

# CAR SECURITY AND QUICK MEDICAL RESCUE: A LITERATURE REVIEW

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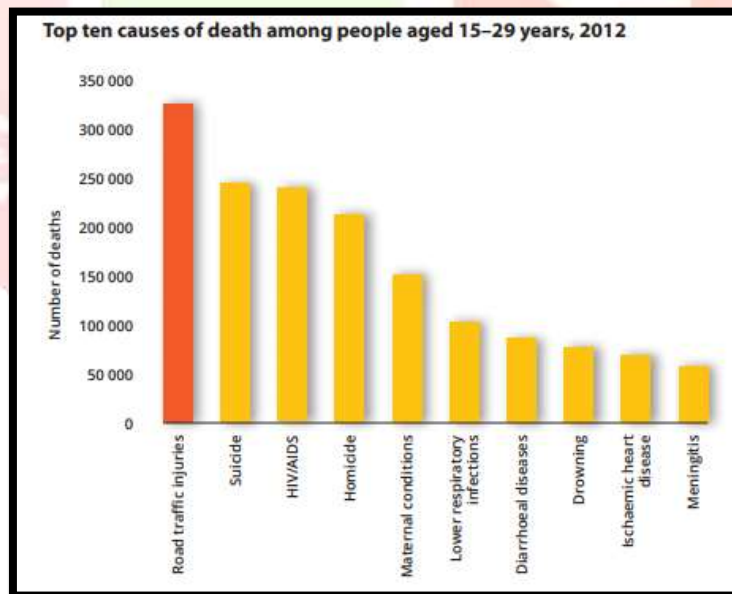
**Abstract-** Automobiles, today have been an integral part of the society with the number of owners increasing exponentially. With the number of owners increasing more than ever, various problems related to car safety becomes a huge matter of concern. Also safety of the car owner driving it has to be given utmost priority given the amount of accidents increasing on a huge scale. The paper showcases previous attempts and work been done by various authors on this crucial subject and tries to provide a thorough comparison highlighting the pros and cons of the approach suggested by various authors. The literature review can further be used to develop a better alternative covering all the loopholes developing a far more accurate and robust system.

**IndexTerms -** Automobiles, accidents, comparison, loopholes.

## I. INTRODUCTION

In the last decade, the world has seen a huge upsurge in the number of automobiles worldwide. Naturally with the huge increase, comes the rise in number of accidents and casualties arising out of car accidents all over the world. The casualties rising from accidents have grown such that it ranked among the top ten causes of death among people aged 15-29 years according to a survey taken in 2012 as described in the report by World Health Organization described in Figure 1. A detailed description of this report can be availed in [1].

Figure 1. Top ten causes of accident in year 2012



### 1.1 Accident statistics

The impact of this problem ranges world-wide with some countries seem to suffer more as compared to others due to a number of factors like road conditions, weather conditions, traffic rules, number of vehicles, road discipline and laws, etc. According to a report by World Health Organization on road safety for the year 2005, countries with more population were found out to be more vulnerable to car accidents and casualties. India and Africa were found out to be most vulnerable among the lot. According to a survey taken in India in the year 2016 alone, 4,80,652 accidents occurred taking a toll on 1,50,785 lives as shown in [2]. The detailed description of statistics of number of accidents occurred year wise along with death toll is shown in table 1. Speed of rescue operation becomes a major differentiator and a deciding factor between life of a victim being saved. Studies show that more than 50% of those lives could

have been saved if the medical rescue operation would have been on time. While the many of the countries have taken steps to quicken the pace of the rescue operations but the real problem lies with the unwillingness of people to help out the victim. This is commonly termed as the bystander effect where people would rather carry on their own task rather than helping out the victim in need. Factors like date, time, classification of accident as minor, major, etc. as well as details of the location of the accident can prove beneficial during the analysis of the accident as correctly noted in [9].

Table 1. Year wise Statistics of casualties through in India

Year	Total Number of Road Accidents (in numbers)	Total Number of People Killed (in numbers)
2005	4,39,255	94,968
2006	4,60,920	1,05,749
2007	4,79,216	1,14,444
2008	4,84,704	1,19,860
2009	4,86,384	1,25,660
2010	4,99,628	1,34,513
2011	4,97,686	1,42,485
2012	4,90,383	1,38,258
2013	4,86,476	1,37,572
2014	4,89,400	1,39,671
2015	5,01,423	1,46,133
2016	4,80,652	1,50,785

## 1.2 Car Theft

Another problem associated with increase in cars is car theft. Car theft has been a huge point of problem for the car owners and most of the cases end up with car being disassembled and parts being sold separately leaving no chance of getting to the actual culprit. A slow and weak police action adds up to the problem. Researchers are constantly searching for new and innovative ways to acknowledge the problem but the thieves always seem to be a step ahead. The latter half of the paper showcases various attempts and systems suggested by various authors to curb the problem. Not only India but the entire world has been facing the problem since a while now. The facts listed on nation master [4] clearly indicate the magnitude of the problem on the global scale.

## II. LITERATURE REVIEW

The paper discusses the systems and models suggested by various authors dealing with two big problems i.e. Accident rescue operation and anti-theft protection. After a lot of research and analysis, we found many papers in which the authors had done an outstanding job in identifying the core of the problem and proposing models to overcome the issue. We have tried to cover most of the major aspects of the proposed model in and out and discuss possible implications.

### 2.1 Accident Detection and Rescue

Md. Syedul Amin et. al., in [3] have presented a unique way of detecting an accident that is through speed from GPS installed within the system. The GPS not only provides us with just the co-ordinates but also the speed of a moving vehicle. The authors have basically created an algorithm that would take speed as an input and on the basis of speed the algorithm would decide whether the accident has occurred or not. While everything just looks fine on paper, but considering a real world scenario there would arise a lot of discrepancy of whether the accident has actually occurred or not thus creating a lot of false alarm that is undesirable while considering the system for real working environment. Li Chuan-Zhi et. al., in [4] have done an excellent job in creating a system that could notify the emergency service providers in case of an accident and send the location of the accident for quick rescue operation using a host of devices like GPS, CPS, GSM, etc. but the thing that concerns regarding the proposed model is the means of accident detection. While the authors have done a brilliant job in avoiding the possibility of a fake alarm but the issue lies with the primary detection of the accident. The sensor used is an airbag sensor. The sensor completely depends on the accuracy of an airbag and thus decides the occurrence of accident. But many incidents have occurred in the past where the accident occurred causing major effect but airbags didn't open up. So sensors completely dependent on accuracy of airbag would leave some vulnerability to the system in terms of accuracy. C. Thompson et. al., in [5] have come up with a model which uses smartphone as primary detection method for accident. Again there are various ambiguities regarding the accuracy of accident detection and speed of response of the model.

### 2.2 Anti-Theft Protection

Kyungroul et. al., in [6] have laid out various vulnerabilities when it comes to security of a vehicle. They have wonderfully presented a thorough comparison between outdated systems and newer ones and what features need to be implemented in future. They

have also mentioned about various loopholes in the existing technology used so far and the types of attacks been tried by intruders. It gave a thorough understanding of where the vulnerability lies and also suggested some methods through which these vulnerabilities could be resolved. Al-Khedher et. al., in [7] have developed a hybrid model consisting of GPS and GSM and monitor the vehicle via Google Earth application. Basically the car is in a constant monitoring state when the owner leaves the car. If a possible theft occurs, the co-ordinates of the vehicle in the application would change hence giving an alert to the owner of the car. S. S. Pethakar et. al., in [8] have designed a system based on RFID. The company whoever wishes to install the system can allot predefined cards to the taxi drivers using the car. If any unidentified person tries to get into the car and RFID module would ask for the card for an access to the vehicle failing in which would issue a notification to the owner of the car. Kim et. al., in [11] have suggested a CAN based approach to deal with theft. But a CAN network is vulnerable to DoS attacks and also other types of attacks where the intruder could literally intrude using existing vulnerabilities in the system. Hence using a CAN based approach could be potentially unsafe for the system.

### III. CONCLUSION

A thorough literature review of various papers and work presented by authors in the areas concerning two of the major problems associated with automobiles today that is accident rescue operation and anti-theft systems has been done discussing strengths, loopholes and potential vulnerabilities which could be a helping hand in innovating more fundamentally accurate and robust systems in future.

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