

# Management of Road Accidents in Cities Through Smart Technologies

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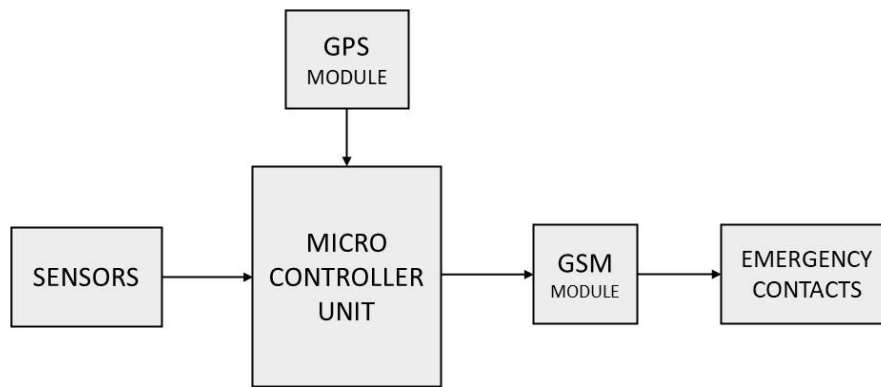
## 1.1 Abstract:

Management of road accidents has been a challenging task in the country like India, whose vision is more focused on smart cities development. The reporting of vehicle accident incidents immediately in case of emergency is being delayed and the death rate is increasing in such cases, due to less concentration on usage of technology in the management of road accidents in smart cities. The recent available technology used in the management of accidents through vehicles are challenging, as they are not smart enough, unreliable, ease of application is unrealistic, not so economic friendly, and they are not meant for all vehicles too, as the detection of accidents and the immediate response or plan of action for it is unrealistic. The main contribution from our research is to detect accidents and respond to the notification which would be sent through our accident management system generating short message service to the concern person's family, nearby hospital, ambulance, local volunteer, police station, vehicle customer care, to all the respondents immediately. In this paper we have proposed our idea on managing the road accidents in smart cities through smart vehicle technology which would assist the policy makers of smart city mission.

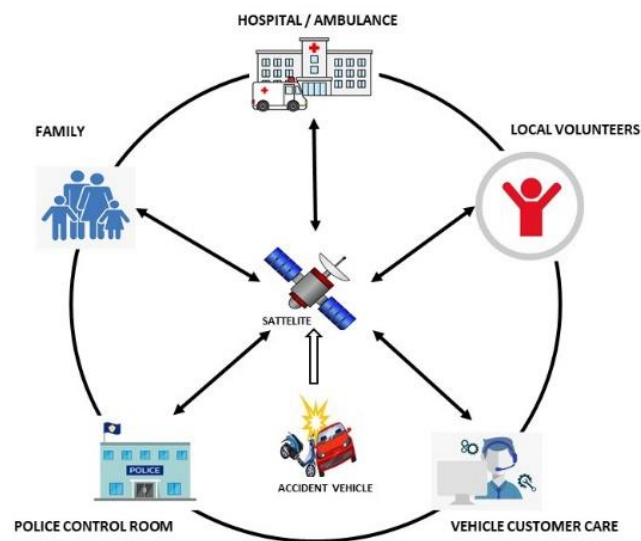
**Keywords:** Smart Technologies; Smart Vehicle; Accident Management; Smart Healthcare; Smart Safety; Smart Cities

## 1.2 Introduction

In the current scenario, the management of road accidents using IoT – internet of things, Sensors, GSM & GPS i.e., Global System for Mobile Communication and Global Positioning System respectively, Micro controller unit technologies to notify and alert the nearby emergency contacts, includes family, nearby hospital, ambulance, police control room and vehicle customer care center. As per the block diagram shown in *Fig: A*, when the accident occurs the sensors will activate and send it to the microcontroller unit which is interconnected with the satellite through GPS module and the signal received from the GPS module is sent to the emergency contacts through GSM module, and finally the SMS will reach the concern authorities and contacts. As shown in *Fig B*, this process can be developed and designed to advance level by introducing the managerial concepts of effective utilization of man power in the form of local volunteers, who includes delivery partners of different service industries, social activists, governmental organization field work employees. This local volunteering concept in the smart cities is easy to adopt and implement with the existing technology. The whole system can be built on a single technical platform in the form of mobile application.



*Fig A: Block Diagram of Accident Recognition and Alarm System*



*Fig B: Arcitecture of Accident Management System*

### 1.3 Review of literature

This Network is based on DQN which is in turn depended on Deep Reinforcement Learning (Deep RL) system which will lessen the car velocity logically when the motive force acts upon the velocity restricts in a specific area<sup>[i]</sup>. The purpose of this system is to triumph over the over-pace hassle in diverse pace restriction areas, and indirectly focusing on reducing the accidents via speed control. But the accidents may occur in low speeds also, so that we need support in quick response towards occurred accident and helps in providing required aid.

The ideas of crash prediction using smart mobile phones, GPS/GSM, networks based on vehicular ad-hoc included systems, and other automation methods<sup>[ii]</sup>. In this paper, the authors have focused on vital evaluation of diverse present methodologies used for foreseeing and avoiding road mishaps, their pros and cons, opportunities and challenges matters should be solved that allows you to make sure avenue protection and hold lives. As this paper is more towards predictive and preventive actions, post accidental measures are not discussed, which are more important is saving the lives and can be done through the similar methodologies and techniques.

Road Accident Prevention System and Bus Management System in Smart Cities <sup>[iii]</sup>. The author is more concentrated on safe driving of bus in smart cities, as prevention is better than cure, their machine will assist in control to lower the quantity of street injuries to a clean volume through stopping the critical purpose of reckless driving. The use of IoT empowered smart control of traffic <sup>[iv]</sup>. The authors here have focused on Green Corridors especially for emergency vehicles, that could assist in saving the time to attain the vacation spot and may save you the lack of human existence as much as a extremely good volume the use of IoT in offering clever and sensible site visitors control system. This proposed device incorporates with the site visitor's device and its capabilities in the course of emergency conditions as a way to attain the vacation spot with none delay. There is a gap in the system, as no clarity on who is reaching the accident destination in time.

Vehicle Tracking and Accident Detection can be done through Automatic Messaging System <sup>[v]</sup>. This device will notify the involved human beings approximately the accident, the use of GPS, GSM modules, on the facet of accelerometer is connected with Arduino uno which acts due to the fact the controller. Here this accelerometer helps to detect the twist of fate with the aid of using an alternate in pre-set cost of the automobile positioning and provides the region via GPS into the enumerated sim card through GSM without any indulgence of the cause pressure or passengers. This strategic system aims in minimizing the deaths due to road accidents by sending the alert message only to certain concerned people where their time of reaction to that SMS will be a hypothetical scenario.

Blockchain included accident identification system focuses on taming the detection ease, violation and measures of law <sup>[vi]</sup>. In this paper the authors have introduced a technical idea named offline detection, linking to the identification of road accidents when there is no communication and no access to internet. This technology using Blockchain could be an answer for issues like honesty, frankness, and being truthful with respect to road problems by reinstating same road condition in specific way which will include location, vehicles, and surrounding infrastructure too. This advance technology can help in understanding and analysing the cause of accident in a clear way, but this advance technology will not save the lives of the people who met with the accident.

In the system of detection and reporting of accidents using IoT for a smart city atmosphere <sup>[vii]</sup>. This system aims to utilize smartphone's specifications to plan and develop an affordable result for advanced system for transportation that is available in luxury vehicles. Here the authors have tailored a mobile application is technologically advanced to collect the data regarding pressure, sound, force towards gravitation, location and speed. In this the predictable method is authenticated through comparison and simulations with the exact data and group of road mishaps attained from open source of road safety, and showing hopeful accurate outcomes, which are useful in minimizing road accidents.

Smart Detection and communication System for Road Accidents <sup>[ix]</sup>. Here, the authors tried to form a system for car accident recognition and message communication that would alert family members, nearby hospitals, and police, as well as provide the location of the accident. A similar technological system with upgradation for effective and efficient management of road accidents in smart cities will be our main area of approach.

Emergency Management in Smart Cities through Intelligent Transport System <sup>[x]</sup>. In this paper, the authors have designed an intelligent traffic system framework for smart cities that will insist in reduction of waiting time in traffic signal for vehicles. The output of

this system, as evidenced by experimental results, shows a significant reduction in vehicle waiting time at the signal, which will aid in efficiently handling traffic problems and, ultimately, minimising the number of casualties caused by road accidents.

An alert system for collision which is termed as Motorcycle collision alert system shortly called as MCAS, which can be furnished on two wheelers<sup>[xiii]</sup>. This system detects a collision, it conveys an alert SMS to the closest available hospital, police control room, and the victim's family, giving the vehicle's location, as well as identifying information about the rider and the motorcycle. This is accomplished by mounting a module which includes GPS/GSM, and Arduino atop a tremorproof case that is fastened to the motorcycle's frame. This MCAS technology which can be fixed for two-wheeler motorcycles, also can be utilised to vehicles of all sectors, so that all sought of road accidents can be notified and required emergency aid can be done in time.

#### **1.4 Research objectives**

- To study and understand the performance of the current state of accessible technologies used to manage road accidents in smart cities.
- To analyze the architectural framework of the current accident management system.
- To propose a techno managerial framework for management of road accidents through technologies in smart cities.

#### **1.5 Scope**

The purpose of this study includes mitigating of the road accidental deaths cases in cities through smart technologies. Our study is to minimize the accident response time to rescue the victims through advanced techno managerial concepts. Our research work is mostly focused on smart city issues. Our research work is carried out, by analyzing the existing current technology and comparing it with the precise requirements, and developing a new solution for in the existing system.

#### **1.6 Major findings**

The plan of action for the notification received through GPS/GSM technology to the emergency respondents in the existing system is limited to certain authorities such as hospitals, police control rooms & customer care and concern family members, whose time and boundary to respond was restricted. But as per our developed system for accidents detection through techno managerial concept with the inclusion of service industry partners, social activists, and government field work employees as local volunteers by integrating them within our technical framework in the accident management system will be a positive and major impact on saving lives of accident victims with quick response time.

The service industry partners like Swiggy, Zomato, Dunzo, Porter, Rapido, OLA, KSTDC, Uber etc, these delivery partners can be utilized as their area of scope is wide and spread all over the city. These partners can perform the rescue process while they are active in their duty hours and no delivery time, as their effort while rescuing the accident victim, the partners would be appreciated with some bonus or with some good complimentary, and this complimentary can be provided to the partner from their respective company, and the company here can utilize the corporate social responsibility fund.

Involvement of social activists, and government field work employees into this system,

which can lead to a better efficient way of management of road accidents. We can involve them as partners by integrating through a mobile application, where they can self-enroll as volunteers and they can be part of this system and they will get notified of their nearby accident through GPS/GSM technology.

### 1.8 Directions for future research

To implement of our proposed techno managerial framework through advanced technical management system can be developed on a single platform of mobile application and could be integrated this system with available service industry partners on their own technical platforms. Also, to motivate the local volunteers in future can be enhanced through some compensational benefits, which can be shown as a part of CSR activity in their respective service organization.

### 1.9 References

- i. M. F. Sadiq, N. Tasneem, M. Ahmed, S. M. Sultan and S. Hasan (2021) Towards Mitigating Probable Road Mishaps through DQN Based Deep Reinforcement Learning doi: 10.1109/ECBIOS51820.2021.9510732.
- ii. U. Alvi, M. A. K. Khattak, B. Shabir, A. W. Malik and S. R. Muhammad (2020) A Comprehensive Study on IoT Based Accident Detection Systems for Smart Vehicles doi: 10.1109/ACCESS.2020.3006887.
- iii. Benjir Islam Alvee, ABM. Adnan Azmee, Pranto Protim Choudhury, Sadia Nasrin Tisha, Abdulla Hil Kafi, Raihana Shams Islam Antara (2020) Bus Management & Road Accident Prevention System for Smart Cities, doi: 10.1109/ICCIT51783.2020.9392747.
- iv. V. Bali, S. Mathur, V. Sharma and D. Gaur (2020) Smart Traffic Management System using IoT Enabled Technology doi: 10.1109/ICACCCN51052.2020.9362753.
- v. R. Rishi, N. V. Bansode, and S. Yede (2020) Automatic Messaging System for Vehicle Tracking and Accident Detection doi: 10.1109/ICESC48915.2020.9155836.
- vi. V. Davydov and S. Bezzateev, (2020) Accident Detection in Internet of Vehicles using Blockchain Technology doi: 10.1109/ICOIN48656.2020.9016602.
- vii. Fizzah Bhatti, Munam Ali Shah, Carsten Maple and Saif Ul Islam (2019) A Novel Internet of Things-Enabled Accident Detection and Reporting System for Smart City Environments doi: 10.3390/s19092071.
- viii. B. K. Dar, M. A. Shah, S. U. Islam, C. Maple, S. Khan and S. Mussadiq (2019) Delay Aware Accident Detection & Response System Using Fog Computing doi: 10.1109/ACCESS.2019.2910862.
- ix. Nagarjuna R Vatti, Prasanna Lakshmi Vatti, Rambabu Vatti, Chandrashekhar Garde, (2018) Smart Road Accident Detection and communication System doi: 10.1109/ICCTCT.2018.8551179.

- x. F. Malik, M. A. Shah and H. A. Khattak, (2018) Intelligent Transport System: An Important Aspect of Emergency Management in Smart Cities doi:10.23919/IconAC.2018.8749062.
- xi. B. Faiz, A. Imteaj and M. Chowdhury (2015) Smart vehicle accident detection and alarming system using a smartphonedoi: 10.1109/CCIE.2015.7399319.
- xii. Mubarak, N. Murali and H. Anantharaman (2018) MCAS: A collision sustenance mechanism for motorcyclists doi: 10.1109/ICSSIT.2018.8748739.