# PRACTICAL ANIMAL DETECTION AND COLLISION AVOIDANCE ON ROAD USING COMPUTER VISION TECHNIQUE

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**ABSTRACT**

One serious problem that all the advanced nations are facing moment is death and injuries due to road accidents. The collision of an beast with the vehicle on the trace is one similar big issue which leads to similar road accidents. In this paper, a simple and a low-cost approach for automatic beast discovery on roadways for precluding beast- vehicle collision using computer vision ways are proposed. A system for chancing the distance of the beast in real- world units from the camera mounted vehicle is also proposed. The proposed system is trained on further than 2200 images conforming of positive and negatives images and tested on colorful videotape clips of creatures on roadways with varying vehicle speed. As per the two-alternate rule, our proposed system can warn the motorist when the vehicle speed is over to 35 kmph. Beyond this speed, though the beast gets rightly, the motorist doesn't get enough time to help a collision. An overall delicacy of nearly 82.5 is achieved regarding discovery using our proposed system.

## I. INTRODUCTION

Today's vehicle plan essentially depends on security measures, security instruments and consolation component. The approach has encouraged the improvement of a few brilliantly vehicles that depend on present day devices and innovation for their execution. The security of an vehicle is the most elevated need concurring to a later report. The report commissioned by World Wellbeing Organization in its Worldwide Status Consider on Street Security 2013, uncovered that the driving cause of passing for youthful individuals (15-29 age) all inclusive is due to street activity collisions. Indeed in spite of the fact that different nations have started and taken steps to diminish street activity collisions and mishaps, the add up to number of crashes and activity mishaps stay as tall as 1.24 million per year. Street activity mischances and wounds are anticipated to rise by nearly 65% by the conclusion of 2020. Due to street mischances, each year 1 out of 20,000 people lose their life and 12 out of 70,000 people confront genuine wounds in India. India is too known for the greatest number of street mishaps in the world. Agreeing to the information given by National Wrongdoing Records Bureau (NCRB), India, there was nearly 118,239 individuals who misplaced their life due to street mishaps in the year 2008.

### 1.1 MOTIVATION

Animal-vehicle collisions pose a serious threat to both human safety and wildlife conservation, particularly in regions where roads intersect with natural habitats. These incidents can lead to significant injuries, fatalities, and substantial economic losses due to vehicle damage and insurance costs. Traditional preventive measures, such as warning signs or roadside fencing, often prove inadequate, especially in detecting unexpected animal movements in real time. With the advancement of computer vision and deep learning technologies, there is now a practical opportunity to enhance road safety through automated animal detection systems. These systems utilize real-time image processing to identify animals near or on roadways, enabling timely collision avoidance actions such as braking or alerting the driver. Integrating such intelligent systems into modern vehicles not only supports the development of safer, more adaptive transportation infrastructure but also contributes to the broader goals of wildlife protection and sustainable mobility.

### 1.2 PROBLEM STATEMENT

Animal-vehicle collisions remain a significant challenge on roads, often resulting in severe injuries, fatalities, and damage to vehicles. Existing preventive methods, such as road signs and physical barriers, are limited in their ability to respond to real-time situations and are often ineffective in preventing accidents, especially during low- visibility conditions. There is a pressing need for an intelligent, automated solution that can detect the presence of animals near roadways and assist in avoiding potential collisions. The problem lies in developing a reliable, real-time animal detection and collision avoidance system using computer vision techniques that can operate accurately under various environmental and lighting conditions, providing timely alerts or responses to reduce accidents and enhance road safety for both humans and wildlife.

### 1.3 SCOPE AND OBJECTIVE

**Scope**

This project focuses on developing a practical, real-time system that can detect animals on or near roads using computer vision techniques. The aim is to create a solution that can be integrated into vehicles or roadside monitoring units to help prevent accidents caused by unexpected animal crossings. The system will be designed to work under various conditions, including different lighting and weather scenarios, and will prioritize speed and accuracy to ensure timely response. While the project primarily targets common road-crossing animals, the framework can be expanded in the future to include a wider range of objects or threats.

**Objectives**

- To design and implement a computer vision-based system capable of detecting animals in real time from video input.
- To train and test deep learning models (e.g., YOLO, SSD) for accurate animal recognition and localization.
- To ensure the system can function effectively in diverse environments and lighting conditions (day/night).
- To provide immediate alerts or automated responses that can help drivers avoid potential collisions.
- To evaluate the system's performance based on accuracy, detection speed, and reliability in real-world scenarios..

## II. LITERATURE SURVEY

Operations erected on discovery of creatures play a veritably vital part in furnishing results to colorful real- life problems(9). The base for utmost of the operations is the discovery of creatures in the videotape or image. A recent study(10) shown that mortal beings have to take the final call while driving whether they can control their auto to help collision with a response time of 150ms or no. The issue with the below approach is that mortal eyes get exhausted snappily and need rest, which is why this system isn't that effective. Some scientific experimenters(11) have proposed a system that requires the creatures to take a disguise towards the camera for the detector, including face discovery. The problem with this fashion is that face discovery requires creatures to see into the camera which is, not inescapably captured by the road trip videotape. creatures can arrive from a scene from colorful directions and in different sizes, acts, and color. creatures can be detected using the knowledge of their stir. The abecedarian supposition then(12) is that the dereliction position is stationary and can simply be abated. Although this fashion performs well in controlled areas, e.g. aquatic vids, it doesn't work widely, especially road or trace side vids. Experimenters(13) used threshold segmentation approach for getting the targeted beast's details from the background. Recent inquiries(14) also revealed that it's hard to decide the threshold value as the background changes frequently.

A system applicable to moving backgrounds(e.g., due to camera stir) is presented in posterior studies(15) and(16). The authors also state that other moving objects piecemeal from the object of interest may be falsely detected as an beast. Experimenters in(17) tried to discover an beast's presence in the scene(image) affecting the power diapason

of the picture. This system of beast discovery was also considered not applicable since quicker results with this approach would involve massive quantum of image processing in a short period(18). Experimenters in(19) also used the face sensor fashion initiated by Viola and Jones for a particular beast type. After the beast face is linked, the experimenters track it over time. The problem with this fashion is that face discovery requires creatures to see into the camera not inescapably captured by the road trip videotape. creatures can arrive from a scene from colorful directions and in different sizes, acts, and colors. Another system for beast discovery and shadowing that uses texture descriptor grounded on SIFT and matching it against a predefined library of beast textures is proposed in(20). The problem with this system is that it's confined to vids having single beast only and veritably minimum background clutter.

**EXISTING SYSTEM**

Currently, the methods used to prevent animal-related road accidents are mostly passive and limited in effectiveness. Common approaches include warning signs in high-risk areas, wildlife crossing zones, and fencing along highways to keep animals off the road. While these methods can help to some extent, they don’t adapt to real-time situations and often fail to prevent collisions—especially when animals unexpectedly enter the road.

Some advanced systems have been introduced in modern vehicles, such as basic obstacle detection using radar or infrared sensors. However, these systems are typically designed for detecting other vehicles or large obstacles, and they may struggle with identifying animals, especially smaller or faster-moving ones. In certain regions, thermal cameras and motion detectors have been installed along highways to detect large wildlife, but these setups are costly and not widely adopted.

**PROPOSED SYSTEM**

The proposed system aims to create a smart, real-time solution that can detect animals on or near roads using computer vision techniques. Unlike traditional methods or basic sensor-based systems, this approach will rely on video input from cameras—either mounted on vehicles or set up along roadsides—to visually identify animals before a collision can occur.

Using deep learning models trained specifically to recognize various animal shapes and movements, the system will process live video frames and detect the presence of animals with high accuracy. When an animal is detected within a certain distance or danger zone, the system will generate an alert to the driver or trigger an automatic response, such as slowing down the vehicle or flashing warning lights.

This solution is designed to be fast, flexible, and scalable. It can work in different lighting conditions (including night time) and adapt to various types of terrain or road environments. By using AI and real-time image processing, the system offers a more intelligent and proactive way to reduce the number of animal-vehicle collisions, ultimately helping to save both human and animal lives.

## III. MODULE DESCRIPTION

Dataset Our Deep literacy operation uses Neural Networks for object recognition. This requires an image dataset of the objects to train the classifier. In this design we've used COCO(Common Objects in Context) 2014 Database with 80 different object classes which have 83K training images, 41K Testing images. The dataset used is the labeled dataset which is useful to train the model. Some of the objects among 80 classes are as follows

- Beast cat, cow, canine, steed, lamb etc.

**Data Preparation**

The COCO dataset was downloaded from cocodataset.org.

**Data Labeling**

The images are labeled by using LabelImg software. For some images the reflections train is downloaded with the dataset itself. Reflection train contains parameters object_class, unique object_id, x_coordinate for centre, y_coordinate for centre, range and height for each image.

**Train- Test Split**

After collecting and annotating the dataset, we aimlessly shuffle the data to elect 80 of the data on which we train the model. The remaining 20 of the data, unseen by the model, is used for the testing of the model.

**Model training**

The main idea behind making object discovery or object bracket model is Transfer literacy which means using an effectivepre-trained model. Then we've using three models Object Discovery API handed by Tensorflow(uses SSD mobilenet v1), MULTIBOX and YOLO. By dereliction Object Discovery API by Tensor is used since it was set up to be most effective.

Real Time Video Processing The frames are captured at the rate of- frames per second with exercise size of 640 x 680. The stable affair is generated for the real- time input.

**Beast Discovery**

Bounding boxes are generated which predicts the certainty called as confidence score. This score lets us know that the bounding box consists of some object. For every bounding box, the cell predicts a class of that object which gives a distribution of probability among all the available classes in the given model. The confidence score on with the probability just calculated, gives us the final score which lets the stoner know how likely it's that the bounding box contains some specific object. minimal discovery confidence to track a decision For Tensorflow Object Discovery API 0.6 f For MULTIBOX 0.1 f For YOLO 0.25 f Bounding boxes whose score is further than the threshold is given as an affair along with the separate class name. Eventually, the generated textbook affair is converted into audio by using TextToSpeech API.

**Distance computation**

In this module we're going to calculate the distance between hinder camera and detected beast in the videotape using OpenCV. Grounded on the distance measured if the detected, beast is near to vehicle operation will play an alarm to warn motorist..

## IV. SYSTEM DESIGN

**SYSTEM ARCHITECTURE**

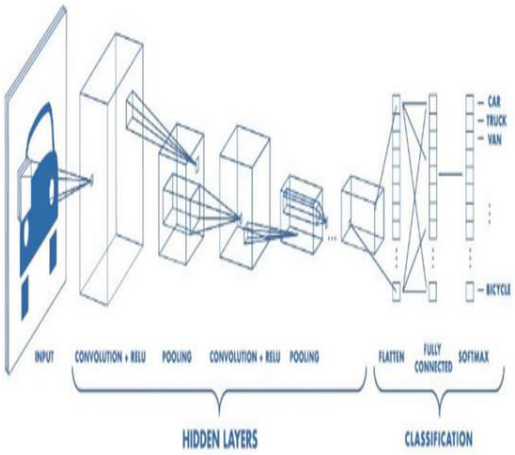


Fig. System Architecture

## V. OUTPUT SCREENS

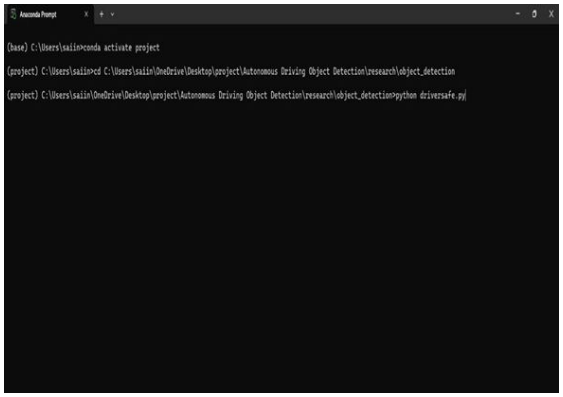

Fig: Anaconda prompt


Fig: Output

## VI. CONCLUSION

In this project, we developed an intelligent system capable of detecting animals on the road using computer vision techniques, aiming to reduce road accidents and improve driver safety. By leveraging machine learning algorithms such as Faster R-CNN and YOLO,

combined with image processing methods in OpenCV, the system can effectively identify moving animals in real-time video feeds. It also estimates the distance of the animal from the vehicle and provides timely alerts to the driver, enabling proactive responses. The integration of these technologies not only enhances situational awareness but also demonstrates the potential of AI-powered solutions in addressing real-world problems in transportation. This system lays a strong foundation for further advancements in autonomous driving and smart vehicle safety systems.

**REFERENCE**

[1] Bc. Jan Hadáček ,"Application of a Camera in a Mobile Phone for Visually Impaired People." Master's thesis, Czech Technical University in Prague, May 2017.

[2] "Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks." Shaoqing Ren, Kaiming He, Ross Girshick, and Jian Sun,IEEE transactions,Dec 2016

[3] "You Only Look once: Unified, Real-Time Object Detection." J Redmon, S Divvala,R Girshick, A Farhadi,IEEE transactions, May 2016

[4] "SSD: Single Shot MultiBox Detector Wei Liu.", Dragomir Anguelov, Dumitru Erhan, Christian Szegedy, Scott Reed, ChengYang Fu, Alexander C. Berg, IEEE transactions , Jan 2016

[5] "Support Vector Machines for 3D Object Recognition", Massimiliano Pontil and Alessandro Verri ,IEEE transactions on pattern analysis and machine intelligence, vol:20, no. 6

[6] Vicky Mohane, Chetan Gade "Object Recognition for Blind people Using Portable Camera" WCFTR World conference 2016

[7] Meghajit Mazumdar, Dr. Sarasvathi V, Akshay Kumar "Object Recognition in Videos by Sequential Frame Extraction using Convolutional Neural Networks and Fully Connected Neural Networks" International Conference on Energy, Communication, Data Analytics and Soft Computing 2017

[8] Yide Ma, Dong Hwan Kim, and Sung-Kee Park "Region-Based Object Recognition by Color Segmentation Using a Simplified PCNN" IEEE transactions on neural network and learning system, Vol, 26 No. 8 Aug 2015

[9] Mingjie Liang, Huaqing Min, Ronghua Luo, and Jinhui Zhu "Simultaneous Recognition and Modeling for Learning 3-D Object Models from Everyday Scenes" IEEE transcation on cybernetics, Vol 45 No. 10 Oct. 2015