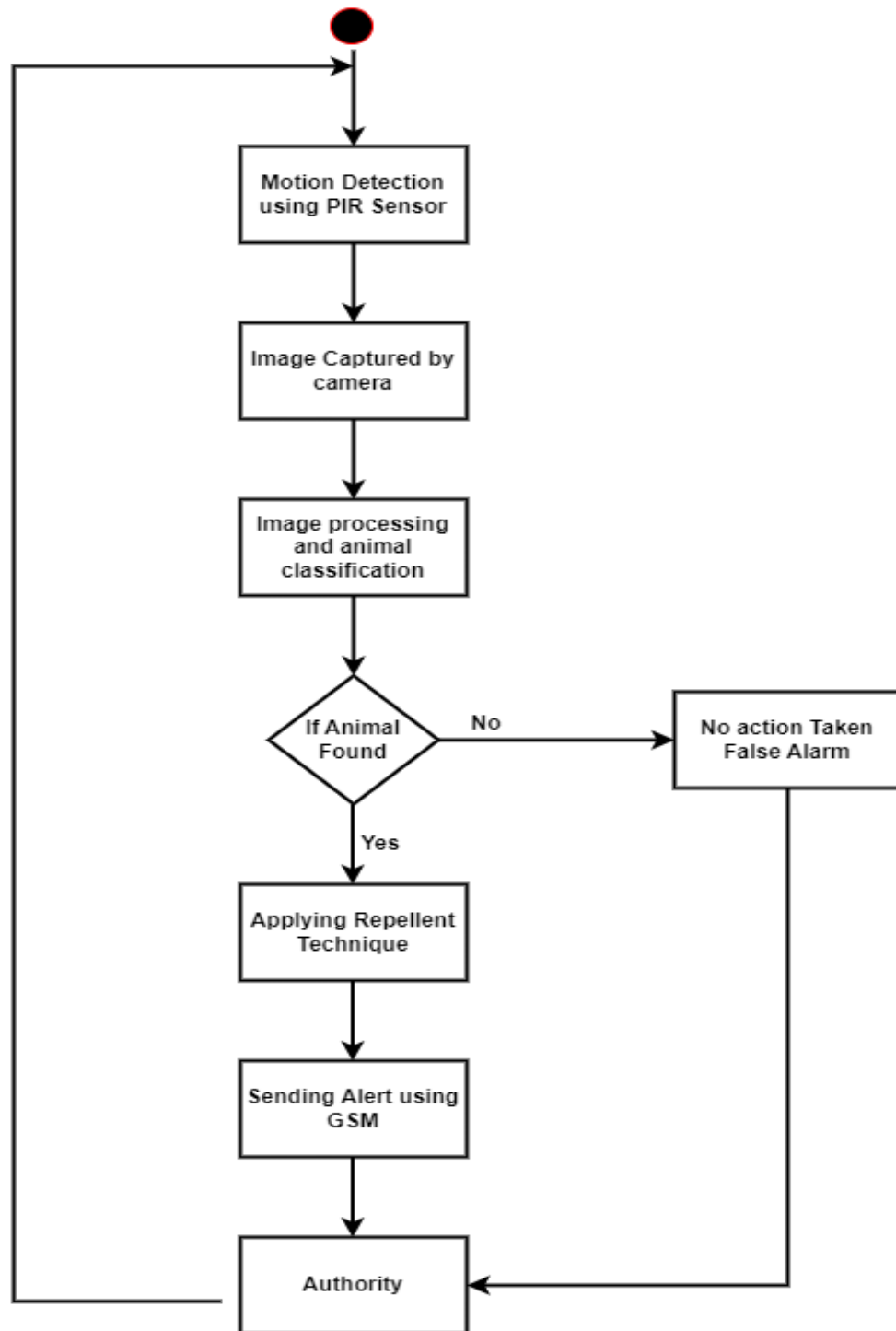


Fig 2: Activity Diagram

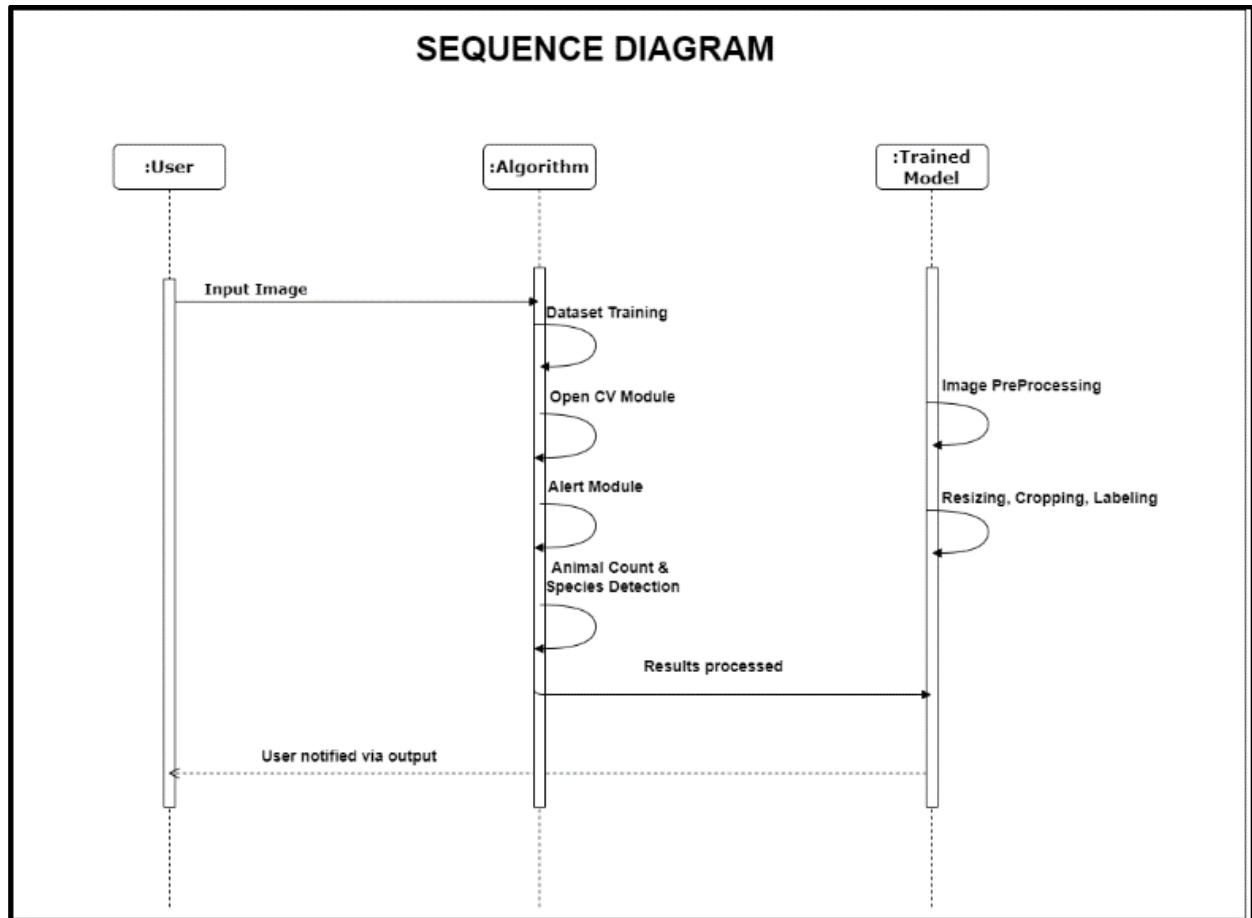


Fig.3 Sequence Diagram

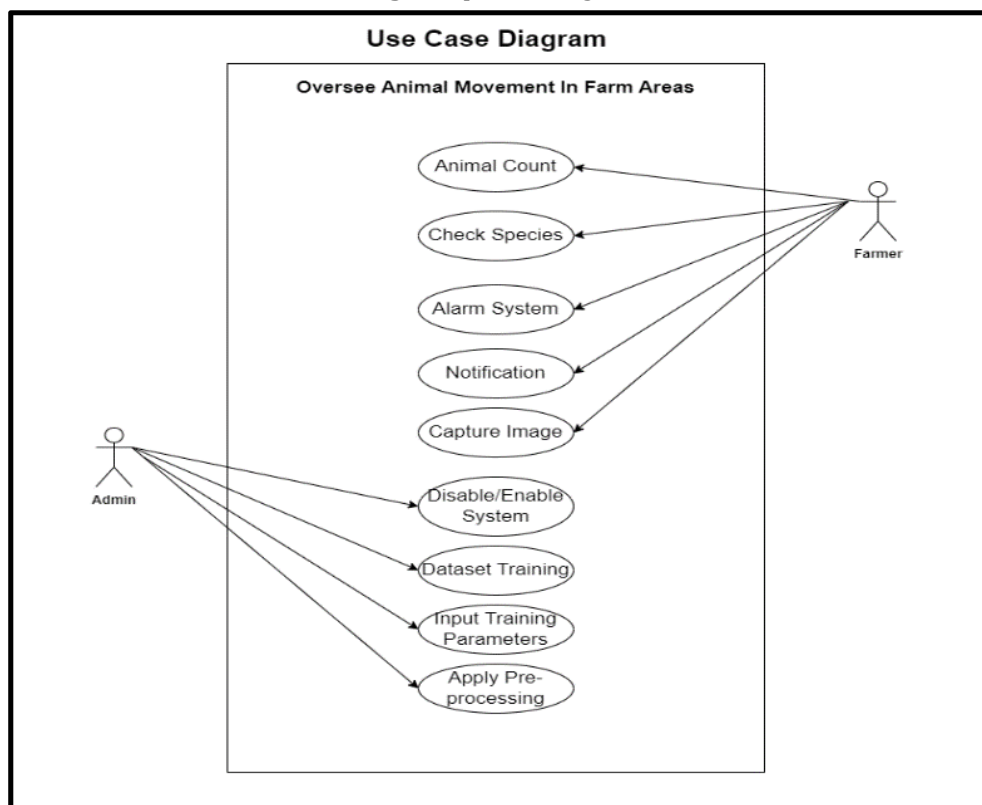


Fig.4 Use Case Diagram of

VI. PROJECT DESCRIPTION

Our proposed solution provides a live animal detecting video sensor to protect the farmland. When any kind of animal tries to enter the region, the integrated software detects the presence of that animal and identifies the species name as well as the count. Immediately, an alert is given to the farmer by mail /call / sms which contains the information about the animal like what kind and how many, so that he can take the essential steps in order to protect his land. In addition to alerting the farmer, the speaker will emit a sound which would help to threaten the animals while the farmer is thinking and taking the essential actions. This system will monitor the farms 24/7 depending upon the availability of the electric supply. In rural areas, saving the farms is a major concern to deal with in order to save the cultivation of the crops, hence this developed software will help in addressing the issue.

VII. METHODOLOGY

The animal detection and alarm system involves several steps, including dataset training, setting up libraries with usable hardware, and testing the model's predictions. The following points provide a detailed description of each step:

Dataset Training:

The first step is to train the datasets, which involves several processes, including installing OpenCV and ImageAI for Object Detection, finding training data, using pre-trained models, preparing images, training a custom model, and detecting custom model objects.

Model Building Using OpenCV:

This section details the entire system's design, which incorporates animal detection, tracking, and alerting. OpenCV is used to create the model, where we construct a function called "detect" that resizes the picture and calls it at relevant locations. We use the try and except methods, with the former resizing the picture to 64x64 dimensions and the latter extending the dimensions. If the image's ranges exceed one, we rescale it to the range 0 to 1 and forecast the outcome using the 'predict' function. Then, we use predict classes to determine the class to which the image belongs. Finally, we provide a testing image to determine whether it belongs to the correct class.

Alert Module:

The last module is the alert module, which sends an SMS through Twilio using Python and sends an email using the smtplib library. If one of the trained animals is identified during the live capture, a repellent sound is provided to the animal via speakers. Speakers are designed to produce audible output that is both loud and clear, scaring away animals. Along with the audible signal, the system sends an email to the user if an animal is spotted.

Improving the Model:

To make the model more prescriptive, work is done to detect specific animal species and add their count to prepare a report. Major work will be done to improve dataset training with minute detailing to species names, and for animal count, a little programming concept needs to be implemented in Python only to add on the species' total count whenever it is detected and renew the count periodically as requested by the user.

In summary, the animal detection and alarm system is a multi-step process that involves training datasets, building the model, and creating an alert module. The system uses OpenCV and ImageAI for Object Detection to train the datasets and build the model, while the alert module sends SMS and email notifications to the user when an animal is spotted. To improve the model, work can be done to detect specific animal species and add their count to prepare a report, and the dataset training can be improved with species names. With these improvements, the system can be more effective in detecting and alerting users about animals in the field.

VIII. EXPECTED OUTCOME

After the implementation of this application, society will have a convenient system for alerting the farmers and other people whenever there will be any animal intrusion. After identifying the gaps in the previous system we have tried to overcome the problems and provide a solution by installing high resolution CCTV and by

implementing our knowledge in deep learning this application is efficient in detecting all the animals and is keeping count of each animal.

This application will alert the farmers and natives in the fastest way and even send an email for alert. The sound producing system will make a noise which will scare the animal when they try to invade the area.

IX. CONCLUSION

- Due to the fact that the issues mentioned earlier continue to exist despite the approaches used, we handled the problem by utilising computer vision to automatically drive away the animals.
- The input to our suggested model comes from the CCTV (Closed Circuit Television). The algorithm processes and predicts the frames received from the camera and plays an appropriate repellent sound to scare away the observed animal.
- Thus, this initiative has a huge social impact since it will assist farmers in safeguarding their farms, protect them from large financial losses, and spare them from the wasteful activities required to preserve their fields. This may also assist in preventing frequent human-animal confrontations and the loss of human life, as well as avoiding any substantial injury to people.

X. REFERENCES

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