

# Chapter 19

## IoT–Based Smart Accident Detection and Alert System

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### ABSTRACT

*The smart accident detection and alert system using IoT is a technical solution that detects accidents and alerts authorities and emergency services. The system mainly relies on sensors, GPS, and Arduino UNO to detect and collect information about the location and severity of the accident. The system then transmits this information in real time to the appropriate authorities using algorithms and protocols, enabling them to respond quickly and effectively, therefore increasing the possibility of saving lives and benefiting road users, emergency services, and transportation authorities in case of accidents.*

### INTRODUCTION

The Smart Accident Detection and Alert System is an intricate system to detect accidents and alert emergency services using Internet of Things (IoT) technology. The objective of this system is to minimize emergency response time and increase the possibility of saving lives in case of accidents (Suresh Babu, 2023).

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## ***IoT-Based Smart Accident Detection and Alert System***

The system comprises a setup of in-vehicle sensors that record data like speed, GPS location, and accelerometer readings. A central server receives these data and processes it to determine whether an accident has taken place. The sensors communicate with the server using 3G, 4G, Wi-Fi or any other such wireless networks. The server analyses the data using machine learning algorithms in order to decide if an accident has happened.

If an accident is detected, the system notifies emergency services and designated contacts with details about the location and severity of the accident. The victim's friends or family can also receive notifications from the system informing them of the accident. To send alerts, the system utilizes a variety of communication methods, including SMS, email, and push notifications.

One of the major advantages of this system is that it can detect accidents even in remote locations where cellular connectivity is unavailable. In such instances, the system sends alerts via satellite communication. The system can also communicate with existing emergency services, enabling more efficient and coordinated responses. For example, the system can automatically notify nearby hospitals to prepare for arriving patients. The system may additionally inform you how many passengers were in the vehicle, what kind of vehicle it was, and how serious the collision was.

Another beneficial feature of the system is its ability to collect data on driving behaviour, which may be helpful in improving road safety. The system can acquire data on factors like speed, acceleration, and braking that can be used to spot unsafe driving behaviours. With the use of this data, drivers can receive feedback and be encouraged to adopt safer driving habits.

In order to provide additional functionality, the system can be integrated with other IoT devices. For instance, it can be connected to wearable gadgets like smart watches or health monitors to provide information regarding the victim's health status. Emergency services can use this information to provide appropriate medical assistance.

In conclusion, the Smart Accident Detection and Alert System have the potential to revolutionize the way we respond to accidents and ensure the safety of drivers and passengers on the road.

## **RATIONALE BACKGROUND**

Accidents may happen anywhere, to anybody, at any time. In many circumstances, the difference between life and death depends on how soon medical assistance is provided. Drivers can make sure they get assistance as soon as possible in the event of an accident by installing the smart accident detection and alert system. The smart accident detection and alert system is a technical system that detects accidents and triggers an emergency response in order to ensure the safety of people involved in an accident. The rising rate of road accidents, particularly those involving motor vehicles, is what motivated the development of the accident detection system. These accidents create considerable economic and social consequences, such as medical expenses, lost productivity, and emotional distress.

Road and highway accidents are a major public safety concern. The World Health Organisation (WHO) reports that road traffic accidents are the primary cause of death among young people. Also, it is predicted that by 2030, the cost of road accidents will increase to 5% of global GDP from its current estimate of around 3%. Therefore, finding ways to minimise the frequency of accidents on the road is essential and the smart accident detection and alert system is one such solution.

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