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Detection and Prevention of Accidents using IOT

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Abstract: ***The population of world increasing day by day and our India become 2nd in position in population count and also the number of vehicles is also increase and because of that alternatively accidents are also increase. There are two basic reasons to occur the accident: accident occur due to the alcohol consumption and the second reason is accident occur due to the driver's incomplete sleep condition. While driving long distance they not taking proper sleep in night and because of that accident happens. The main concept of this paper is to avoid and detect the road accident. So, alcohol detector is use to detect alcohol was taken by driver or not and eye blinker to detect the driver is in sleepy condition or not if he is in sleepy condition then eye blinker will trigger the alarm to wake up driver, tilt sensor to detect the accident happen or not, GPS is to getting location and GSM to sending the message with accident current location to the police, ambulance and driver's relatives.***
Keywords: Arduino Uno R3, MQ-3 sensor, GPS, GSM900A, Ultrasonic sensor, Eye blinker, vibration sensor.

I. INTRODUCTION

In today's world the number of vehicles is increasing and alternately traffic and road accidents are also increasing. For controlling the accidents, we have to find the reasons behind them. The most common reason of an accident is rash driving caused by the drunken drivers. Second reason is driver's incomplete sleep condition in long distance traveling. While traveling long distance drivers did not take proper sleep at the night and because of this accident happens. According to the Ministry of Road Transport and Highway India,2018 total of 4,67,077 accidents have been reported by government in which 1,51,417 deaths and causing injuries to 4,69,418. Road accident severity measured by the number of persons killed per 100 accident, has been increased by the 0.6 percent in 2018 over the year 2017. And because of this India, ranks 1st in the number of road accident deaths across the 199 countries. Therefore, in this paper all the possible condition has been take care of. In proposed system Arduino board is use as main part of system. In which MQ3 sensor which is fixed on steering wheel to detect driver is drunken or not. If driver is drunken then the engine will not start.

The eye blinker sensor is use to detect the driver is in sleepy condition or not if driver is in sleepy condition then the alarm will trigger to make the driver conscious. Ultrasonic sensor is use to detect the is there any object in front of vehicle. If there will be object in front of vehicle at the certain distance then the speed will be reduced and back light will to warn the vehicle coming from back side. GSM and GPS module are used to detect the location of the vehicle when the accident happens. Vibration sensor is use to detect the accident happen or not.

If accident then with help of GSM module accident location send to rescue team, police and to relatives or if the accident happens and there will be not serious casualty then driver can press the reset button to stop sending message of accident to save time of rescue team.

II. OBJECTIVE

A. It is helpful to Preventing and detecting accident.

B. This system is useful for the driver's because it sends the accident location to the rescue team, police and to relatives of driver if accident happens.

We will achieve this objective by doing survey analysis. Therefore, we propose the following Hypothesis.

1) Vibration sensor is use to detect accident we can get the more accurate accident detection because when accident happens the due to collision strong vibration will be sense by the sensor and it will helping to getting more accuracy about to know the accident happens or not.

2) GSM module is better to send the SMS of accident detection because there will be maximum chance of getting SMS because GSM will not require any type of internet, WI-FI, etc. to sending message it will send the message in normal network condition.

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III. LITERATURE REVIEW

In[1], Viral M, V. et al. This author was concluded on concerning Alcohol Detection in the car and additionally an Accidental Location Detection with help of GPS using IoT. In[2], Jesudoss, A. et al. The author proposed was to prevent the road Accident they are using alcohol detection sensor, eye blink sensor, over speed control sensor. In[3], Kumar, P et al. Author of research paper reduced the components which is GPS and GSM module instead of this they use the Mobile GPS with the MIT App to detect the accident location. In[4], Posonia, M et al.

The author presence in this system Raspberry pi was use to collect the data from different sensors. In[5], Altaf, S. V et al. The author presence in this system they are use the engine Locking technique if driver drink alcohol in then it will be detecting bay sensor and engine get lock. In[6], Venkataramana, R. et al. The author presence that this system located the accident spot accurately, realizing the automation of accident detection and messaging to system consequently, it will save the precious time required to save the accident victims. In[7], Tara, K et al.

The author presence the real time tracking system using GPS, GSM module with Arduino Uno board to monitoring the vehicle. In[8], Sisodiya, T. et al. The author presence the finding the occurrence of any accident and reporting the location of the accident to coded number with the help of GSM module. In[9], Singh, K et al. Research paper presence Accident detection device installed in a vehicle when meets with an accident will send SMS/ messages to the preinstall numbers of the driver's family members, police station, ambulance and nearest hospital.

In[10], Chaturvedi, N et al. author presence this system provides the optimum solution to poor emergency facilities provided to victims in road accidents in the most feasible way. In[11], Shukla, D. P et al. The author presence the design and implementation of alcohol detection with engine locking using Arduino Uno and sending SMS of alcohol consumption to police or relatives. In[12], Dada Emmanuel Gbenga et al.

The author presence the alcohol detection by MQ3 sensor if the sensor detect alcohol in driver's breath then ignition will be failed to start engine. In case of driving the driver got drunk alcohol while driving system will stop the engine.

In[13], Lawphniaw, O et al. Author proposed prevention and detection of accident using GSM module, Arduino, temperature, eye blinker sensor, etc.

In[14], Patil Ashish N et al. Author proposed in this system detection of accident using GSM GPS module and AT89S52 Microcontroller. In[15], Antony Puthur, J et al. Author proposed Detection and prevention of accident with help of mobile application and cloud networking.

IV. COMPONENT

1) *Arduino Uno:* It is an open-source microcontroller board based on the ATmega328P microcontroller. The board is consisting of sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE via a type B USB cable.
2) *MQ-3 Sensor:* The MQ3 gas sensor is alcohol sensor which is used to detect the alcohol concentration level on your breath. This sensor provides an analog resistive output based on alcohol concentration level. When the alcohol gas exists, the sensor's conductivity gets increases along with the gas concentration of alcohol rising.
3) *GSM900A Module:* It is mostly use in the mobile communication system. It will help to send the message with registered mobile number in sim card which is interested in GSM module. It has capacity of transmitting data from 64 Kbps to 120 Mbps rates.
4) *GPS:* Global Positioning System is use to get accident location of vehicle. When the accident happens, it will send the current location of vehicle along with longitude and latitude to the rescue team, police and to relatives with help of GSM module.
5) *Ultrasonic Sensor:* Ultrasonic sensor use in this system to detect any is present in front of vehicle at certain distance if object is present in front then speed of vehicle reduce and back light will on to notify the vehicle coming from back side.
6) *Eye Blinker:* It is use to identify the driver is in sleepy condition or not. If driver's eye close for more than 5 second then it will trigger the buzzer to make the driver conscious.
7) *Vibration Sensor:* In this system it is use to detect the accident happens or not. When accident happens the due to collision vibration generated and this vibration sense by the sensor and accident message with location will send it by other components.
8) *Buzzer:* It is audio signal device. It produces the noisy sound. It used to make the driver conscious when driver is in sleepy condition.

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V. PROPOSED SYSTEM

The accident detection and prevention system are to use to detect accidents and avoid road accidents. There are many reasons behind the accidents but common reasons are alcohol consumption and incomplete sleep of driver. This system allows you to make use of different sensors and control unit to avoid and detect the accident.

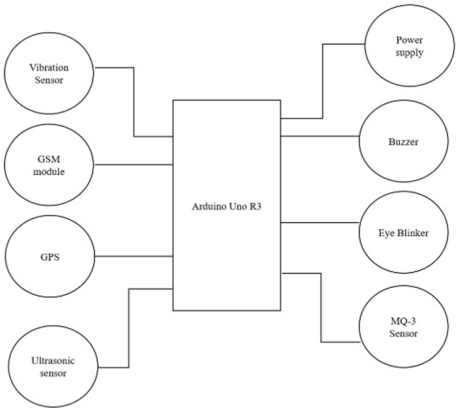


Fig. 1 Block diagram of proposed system

VI. METHODOLOGY

An online survey was taken using the google forms. Link of the form was circulated on social media platforms. The questionnaire was designed in form to test the above proposed hypothesis which verify the certain parameters.

1) *Participants:* To test this hypothesis, this study uses two conditions i.e., first one is helpful and second one not helpful. Total 44 participants data were collected from different states. From this 25% were female and remaining 75% male.
2) *Measures*

Gender	Yes	No	Total
Male	31	2	33
Female	9	2	11
Total	40	4	44

Table 1: Collected data by online survey

Here is the formula of calculating the expected value.
Formula: - Expected Value = (row total) * (column total)/ (grand total)
E_{11} = (33*40)/44 =30
E_{12} = (33*4)/44 = 3
E_{21} = (11*40)/44 = 10
E_{22} = (11*4)/44 = 1

We have obtained these expected values, now we need to compare this value with what has been observed. To do this, we need to calculate the X^2 statistic, which is shown below.

$$X^2 = \frac{\sum (\text{Observed value} - \text{Expected value})}{\text{Expected value}}$$

In this formula we have to subtract the expected value from the corresponding observed value. After subtraction has been completed, we have to square them and after squaring result we have divide it by expected value. We have to perform this step for every value and at the end we have to add this answer together.

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Calculation table for above example is given below

Obs	Exp	Obs - Exp	$(Obs – Exp)^2$	$(Obs – Exp)^2/Exp$
31	30	1	1	0.03333
2	3	-1	1	0.33333
9	10	-1	1	0.1
2	1	1	1	1
Total				1.46666

Table 2: Calculation table

Therefore, value of X^2 is 1.46666
Degree of Freedom = (no. of rows -1) *(no. of columns)
Degree of freedom = (2-1) *(2-1) = 1

VII. EXPERIMENT

Test value of independent sample where calculated at the significant level 95% using chi-square test. By using this test, we calculated X2 value. With help of participants, we able to test the multiple parameters in test i.e. (Would it be helpful to know if an accident has occurred or not? If an accident occurred, would it be helpful to send a message to the rescue squad, police and to relatives?). The calculated chi value is 1.46666 and tabulated chi value at 95% significant level is 3.84 with degree of freedom 1.

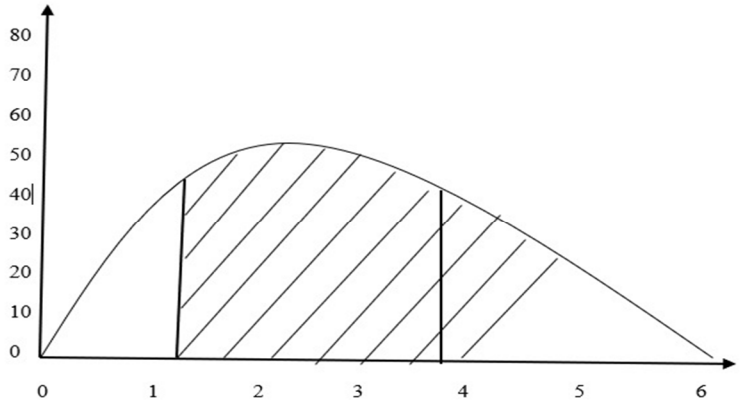


Fig 2: Statistics of chi-square test.

VIII. RESULT

The test value of independent sample calculated by chi-square test with help of online survey analysis in that participants have facing at least one accident in their life, so therefore this accident detection technology is helpful to them. Therefore hypothesis 1 is accepted.

The test value of independent sample calculated by chi-square test with help online survey analysis in that participants have been seen that when accident happens there is lack of emergency facilities and because of this accident victims not get proper treatment in time; therefore, this accident location sends to rescue team police and to relatives is this technology helpful to them. Therefore hypothesis 2 is accepted.

IX. FUTURE SCOPE

This system can further enhance by using WI-FI instead of GSM module to send the accident location of the vehicle to rescue team. And it can also develop Android application to getting accident location of vehicle using Mobile's inbuilt GPS.

X. CONCLUSION

In this paper proposed system is use to provide the information about accident happens or not and getting accident location. In this system GPS is used to getting the accident location and GSM module is used to send the message of accident location to the registered numbers. The results of proposed system it satisfying the participants according to survey analysis.

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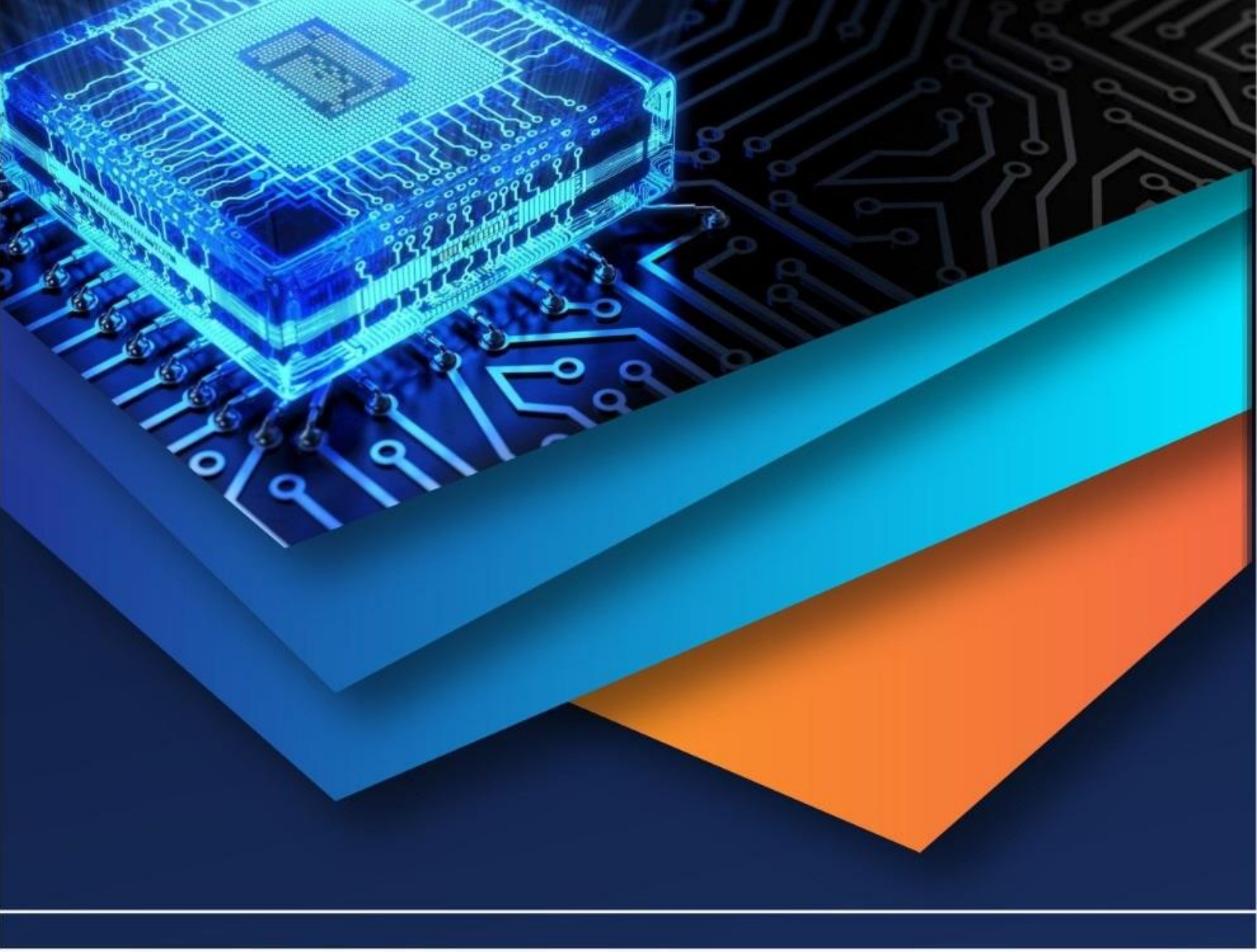
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