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Wireless Black Box using MEMS Accelerometer and GPS Tracking for Accidental Monitoring of Vehicle

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Abstract: This paper we proposed in GPS (Global Position System) for driver to reduce accident in many critical situation .Our project will provide an optimum solution to the Car accidents cause a large number of deaths and disabilities every day this have been keeping in the mind we are proposing the system were the car intimate the emergency situation. wireless Black box using MEMS accelerometer and GPS tracking system it is developed for monitoring the accident. It can be used as a crash recorder of the vehicle movements before and after a crash of vehicles with signals from an accelerometer. If a driver is met with an accident then his location will be sent to an authorized person medical team police station and emergency team for first aid and rescue. Location is read using the on GPS board the car using this location emergency team can navigate there easily This can be solved by reading and saving all the information for further analysis, this gives the name black box.

I. INTRODUCTION

The car black box is a vehicle based recorder which is used to detect the alcoholic gas in a vehicle or any leakage of gas in vehicle and if the car have been met with the accident it can be find using the vibration sensor and MEMS[2].the once the alert have been recognized the alert message have been send to authorized person or to family members through the MTTQ application.

In [4]These data can be used for accurate the car accident investigation and for crimes and for insurance climing. These important issues such as user privacy and data management for vehicle based recording in qthe proposed system can reduce the driver privacy concerns and management overheads and communication. Car black box is a device to record the driver driving history which is used for the car forensics of accident or crimes.it will record the video clips for the further investigation purpose and which also produce the clues for crime .[5]the car black box store the video clips the wireless black box using mems accelerometer and GPS tracking system is developed for accident monitoring system .this system consist of conjuctive components of accelerometer ,microcontroller unit ,GPS device ,sensor, mobile phones mttq application .In this event this wireless device will send phone short message indicating position of the vehicle by GPS system to the family members, emergency service, nearest hospital, police station etc. We are tying to develop thesystem useful in case above mentioned scenario.if there is an accident of vechicle,then the system will be automatically activate itself .once the sudden change in speed of car or any leakage in car they started monitoring the driver and car recorded in black box once this is done the alert messagewill be sended to family or authorized person then further can access the medical service.
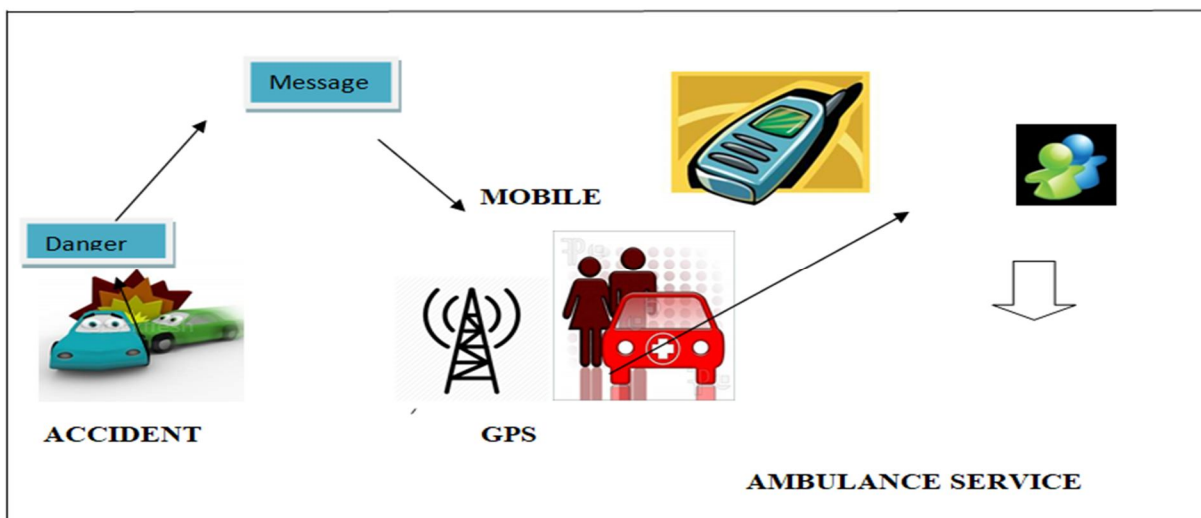

Fig1. communication architecture

A. Motivation

In a critical situation many vehicles face accident, due to this lot of person lost their lives. Some people can be saved at that time, but because of lack of information, time and place it may not be possible. Our project will provide an optimum solution to that draw back are reduced in this system and providing the information of the driver and monitoring the driver drowsiness and the detection of information of alcohol consumption and monitoring it.

B. Contribution

This paper work address the accident observation supported the an measuring device is employed in a automotive .am Dangerous driving is detected with AN measuring device. It is used as a crash recorder of the vehicle movements before, throughout and when a crash. With signals from an measuring device, a severe accident is recognized the info and sended to the licensed person or the recuse service department this may be discerned by the accident detection rule. Here we have a tendency to enforced [1] BergasaL. M, J. Nuevo, M. A. Sotelo, R. Barea, and M. E. Lopez,(Mar. 2006) the data is taken from the recorder victimization the gps the data is obtained to the emergency team**.**

II.   RELATED WORK

In this N. Watthanawisuth, T. Lomas projected Wireless recording equipment mistreatment MEMS measuring device and GPS chase system has been developed for bike accidental monitoring[1]. The system will discover sort of accident (linear and nonlinear fall) from measuring device signal mistreatment threshold rule, posture when bloody of motorbike and GPS ground speed. when accident is detected, short alarm massage knowledge (alarm massage and position of accident) are going to be sent via GSM network he Limitation of this paper is as follows : automobile security is that the major security currently a day's. automobile makers try and modify security system by implementing totally different technologies. presently protection system and Wireless in-complaint Box For Accident Analysis,[6] laurels S. Siordia, patriarch Martín .dedecting the harmful run and rash driving is detected during this methodology.

Murugandhan and P.R. Mukesh planned an internet based mostly vehicle chase system victimization GPS[2]

Several researchers have examined the event of driver observation and findion system victimization several move of ways some have tried to measure[8] the drivers stateor the vechcles behavior to detect the drunk drivers. the most studies square measure summarized within the following. In [4], the focus of the paper was building the context aware the smart car by developing the model that is able to collect, to reason about the and to react to contextual information about the driver, the vechicle and the environment however, this system is restricted to warning the driver and sensing the information and sending the warning message.[5] the context aware system is proposed that is used to collect and analyze information about the driver, the vehicle and the environments in real time driving it collect information from the system. In [6]-[9] the detection of the sensor of the fatigue level of the driver using the video camera to extract different cues such as eyelid movement gaze movement head movement and facial expression is attempted the to measure the level of the driver via sensor

In [10] a Program that works work on a mobile phone and that contains an accelerometer and sensors placed in the vehicle to detect a drunk driver in real time is developed. the program compare current accelerations with typical drunk driving pattern. When the program indicates that the driver is influenced by alcohol and warning message are generated the alert of the driver to authorized person. [5] a drunk and drowsy driver detection system combining breath and alcohol sensors in a single device is developed. This device is able to measure the degree and alertness of the driver to detect charged to detect of alcohol sensor using the breath and alcohol sensor. In the system [8] the drowsy driver detection in real time driving by collecting information about the driver behavior, such as speed of vehicle an d lateral position that indicate the driver drowsy and issue a warning is required in[7] to prevent driver drowsiness by detecting the eyes of the driver and checking whether they are opened and closed using a charged coupled device camera developed. If eyes are closed, the driver is drowsy, and the system will issue a warning to the driver.

III.   PROPOSED SYSTEM

A. Detection Of Location

1) *Detection Of Automotive Location:* This is another advantage of system that we are able to track the carlocation simply by causing the mobile SMS. owner is fastened with GPS device therefore its doable to find the automotive location on google map is extremely straightforward. here user can send preformatted SMS to automotive in response automotive system can use GPS device and collect this automotive great circle and latitude and remit as trust to SMS currently the user get the placement detail and track the care location simply.

2) *Reconnaissance of Automotive Accident:* In way of life we tend to face several accident and plenty of times we tend to ar helpless and wish someone's help and that isn't doable whenever. contemplate a scenario we tend to ar going for drive and suddenly we tend to caught in important condition it should be accident .In such case we tend to can't do something as fast action. we tend to ar having such a large amount of technologies to beat such downside and supply artificial intelligent primarily based system to help human in such a condition[4]. contemplate a automotive had AN accident the detector can activated mechanically. . Once the system started in help mode initial of all system can gather the automotive location exploitation GPS device within the type of great circle and latitude. Then they begin gathering the data of detector like alcoholic, vibration exploitation MEMS. it records automotive details like automotive owner details, car number, car model, automotive speed if doable and convert this knowledge in to formatted SMS and send this knowledge to call centre and person's relative wherever person got to give contact person details manually before beginning drive[7]. Once the decision center get the automotive standing it'll look for nearest hospital, machine service ,police station and make contact with then to achieve at the location to help the people.

3) *Advantage*
a) To find out the precise position of the vehicle
b) Reducing the time between once AN accident takes place and once it's detected will taken
c) Low value answer
d) straightforward to installable in any variety of vehicles
e) Less spaced model.

4) *Methodology:* In this project time of installation, the number of auto at the side of relative's sign, emergency services variety feed into the ASCII text file of the system GPS parole and user name is joined with the system . automobile had Associate in Nursing accident the sensing element can activated mechanically . If user isn't in important condition the system started in assist 1st of all system can gather the automobile location exploitation GPS device within the type of great circle and latitude[1]. Then it records automobile details like automobile owner details, car number, car model, automobile speed if potential and convert this information in to formatted SMS and send this information to centre and person's relative wherever person have to be compelled to give contact person details manually before beginning drive. Once the decision center get the automobile standing it'll search to search out nearest they begin to search out the police office car service and make contact with then to succeed in at accident location to assist the person[8]. this may} give immediate alert with none delay so correct action can METHODOLOGY In this system finding the leakage of the gas in the car is detected and the alert messages will be sent to the family or owner once the message alert is received the precaution of the accident can be taken .the vibration of the vehicles can be detected that can be dectected when the axis changes in MEMS they automatically record if the driver is consumed alcohol the if he is driving then it the camera that have been placed in driver side the monitor the driver if its eye is closed are he is unable to drive the camera will send the message to the family or the car owner that's the driver is drowsy these are some of important feature that have been placed in this system[10]. This message helps the ambulance section and the family member about the accident and ambulance section can collect the patient from theaccident spot to the hospital.

ALGORITHM

Step 1: start optimizing and collect the information about the driver

Step 2: pass the information through gps

Step 3: calculating the distance

Step 4: if the data is critical, forward immediately to server via internet.

Step 5: if that data arrives   forward the message to recuse service or ambulance and end the procedure
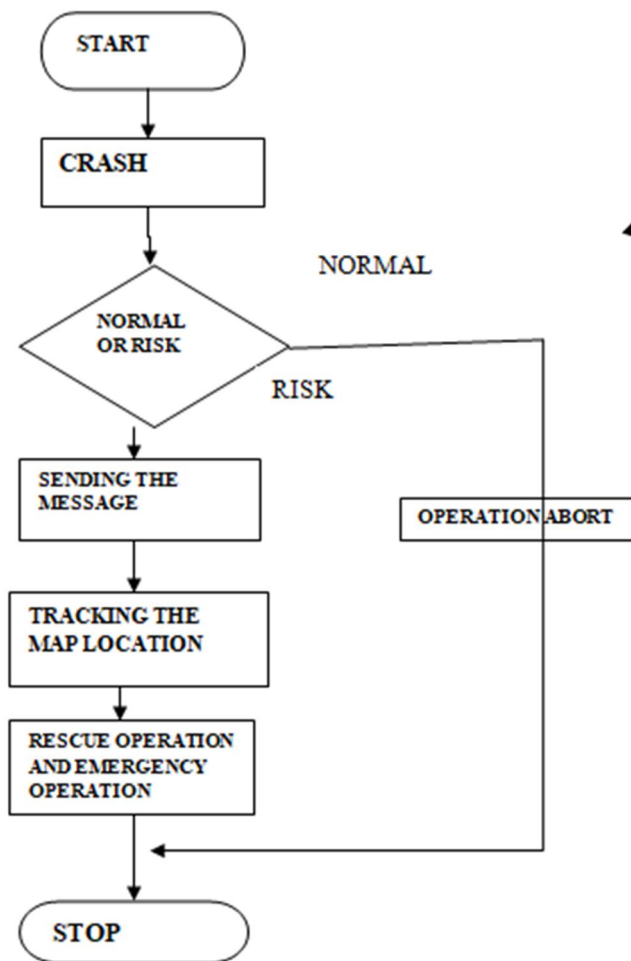
Table 1.1 implementation algorithm

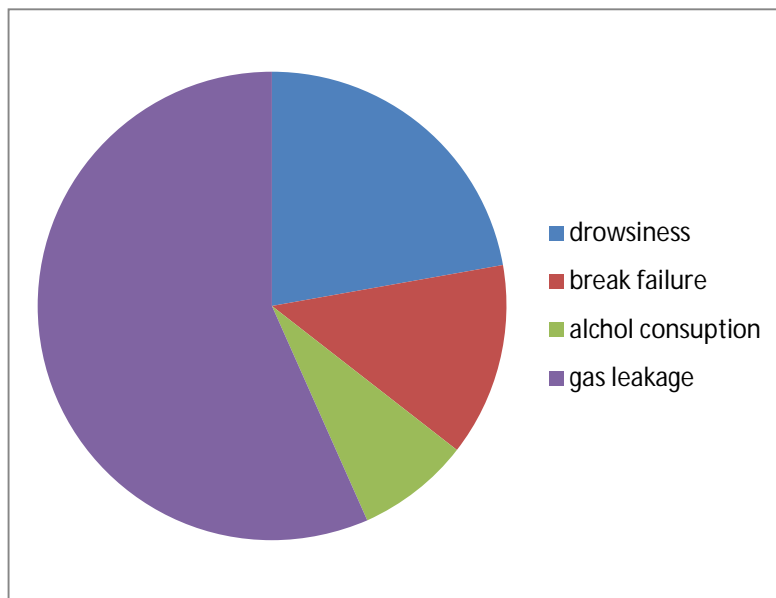Figure 3 flow diagram of accident prevention and detection system

Figure 4 Accident survey chart

IV. ACCIDENT DETECTION ALGORITHM

Accident Detection algorithm The first goal of the interpretation of acceleration to the traffic accidents abdicated. The straightforward approach to easily collaged domain, there are two main events that could use would consist of dealing a series of acceleration damage to the passengers in a while rolleven that and strong impact [5] We are currently working with the Appliar-RADA Automobile Research Co as more then 14 to develop a realistic accident detection algorithm had on information that characters different Recorded in the miner consists of determine when is new Nevertheless, this simple method is not valid shown in Fire S. The graph for all tested witons acceleration with diversity. As show the accident ceeds the main types of accidents. value restored in the collision, although . Therefore it is simple acceleration thresholds to distinguish to the better estimate the severity of accidents and both the amplitude and acceleration[8] .Crash tests information about the collision (10,000 ta unibe to be processed oltline after an accident. Nevertheless, tor d really well system e moment of the accident to reduce the assistance time and by DADA college amount of ples's) which died in mal time.[10] It must be processed at the the effects of allusion in the passengers. Moreover, the equipments by IDIADA to record all the information is fordable in a standard vehicle. Therefore system should be in foldable line.

To take into account of the amplitude of the pulse. the eNOTHI system in the area that integral valuing the function is ratio of an impact The Disaster to collect as much data as possible calculation the average value measured during the sending to the persist. Hence, the most appropriate method for value during an interval will be the rectangle using form with the time axis,[6] which can be obtained the applying the integral of the function Therefore, the to classify acceleration s and determine the preliminary severity of intervals between sam the integral calculation the time interval 0.15 Scopus torrent that provided try Applus IDIADA Corporation 14where in the number of intervals recorded and the ag value of the nation)[2] The integration of the acceleration fraction starts wm a value over 6G (tor front collision) . These a s were found and tested by using the historical information about crash tests provided.

To take each amplitude and length of the heartbeat the world wherever n is that the range of interval recorded and favg the common worth of the perform.f(x) is the interval .the integration of th eacceralation perform started the perform once a worth over 6G r 3G is detected. these worth were found and adjusted. these worth were found and adjusted by exploitation the historical data regarding crash tests provided .

The information designed to gather the maximum amount data as potential from the sensors throughout the intervals between sampling, calculative the common worth measured throughout the amount before causing it to the method unit. Hence, the foremost acceptable technique for approximating the integral worth throughout AN interval are going to be the parallelogram rule

$$\int_{x_0}^{x_n} f(x)\, dx = \sum (x_e - x_e - 1).\mathrm{Favg}(x_e - 1, x_e);$$

where n is that the range of intervals recorded and favg is that the average worth of the perform f(x) within the interval [x_e-1, x_e]. the combination of the acceleration function starts once a worth over 6G (for front collisions) or 3G(for aspect and impinge on collisions) is detected. These values were found and adjusted by exploitation the historical data regarding crash tests provided by Applus+ IDIADA.
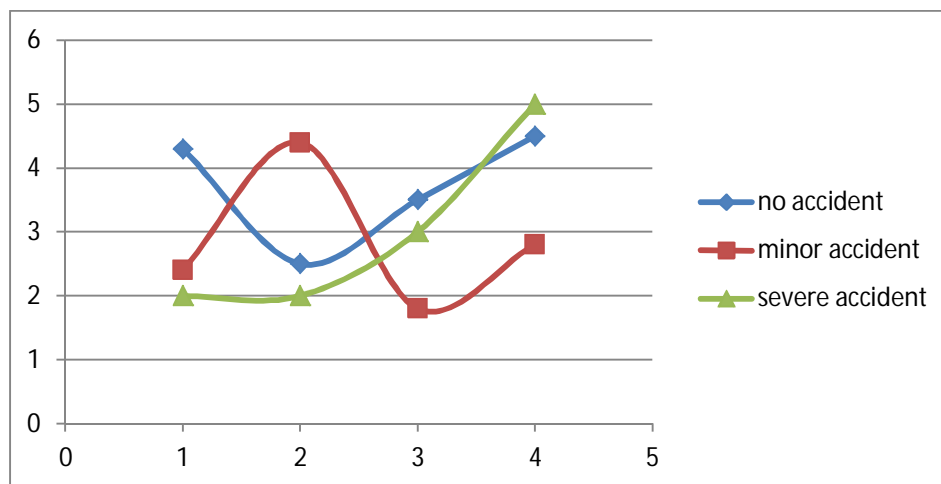

Figure 4 accident monitoring chart on 2019

These be carried out using similar procedure obtaining a high scalable and updatedable architecture.
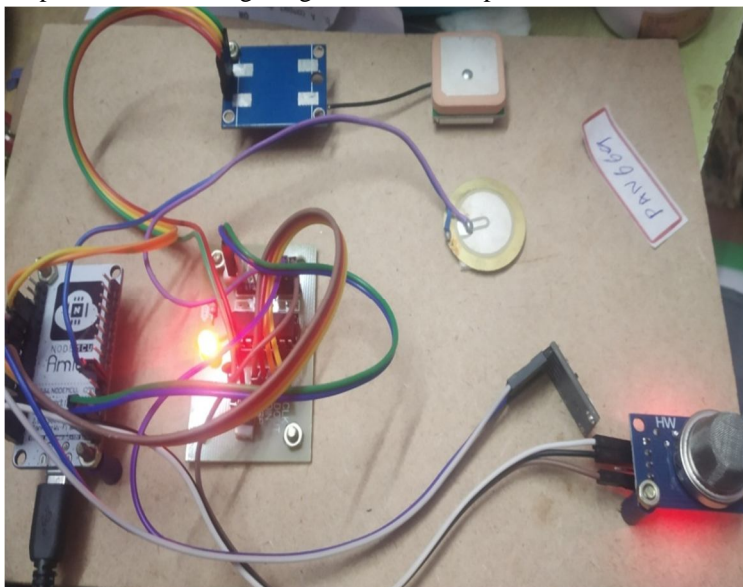

Fig 5 Black Box Setup

V.   CONCLUSION

The system that we are able to track the automotive location simply by causing the mobile SMS . A automotive has accidental observation device in numerous ways that to predict the driving force moments and recording victimisation recording equipment.In a important state of affairs several vehicles faces accident, because of this ton of person lost their lives. Some individuals will be saved at that point, however owing to lack of knowledge, time and place it should not be doable. victimisation the vehicle recording equipment conception the accident happened will be detected with the assistance of GPS and GSM systems. The victim will be admitted within the hospital by the car as shortly as doable by dominant the traffic signals. so the recording equipment conception will give road safety therefore its creates a secure driving for the driving force and provides security for the life and property of the general public.

VI.   FUTURE RESEARCH

An accident notification system in concrete running victimization sound analysis Inchie Kim, Sangyoon Chin, Jinho knockout ISARC. Proceedings of the International conference on Automation and artificial intelligence in Construction thirty five, 1-5, 2018 during this study, a sound analysis-based detection and news system for accidents that occur throughout concrete running is projected. First, the method of the present observation system was examined and issues were noted, and studies and technical approaches to sound analysis were analyzed. running sound samples were then collected from construction sites, the frequencies and patterns were known, and accident sound patterns were created by superimposing run and different noise onto running sound samples. Finally, logic Associate in Nursingd an rule to spot accidents were projected supported the results of patterns retrieved from the higher than datasets. within the future, it's expected that accident notification systems victimization the sound analysis projected during this study are going to be helpful not just for the hindrance of accidents however conjointly for safety management throughout construction sites generall two variations in ascertained speed patterns between crash-involved and crash-not-involved drivers: Application of in-vehicle observation technology Jungwook Jun, Randall Guensler, Jennifer look Transportation analysis half C: rising technologies nineteen (4), 569-578, 2011

Due to the dearth of information assortment systems in previous studies, it's not clear whether or not driving speed patterns in everyday conditions of crash-involved drivers were extremely completely different from those of crash-not-involved drivers. This study evaluated these variations through numerous potential speed metrics created from longitudinally-measured GPS speed information of light vehicles. As a result, this study found that at the most times (spatially and temporally), drivers WHO had crash experiences cared-for drive at higher speeds than crash-not-involved drivers except in thruway travels throughout a.m. peak hours. Crash-involved drivers conjointly showed higher tendencies of non-compliance with the announce ordinance**.**

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