CHAPTER 1

INTRODUCTION

1.1 Motivation

With rapid economic growth and improved living standards, road usage has increased significantly, leading to a rise in road traffic accidents. These incidents result in considerable losses of life and property. A critical factor contributing to the high fatality rates is the delayed emergency response. Research shows that even a 60-second reduction in response time can improve the survival rate by 6%. Technological interventions like increased seatbelt use have already demonstrated the potential to save lives — a 1% increase saves approximately 136 lives annually. Thus, leveraging modern technologies to detect accidents early and trigger emergency responses promptly is crucial to improving road safety and saving lives.

1.2 Problem Definition

Traditional accident detection and response systems rely heavily on human monitoring, which can lead to delayed or missed reactions, especially under poor visibility conditions. Current surveillance systems are not equipped to detect vehicle accidents automatically and promptly alert emergency services. The major problem is the absence of an automated, real-time accident detection system that can operate effectively across varying weather and lighting conditions using existing road-side CCTV infrastructure.

1.3 Objective of the Project

The primary objective of this project is to develop a real-time accident detection and emergency alert system using deep learning techniques. The system aims to:
Detect accidents using object tracking and movement anomalies from CCTV footage.Analyze vehicle speed and trajectory to identify unusual behavior indicative of collisions.Achieve high detection accuracy with a low false alarm rate under diverse environmental conditions such as daylight, rain, snow, and low visibility.Minimize emergency response time by automatically generating alerts when accidents are detected

1.4 Limitation of the Project

Despite its effectiveness, the project has some limitations:

Dataset Dependency: The system's performance heavily relies on the quality and diversity of the training dataset. It may struggle in unseen or rare accident scenarios not represented in the training data.

Environmental Conditions: Although the model is tested under varied conditions, extremely poor visibility (e.g., heavy fog or night without proper lighting) can affect detection accuracy.

Hardware Constraints: Real-time performance requires high-end computational resources, which may not be feasible in all deployment scenarios.

Limited Context Understanding: The system detects based on motion and visual cues without a deeper contextual understanding, which may sometimes result in false positives in complex scenes (e.g., sudden stops not due to accidents).

Scalability: Large-scale deployment across cities might require significant integration with existing traffic surveillance and emergency systems.

CHAPTER 2

LITERATURE SURVEY

2.1. Introduction

With the rapid rise in vehicle usage, road accidents have become a major concern, causing significant loss of life and property. A key issue is the delay in emergency response, which greatly impacts survival rates. Studies show that reducing response time by even one minute can save more lives.Manual monitoring of CCTV footage is inefficient and prone to delays. To address this, the project proposes an automated, real-time automatic detection of unexpected accident under bad cctv monitorint condtions using deep learning and computer vision. By analyzing vehicle movement and detecting anomalies through CCTV footage, the system aims to quickly identify accidents and notify emergency services, ultimately reducing response times and saving lives.