IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, November 2024

Vehicle Crash Detection

Sarthak Chavan[1], Isha Deulgaonkar[2], Sankalp Dhage[3], Shravani Tembhekar[4]
Students, Diploma of Computer Engineering[1,2,3,4]
Guru Gobind Singh Polytechnic, Nashik, India

Abstract: *Speed is one of the basic reasons for vehicle accident. Many lives could have been saved if Emergency services could get accident information and reach in time. This project deals with Accident detection system when the accident occurs it uses various components and alerts the Rescue team for help. An efficient automatic accident detection with an automatic notification To the emergency service with the accident location is a prime need to save the precious human Life. The proposed system deals with accident alerting and detection. It reads the exact latitude And longitude of the vehicle involved in the accident and sends this information to nearest Emergency service provider. The goal of the project is to detect accidents and alert the rescue team in time*

Keywords: Speed, Vehicle accident, Emergency services, Accident information, Accident detection system, Alerts, Rescue team, Automatic notification, Accident location, Human life, Accident alerting, Latitude and longitude, Emergency service provider, Detect accidents, Alert the rescue team

I. INTRODUCTION

The development of a transportation system has been the generative power for Human beings to have the highest civilization above creatures in the earth. Automobile Has a great importance in our daily life. We utilize it to go to our work place, keep in Touch with our friends and family, and deliver our goods. But it can also bring Disaster to us and even can kill us through accidents. Speed is one of the most Important and basic risk factors in driving. It not only affects the severity of a crash, But also increases risk of being involved in a crash. Despite many efforts taken by different governmental and non-governmental Organizations all around the world by various programs to aware against careless Driving, yet accidents are taking place every now and then. However, many lives Could have been saved if the emergency service could get the crash information in Time. A study by Virtanen et al. shows that 4.6% of the fatalities in accidents could Have been prevented only if the emergency services could be provided at the place of Accident at the proper time. As such, efficient automatic accident detection with an Automatic notification to the emergency service with the accident location is a prime Need to save the precious human life.

II. METHODOLOGY

Vehicle crash detection systems use a combination of sensors, algorithms, and communication technologies to identify and respond to collisions.The methodology is commonly used in crash detection systems:

1. Sensor Integration:

The first step in crash detection is integrating sensors into the vehicle. Various types of sensors are employed, each providing different data relevant to detecting crashes.

- Accelerometers: These detect sudden changes in velocity or direction. A rapid drop in speed could indicate a collision.
- Gyroscopes: Used to measure changes in angular momentum, which helps in detecting rollovers or severe swerving.
- Airbag sensors: In more severe accidents, the airbag sensors trigger the release of the airbags, which are also detected by crash systems.
- GPS: Used to log the vehicle's speed, location, and sometimes direction. A sudden halt in GPS data combined with other sensor readings can indicate a crash.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, November 2024

- Cameras and LIDAR: Increasingly, advanced detection systems use visual data to detect collisions with other objects on the road.

2. Data Processing and Fusion:

Once sensor data is collected, it's processed to identify crash-related patterns. This step involves:

- Filtering: Raw sensor data may contain noise. Filtering methods like Kalman filters smooth out noisy data, helping the system focus on significant changes.
- Data Fusion: Multiple sources of data are combined to enhance detection accuracy. By fusing data, false positives can be avoided.

3. Threshold-Based Detection:

Many crash detection systems rely on threshold-based triggers:

- Impact thresholds: If deceleration crosses a certain threshold, it indicates a likely crash.
- Time-to-collision (TTC): By calculating the time remaining before an impact based on vehicle speed and sensor input, the system can detect imminent collisions before they occur.

4. Machine Learning and Predictive Algorithms:

Some modern systems incorporate machine learning algorithms trained on historical crash data to predict and detect accidents more accurately:

- Training data: The algorithms are fed large amounts of data from previous crash events to learn patterns of collisions.
- Real-time prediction: The trained model can then process live data from the vehicle's sensors to predict the likelihood of a crash. These systems may improve over time as more data is gathered.

5. Crash Notification System:

Once a crash is detected, the system initiates appropriate actions:

- Emergency alerts: Automatic notifications are sent to emergency services with the vehicle's location, severity of the crash, and potentially other details like the number of occupants (based on seat sensors).
- In-vehicle alerts: The system may trigger safety measures within the vehicle, such as unlocking doors, shutting off the engine, or activating hazard lights.
- Driver alerts: Audible or visual alerts inside the vehicle can notify the driver or passengers about the collision event.

6. Post-Crash Actions:

After detection, the system may:

- Initiate emergency calls: Some vehicles come equipped with systems like eCall or similar, which automatically contacts emergency services in the event of a crash.
- Trigger safety features: Safety protocols like airbag deployment, fuel cut-off, or seatbelt tightening mechanisms can be activated based on the severity and type of crash detected.

7. Continuous Improvement and Learning:

- Advanced crash detection systems learn over time by collecting data from actual incidents, which is then used to update the machine learning models and improve accuracy in detecting and predicting crashes.
- This methodology provides a comprehensive system for detecting vehicle crashes, combining hardware sensors, data fusion, predictive algorithms, and real-time actions to protect occupants and send timely alerts in case of emergencies.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, November 2024

III. EXISTING SYSTEM

Many researchers carried out their studies on accident detection system. Traditional traffic accident prediction uses long-term traffic data such as annual average daily traffic and hourly volume. In contrast to traditional traffic accident prediction, realtime traffic accident prediction relates accident occurrences to real-time traffic data obtained from various detectors such as induction loops, infrared detector, camera etc. Real-time traffic accident prediction focuses on the change of traffic conditions before an accident occurrence, while traffic incident detection studies are concerned with the change of traffic conditions after an incident occurrence. However, the performance of these detection and prediction system is greatly restricted by the number of monitoring sensor, available fund, algorithms used to confirm an accident, weather, traffic flow etc. Besides the automatic detection system, manual incident detection methods detects the accident from the motorist report, transportation department or public crews report, aerial surveillance or close circuit camera surveillance. The drawback of this type of detection system is that someone has to witness the incident. Moreover, there are delays and inaccuracies due to the expression problem of the witness. Compared to these detection method, driver initiated incident detection system has more advantages which includes the quick reaction, more incident information etc. However, with the severity of the accident, driver may not be able to report at all. Conventional built-in automatic accident detection system utilizes impact senor or the car airbag senor to detect an accident and GPS to locate the accident place.

IV. PROPOSED SYSTEM

Arduino Nano is used as controlling unit, communicating between modules for better information transformation at time.

Accelerometer can be used for detecting the collision direction from tri-lateral axis movements. Gyroscope can be used for rollover collisions after a threshold of roll and pitch values, the weight and centre of gravity of vehicle plays an important role in rollover.

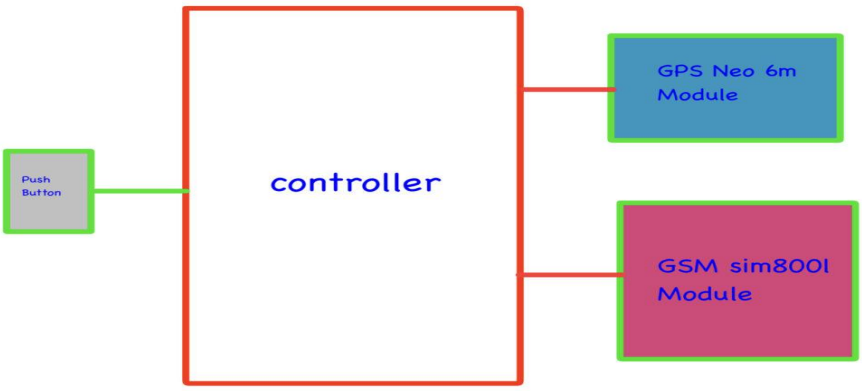
The device also confirms from vibration sensors which detects the collision after a threshold voltage increase.

Then a buzzer is provided to abort the false detection of accident to the passenger. Within of limited time of buzzer signal the GPS module collects the coordinates from Google Module.

These co-ordinates nearby hospitals are alerted for emergency rescue call to passenger.

The scope of the project is to design an accidental detection system that detect the accidents and alert rescue team in time.

GPS module will find the location of the vehicle and the information is fetched by the receiver through the coordinates and the received data is sent to Arduino and the alert to rescue team by GSM module.



V. CONCLUSION

A system to detect an event of accident has been developed. The proposed System deals with accident alerting and detection. It reads the exact latitude and Longitude of the vehicle involved in the accident and sends this information to

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 5, November 2024

nearest Emergency service provider. Arduino helps in transferring the message to differentDevices in the system. Accelerometer monitors the accident happening direction and Gyroscope is used to determine rollover of the vehicle. The information is transferred To the registered number through GSM module. Using GPS, the location can be sent Through tracking system to cover the geographical coordinates over the area.

REFERENCES

[1] T Kalyani, S Monika, B Naresh, MahendraVucha, Accident Detection and Alert System, IJITEE, March 2019(Base paper).
[2] Parag Parmar, Ashok M.Sapkal, Real time detection and reporting of vehicle Collision, IEEE,2017.
[3] Md. Syedul Amin, Jubayer Jalil, M.B.I.Reaz, Accident Detection and Reporting System using GPS,GPRS and GSM Technology, IEEE,2012.
[4] Gowshika B, MadhuMitha, G,Jayashree,Vehicle accident detection system using GPS, GSM modem, IRJET,2019.
[5] Notification,IEEE,2016. Sayanee Nanda, Harshada Joshi, Smitha Khairnar, An IOT Based Smart System for Accident Prevention and Detection,IEEE,2018.
[6] NorsuzilaYaacob, AinnurEizaAzhar, AzitaLailyYusofl, Suzi SerojaSarnin, DarmawatyMohd Ali and Ammar Anuar, Real Time Wireless Accident Tracker Using Mobile Phone,IEEE,2017.
[7] S.Sonika, Dr.K.Sathyasekhar, S.Jaishree, Intelligent accident identification system Using GPS, GSM modem,DARCCE,2014.
[8] DhruveshH.Patel, ParthSadatiya, Dhruvbhai K. Patel, PrasannBarot, IoT based Obligatory usage of Safety Equipment for Alcohol and Accident Detection,IEEE,2019.
[9] Ajith Kumar.A, Jaganivasan.V, Sathish.T, Mohanram.S,Accident detection and Alert system using GPS&GSM,IJOPAAM,2018.