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Accident Intensity Detection and Reporting

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Abstract— *Advancement in technology and increasing traffic, road accidents and traffic hazards have increased, causing more chances of loss of life due to lack of timely help facilities. This project is an attempt towards finding solutions for timely accident notification. The proposed project records the parameters of vehicle at regular intervals of time, through a smart device installed in the vehicle and sends these values onto the cloud, vehicle owner or a third party. Based on the information, appropriate algorithms are implemented to send alerts and initiate action. The system will facilitate the users in a number of ways such as notification for immediate aid in case of accident, tracking the vehicle conditions in cases of accident and disabling the vehicle remotely and last but not the least, the hardware components include the smart device installed in the vehicle and a mobile phone for user interaction. The smart device installed in the vehicle does not interfere with the normal functioning of the vehicle or cause overheads.*

Keywords— *IoT, Traffic hazards, Emergency Vehicles, Vehicle tracking, cloud.*

I. INTRODUCTION

In the modern world, long distance travel is made easier and more reliable. You can reach to any part of the world any time you wish with wide variety of the modern means of transportation. The advancement in the technology has very less effect on making your commute a safer one. Emergencies are not predictable and avoiding them is quite a challenge too, but with proper aid and quick reach for help can avoid catastrophe. One of the ways to reduce road accident is by management of accident victims. One of the most common causes of road deaths is due to loss of oxygen supply. The first hour after the trauma is called the “golden hour”. If proper first aid is given within the golden hour the road accidents victims have the greater chances of survival.

II. LITERATURE SURVEY

YogitaJadhavetal [1] has discussed a study about the automotive localization system using GPS and GSM services. In this paper the designed system permits localization of the automobile and transmits the vehicle position to owner on his mobile phone as a short message on his request. The system is also provided with emergency switch which can turn off the vehicle through an SMS. The drawback of this system is that if there is no provision of GSM networks, it would be difficult for communication also if network is not available at accident spot then the SMS cannot be sent.

With the current mechanical and populace blast, the utilization of vehicles has quickly accumulated and in the meantime the frequencies of accidents have likewise expanded. Nobody can turn away the accidents, yet can spare their life by pushing the ambulances to the doctor's facilities in time. In this paper accidents discovery and

route of crisis vehicle utilizing IoT is proposed. The target of this plan is to limit the delay caused for movement of emergency vehicles. This approach additionally plans to give the accident spot to emergency vehicle utilizing GPS which is accessible in rescue vehicle.

Zhang Wen *et.al* [2] has developed a vehicle positioning system based on ARM. In this study to get the position of the vehicle, the owner sends a request through a SMS. This is acknowledged by a GSM modem in the device and processed by the Spartan processor and the processor sends command to a GPS module in the device. The GPS module replies with coordinates of vehicle's position. This position is sent back to user as an SMS with date, time, latitude and longitude values. The drawback of this system is that when there are air masses in the sky GPS will stop working and cannot send message and determine the location.

Yilin Zhao *et.al* [3] has shown in his study about the crash notification system that can be implemented in portable handheld and aftermarket devices. This system features a crash detector, which can be coupled over a wired or wireless network. This literature has some weakness as the delay in communication networks to send message that is recorded when the accident has occurred and has less strength to capture the data provided by their accelerometers, compasses, and GPS sensors.

Elie Nasr *et.al* [4] has proposed a technique which conveys a smart and reliable IoT system solution which instantly notifies whenever an accident takes place and locates its coordinates on the map. When an accident takes place, a shock sensor detects it. Then, an algorithm is applied to process the sensor signal and send the geographic location along with some indicating accident occurrence.

S.Sonika *et.al* [5] has proposed a new vivid scheme called Intelligent Transportation System (ITS). The objective of this methodology is to minimize the delay caused by congestion in traffic and to provide smooth flow of emergency vehicles. The idea of this methodology is to turn the traffic signal green in the path where ambulance is expected to go. The main server finds the nearby ambulance to the accident location and sends the latitude and longitude points to ambulance.

Modugula Ravikanth Reddy *et.al* [6] has concentrated on accident detection and alerting by sending message to the Android Mobile. An android app that specifies the location name and Vehicle position on the road is important consideration for detecting accidents. Using this approach accident can be detected by using vehicle position on the road.

Road accident is a major problem our nation is facing today. Study shows that if our eyes are exposed to bright light source more than 1000 lumens even from 20 feet, we experience a glare, due to over exposure of rods and cones inside our eye. Even after source of glare is removed, after imaging remains in our eye that creates a blind spot. Also many accidents occurs on roads having steep turns and curved roads in hilly areas, due to presence of blind spots, These areas cannot be seen directly by looking forward or by looking through either of side mirrors. Many reasons causes these blind spots like steep curves in roads, weather conditions, poor infrastructure, improper street lights etc. which creates problems for driver. A vehicle with normal headlights sends the light rays tangential to curves; this reduces the ability of driver to see the blind spots. These blind spots can be eliminated for safe driving using adaptive headlight system . Many people lost their lives every year in vehicle collision majorly due to driver's inability to observe keenly in vehicle's vicinity while driving and in traffic condition, while overtaking, sudden braking on turns, loss of control etc. There are certain research works carried out on anti-collision devices using ad hoc wireless network, V2V communication, GPS and radar implementation but all focuses on communicating the driver and later he will take action manually which includes chances of collisions. But we have developed a system which will not only provide driver a safe warning but also automatically apply braking system after specific time if any sudden action not taken by driver. Now-a-days private taxi services have been increased to huge number so it has raised the question of security especially for women passenger. Recently we have heard lot of news about such cases specially that happen with Uber taxi few months ago. So for security purpose of passenger we have devised a system to communicate with nearby vehicles and sending message.

A recent study by Abid *et al*. found that in 2009 there were 33,000 casualties and 2.2 million different injuries due to motor vehicle crashes in the United States. These crashes impact the society economically and incur an annual estimate cost of \$230 billion dollars. For every single person in the USA, \$750 dollars is spent. Moreover, the highway congestion costs \$78 billion annually. Olariu and Eltoweissy *et.al*. proposed an innovative and effective idea of involving Mobile Ad-hoc Networks (MANET) for street and highway

communications using cutting edge technological advancements known as Vehicle Ad-hoc Networks (VANET). VANET employs a combination of Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communications, to give drivers advance notification of traffic events. In V2V systems, each vehicle is responsible for inferring the presence of an incident based on reports from other vehicles. This system can lead to well-organized security attacks by marking incorrect inferences, which produce more congestion and a greater possibility of severe hazards. Thus far, to solve this security problem, much of work had been concluded by Aijaz *et al.*, Lochert *et al.*, Lochert *et al.*, Yan *et al.* and Yan *et al*[7].

Covering these disadvantages, the paper introduces a new system with different algorithm that sense accidents with accelerometer sensor and on other hand it displays location name with the help of android app . In order to detect accident accelerometer sensor's tilt detection is considered which would decrease false alarm. This type of system would be more useful and effectively applicable for developed cities where security is highly sensitive. To perform all these embedded C programming in Keil and android app development in eclipse are used which are run on an ARM7 development board[8].

III. ACCIDENT INTENSITY AND REPORTING SYSTEM

The proposed method aims to overcome the limitations of above mentioned existing models. The Vehicle Accident detection and rescue system is successfully implemented using database cloud server and API and also fulfils all the requirements to be an Iot based framework. This device is capable of reading and collecting the required data and sends them securely to the database stored in cloud so as to maximize the effectiveness of the shared resources. Cloud resources are usually not only shared by multiple users but are also dynamically reallocated as per demand. The system involves the mechanism of initially registering a particular vehicle with the organization which would be assigned a vehicle ID by the organization. And subsequently the owner of the vehicle along with the other passengers is also registered and assigned a passenger ID and all their medical details such as age, blood group etc. is recorded by the organization.

In case an accident takes place and involves that particular vehicle and passenger, the system tries to communicate the vehicle ID and the passenger ID to the headquarters and headquarters in turn will communicate all the needed medical information about the passengers to the nearest hospitals to the accident spot by finding the shortest path using haversine approximation method to reach the accident spot along with the details of that particular passenger.

Nowadays, GPS receiver has become an integral part of a vehicle. Besides using in other purposes, the GPS can also monitor the speed and detect an accident. It can use a very cheap and popular GSM modem to send the accident location to the concerned headquarters. It can also send the last speed before accident which will helps to assess the severity of the accident and claim insurance. The accident detection algorithm: A moving body contains kinetic energy. When an accident occurs, this kinetic energy is transformed into destructive forces cause injury to the occupants of the vehicle as well as the vehicle. When brake is applied, two forces work on the vehicle to decelerate the speed. One is the gravitational force and the other one is the friction force. Considering the friction coefficient 0.8 for a plain road surface and standard gravitational force from the Formula of we can get the final speed of a vehicle after one second once the brake is applied. This is the maximum speed after considering the deceleration factors. It follows a technique where in for every speed at which the vehicle is moving, there is a threshold value, if the speed goes below that value after 1 second after the accident has occurred, then the vehicle has met with an accident. The system along with speed measurements as specified above also detects an accident on a two wheeler using ground sensors where in if the vehicle is not in contact with the ground, the sensor is switched on and an alert message is sent to the headquarters. Similarly when a four wheeler meets with an accident, with the presence of shock sensors in the car, it is detected that the vehicle maybe in trouble.

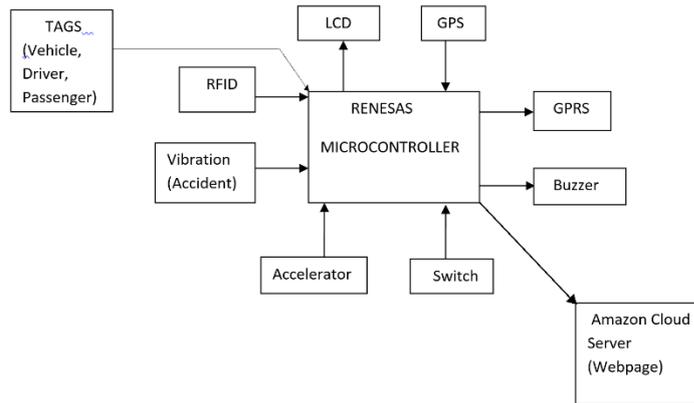


Fig. 1 The block diagram of Accident Intensity Detection and Reporting System

IV. CONCLUSIONS

The project is designed using structured modelling and is able to provide the desired results. It can be successfully implemented as a Real Time system with certain modifications. It saves time. Manual operation has been reduced to major extent. Less man power required. Easy to use efficient and reliable. Increased safety for drivers, pedestrians and passengers Science is discovering or creating major breakthrough in various fields, and hence technology keeps changing from time to time. Going further, most of the units can be fabricated on a single along with microprocessor thus making the system compact thereby making the existing system more effective. To make the system applicable for real time purposes components with greater range needs to be implemented.

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