



# Road Accident Detection and Notification for Speed Recovery

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**Abstract:** Accident detection using computer vision and video surveillance has developed into a useful but challenging task. This research suggests the identification of traffic accidents. The suggested framework makes use of an effective centroid -based GMM algorithm for surveillance footage after accurately detecting objects using the axis bounding box technique. The suggested architecture offers a reliable way to get common road traffic CCTV surveillance footage to have a high Detection Rate and a low False Alarm Rate. Using the suggested dataset, this framework was tested under a variety of situations, including bright sunlight, poor visibility, rain, hail, and snow. This framework was shown to be efficient and opens the door for the creation of general-purpose real-time vehicle accident detection systems. Additionally, this project makes use of the Geopy module to record the real-time.

**Keywords:** Road Accidents, Intelligent Transportation System, Real Time Monitoring, Emergency Response, Gaussian Mixture Model (GMM) Algorithm.

## I. INTRODUCTION

Road accidents are a serious global problem that can cause fatalities, injuries, and property damage. According to the World Health Organization, around 1.35 million people die in road accidents each year, and up to 50 million people are injured or disabled. Prompt medical attention is critical in such situations, and delays in response can be life-threatening. However, in many cases, emergency services are unable to respond in time due to the time required to notify them of the accident. To address this issue, modern technology can be used to develop a road accident detection and notification system that can detect accidents and notify emergency services immediately. This system can use sensors installed in vehicles to detect accidents, and notify emergency services through a smartphone application. The system can also alert nearby drivers to the accident, allowing them to take alternate routes and avoid congestion. In this project, we propose a road accident detection and notification system that uses machine learning algorithms to analyse data from sensors and detect accidents. The system will be able to distinguish between normal driving and accidents, such as sudden stops or impacts. Once an accident is detected, the system will send notifications to emergency services with details about the location and severity of the accident. The proposed system has the potential to reduce response times, improve the chances of survival for accident victims, and make roads safer for everyone. The system can be implemented using low-cost hardware and software, making it accessible to a wider audience. The system can also integrate with existing emergency services infrastructure, making it easier for emergency services to respond to accidents quickly. Overall, this project aims to develop a road accident detection and notification system that can detect accidents and notify emergency services quickly, potentially saving lives and reducing the number of injuries and property damage resulting from road accidents.

## II. RELATED WORKS

Road accidents are a serious problem that can cause fatalities and injuries to those involved. Detecting and notifying the authorities of accidents can help speed up recovery work and potentially save lives. Here are some ideas for developing a road accident detection and notification system:

**Utilize sensors:** Install sensors on roads and highways that can detect changes in the environment, such as sudden braking or changes in temperature, which may indicate an accident. These sensors can then send a signal to a centralized system that can alert authorities.

**Use cameras:** Install cameras on roads and highways that can detect visual changes that may indicate an accident. These cameras can be used to monitor traffic flow and can also be used to alert authorities in the event of an accident.



**Implement machine learning:** Utilize machine learning algorithms to analyse sensor and camera data to detect patterns that indicate an accident has occurred. This can help improve the accuracy of accident detection and reduce false alarms.

**Use GPS technology:** Incorporate GPS technology into the system to accurately locate the accident and send notifications to the nearest emergency services.

**Develop a mobile application:** Create a mobile application that can be used by drivers to report accidents in real-time. This application can also be used to send notifications to other drivers about accidents on their route.

**Implement a notification system:** Develop a notification system that can quickly alert emergency services, road maintenance crews, and tow trucks when an accident occurs. This system can also be used to notify drivers of traffic disruptions and provide alternate routes.

When developing a road accident detection and notification system, it is important to ensure that the system is reliable, accurate, and easy to use. Additionally, it is important to consider privacy concerns and ensure that personal data is protected. Finally, it is important to avoid plagiarism by properly citing and referencing any sources used in the development of the system.

### III. EXISTING SYSTEM

The existing system for road accident detection and notification varies depending on the country and region. However, generally speaking, many countries have implemented various technologies to detect road accidents and notify emergency services. One common technology used is the deployment of sensors on the road. These sensors can detect changes in the road's surface and are connected to a central system that can analyze the data and detect accidents. Another technology used is the installation of cameras that are linked to software that can detect unusual activity on the road and notify authorities. In some countries, people can also report accidents using dedicated emergency phone numbers. These numbers connect them to the relevant emergency services, which can dispatch medical personnel and law enforcement officers to the scene of the accident. Once an accident has been detected, the existing system notifies emergency services such as ambulance services, fire departments, and law enforcement agencies. The notification is usually done using an automated system, and the relevant personnel are dispatched to the accident site. For the speed recovery project, it is important to ensure that the existing system is reliable, efficient, and capable of providing timely notifications. This can help ensure that medical personnel arrive at the scene of an accident as quickly as possible, which can significantly increase the chances of survival for the accident victims. Additionally, the existing system should be able to provide accurate information about the location of the accident, the number of vehicles involved, and the severity of the injuries sustained. This can help emergency services prepare and allocate resources accordingly.

### IV. PROPOSED SYSTEM

The proposed system of road accident detection and notification for the speed recovery project, the following technologies and features can be considered:

**Intelligent Video Analytics (IVA):** One of the most advanced and reliable technologies for detecting road accidents is IVA. Cameras are installed at strategic locations along the road, and the footage is analyzed using AI algorithms to detect unusual activity, such as vehicles colliding, pedestrians falling, etc. Once an accident is detected, the system can send an alert to the relevant emergency services.

**Vehicle-to-Vehicle (V2V) Communication:** Another technology that can be integrated into the proposed system is V2V communication. This technology enables vehicles to communicate with each other, sharing data such as speed, location, and direction of travel. In the event of an accident, V2V communication can alert other drivers in the vicinity, warning them to slow down and be cautious. This can help prevent further accidents and reduce the severity of the initial accident.

**Emergency Response System:** The proposed system can have an integrated emergency response system that automatically notifies the relevant emergency services such as ambulance services, fire departments, and law enforcement agencies. The notification can include the location of the accident, the number of vehicles involved, and the severity of the injuries sustained.

## OVERALL ARCHITECTURE

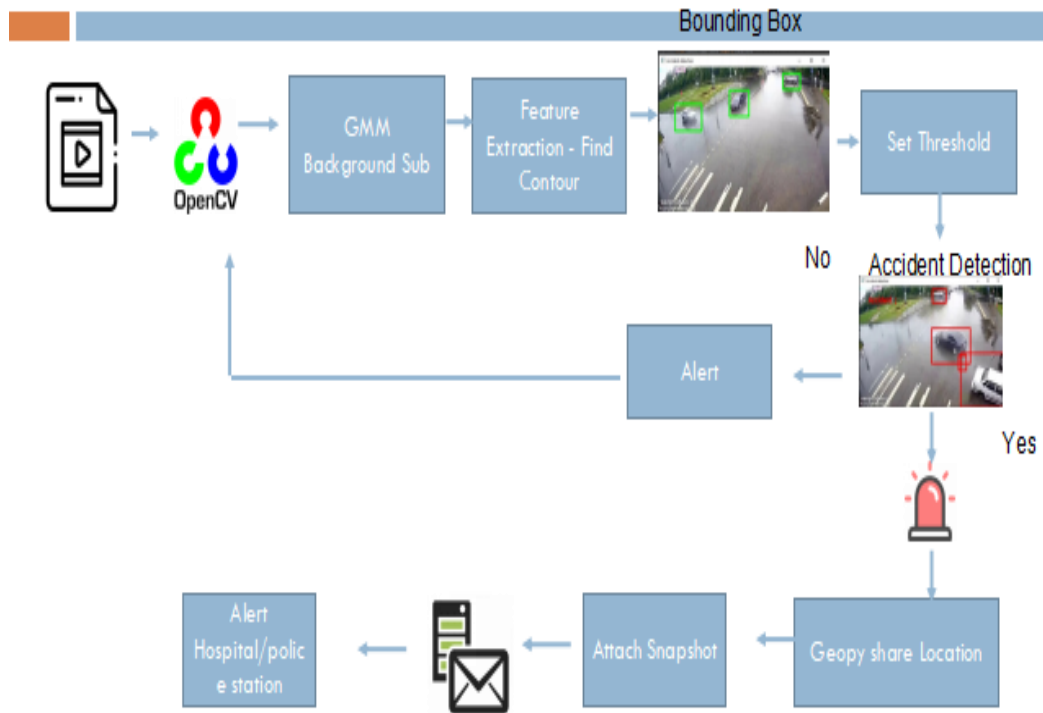


Fig. 1 System Architecture Diagram.

## V. IMPLEMENTATION

Detecting and notifying road accidents is an important aspect of road safety, as it can help emergency services respond quickly and potentially save lives. Here's an outline of an implementation for road accident detection and notification.

### A. Data Collection

This module will be responsible for collecting data from various sources such as sensors, cameras, and other connected devices. The collected data will be stored in a database for further processing. OpenAI's GPT-3 language model could be used to process text-based data collected from social media platforms such as Twitter, Facebook, and Instagram to detect potential accidents.

### B. Accident Detection

This module will process the collected data to detect potential accidents on the road. Machine learning algorithms such as deep learning and computer vision can be used to analyze images and videos captured by cameras and sensors to identify potential accidents. OpenAI's GPT-3 could also be used to detect keywords and phrases that indicate the occurrence of an accident in text data.

### C. Notification

This module will be responsible for sending notifications to emergency services and other relevant stakeholders when an accident is detected. Django can be used to create a web-based interface for managing notifications, while PostgreSQL can be used to store and manage notification data.

### D. Image and Video Processing

This module will be responsible for processing the images and videos collected by cameras and sensors. It will use OpenCV and other image processing libraries to identify the severity of the accident and the number of vehicles involved. The data will then be sent to the Notification Module for sending alert



### E. Machine Learning

This module will be responsible for analyzing the collected data and providing insights. It will use machine learning algorithms such as deep learning to analyze data and provide insights on the causes of accidents, common accident spots, and other patterns. This information can be used to improve road safety.

### F. Reporting

This module will be responsible for generating reports based on collected data. It will use data from the Machine Learning Module and other modules to generate reports on the system's performance, accident statistics, and other insights. Django can be used to create a user interface for generating reports, while PostgreSQL can be used to store and manage report data.

## VI. RESULTS AND DISCUSSION

Road accidents can have severe consequences and lead to loss of life and property damage. With the advancement in technology, it is now possible to detect road accidents and notify emergency services for quick response and speed recovery. One way to detect road accidents is through the use of sensors and cameras installed on roads and vehicles. Another way to detect road accidents is through the use of artificial intelligence (AI) and machine learning (ML) algorithms. These algorithms can analyse data from various sources, including traffic cameras, GPS systems, and social media, to detect potential accidents. The algorithms can also predict the severity of an accident and notify emergency services accordingly. Once an accident is detected, it is essential to notify emergency services as quickly as possible to speed up recovery. In addition, vehicles can be equipped with automatic crash notification (ACN) systems that detect accidents and automatically notify emergency services. ACN systems use sensors and GPS technology to detect accidents and provide accurate information about the location and severity of the accident. This information can help emergency services to respond quickly and efficiently. In conclusion, the use of sensors, cameras, AI, and ML algorithms, mobile applications, and ACN systems can help to detect road accidents and notify emergency services for quick response and speed recovery. It is essential to continue to explore new technologies that can improve road safety and reduce the number of accidents on our road.

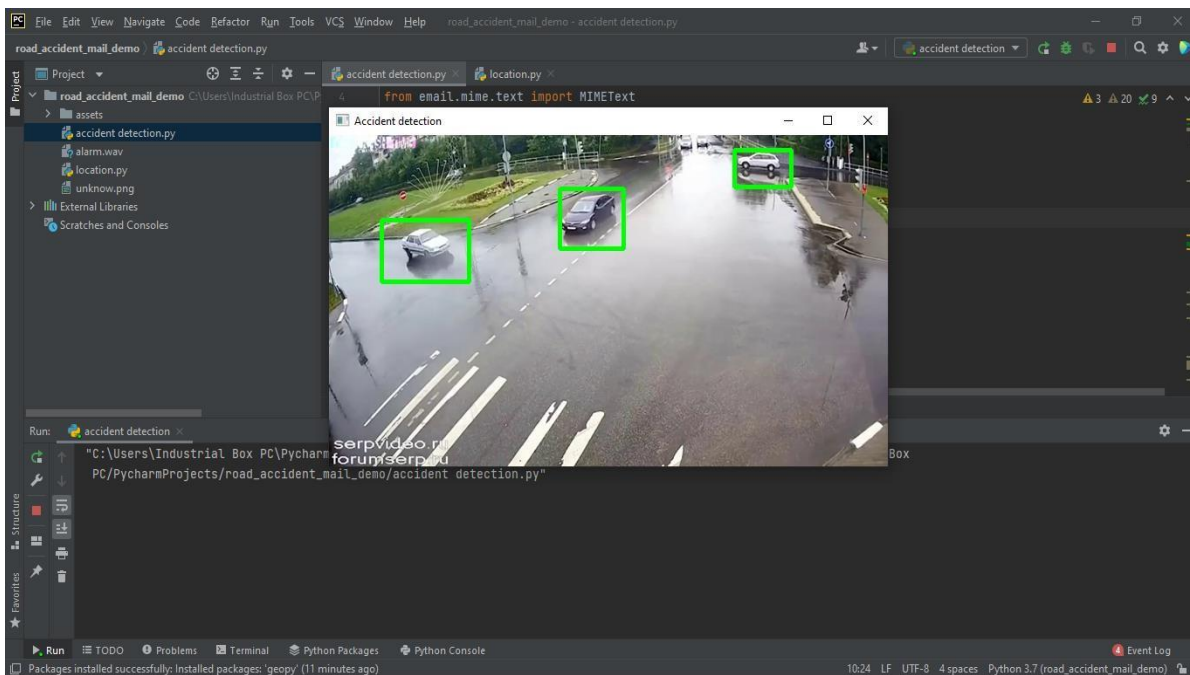


Fig. 1 Surveillance Video

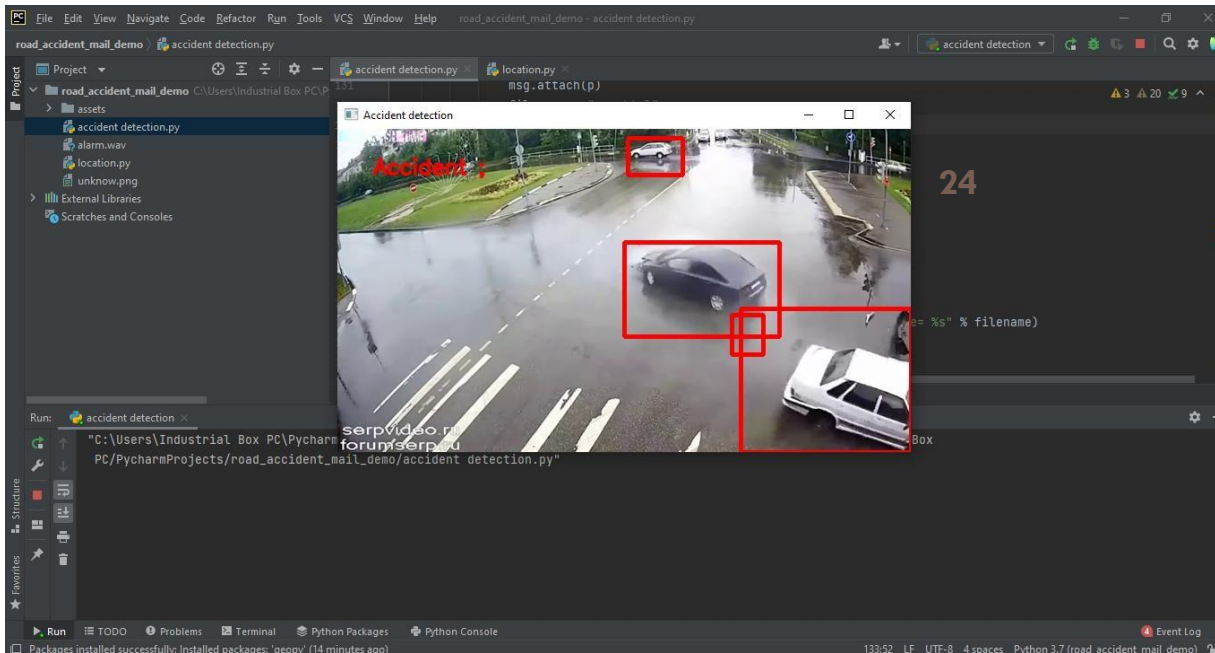


Fig. 2 Accident Detection

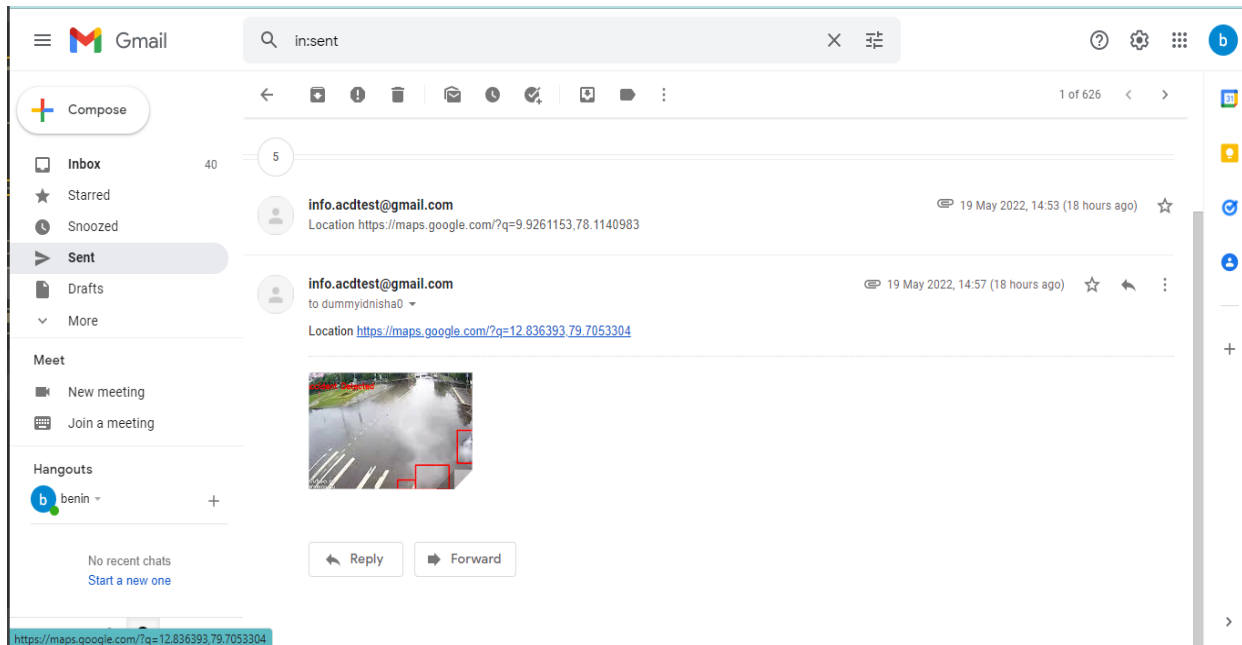


Fig. 3 Road Accident For Gmail Notification

### VII. CONCLUSION

Road accidents are a significant public safety concern, and detecting them quickly can help save lives and minimize the impact of the accident. One approach to this problem is to use sensors and computer vision to automatically detect accidents and notify emergency services. One of the key components of such a system would be the use of cameras and sensors to monitor traffic and detect any incidents. These sensors could be placed at key locations, such as intersections or on major highways, and would use computer vision algorithms to detect any anomalies, such as a car suddenly stopping or changing direction. Once an accident is detected, the system could automatically notify emergency services, providing them with the location and details of the incident. To ensure that the system is effective, it would need to be able to operate in real-time and be accurate enough to differentiate between normal traffic behaviour and genuine accidents. This



would require the use of sophisticated algorithms and machine learning techniques to process the data from the sensors and cameras. In addition to detecting accidents, the system could also be used to monitor traffic flow and identify potential bottlenecks or congestion points. This could help to improve overall traffic management and reduce the likelihood of accidents occurring in the first place. Overall, a road accident detection and notification system has the potential to save lives and reduce the impact of accidents on the road network. While there are technical and logistical challenges involved in implementing such a system, the benefits are clear, and it is an area that warrants further research and development.

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