Design of Vehicular Black Box for Automotive Application

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***Abstract*— Rapid growth of population coupled with increased economic activities has favored in tremendous growth of motor vehicles. This is one of the primary factors responsible for road accidents. It is observed that few works have been carried out on statistical analysis of accidents particularly on two-lane National Highways.**

The highway network is accelerated at a fast rate and the safety of vehicular movements becomes a concern for everybody due to reporting of loss of lives and properties along with fatal injuries and periodical obstruction of traffic flow. National highways provide the efficient mobility and accessibility function. The increasing road accidents have created social problems due to loss of lives and human miseries. Road accidents are essentially caused by interactions of the vehicles, road users and roadway conditions. Each of these basic elements comprises a number of sub elements like pavement characteristics, geometric features, traffic characteristics, road user's behavior, vehicle design, driver's characteristics and environmental aspects.

Road traffic accident (RTA), a cause of unnatural death is the third major preventable one amongst all deaths. Road deaths in India are publicly glaring, while road safety is professionally lacking and politically missing.

***Keywords*—**

I. INTRODUCTION

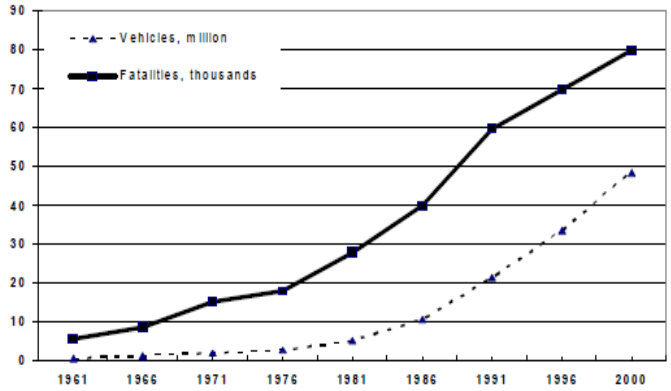
Event Data Recorder (EDRs) are also often referred to as black box or in-vehicle data recorders. These onboard devices can record pre-crash, crash and post-crash data and their usefulness has been also recognised by the European Parliament

The Driver Safety Rating is evaluated by detecting dangerousdriving patterns based on vehicles data collected via Vehicular Black Box for Automotive Application. Dangerous driving patterns include sudden acceleration, ruthless braking and driving too fast i.e out of control and four triggering events are used in the car black box. And that's the reason why road safety is treated as a transportation issue, not a public health issue, and road traffic injuries are called "accidents," though most could be prevented. As a result, many countries put far less effort into understanding and preventing road traffic injuries than they do into understanding and preventing diseases that do less harm. Every day as many as 140 000 people are injured on the world's roads. More than 3,000 die and some 15,000 are disabled for life. Each of those people has a network of family,friends, neighbours, colleagues or classmates who are also affected, emotionally and otherwise. Families struggle with poverty when they lose a breadwinner or have the added expense of caring for disabled family members."

India has 1% of vehicles in the world; but it accounts for about 6% of the total cases of unintentional injuries. In the present study, males constituted 78.22% and females constituted only 21.78% of the total victims. Males being the breadwinner in majority of family are exposed more frequently to outdoor work than females. This explains the involvement of maximum number of males in traffic accident deaths.Rapid growth of population coupled with increased economic activities has favored in tremendous growth of motor vehicles. This is one of the primary factors responsible for road accidents. It is observed that few works have been carried out on statistical analysis of accidents particularly on two-lane National Highways.Percentage accidents of a particular type of vehicle. It is observed that Truck are involved in maximum number of accidents almost 48%. It may be due to the most of the Truck driver are driving their vehicles after drink of alcohol or they are not aware about the condition /maintenance of their vehicles. It is followed by Motorcycle (16%), Car (12%), Bus (10%), Tempo (5%), Jeep & Tractor (3%), cycle (2%) and Pedestrian (1%).

Road traffic injuries (rti) are the only public health problem where society and decision makers still accept death and disability on a large scale among young people. This human sacrifice is deemed necessary to maintain high levels of mobility and is seen as a necessary "externality" of doing business. Discussion only revolves around the number of deaths and injuries we are willing to accept. According to official statistics 80,118 persons were killed and 342,200

injured in road traffic crashes in india in the year 2000 (2). However, this is an underestimate, as not all injuries are reported to the police. The actual numbers are likely to have been in the region of 1,200,000 persons with injuries requiring hospital treatment and 5,600,000 persons sustaining minor injuries. The situation in india is worsening and rti have been increasing over the past twenty years. This is partly due to the increase in the number of vehicles on the road and partly due to the absence of a coordinated official policy to control the problem. These data show that the number of fatalities have continued to increase at approximately the same rate of about five percent a year over the past two decades. The fatality rate per million vehicles has remained around 2 for the past few years, whereas, the rate per million population continues to increase and is around 80 at present.



Growth of motor vehicle population (registered) and road traffic fatalities in India (Source: Ministry of Road Transport and Highways)

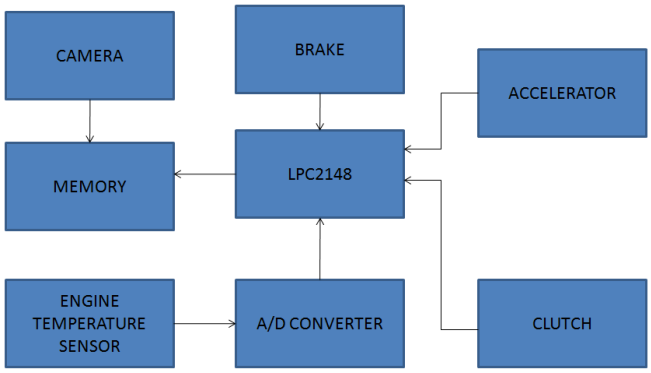
Hence, to reduce accidental cause and to detect why the accident occurred and what's the reason behind accident the special combination of software and hardware known as design of vehicular black box for automotive application or in simple words black box fir cars has been introduced.

Most people associate black boxes with airplanes but they are no longer just the key tool in investigation of airplane accidents. The event data recorder (edr) as the black box is officially called is slowly gaining an important role in investigation of car accidents as well.by recording the events and actions of the driver including speed, braking, turning, etc seconds before the collision. Nowadays,security and safety plays major role in cars,even a single collisions can be harmful for the passengers in the cars.looking at the groth in technology its its quite important to have some important devices to be implemented in cars.Different applications like IR sensors at the bottom end of the steering one at far right and one at far left so as to detect the steering rotation in case of post accident detection.It simply tells the detection team the rotation of steering at the time of accident. Another parameter is temperature sensor which is nothing but in simple words engine temperature sensor.And even eye tracking system can of great help in detection of roll of eye or has the driver has blink the eye at the instant of accident and even how long was the eye blinked or driver went completely in sleep mode. Some of the simple parameters can be like placing limit switch under the seat which helps in detection of passenger i.e.how many passenger were at the time of accident present inside the car.Using modern technology,we can even implement cameras at each corner of car to detect who was the another responsible party for the cause of accident.Now, question might arise that where this all connections be established a nd whether this whole circuit might get bulky.But the answer to it simply the black box which will be placed at the exact center of car where it will safe for sure.And even the accident takes place the detection of cause of accident will be quite simpler and easier for detection team.

II.Description:-

The ARM7TDMI (ARM7+16 bit Thumb+JTAG Debug+fast Multiplier+enhanced ICE) processor implements the ARMv4 instruction set. It was licensed for manufacture by an array of semiconductor companies. In 2009 it remains one of the most widely used ARM cores, and is found in numerous deeply embedded system designs. Texas Instruments licensed the ARM7TDMI, which was designed into the Nokia 6110. The ARM7TDMI-S variant is the synthesizable core.

The functions of Car Black Box are Data collection,driving data: driving information such as speed, brake and seat belt status, steering performance,collision data: Time, speed and shock power when accident from accelerometer,positioning data: The car positions checked can be checked in real time by GPS,accident analysis & reconstruction by adding simle GSM module. The system uses LPC2148 with ARM7kernel as the master controller. Mainly includes information collection module, information storage module, communication module and information processing module. The block diagram of system hardware design as shown in figure.



Block diagram of Vehicular Black Box for Automotive Application.

III.Applications:-

The ratio of road accidents have been increasing rapidy like a tracer bullet nowadays which is one of the concern point for the road safety athority of India and even for the national highway athority of India.It has been noticed in past few years that the road mishaps has been increaseing gradually as the number of vehicles on road are increasing so as to investigate yhe cause of accidental collision between two vehicles the module known as Vehicular Black Box for Automotive Application is being introduced.

The module Vehicular Black Box for Automotive Application is of great use in cars and also will be one of the major part of the vrhicles like cars,bikes,truckes,buses and many more.Looking at the advancement in technology this module will be for sure be like the heart of the vehicles like cars,bikes,truckes,buses and many more.

The output of cause of accident is amalgamated onto a single graphical representation,so as to setect What was the steering rotation?,Was the eye blinked at the time of collision?,what was the temperature of engine?,number of passengers at the of accident present in the vehicle.The answer to all this question is simply the Vehicular Black Box for Automotive Application. This model can be helpful to crime investigators to investigate any crime was occurred or not. Investigators can simply attach pen drive and observe log file that is generated into pen drive like investigators insurance companies can also verify the cause of mishap for the purpose of claiming.The best part of module is that it is SD card interfaced hence,even if the car is fully crashed there is no possibilty of data loss.

The data will be saved in SD card which will be inside that one tough metal box which can sustain even the toughest of the crashes.So the investigation team can now take the sigh of relief because now it will be much simpler for them them to collect data without burnig their extra calories and sweat.

IV. CONLUSION

A better knowledge of what evidence is required for certification, what relationships exist between them and how can this information be managed, analysed and reused can help reduce certification costs and further make certification results more credible.

With this in mind, this thesis aims to provide an Evidence , that proposes better practices for understanding the notion of evidence requirements, capturing traceability among the evidence items, enabling better change impact analysis and facilitate reuse of evidence information.

V. REFRENCE

[1]Chundong Wang, “Extending the lifetime of NAND flash memory by
salvaging bad blocks,” *2012 Design, Automation & Test in Europe*
Conference & Exhibition (DATE 2012), pp. 260 – 263, March 2012.
[2] Micheloni R., Picca M., Amato S., Schwalm H., Scheppler M. and
Commodaro S., “Non-Volatile Memories for Removable Media,”
Proceedings of the IEEE, vol. 97, pp. 148 - 160, Jan. 2009.
[3] Sunil Nair Rio De Janeiro, Brazil Doctoral Symposium. 2013 Evidence Management for Evolutionary Safety Assurance and Certification
[4] D. Falessi, et al., “Planning for Safety Evidence Collection: A Tool- Supported Approach Based on Modeling of Standards Compliance Information”. IEEE Softw. 29(3): 64-70, 2012