

# ACCIDENT PREVENTION AND DETECTION SYSTEM (IN DEADLY CURVE) USING IoT

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## 1. INTRODUCTION

Introduction Accident Prevention and Alert System (in deadly curves) using IOT is a relatively new concept that has been gaining traction due to its potential to reduce the number of curve accidents. IOT is a technology that enables devices to be interconnected and communicate with each other. It has the potential to improve safety in curve accident prevention and detection by allowing devices to send and receive real-time information about the conditions of the roads and traffic.

IOT technologies can help to detect and prevent curve accidents by monitoring the conditions of the roads, such as the shape of the curves and the presence of any obstructions or hazards. This can be done through the use of sensors, cameras, radars, and other devices that are placed on the roads. These devices can detect any changes in the environment that may lead to a curve accident, which can help to alert drivers of potential dangers. In addition, IOT can be used to provide real-time information to drivers about the road and traffic conditions. This can help drivers to make informed decisions about the safest route to take and can even alert drivers when potential dangers are present. This can reduce the number of curve accidents by providing drivers with the necessary information to avoid dangerous road conditions.

## 2. LITERATURE SURVEY

A literature survey or a overview in a project report is that phase which indicates the various analyses and studies made in the area of our hobby and the consequences already published .Literature Survey consists of looking strategies and optimized algorithms from referred base papers to come back up change which ends up in first-class solution. Mr. G.

Liang et al, Dr. V. Ravindran, N. Kumar, F. Bhatti , Shivangi Sharma [1] Recognition of mishap utilizing piezoelectric

sensor. The result was Emergency administrations with legitimate mishap data and help are given on schedule. [8] Keeping away from mishaps in clasp bends and hazy regions utilizing Critical hint framework. The Outcomes was Information trade between vehicles with respect to speed and distance is caught by the framework and the choice dependent on calculation is given to the vehicle by visual presentation. [3] Mishap prevention using Sensor framework the result was LED is set off in this manner focusing on the vehicles development. [4] Mishap aversion in sloping track utilizing Real time system.

The result was Altering the driver about the vehicle coming from inverse side. In the event that vehicle comes from one finish of the bend sensor faculties and LED light shines at the contrary side. By taking a gander at the LED light on/off standards driver can wake up and can hinder the speed of the vehicle. [2]Mishap anticipation utilizing Sensors, The result was driver will be alarmed about vehicles coming from inverse side. [7]Mishap counteraction in mountain roads utilizing Ultrasonic sensors. The result was number of mishap occurring in the bends of slopes have diminished as well as there is signal giving data that vehicles are coming from the contrary sides, thus adjusting.[6] Mishap avoidance framework in bending utilizing Ultrasonic sensors.

Quantity of mishaps in bend streets by modifying the driver through LED light which sparkles when vehicle comes from the opposite side. [9] Mishap avoidance system using Vibration Sensor, LED, Ignition key, DC Motor, The result was robbery anticipation utilizing the message drivers can organize the curve and judge the presence of the vehicles from the far edge even more positively. Similarly as speed trap structure will help the authority with taking actions against the vehicle owner who upsets the rules.

Author	Domain	Dataset	Algorithm & Tools	Accuracy
G. Liang et al. 2018	Automatic Traffic Accident Detection Based on the IoT and Support Vector Machine	Real-world traffic data as sound signal & magnetic field signal	Ant Colony Algorithm applied on Support Vector Machine	It varies from 89% to 99.15% according to accident type.
V. Ravindran et al. 2019	A Novel Approach to Automatic Road-Accident Detection	Image captured within 2 meters & 20 meters.	Support Vector Machine trained with Histogram of Gradient & Gray Level Co-occurrence Matrix features.	81.83 % for an image captured within 2m & 64.37% within 20m.
N. Kumar et al. 2020	An IoT Based Vehicle Accident Detection and Classification System using Sensor Fusion	1167 Observation in changes of Speed by conducting the rollover experiment	Naive Bayes (NB), Gaussian Mixture Model (GMM), and Decision Tree (DT) techniques.	NB- 97%, GMM-92%, DT- 86%
F. Bhatti et al. 2019	Novel Internet of Things-Enabled Accident Detection and Reporting System for Smart City Environments	Custom Dataset took from Filed Open Data Repository	Smartphones with sensors, Information and Communication Technology	90% detected.
Shivangi Sharma 2021	IoT Based Car Accident Detection And Notification Algorithm For General Road Accidents.	Real-world data	Adriano IDE, Heart Rate Sensor with GSM and GPS.	It is not specified.

Year	Accidents Reported	Number of People Killed
2014	43,713	10,452
2015	44011	10086
2016	43156	11133
2017	42525	10688
2018	41707	10978

Table 2.1 Accidents Reported & Number of People Killed

i. The table 2.1 shows number of accidents from the year 2014 to 2018. The quantity of fatalities expanded notwithstanding the plunge in the quantity of street mishaps. In 2018, a sum of 41,707 mishaps was accounted for in the State, contrasted with the 42,542 of every 2017. Karnataka has additionally dropped down in its positioning of mishaps from three out of 2017 to four out of 2018, enrolling a decrease in mishaps by 835 \_\_\_ about 2% over the earlier year. The State stayed at the fourth spot as far as mishap related passings and showed an increment in people killed by 381\_\_\_ about 3.6%," states the report. Over the

most recent five years, more than 54, 000 individuals were killed in street mishaps in the state.

### 3. PROPOSED METHODOLOGY

#### 3.1 Motivation

The purpose of safety motivation is preventing accidents and injury at the desirable safety level by using scientific principles and procedures. Safety motivation influences adherence to safety procedures, and has been found to ensure safety of not only individuals but also organizations and even society .

#### 3.2 Problem Definition

The use of vehicles increases in the proportion of the population. Due to the curve section the accidents are also increasing day by day. This causes the loss of life to the accident it gives alert to the opposite vehicles, Whenever an accident occurs, it has to be informed to the investigation unit. So, it is also beneficial if the intimation is reached to the enquiry section so that the time for the investigation can be minimized.

#### 3.3 Objectives

To achieve the objectives, the scope of this project is determined. By using this concept to reduce the road accidents in curve section.

- i. To reduce Human death ratio.
- ii. It gives alert to the opposite vehicles
- iii. To initiate the condition of the victim who met the accident. iv. After accident fast indication by SMS.
- v. Understand accident prevention and loss control terms.
- vi. Explain causes of accidents.
- vii. Describe methods used in an accident prevention program strategy.

#### 3.4 Proposed System

A large number of assistance aids have been deployed in real life situations whereas other concepts remained as research ideas. Existing System contains model for accident alert system. This Proposed System is to develop a model using IOT so as to detect the vehicles and alert gives alert. The main idea of this paper is to build an

application that makes use of the sensors present in Accelerometer and detect any collision and opposite vehicles if there is a sudden external disturbance in the speed with the help of the Sensor Fusion Based Algorithm.

A proposed system for accident prevention and detection in curves using IoT (Internet of Things) involves the integration of various devices and technologies to monitor curves, detect potential dangers, and alert drivers. Here's a concise overview of its key components and functionality:

1. Curve Monitoring Sensors: IoT-enabled sensors, such as radar or infrared sensors, are deployed along curves to continuously monitor the road conditions, including factors like vehicle speed, weather conditions, and road surface conditions.

2. Data Collection and Analysis: The sensors collect real-time data from the curves and transmit it to a central server or cloud-based platform for analysis. Machine learning algorithms can be used to analyze the data and identify patterns or anomalies that indicate potential risks.

3. Risk Assessment and Prediction: By combining the collected data with historical information and algorithms, the system assesses the risk level associated with each curve. It can predict the likelihood of accidents based on factors like vehicle speed, road conditions, and past accident data.

4. Real-time Alerts and Warnings: If the system detects a high-risk situation, it can generate real-time alerts and warnings to drivers. These alerts can be communicated through various means, such as in-vehicle displays, mobile apps, or connected wearable devices, to ensure drivers are promptly informed of the potential danger ahead.

5. Intelligent Signage and Road Markings: The system can also integrate with IoT-enabled signage and road markings that provide additional visual cues and warnings to drivers approaching curves. For example, dynamic signs can display speed recommendations based on real-time conditions.

## 4. SYSTEM ARCHITECTURE

### 4.1 Design of System

User switches on power bank, power is supplied to Raspberry Pi3, web camera is initialized it starts capturing pictures and detecting objects based on data sets available, it concludes the object and result is in form of text, using software text is converted to speech and it is heard by user.

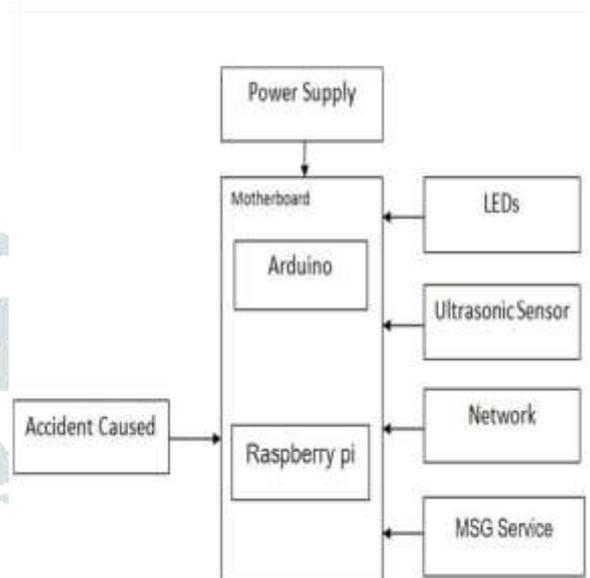


Fig 4.1 Block Diagram of the System

#### 4.1.1 Elements in the System

- i. RPI Camera
- ii. Raspberry Pi3
- iii. Registers&Diodes
- iv. Led sensors
- v. Adriano Uno

### 4.2 Data Flow Diagrams

Data-flow diagram (DFD) is a way of representing a flow of a data of a process or a system. The DFD also provides information about the outputs. A data flow diagram has no control flow there are no decision rules and no loops.

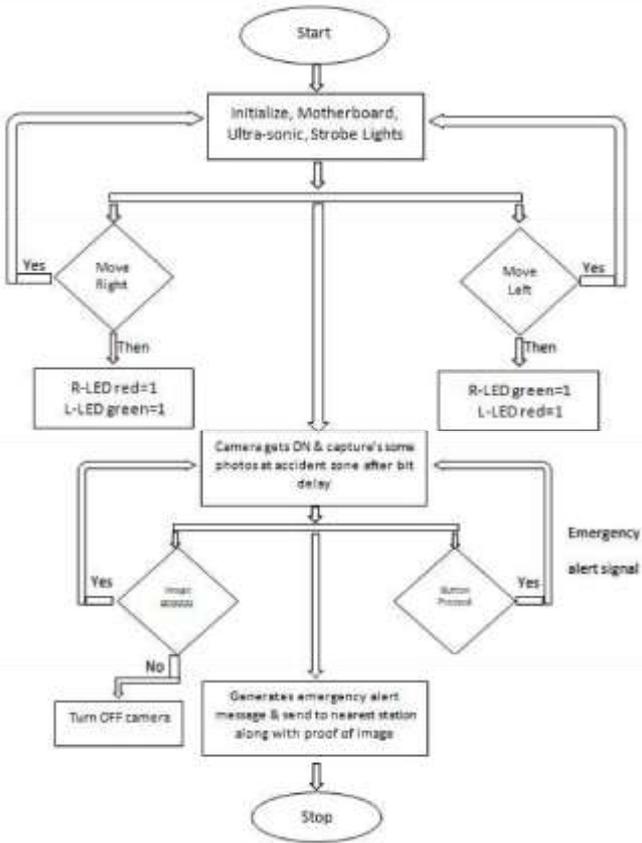


Fig : 4.1 Levels of Data Flow Diagram

Level 0:

- i. It describes the basic overview of the whole system or process being analyzed or modeled.
- ii. It is designed to be an at-a glance view, showing the system as a single high level process, with its relationship to external entities. iii. It is also called as Context Diagram.

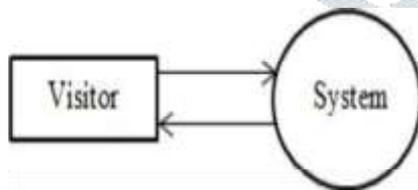


Fig 4.2 Data flow Level 0

Level 1:

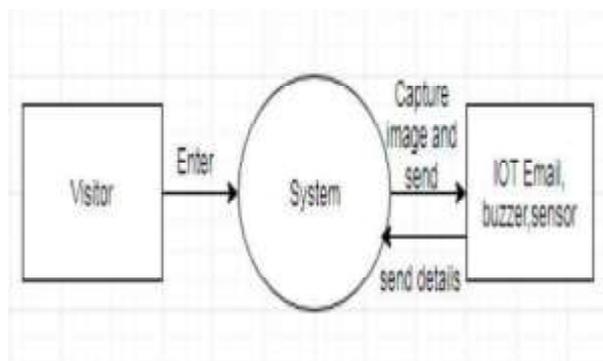


Fig 4.3 Data flow Level 1

- i. Level 0 is broken down into more specific.
- ii. It depicts basic modules in the system and flow of data among various modules.
- iii. It also mentions basic processes and sources of information.

Purpose of Use Case Diagram

- 1. Used to gather the requirements of a system.
- 2. Used to get an outside view of a system.
- 3. Identify the external and internal factors influencing the system.
- 4. Show the interaction among the requirements is actors.

### 4.3 Unified Modeling Language

#### 4.3.1 Activity Diagram

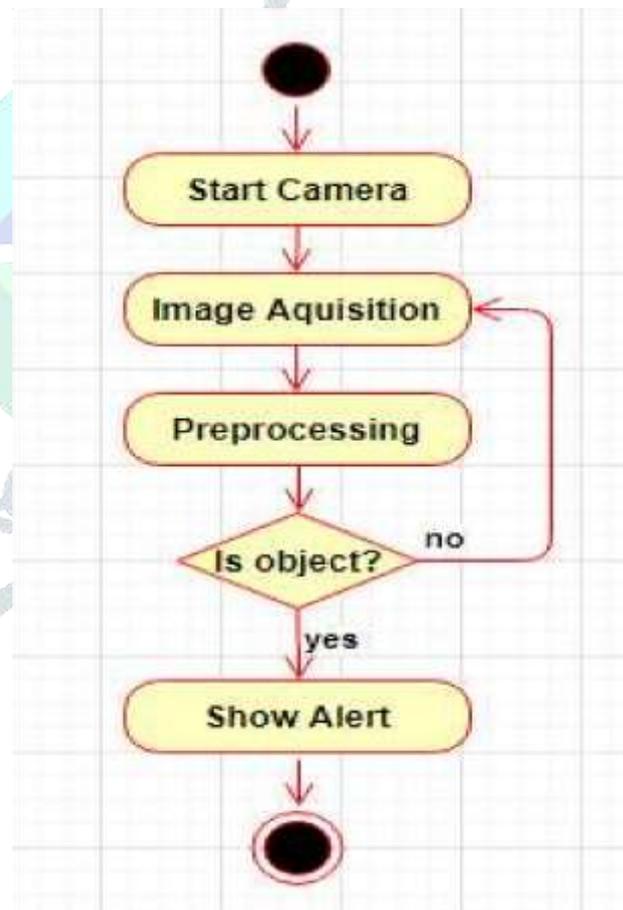


Fig 4.4 Activity Diagram of the System

### RESULTS



Fig 5.1 Initial State



Fig 5.3 Indicating Both Side Vehicles



Fig 5.2 Indicating Opposite Side Vehicles



Fig 5.4 Accident Photo

**APPLICATIONS**

- i. Real-time monitoring: The project can provide real-time monitoring of road conditions, vehicle speed, and other relevant data on curved road sections. This information can be analyzed to identify potential accident-prone areas and take preventive measures.
- ii. Early warning system: By integrating sensors, cameras, and other IoT devices along curved roads, the project can establish an early warning system. It can detect and alert drivers about hazards such as excessive speed, slippery surfaces, obstacles, or sudden changes in road conditions, allowing them to take necessary precautions.
- iii. Adaptive speed control: The project can enable intelligent speed control systems that automatically adjust a vehicle's speed based on the curvature of the road. By utilizing IOT sensors and data analysis, the system can ensure that vehicles maintain a safe speed while navigating curves, reducing the risk of accidents.
- iv. Accident detection and emergency response: The IOT infrastructure can detect accidents or incidents in real-time, such as collisions, rollovers, or vehicles going off the road on curves. The system can promptly notify emergency services and provide them with accurate location information, enabling faster response times and potentially saving lives.
- v. Data-driven road improvements: The collected data can be analyzed to gain insights into the factors contributing to accidents on curved road sections. This information can be utilized by transportation authorities to make informed decisions regarding road design, signage, maintenance, and other improvements aimed at enhancing safety.

**CONCLUSION**

The purpose of this project is to decrease the number of accidents in curve roads. This is done by alerting the driver by means of buzzer when vehicle comes from the other side of the curve. The vehicle is detected by the help of IR sensor which is interfaced to the microcontroller Adriano UNO. By this we can save thousands of lives in the curve roads.

Accident Prevention and Alert System using IOT technology in deadly curves has the potential to significantly enhance road safety. By leveraging interconnected devices and real-time data, it can detect hazards in curves, alert drivers, and enable timely actions to prevent accidents. The system's benefits include early detection of dangers, real-time notifications, valuable data insights, and targeted interventions. However, its success relies on factors such as reliable infrastructure, maintenance, privacy, security, and driver education. Implementing this system can save lives and create safer road environments.

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