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Review on technique used to detect and report the cause of accident.

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Abstract – *With the growth of population, demand of vehicle has increased tremendously, creating an alarming situation in terms of road hazards and road accident. The percentage of traffic accident is increasing exponentially, as the death rate due to accidents. However, the main cause of the increased number of deaths is due to the delay of the emergency services. Effective emergency services could save many lives. Delay occurs due to traffic jams or failure in communication with medical units. The implementation of automatic road accident detection system will provide timely assistance. Many solution for automatic accident detection have been proposed in the last few years. This technique include crash prediction with help of smart phones, automatic ad-hoc networks, GPS/GSM based system and various other techniques. With such a high rate of deaths related to traffic accidents, road safety is the most critical sector that requires a very major investigation. In this project, we present a critical analysis of various existing methodologies used to predict and prevent the death occurring due to road accident, highlighting their strengths, limitations and challenges that need to be addressed to ensure that to lower the death rate of various types of road accident.*

***Key Words*:- GPS, GSM, road accident, medical units, vehicular AD-HOC networks.**

1. INTRODUCTION

The development of the automobile has great importance in our lives. In the past few years, the demand for automobiles has increased, and due to this, the chances of vehicle accidents have also increased. A total of 1, 20,802 fatal accidents were reported in the year 2020. According to the Ministry of Road Transport and Highway (MoRTH), 43,412 accidents occurred on national highways, 30,171 accidents occurred on state highways, and 47,223 accidents occurred on other roads (city roads, street lanes) (1). In most of these cases, people have lost their lives due to the failure of the medical faculty to get a complete accident-based scenario and their location on time. In this case, time and information play a crucial role. According to the study, 4.6% of fatalities in accidents could have been prevented only if the emergency services could have been provided at the scene of the accident at the proper time. To overcome such a problem, we designed a GSM-based system that helps to detect the accident and alert the Emergency facilities as soon as it takes place. In this system, GSM and GPS are the major components that help us send the exact location and alert message to the emergency medical team. An accelerometer and a vibration sensor are the two types of sensors which are embedded in the system used to detect the accident and send the signals to the Arduino. This system is compact and can be placed in any vehicle based on its size. This system can also run on the normal car battery or else we can also provide an individual power supply. The GPS used in this system will be scanning the surrounding area of the vehicle, and during the accident, with the help of Arduino, it will create a message and, with the help of GSM, send the longitude and latitude of the accidental location to the nearby hospital and police station, so as a result, the emergency rescue team can take immediate action according to the situation.. The GSM stands for "Global System for Mobile" which is a system that is used worldwide for communication. It helps to send and receive data between devices. This system has been helping people to communicate with each other since the early 1990s. The GSM is used in many different ways such as voice calls, text messaging, emails, internet access, and more. However, one of the most important uses of the GSM is for detection of accidents and reporting them to the authorities. When an accident occurs, the sensors will send a signal to the GSM system which will then relay the information to the authorities. This information can help to improve safety on the roads and make sure that those who are involved in accidents receive the help they need. So, due to the emergency team's receiving the message in time, the victim can be saved.

1.1 Types of Techniques:-

A) GSM and GPS based System:-

In this technique there is a GSM and GPS both the module is used to detect the location of the vehicle and to send an alert message to the nearby medical team. It basically collect data from various sensors and by combining all the input and transforming into the short service message and proceeding further. This technique has a major drawback is this system does not consider any external sensor so due to which this system is manually operated .And this system can be only used when there is a minor accident take place and the user have to manually operate the button to send an programmed message to be sended to the emergency medical unit.

B) Simple pendulum method:-

This method was basically designed for the bikers which this system basically consist of an simple pendulum tiltmeter, and a piezoelectric sensor which is used to sense thepressure on the vehicle. The pendulum basically plays a vital role as it continuously sense the center of gravity of the particular object that is been connected .This pendulum was a very old method used to sense the angle of the bike as it is a mechanical method there may be a greater chances of misreading or causing errors due to some special case scenario. It basically check the orientation and the pressure of the vehicle, it will be reported as an accident when the tilt meter goes below a certain lean angle and the pressure to check occurred during the vehicle .This technique is basically used to get a detail view about the accident taken place.

C) Orientation and vibration sensing method:-

This method was introduced when there was a bit development in the field of sensors and there was multi sensing was done on this method first .This method was introduced was to detect the accident and measure the severity of the accident as there is two sensor embedded in this system, a accelerometer and a vibration sensor which is embedded in this system together. So during the accident the vibration system will record the hotspot of the vibration like which part the impact have taken place and the accelerometer used in this used to checkthe orientation of the vehicle . This technology is used to check unknown accident taken place in past to check whether it was an accident or something just hitted the vehicle and this basically help the cops to have an clear scenario about the accident was taken place. And this method was boost at the newly innovated but lack a bit in other scenario like not be able to sense the speed so the final statement was not been decided by the rescue team or either the investigating team.

D) Ultrasonic sensor method:-

Ultra sensors are used to measure the distance between a limited distanced two points with the help of sending an ultrasonic wave from the source. This ultrasonic is basically create a wave which will hit the opposite side of the second end point and once it hit it and then it will return the same path and there will receiver that will take the wave and convert the wave into a readable output .In this method previously two ultra-sensors were used one sensors is located on the front wind screen of the car and other sensor is located on the back windscreen of the car. The distances between the respective sensors and the respective bumper is measured it is that the distance between the sensors which is located on the front wind screen and the bumper is already measures. Similarly the distance between the sensors which is located on back wind screen and tail of the car is also already measured. And the methodology is simple whenever any object collides with the car the threshold distances gets breached and processing system turns ON. Then the system quickly finds the location of car using GPS and send it to the rescue service using GSM.

E) SUMO (Simulation of urban mobility):-

Development of SUMO has started in 2001 by the German Aerospace Center as an open source traffic simulation package. It can use different source formats to get road network, generate various quite traffic demand, and route the traffic supported different input sources. High performance simulation is in a position to simulate various traffic scenarios, from one junction to whole city traffic. Simulator also allows external control using remote interface to intervene the flow of simulation. During this study, vehicles' behavior in last 10 second has been analyzed so as to detect accidents which are happening at that moment by employing classification methods. Thanks to the difficulty of collecting vehicle velocity and position information from real world, Simulation of Urban Mobility (SUMO) has been wont to simulate traffic and to generate velocity and position information. Velocity and position values of the vehicles are collected from probe vehicles and each vehicle's information is used as input for machine learning algorithms.

2) Overview of combined techniques and methods:-

These sorts of crash detection systems use different sensors to detect crashes and notifications. Usually these sensors are mounted outside the car. All components like sensors, GSM module, PS module etc. are connected to Atmel AT89S52 microcontroller. Sensors often interpret data like acceleration, force, vibration, etc. and transmit an aware of all stored emergency numbers until the accident is identified. This technique does not support rescue operations. This method proposed accident warning supported IoT and rescue system that uses a GPS sensor and an accelerometer to gather all the information and send it to the cloud. The message are going to be sent to all emergency numbers saved in the victim's profile Sustainability in the event of an accident. This report provides information about the severity of the accident and the scene of the accident to assist the ambulance get to the scene of the accident as soon as possible. This work uses vibration sensor, buzzer and GPS module for accident

detection and notifications. Introduced IoT-based accident detection and a notification system almost like the one advanced proposed methodoly used. The most limitation of this paper is that as soon as the accident is detected, it'll be sent to the customer care department instead, and one calls the closest hospital. It involves human intervention. Proposed a totally automated accident detection and rescue system that uses impact sensor and GPS module to develop this system. The main limitation of IoT-based systems is that they are expensive solutions compared to a smartphone-based system. The accuracy of the system are often improved using some AI based techniques.

3. CONCLUSIONS:-

By comparing various techniques used in this system we concluded that in every technology there is an major drawback so by keeping all this drawback and techniques in the mind we have decided to combine all this technologies into one small compact system which will be robust in nature and will be more accurate compared to the previous technics used .With this we may reduce the death rate occurred due to the road accident and save each and every victim who are affected on that scenario. Furthermore, it has been shown that accidents and other incidents can be considered outliers in traffic data, and machine learning algorithms can be used to detect these outliers. When a traffic accident is detected, other investigative vehicles can be alerted to the accident, helping drivers take steps to prevent further accidents and reroute. As described in previous techniques and methods, these algorithms or combinations thereof use detector data as input. These data can come from individual sensors or from a mix of “fused” sensors.. The input into the incident detection algorithms, whether such input be speed, occupancy, or volume, are often simulated to reproduce incident conditions. However, it's crucial that these algorithms function using actual, real-time data also. Databases are being constructed using data from both incident and non-incident conditions. an important step in specifying the best incident detection system is to identify the functions, limitations, and capabilities of the monitoring system, its detection components, their functional relations, and therefore the forms and nature of the data. An algorithm fusion framework and every one algorithms and sensors are been mentioned based on the formal multi-objective methodology in this paper.

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