

# A Review on Car Collision Avoidance System based on Interpretation of Vehicle Event Data Recorder

<sup>1</sup>Prof. Tejal Irkhede, <sup>2</sup>Rohit Kashayp, <sup>2</sup>Nikhil Kumar, <sup>2</sup>Vivek Ranjan, <sup>2</sup>Manish Kumar

<sup>1</sup>Assistant Professor, Department of Computer Technology, Priyadarshini College of Engineering, Nagpur, Maharashtra, India

<sup>2</sup>BE Students, Department of Computer Technology, Priyadarshini College of Engineering, Nagpur, Maharashtra, India

## ABSTRACT

According to the World Health Organization (WHO), in excess of a million people on the planet pass on consistently by virtue of vehicle accidents. Notwithstanding care cause, this issue is up 'til now growing due to rider's poor practices, for instance, tank driving, speed driving, riding without sufficient rest, riding with no top protection, etc. The Event Data Recorder (EDR) or vehicle 'black box' is a standout amongst the most valuable instruments accessible to crash Reconstructionist. For vehicles outfitted with this innovation, and when the recorders fill in as planned, the EDR gives crash agents significant data that in numerous examples could not be gathered. In this paper, we present the issues related to accident detections and some existing systems for prevention of accidents.

**Keywords :** Car Accidents, Road Safety, Public Health, Black Box, Event Data Recorder

## I. INTRODUCTION

Fatalities and wounds coming about because of streetcar crashes are a noteworthy and developing general medical issue in India. Consistently about 2,650 individuals get executed and 9,000 get harmed because of car crashes. In 2013, the most recent year for which data is accessible, 137,423 individuals passed on and 469,900 individuals got harmed because of street accidents in India [1]. Car crashes have now earned India a questionable qualification; with about 140,000 passings every year, the nation has overwhelmed China to top the world in street fatalities. India is the main nation on the planet which faces in excess of 15 fatalities and 53 wounds each hour as a result of street crashes. While in many created and creating nations including China, the circumstance is commonly improving, India faces an

intensifying circumstance. In the event that the pattern proceeds with, the absolute number of street traffic passings in India would increment by 100% somewhere in the range of 2013 and 2027 [1]. Without expanded endeavors and new activities, the all-out number of street traffic passings in India is probably going to cross the sign of 250,000 by 2025. The primary point of this investigation is to examine the streetcar crashes in India at the national, state, and metropolitan city level. The center is distinguished the significant street wellbeing issues and examine countermeasures that would possibly address the particular street security issues. The essential wellspring of data for the examination is Accidental Deaths and Suicides in India, 1970 to 2013 distributed by the National Crime Records Bureau, Ministry of Home Affairs, Government of India, New Delhi.

The investigation demonstrates that amid the most recent ten years, street unplanned fatalities in India have expanded at the rate of 5% every year while the number of inhabitants in the nation has expanded just at the rate of 1.4% every year. Because of this, casualty chance, street inadvertent passings per 100,000 individuals, has expanded from 7.9 in 2003 to 11.2 in 2013. Casualty hazard in India isn't just fourfold than that in a portion of the created nations, for example, the United Kingdom and Sweden yet in addition as yet expanding quickly. It is likewise discovered that the conveyance of street coincidental passings and wounds shifts as per age, sexual orientation, month and time. Among individuals of all age gatherings, individuals of monetarily dynamic age gathering of 30-59 years is the most powerless. Nonetheless, on the off chance that we analyze sexual orientation insightful fatalities and accidents, we found that the guys represented 85.2% all things considered and 82.1% of all wounds in 2013.

Besides, street accidents are generally higher in May-June and December-January, which demonstrates that extraordinary climate, impacts the event of street accidents. Accidents remain generally steady and high amid 9 AM - 9 PM and variable yet low amid mid-night and early hours of the day. In any case, this does not infer that daytime driving is more hazardous than evening time driving. The investigation additionally attempts to discover the reason shrewd conveyance of street accidents.

There are a few variables in charge of accidents yet the drivers' blame is observed to be the most essential one; drivers' blame represented 78% of all-out accidents in 2013. The recognizable proof of elements influencing street crashes got from the accident examination and remaking has not been directed by and by in the Asian nations. The objective of this examination was to start this street wellbeing practice in Thailand by tending to the auspicious requirement for a top to bottom investigation of street accidents.

The mishap examination includes the investigation of accident scenes and the documentation of all fundamental and accessible data of every segment (for example a human, vehicle, and street condition). Mishap reproduction is characterized by Baker and Fricke as[11]"... the endeavors to decide from whatever data is accessible, how the mishap happened". Mishap reproduction approach works in reverse from the proof of the accident examination and the remaining parts of the collide with investigating the situation of previously (pre-crash), amid (crash) and after the accident (post-crash). The successive investigation of final products to the underlying state of the events can build up "how" and "why" a specific sort of accident happens. Arithmetic and Newtonian material science are connected in this investigation. It tends to be expressed that crash recreation returns to explore the contributory elements and additionally causes behind the accident event dependent on major and minor physical pieces of information abandoned at the accident scene.

The strategies of accident reproduction, direction, and harm based investigation by utilizing material science streamline the assurance of numerous vital parameters of accident events. In addition, to acquire a dependable end, itemized data incorporating the framework segments should be completely explored. The data important for reproduction begins with the accident scene [12]. The responses to the inquiries of 'why', 'what', 'when' and 'how' should lead the recreation procedure to develop the genuine situation of the pre-crash, crash, and post-crash. Capturing of imperative pieces of information and recording of the accident scene assumes an essential job in the reproduction. Damage data from tenant restorative reports can be checked with the direction of the inhabitants found inside the included vehicles at the scene. In this way, a "receptive outlook" insightful frame of mind is extremely urgent to scan for all the point-by-point data from the scene.

## II. LITERATURE REVIEW

Presently a-days, there is intense interest for cars, as a result of this traffic control ends up boisterous and it prompts street accidents. If there should arise an occurrence of mishap, long reaction time to go to the injured individual may prompts increment number of death. In writing a few paper examine mishap recognition and vehicle following. In [2], an inventive remote disclosure using MEMS accelerometer and GPS following system is utilized for identification of accident. The structure can recognize kind of setback (immediate and nonlinear fall) from accelerometer sign using limit figuring, remove in the wake of crushing of GPS ground speed and cruiser. After incident is recognized, short ready data (alert back rub and position of setback) is sent by methods for GSM framework. The system is attempted in genuine 850 applications using bicycles. The test results exhibit that it can recognize direct fall, non-straight fall and ostensible ride with no bogus alarm, remote discovery utilizing MEMS accelerometer and GPS following for unplanned checking of vehicle. The confinement of structure proposed in [2] is mishap recognition for just bikes, and detailing just utilizing GPS with no black box.

The paper [3] titled "The 3-arrange AcuTrac, Motorcycle Tracking System", Elite security supplies outline work is constrained to bike on the grounds that a bikes setbacks could have a few cases which can't absolutely use for four wheeler mishap discovery. The constraints of the above structure is making utilization of capacity of the GPS framework just as a region sensor to influence an extremely decent spread technique to identify incidents. Various gadgets are accessible for occurrence recognition by researchers. The real episode location strategies wound up by deciding realtime focused on vehicles and examination to help expectation focused on vehicle. This particular discovery approach is known while Traffic-

occurrence recognition calculation dictated by nonparametric relapse in [3].

The structure in [4] spare the message just as report with convergence utilizing metadata library. An incident location strategy in street [5], make utilization of CCTV which regularly observe development of auto follow. Anyway this system screens the primary focused on guests move that are fitted with a great deal of circle openings inside it is execution. Because of the escape clauses inside going before is viable a couple of shiny new computerized episode identification just as credit detailing approaches wound up advanced. A large portion of these gadgets is generally significantly centered proposed for some wheeler vehicles. This particular computerized recognition just as credit announcing approach began working with GPS UNIT just as GSM innovative expertise. Anyway these sort of wound up specifically built expected for cars. The real mechanized episode location approach which frequently utilizes air case sensor just as accelerometer to help analyze a mishap wound up set forward by M. Chuan-Zhietal [6]. Later gadgets that have been advanced from this begun working with GPS unit innovation expected for occurrence recognition alongside planned for deciding the setting in regards to episode.

The framework arranged by Jerath just as Jung Lee utilizes GPS unit innovation to help watch out for speed with the auto just as microcontroller to help inspect speed with the auto planned for sequential insignificant seconds [7][8]. Speedy braking will maybe result in a bogus helpful while speed enormous contrast could be the basically angle viewed as expected for identifying episode. The greater part of these strategies wound up made explicitly expected for a few wheelers [9].

The greater part of these gadgets isn't utilized in a few wheelers while they is likely not effective. In

this manner gadgets wound up intended for both the cars. This is a stage for crisis salvage which will work ideally so as to lessen the brilliant time of entry of rescuers if there should arise an occurrence of street accidents, when each microsecond checks. Our paper plans to introduce an innovation consequently identifying the mishap and an equipment GPS beacon dependent on GSM/GPS innovation illuminating at the event of mishap with adequate subtleties like accurate area and time at which mishap occurred and alongside that the voice was recorded for two or three minutes when the mishap occurs. This paper build up a correspondence between the control station and the unit introduced in vehicles. Vehicles will have GPS/GSM empowered following modules and will be followed progressively utilizing cell systems. The product installed in the microcontroller will control the different activities of the gadget by observing waveform from the vibration sensor. In the event of mishap the gadget will send an alarm message alongside area data from GPS module to control station utilizing GSM arrange. It is a thorough and viable answer for the poor salvage reaction in the event of mishap. The mishap detailing can naturally discover an auto collision; scan for the spot and after that send the fundamental data to the salvage office covering topographical directions and the time and conditions in which a car crash occurred. At the server end, a control capacity will remove important data and store it in a database, to which mishap data from models will be surveyed progressively. Our framework joins propelled equipment plan and refined control innovation into a conservative, dependable bundle.

### III. DECODING CAR'S BLACK BOX

#### A. How Black Boxes Work

Event data recorders are not actually black boxes but tiny microcomputer chip sets. In most vehicles, they are part of the airbag control module, and originally

were included to ensure airbags deployed when they were supposed to.

Over the years, as electronics got cheaper, smaller and smarter, event data recorders became capable of doing more than simply monitoring airbags. Automakers realized the devices could be used to provide information about the seriousness of an accident, and if a car was being operated properly when a crash occurred. Based on a separate NHTSA regulation passed in 2012, if a vehicle today does have an event data recorder, it must track 15 specific data points, including speed, steering, braking, acceleration, seatbelt use, and, in the event of a crash, force of impact and whether airbags deployed.

Depending on the automaker and car model, an event data recorder may capture many more functions, though car companies are not required to disclose exactly what those are. The language many use to explain black boxes in owner's manuals also is purposely general to cover technology updates and to save space.

Put everything the devices do in an owner's guide and "instead of one paragraph, you'd have potentially another 20 or 30 pages. That really wouldn't be realistic," says Richard Ruth, a black box equipment trainer, expert witness and consultant who worked at Ford Motor Co. for 33 years, including a stint evaluating event data recorders and other safety equipment. "It's not going to change whether or not you're going to buy the car."

Most event data recorders are programmed to record data in a continuous loop, writing over information again and again until a vehicle is in a front-end collision or other crash. When an accident occurs, the device automatically saves up to 5 seconds of data from immediately before, during and after an incident.

Today, practically every major automaker selling cars in the United States builds event data recorders into new vehicles. The exceptions are Volkswagen (which auto industry watchers say is preparing for the NHTSA regulation to kick in), Ferrari and Maserati. Traffic accident analysis consultant Harris Technical Services maintains a list of car makes and models from 1994-2014 with event data recorders.

The NHTSA rule, which the agency has been working on for years, was supposed to take effect September 1, 2014. However, auto industry insiders say the agency is still reviewing more than 1,000 comments it received about the proposed regulation, making that implementation date unrealistic. A NHTSA representative declined to comment on the delay.

### **B. Getting Black Box Data**

Black box data is difficult and expensive to get to, and interpreting it takes special training. Extracting the data after an accident involves using a data-retrieval tool kit that consists of hardware, software and a cable that plugs into a car's on board diagnostics port. That is the same port mechanics use to identify engine problems and insurance companies tap as the basis for use-based insurance policies. Crash data retrieval tool kits are not cheap, running \$2,000-\$10,000 and up, not including training costs.

It follows that since drivers own their cars or trucks, they own data the vehicles generate, including black box data. But because it's so difficult and costly to extract, it's virtually impossible for average car owners to do it on their own — assuming that they even want to.

Who else can access the information is a point of contention. Automakers would like the right to access the information for numerous reasons including safety, to make sure systems work the way they should and to check for defects. Other parties that want a black box's car crash data can include

police and other law enforcement agencies that are investigating an accident, insurance companies looking into a claim, lawyers representing parties in car-crash lawsuits and accident reconstruction consultants working for any of the above.

In states with no black box laws on the books, "state troopers could get the data without a subpoena if there was a fatality," says Tom Kowalick, a self-taught black box expert who chairs an event data recorder standards working group that's part of the Institute of Electrical and Electronics Engineers. Kowalick also wrote some of the black box information on the NHTSA Web site. "If they want to grab it, there's nobody saying they can't."

To rectify that situation, 15 states have passed EDR regulation over the past decade. Under the theory that car owners have privacy rights, many of the state laws require automakers to notify new-car buyers that vehicles contain black boxes, such as in the owner's manual. State laws also spell out the conditions under which police or other parties can obtain EDR information without an owner's consent, such as with a court order; for dispatching emergency personnel; diagnosing, servicing or repairing the vehicle; or probable cause in an accident. The National Council of State Legislatures maintains an updated list of state EDR laws.

Black boxes have become a battleground in states such as California, where earlier this year, insurance companies and automakers lined up on opposite sides of a black box data protection bill that would have required automakers to let car owners block or opt out of recording vehicle information. The bill didn't make it out of the state Senate Transportation Committee after heavyweights including the Alliance of Automobile Manufacturers opposed it.

Earlier in 2014, two U.S. senators introduced a bipartisan bill that would provide some of the same

protections on a national level. The Driver Privacy Act explicitly states that a black box's data can't be retrieved by anyone other than vehicle owners without their consent and protects any personally identifiable information. By April 2014, the bill had collected 23 co-sponsors and been approved by the Senate Commerce Committee. As of July 2014, however, no further action had been taken.

### C. Black Boxes, Privacy and Security

Meanwhile, electronic privacy advocates worry about a related car-data security issue: that a car's diagnostic port, through which black box data streams, isn't secure enough to withstand hacking, and therefore poses a danger. Security experts and "white-hat" hackers already are testing how to break into the ports to show how vulnerable they are. They are publicly sharing the results, as in a video called "How to Hack a Car."

Kowalick, a longtime black box data privacy advocate, started a company to sell a diagnostic port lock that he invented. The \$30 AutoCyb lock, which he markets on his company Web site, is inserted into the diagnostics port to turn off access and prevent unwelcome parties from getting to the data or interfering with car systems. "Every car in America can be hacked," he says. "The diagnostic link connector is unsecure. All you have to do is set up access to the vehicle and have the right tool."

However, Ruth, the EDR consultant and former Ford executive, maintains a physical lock couldn't stop a black box expert or mechanic from bypassing the diagnostics port and obtaining the data another way. He also dismisses the notion that hackers would be interested in information.

"What would the incentive be?" he asks. "I think it's an over-reaction. For all practical purposes, the owner controls physical access. There's no Internet port on the car that's live, especially when the car's

turned off. No one can hack into something without Internet access." Even if someone could break in, specifically in an effort to get data from an event data recorder, the devices have access codes that need authorized commands to work, he says.

In addition, car companies use threat modeling and simulated attacks to test security and to help design controls that protect data, says Wade Newton, communications director for the Alliance of Automobile Manufacturers, an auto industry trade group that represents 12 large car companies. "From bumper to bumper, automakers use proven security techniques to help prevent unauthorized access to software," he says.

## IV. CONCLUSION

The analysis shows that the distribution of road accidental deaths and injuries in India varies according to age, gender, month and time. It is found that the economically active age group is the most vulnerable population group. In general, males face higher fatality and accident risk than their female counterparts. Moreover, road accidents are relatively higher in May-June and December-January which shows that extreme weather influences the occurrence of road accidents. Accidents are relatively constant and high during 9 AM to 9 PM and variable but low during mid-night and early hours of the day. There are several factors responsible for accidents but drivers' fault is the most important factor; drivers' fault accounted for 78% of total accidents, 76.5% of total injuries and 73.7% of total fatalities in 2013. Automatic vehicle accident detection and reporting System using black box is the need of the hour. The framework should be placed in moving vehicle to detect accident and report to In Case of Emergency (ICE). The black box will records the voice of victim after the accident occurs which will be used for further investigation.

## V. REFERENCES

- [1] Accidental Deaths & Suicides in India, 1970 to 2013 published by the National Crime Records Bureau, Ministry of Home Affairs, Government of India, New Delhi.
- [2] Wireless Black Box using MEMS Accelerometer and GPS Tracking for Accidental Monitoring of Vehicles, 978-1-4577-2177- 9/12\$25 (c) 2012 IEEE.
- [3] "The 3-stage acuTrac Motorcycle Tracking System", Elite security supplies, <http://www.gpsfast.com>.
- [4] "Traffic-incident detection-algorithm based on nonparametric regression", S. M. Tang and H. J. Gao, IEEE Transactions on Intelligent Transportation Systems, vol. 6, 2005, pp. 38-42.
- [5] Yong-Kul Ki, Jin-Woo Kim and Doo-Kwon Baik, "A Traffic Accident Detection Model using Metadata Registry ", Conference on Software Engineering Research, Management and Applications, 2006 ppno: 0-7695-2656-X.
- [6] "Providing Accident Detection in Vehicular Networks Through OBD-II Devices and Android-based Smartphones" Juan Carlos Cano, Jorge Zaldivar, Carlos T. Calafate, Pietro Manzoni in 5th IEEE Workshop On User Mobility and Vehicular Networks 2011 pp no : 978-1-61284-928-7.
- [7] "Method of Freeway Incident Detection Using wireless Positioning," H. Ru-fu, L. Chuan-zhi, Y.E. Hong-wu, in Proceedings of the IEEE International Conference on Automation and Logistics, 2008, pp. 2801 -2804.
- [8] "GPS-free terrain-based vehicle tracking on road networks," Jerath, K.; Brennan, S.N., American Control Conference (ACC), 2012, pp.307, 311, 27-29 June 2012
- [9] "An accident detection system on highway through CCTV with calogero-mosersystem, Jung Lee Conference on Communications (APCC), 2012 18th Asia-Pacific pp.no: 978-1-4673-4726-6.
- [10] Jog, S.R., Sutaone, M.S, Badawe, V.V., "Ruggedisation methodologies for GPS based Vehicle Tracking System," (ICECT), 2011 3rd International Conference on , vol.2, no., pp.214,218, 8-10 April 2011.
- [11] Baker, J., and Fricke, L., Process of Traffic Accident Reconstruction. Traffic Accident Reconstruction (L. Fricke, ed.), Evanston, IL, Northwestern University Traffic Institute. (2010).
- [12] Van Kirk, D. J. Vehicular Accident Investigation and Reconstruction. CRC press. USA. pp.15-19. (2001).

### Cite this article as :

Prof. Tejal Irkhede, Rohit Kashayp, Nikhil Kumar, Vivek Ranjan, Manish Kumar, "A Review on Car Collision Avoidance System based on Interpretation of Vehicle Event Data Recorder ", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 5 Issue 1, pp. 422-428, January-February 2019. Journal URL : <http://ijsrcseit.com/CSEIT1951107>