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IoT Enabled Accident Prevention System Using IFTTT Cloud Server

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ABSTRACT - Traffic accidents are unpreventable in trendy automobile world. The designers and analyst within the automotive sector have wanted to plan and erect procurer automobiles. Patterns concerned in severe crashes may be detected, if tend to design precise prediction designs able to classify the sort of injury hardness of various road accidents. This design encapsulates a shot is formed to design an embedded system to advise the prevalence of accident. The main objective of this work is to save the precious lives by avoiding the road accidents or by providing the emergency medical help to the accident victims with the assistance of associate IoT basic embedded system. This method can advice the prevalence of the accident by sending the message to the closest hospital, ambulance or the police station and additionally to the relatives of the accident victim. The data logger designed can work as a black box and stores the monitored parameters in regular intervals of time. This will be utilized by the station for the preventive maintenance of the vehicle or by the authorities to unravel the accident case. If there is no response from the driver, then the vehicle switches to autonomous mode from the manual mode and can be safely place on its own by exploitation Drive-by-Wire technology.

Keywords: Accident Detection, Alcohol Detection, Microcontroller, GSM.

I. INTRODUCTION

As mentioned within the Transport Analysis Wing Report, Ministry of Road Transport and Highways, Governments of India, the accidents happening on the road are called necessary world condition. In India, concerning five hundred thousand road accidents resulted inside the death of one hundred thousand forty six thousand three hundred and seventy seven individuals and over four hundred thousand fifty thousand people were injured seriously inside the year 2017. As per the information provided by the Road Traffic Injuries (RTI), among the causes of death, road accidents have taken fourth rank all over the globe, leading to the death of around thirteen hundred thousand individuals and around four crore individuals survive with nonfatal injuries and lots of individuals can suffer physical disabilities. The accident victim doesn't get justice in many cases thanks to lack of proof or corruptions within the society. The victims might not get the medical help or facilitate from the general public or from the authorities because it could be a medico legal case. The subsequent are a number of the factors that are chargeable for road accidents:

- Driver skills and behaviour
- Speed of the vehicle,
- Design of the vehicle,
- Condition of the road
- Technical problems with the vehicle, etc.

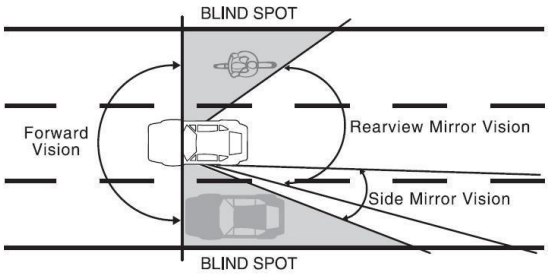

Fig.1 Blind Spot Definition

This work aims at arising with and implementation of a wise vehicle to avoid accidents so on save precious life and in addition to resolve the accident cases merely, so as that justice is given to the accident victims or to their members of the family. Fig.1 Describe model view of planned system style. The rest of the paper is organized as follows. The work done by various researches throughout this domain has been given in section II. The system block diagram and outline has been mentioned in section III. In addition Experimentation and thus the performance of the system is conferred in section III. Results of the experiments complete in section IV.

II. LITERATURE REVIEW

This chapter provides data concerning earlier work administrated by completely different researchers during this field. There are some studies occurring during this

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field and each system uses its own means that of triggering the alarm, sort of a fireplace alarm or a crash device alarm integrated with the air bag control unit of the vehicle. Here a brief introduction is provided on the various current analysis work and conjointly the prevailing systems that are operating in several elements of the planet [1]. Namrata H. Sane et al. (2016,) [2], have mentioned that, heap of accidents on highways are happening because of increase in traffic and conjointly because of to rash driving. In many things the members of the family or the ambulance and police authorities don't seem to be privy time. This ends up with delaying facilitate reaching the accident victim. Conjointly they need designed a system to send message to the pre-defined number along with the placement of the vehicle. Amrutha Madhusan et al. [3], have created a survey on "Road accident detection and Reporting" within the year 2016. During this survey they have determined that, the road accident might be a significant issue of concern. Even with all fashionable developments within the field of vehicle design, road lane vogue and management, accidents do occur. Timely accident detection associated taking immediate action with reference to emergency health care of victims by informing associate emergency centre regarding the accident on time plays a big role in human safety and road traffic management. They need studied varied strategies to attain this and conjointly they need aforesaid that, every methodology has its own accuracy and limitations. Venkatesh Alwarsamy [4], (2014) has planned "Automatic Accident Notification and Severity Estimation". [5] He has mentioned the new communication technologies integrated into trendy vehicles that supply a chance for higher help to individuals injured in traffic accidents and cojointly talks a number of system to considers most relevant variables (such as sensors) which can characterize the severity of accident. A. Sriram et al. [6] (2013) have planned associate intelligent system for accident notification. Throughout this work, accident is notified automatically using sensors beside the health condition of the passengers. This technique sends the traveler health condition as MMS, in order that the rescue team might understand the condition of the traveler to bring them to hospital as early as potential which could be vitally necessary for a few real-time applications.

Montaser N. Ramadan, et al. (2012) [8], planned the Implementation of associate in nursing economical automotive security system for anti-theft exploitation an embedded system fitted with a GPS and GSM. In this, consumer interacts through the system with vehicles and determines their current locations and standing exploitation Google Earth. User track the position of targeted vehicles on Google Earth victimization GPS locator, the target current location is set and sent, along with side varied parameters received by vehicle's knowledge port, via Short Message Service (SMS) through GSM networks to a GSM modem that's connected to computer or laptop [7]. R. Rathinakumar et al. [9], (2014) planned a" Wireless Accident Information System Using GSM and GPS". In this they have mentioned that, the design of a Smart Display and Control mechanism which may monitor the zone and maintains the desired speed within the zone levels includes accident detection and knowledge sending module. Fogue M, et al. [10], (2011) planned the "Prototyping of an automatic notification scheme for traffic accidents in vehicular networks". Throughout this they have mentioned a system that desires each vehicle to be invested with an On-Board Unit answerable for detection associate in nursing the reportage accident things to an external management unit that estimates its severity, allocating the desired resources for its facilitate. The development of a prototype based on off-the-rack devices shows that this system may scale back notably the time needed to deploy the emergency services when associate in nursing accident takes place. Ching Yao Chan, [11], (2011) mentioned the current era of omnipresent property, wireless communication technologies that have enabled a kaleidoscopically array of applications that revolutionize many aspects of economic activities and public services. Quietly, but not entirely inconspicuously, in recent years the very revolution that redefines the landscape of user expertise and business models is invasive into the consequent frontier - vehicles. Analysis and business activities round the globe area unit exploring the practicableness and edges of providing safety, mobility, efficiency, and environment-friendly services to users supported the thought of connected vehicles. The exploitation of wireless communication for vehicles and for transportation as an entire presents exciting opportunities still as intriguing challenges. Kristofer D. Kusano, et al. [12] (2011) planned that, "The Automated Crash Notification algorithms utilize telemetric data from vehicles concerned in collisions" to provide notice applicable non-public medical response. One vital important piece of telemetric information is that the Principal Direction of Force (PDOF) of the collision, which can be determined from data stored in the Event Data Recorder (EDR).

Walker R, Anjum o, et al. [13] (2010) projected that, eDecision is associate eSafety technology giving automatic notification of vehicles involved in "a crash situation' to the emergency services, whereas the vehicle is during a movable coverage space. The principal edges of eCall area unit according to be safety-related; alerting emergency services to the precise location of an event that permits faster and more effective medical assistance. However, recent work for the Highways Agency and for the European Commission have, for the primary time known and quantified the potential edges in utilizing eCall knowledge for traffic management and congestion reduction. This paper shortly reviews the European scenario with eCall and describes a number of the potential implications for the angular distance if eCall were enforced in the United Kingdom. T. K. Kishore, et

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al. [14] described the principles of a low operational-cost, versatile Internet-based data-acquisition system in 2010, which eliminates the necessity for server software package and maintenance and to attenuate the operational prices whereas operational with an oversized quantity of information. This technique is appropriate for various embedded applications by attaching many real-time modules through acceptable interfaces. Schooly B, et al. [15] (2009), explores however a good vary of automobiles crash, emergency communicator, hospital, and trauma data may well be helpful to emergency medical practitioners for creating choices regarding automobile crash victims. The authors use a framework from previous analysis to think about, devise and examine emergency medical practitioner's use of knowledge systems for rising emergency response services and outcomes. This paper initial provides an summary of clinical decision support systems targeted on automotive crash emergency and trauma response. Ideas area unit grounded during a case study investigation conducted in Minnesota at the State and native level (Mayo Clinic). Operational knowledge from 911 communications, ambulance response, associate degreed trauma information systems were connected on to demonstrate an information integration "proof of concept" to emergency medical practitioners. Interviews and focus teams discussions were then conducted to debate this and potential worth of integrating inter-organizational information for real-time decision support. Analysis across these numerous strategies provided a multi-layered understanding which led to a descriptive design for a crash trauma system.

J. Lin, et al. [16] (2009), planned an overseas on-line diagnostic system for vehicles via use of On-Board Diagnostic, GPS, and 3G techniques which might facilitate fleet managers and car knockers to know the remote vehicle standing. Therefore this method can decrease the time of fleet management and vehicle repair because of to the fleet managers and car knockers who find the diagnostic bother messages in time. Grover, et al. [17] in 2008, dispended associate degree analysis to assess the technical requirement, costs and benefits related to Automated Emergency Brake Systems (AEBS) and cojointly to assess systems primarily based on: Review of scientific literature; Gathering information from industry; Analysis of RTI data; Simulation of potential implications of reduced RTI severity on congestion cost; and value profit analysis. In 2008, Ertlmeier R. et al. [18], planned "Expanding design process of the Airbag Control Unit ACU - Connection of Active and Passive Safety by using vehicles dynamics for rollover and side crash detection". During this they need mentioned that, Vehicle safety relies on the shunning of accidents (active safety) and reduction of injuries just in case a crash isn't preventable (passive safety). Therefore, the motion of the vehicle is measured with appropriate sensors. The information analysis takes place in qualified vehicle management units. Vehicle stabilization is calculated within the electronically-stability management unit. The restraint systems like seatbelts or airbags are triggered by the airbag-control-unit. In step with this the boundary conditions of some necessary crash eventualities are calibrated. M. Wolf, et al. [19] in 2007 planned core security technologies and relevant security mechanisms followed by an in depth description of essential vehicular applications, business models, and components relying on IT security and conclude with an in depth statement regarding challenges and opportunities for the automotive IT community for embedding IT security in vehicles.

LIMITATION IN RESEARCH REVIEW:

Though there are various automated systems to notify the accidents, to find the driver fatigue, to monitor the vehicle health condition and also the autonomous vehicles, still there are many challenges that need to be addressed and some of them are listed below.

Sending SMS to the nearest emergency medical help center, to the closest station and to the family members of the accident victim.

Using time efficient electronic hardware so that communication can be done in the shortest possible time.

Finding the nearest hospital or relative dynamically (when both transmitting receiving units are in motion).

Monitoring the vehicle health condition in regular intervals of time and storing the same in a black box, which helps in solving accident cases due to technical issues with the vehicle

III. SYSTEM DESIGN

The system is consisting of Raspberry pi board p3 which use controller. To access the internet we required the internet connectivity which provided by WiFi module NEO-6M GPS Module to transmit the message. The find accident occur use the vibration sensor SW 420. To monitor the live data we used application called python. The common access point like router is used to provide the internet connectivity for system as well for used is used like router.

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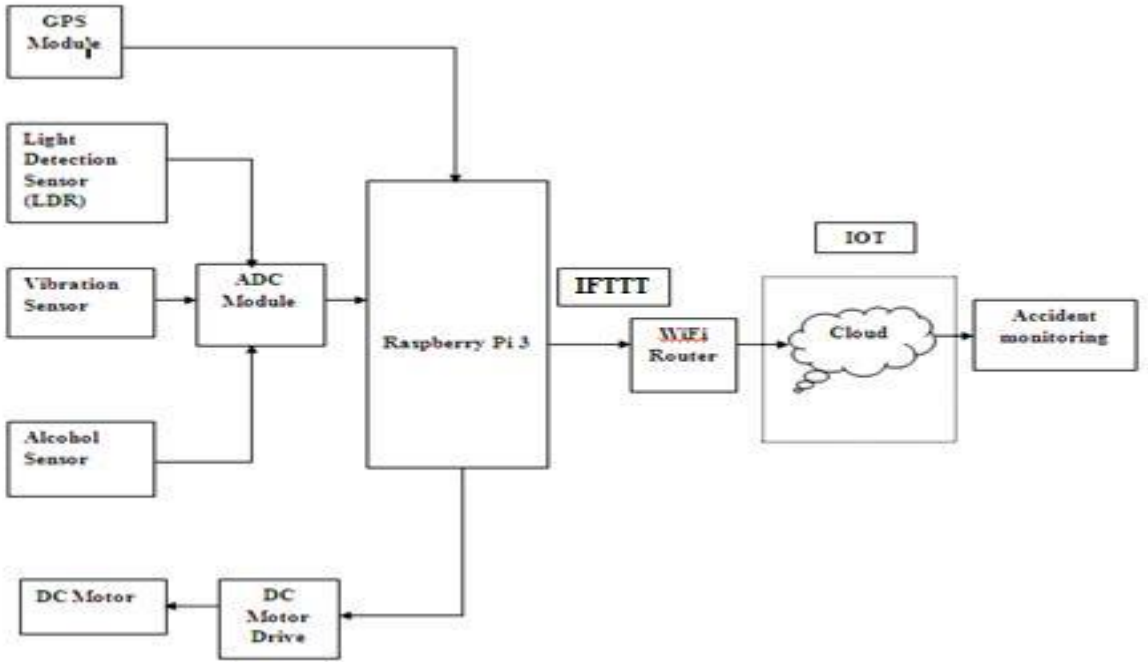

Fig.2 Block Diagram of Proposed System

In the above Fig.2 shows the overall block diagram of the proposed system. Initially the values of cloud server are being cleared so that a previous value does not required to be stored after each restart. Then the VNC Viewer app is started and simultaneously the Wifi module is powered and connection is established between Wifi module and acess point through which can upload and access the sensor value over internet. The control taken through the used are send by VNC Viewer application and uploaded over the cloud server the controller retrieves the data through Wifi module and performs the required action, depending on the control signal provide by the user.

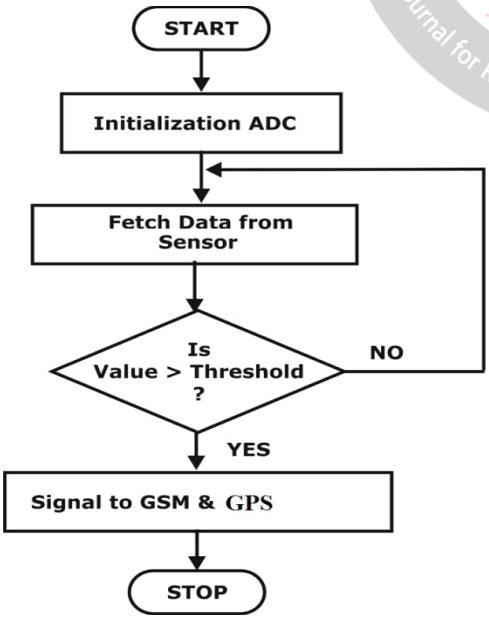

Fig 3 Flowchart for sensing the impact of the sensors in proposed system

Fig.3 shows the flowchart of impact sensing by the sensors whenever the crash takes place. It starts with the initialization of the ADC as the output of the force sensor is an analog signal. The ADC digitizes the impact of the crash sensed by the sensor and sends it to the microcontroller. Significance of this impact is lesser amount than the threshold value then, the microcontroller can ignore it and if the value of impact exceeds the threshold value then, the microcontroller will consider it as an accident and get location from GPS sends the signal to the GSM module and the base station so that, the crash notification is sent to the emergency contact numbers.

1. Is the level of vibration sensor and LDR > threshold
2. If the above condition is true wait for distances (seconds)
   and check for reset status
3. Check the reset button if it is pressed go to 1 otherwise go to 4
4. Get the Sensors data.
5. Get the current position from vehicles (GPS section)
6. If (accident information)
   {
   Production device on ();
   Vehicle stop ();
   GSM message send ();
   Store IFTTT server();
   alart()
   7.else
   {
   Vehical run();
   }

Fig.4 Pseudo code for Proposed System Design

This module is designed to send SMS to the nearby emergency medical care center, the Police and to the family or the friends of the accident victim, to give information about the accident along with the Google maps of the accident spot so that, emergency medical

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assistance is provided to the accident victim. Figure 4 describe the algorithm and pseudocode for proposed system design.

IV. RESULT AND DISCUSSIONS

A crash notifier is a device which sends messages to the relatives of an accident victim or to a pre-defined number as and when the accident takes place. The reason behind the designing and implementation of the Crash notifier is to intimate the occurrence of the accident along with the location map of the accident spot to the nearby ambulance and to the police station, through the GPS and GSM so that immediate medical services are provided to the accident victim and save a precious life. The crash notifier module contains a force sensor, which will sense the occurrence of the accident based on the amount of force falling on it. The threshold value of the force can be preset so that, if the force exceeds the threshold value then it considers it as a crash or collusion and sends the analog signal to the Analog to Digital Converter (ADC) present in the Raspberry Pi 3 microcontroller which in turn, activates the GSM module to send the message to the nearby emergency contact number when vibration sensor sense the accident. Also alcohol sensor sense the alcohol (it is a digital sensor) vehicle integrated motor does not run.

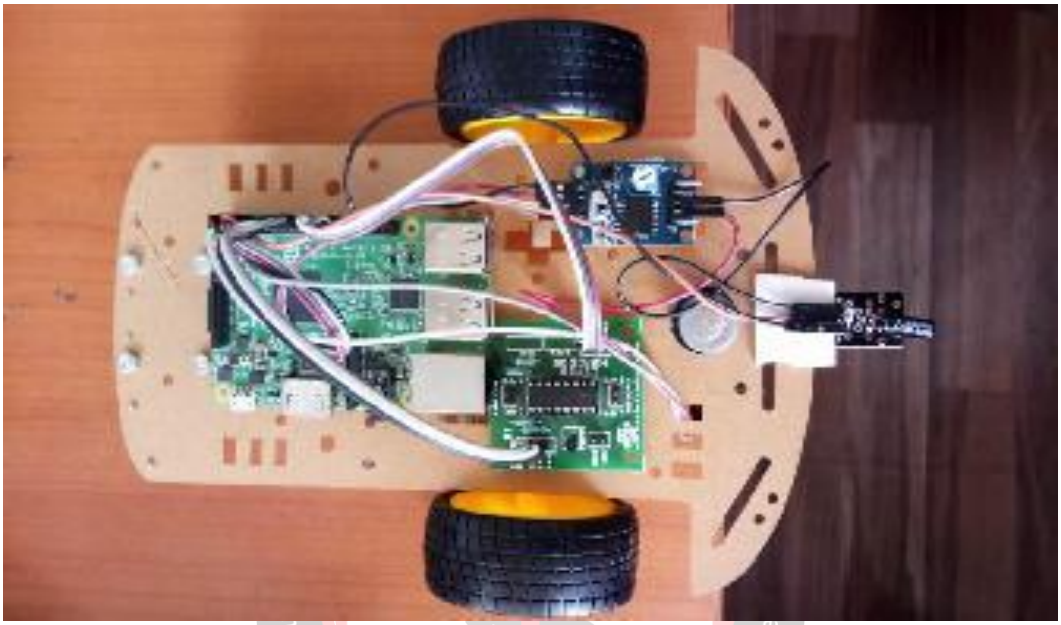

Fig.4 Hardware assembly of the Project Conclusions

In this above Fig.4 Hardware assemblies of the project and the hardware result showed in monitor of the raspberry pi board Python compiler. The analog output of the vibration sensor, LDR, and Alcohol sensor is given to the ADC channel in controller which is connected to GPIO pins of Raspberry Pi 3.The resistance of the sensor is digitized, by voltage divider circuit hence we can know the impact on the force sensor.

- Raw ADC value >= 250
- In terms of voltage = 250x3.3/1024= 0.8v

Where 3.3V is reference voltage to ADC and 1024 is resolution of ADC.

The Fig.5 shows the hardware result of the project, output are perform in the python program and output are displays in the raspberry pi board Python compiler. the details of alcohol sensor, light dependency resister, vibration sensor ,location of the vehicle (GPS Value), and message details are stored in the clouds storage using IFTTT server. Accidental severity notification received from mobile using this cloud IFTTT server.

The information about the occurrence of the accident is sent to the nearby emergency contact number immediately after the crash. In the existing systems, the SMS or MMS is sent to the pre-defined contact numbers of the family members or the friends of the accident victim, which creates panic among the family members or the friends of the victim. The SMS is sent along with the Google map of the accident spot to the nearby emergency contact number so that the emergency medical assistance is provided to the accident victim within a short span of time.

The Proposed system is designed to send the SMS to the Base station, the nearest emergency medical assistance center, the nearest police station and also to the predefined cellular mobile phones along with the latitude and longitude of the accident spot with the Google map of the location sent to the base station, so that the immediate required medical assistance is provided to save the precious life of the accident victim prevention. The future enhancement of flux sensor used and consider to produce more security fields.

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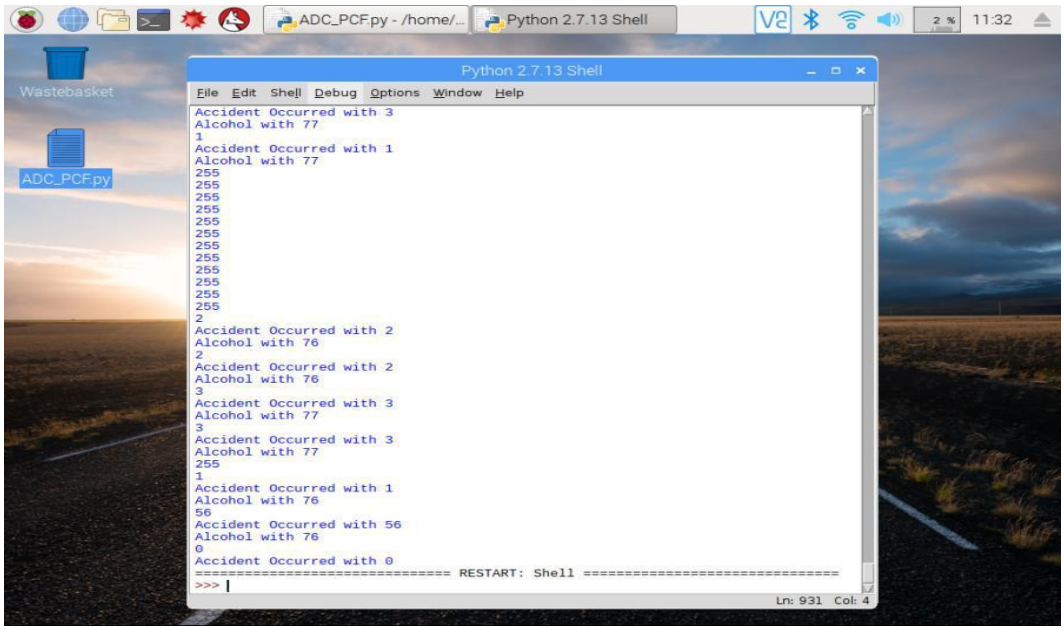

Fig.5 Hardware result of the project

V. CONCLUSIONS

The objective of proposed work is to prevent accidents so as to save precious life, to help the government agencies such as police, RTO, Insurance Company and legal departments in solving accident cases, to help the accident victims in getting immediate medical assistance and also justice. The objectives of the work are achieved successfully by:

"Designing an efficient crash notifier" and accidental severity notification, stored in IFTTT server and details which sends SMS to the nearby emergency contact numbers for emergency medical assistance. Thus, this system will help a great deal in increasing road safety, reduces accidents and misshapenness. Comparatively existing system proposed prototype modal deal effective and more convenient to accident.

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