

Smart Accidental Alert and Location Tracking System Using Telegram Bot and GPS Technology

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Abstract - Vehicle accidents have become one of the major issues, which cause the death of many people around the globe. Currently among all countries India is in the top-ranked in death due to road accidents [1]. As the population is increasing day-by-day, the demand for the cars has also increased, because of this the areas in which there are no traffic signals or in the small areas the chances of vehicle accidents gets increased and due to this the death rates gets increased. However the death rates do not completely depend on the accidents, the death rates also increases because of lack of help being provided to the injured person at right time. A system is needed to be build up which will help to reduce the death rates by sending the alert message to the hospital or the closed ones, so that the injured person will get the help as soon as possible. The aim of our designed project is to detect the accident as soon as it occurs and send alert message along with the location where the accident took place to the respective family members so that the injured person will get a quick and proper medical help. The result showed the accurate location of the vehicle via telegram bot and NodeMCU only thing is the GPS Module should always be able to catch the location. We concluded that the designed model provides high accuracy and can detect the accident immediately because of proper calibration of accelerometer also the system is fully dependent on internet so in some areas where connectivity is less, it is difficult to get the location.

Not only talking about India, In 2009, 33,808 people died due to car crashes in the USA only [3]. Bangladesh has also registered a rise by 19.58%, in road accidents in 2018 as compared to 2017 and 3,472 accidents in 2017, where there were 4,317 deaths in 2018 [1]. This was about the 3 countries but there are many more countries which have to deal with the accidents, and they are still finding an effective solution to it. There is no fixed way in which accidents can take place, accidents can be caused due to the uncertain weather conditions or due to fault of driver or due to intake of alcohol and many other ways.

In this current generation time is most valuable thing. To save the time or to utilize the day time most of the people travel at night, but due to this we get 1 step closer towards the accident because at that time the prominent reason of accident can be sleepy drivers. The survival rate depends on what time the ambulance arrives and takes the victim to the hospital [3]. In most of the cases the injury is not major but because of late arrival of rescue team, the minor injury can turn into death.

Key Words: Accident Alert . Telegram . GPS . Location . Vehicle tracker.

1. INTRODUCTION

The cars have a great importance in our daily lives. Cars are used to satisfy our daily needs, cars are an important mode of transport. But if the cars are not driven properly or if there is a lack of carelessness while driving, it may lead to the major accidents. Talking about the accidents, in India some about 4,80,652 accidents were recorded in 2016, which leads to 1,50,785 deaths. The study shows that 413 people die every day in 1,317 road accidents. The most shocking thing is that in India the accident rate has been increased from 29.1% in 2015 to 31.4% in 2016 [2]. The (Fig 1) shows the road accident graph in India, which gets increasing year by year.

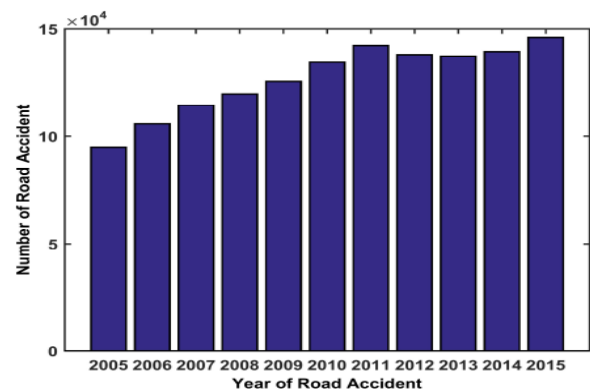


Fig. 1. Number Of Road Accidents In India [4]

1 lakh road accidents took place in India in 2004, the numbers increased to 1.2 lakh in 2010 and then 1.36 [4]. In short because of less emergency facilities in the country, life of the people is under risk. An smart accidental alert system which will provide the exact location of the place where accident took place on telegram app has been introduced in this paper using GSM module and Node-MCU.

The latitudes and longitudes are sent on the telegram app as soon as the accident takes place. Also the proposed system can be also used as a normal location tracker of the vehicle which can track the live location of vehicle even if there is no accident. The advantage of the system is that, it is highly accurate, provides exact location and on a right time.

The rest of the paper contains literature Review in section II, equipments Used in section III, flowchart of system working in section IV, some information about telegram bot in section V, system implementation and working in section VI, system as vehicle tracker in section VII, flowchart of system as vehicle tracking system in section VIII and conclusion in section IX.

2. LITERATURE REVIEW

In this paper the author has considered all possible ways based on acceleration in which the accident can be detected. When the anomaly situations occur, the author notices a change in spikes, this happens because of anomaly of acceleration. Pitch, Roll, X Y Z are the points or parameters on which the accident can be detected [1].

The author has proposed a prototype for avoiding accidents by giving a alert on the basis on the obstacles in the path and turn to left direction. The system proposed uses the ultrasonic sensor which measures the distance, when the distance goes below the safety distance then the alarm rings. If the sensor value is too less than the safest distance the vehicle automatically applies the break [2].

The author has used IOT to detect the accidents. The paper firstly describes the importance of IOT in a day-to-day life. Later author speaks about the different sensors such as piezoelectric sensor, accelerometer sensor, pressure sensor which are used to detect the accident. The author says safe distance should be maintained between the cars to avoid the accidents for that purpose the ultrasonic sensors can be used [3].

The author says that there is a need of OS systems which do not depend on others to rescue the injured person. The author says that the accident rates in India are increasing year-by-year, the graph shows the increase in rates and hence the accidents are a serious matter. The paper proposes a system which is based on micro-controller, which talks with other sensors such as GPS and accelerometer [4].

The paper talks about the importance of GPS technology and further talks about how accurate the new GPS modules work. The author has mentioned the death rates in USA and other countries like Finland caused due to accidents. An accident detection algorithm has also been mentioned which uses the mass and speed of vehicle to generate kinetic energy [5].

The author has designed the system using accelerometer and when the accident is detected notification is sent to family member and hospital, with the help of NodeMCU the location is sent on the application [6].

3. Equipment's Used

A. ESP8266 NodeMCU

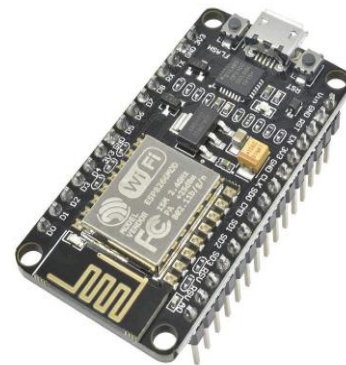


Fig.2. ESP8266 NodeMCU (Source:-
(<https://www.heelectronicslk.com/product/node-mcu-wi-fi-development-board-esp8266-cp2102-2/>))

With the help of NodeMCU one can connect objects and transfer the data using the Internet. Here in this project, NodeMCU is used to send the location link and other messages to the respective authority wirelessly through Wi-Fi module via the telegram application.

NodeMCU is the most important component in this project. NodeMCU operates on internet. To deliver the message to the telegram application wirelessly there is a need of NodeMCU. It consists of 1 analog input pin which we can connect to accelerometer or flame sensor and as per the input is provided (via flame or changing the directions) NodeMCU will work according to that and deliver the message to the mentioned user's telegram app.

B. Neo 6M GPS Module

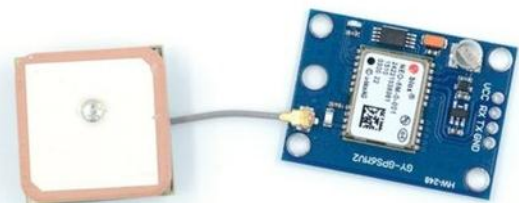


Fig. 3. Neo 6M GPS Module (Source:-
(<https://5.imimg.com/data5/ZM/WG/JQ/SELLER-5015976/ublox-neo-6m-gps-module-500x500.jpg>))

The 6M GPS Module uses the most recent and latest technology to give the best positioning to the user. It consists of 25 x 25mm antenna and also a socket named as UART TTL. At first the GPS Module takes time to find the GPS location, it consists of Red LED light which indicates whether the module has received the GPS signal or not. If the red LED blinks that means the module has got the GPS location of the area where the module is placed and it is ready to use.

The GPS Module is used for multiple purposes such as location, speed, timing, security etc. It can provide accurate time and location coordinates [5].

(Fig. 4) shows the signals provided by Neo 6M GPS Module which indicates that the module is still not able to detect or track the location, the GPGLL link is still not activated. (Fig. 5) shows the output of Neo 6M when it catches the location.

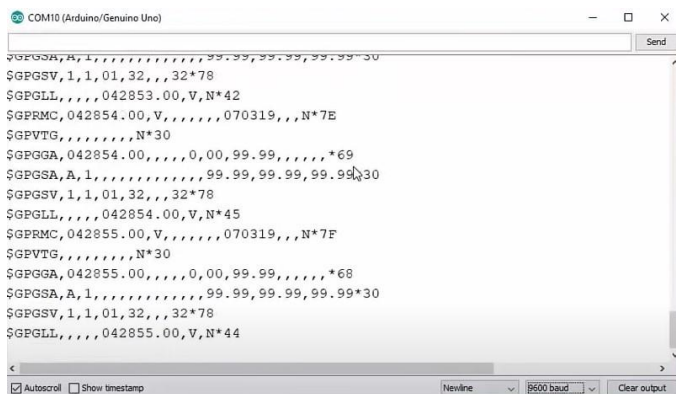


Fig. 4. Neo 6M GPS output when location not found

When the module catches the location the red LED starts blinking. As shown in (Fig. 5) the most important part of output is the \$GPGLL string. This string provides the exact location. When we decode this string, we will get a proper google maps link via which we can get the location.

Based on the location where the device is placed, the time taken by module to catch the location may differ. The user has to make sure that the module is placed in open environment so that the signal can be acquired easily. The users have to make sure that the socket has been placed properly and have patience until the signal is not obtained.

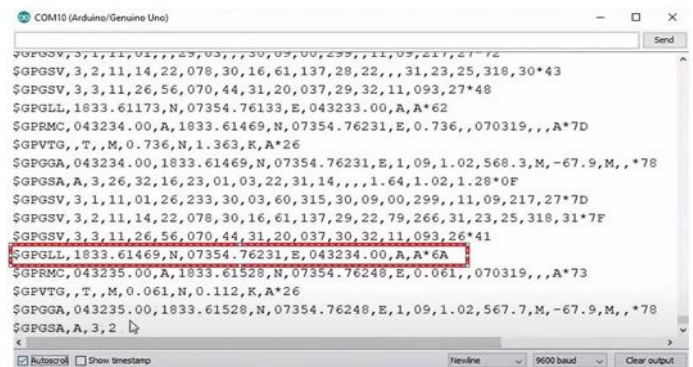


Fig. 5. Neo 6M GPS output when location is found

C. ADXL 355 Accelerometer



Fig. 6. Accelerometer (Source:- <https://www.techtonics.in/adxl335-3-axis-analog-output-accelerometer-module>)

Accelerometer is a small device and has a ability to sense tilts in 3 dimensions [6] i.e X, Y, Z. It consists on 3 axis X,Y and X which are generally connected to A0, A1 and A2 pins of arduino but here because we are using ESP8266 it has only one analog pin, so we have interfaced only x-axis of Accelerometer to ESP8266 so when the car will be upside down we will get the message “Car is upside down” alongwith the GPS location on telegram app.

If the gravity is to be measured the accelerometer can sense the static acceleration. If there is an kind of movement it can also sense the dynamic acceleration.

D. Flame Sensor



Fig.7. Flame Sensor (Source:- <https://electronicsHub.pk/wp-content/uploads/2020/07/Flame-Sensor-Module-800x800-1-1.jpg>)

If the accident is very major the car can be set on the fire so even that too is a urgent case so in order to detect that incident also we have placed the flame sensor. Whenever the car will set on fire the respective authority will get the message that "The car is on Fire" along with the GPS location. The D0 pin of flame sensor is interfaced with A0 pin of NodeMCU to take input. When ever there is a fire near the flame sensor (we assume that the car is set on fire) the ESP8266 will provide the output message on telegram app.

E. Buzzer



Fig 8. Piezoelectric [Source:- <https://www.amazon.in/CentloT%C2%AE-Magnetic-Continous-Computers-Printers/dp/B07Q6RM256>]

When the accident will take place, the alert message will be delivered to family members via telegram app, but an alert message should also be given so that the people around the accident location can hear the sound and can provide urgent help so, whenever the accident occurs the buzzer rings for few seconds so that others can also get the signal that the accident has really occurred.

3. FLOWCHART OF THE SYSTEM WORKING

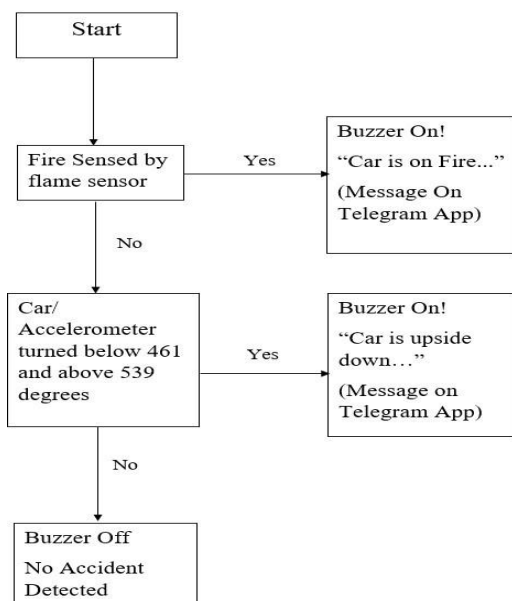


Fig. 9. Flowchart of system working

4. TELEGRAM BOT

Telegram Bot is a account which is handled by software not by any particular user. Telegram bot can be created with the help of BotFather. BotFather is a official telegram account which provides the API for the particular bot, which can be used in the code and the messages can be received via that API key to the telegram bot.

(Fig. 10) shows the procedure to create the telegram bot.

The API in (Fig. 10) is a path through which the message is received on the telegram.

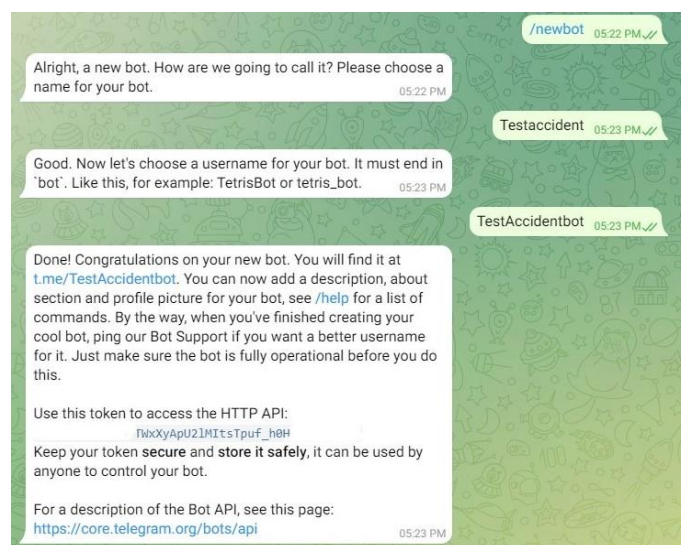


Fig. 10. Creation of telegram bot

5. SYSTEM IMPLEMENTATION AND WORKING

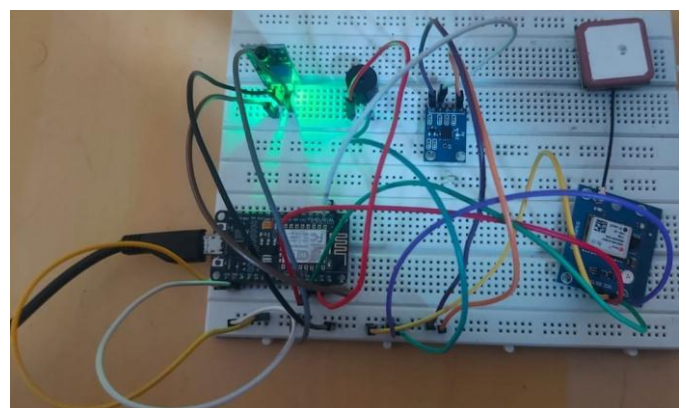


Fig. 11. Implementation Diagram

So we will assume that the Bread-Board in the above diagram is a car. And this system is placed in it. So when we burn the code in ESP8266, then our model is ready to be

tested. Our telegram bot also gets activated automatically. This project can also be used as the location tracker.

Our first Experiment (With Flame Sensor) - When we take the flame closer to Flame Sensor immediately buzzer will start ringing for few seconds, and then we will get the message on telegram such as "Car is on Fire" and the second message will be the google maps link of the location where the accident happened.

Our Second Experiment (With Accelerometer) - We have set an angle of 461-539. That means when our car will be in between these two angles there will be no accident detected but if the angle goes below 461 or rises above 539 then the accident will be detected and the message on the telegram will be "Car is upside down" and the second message will be the google maps link, as shown in (Fig. 12)

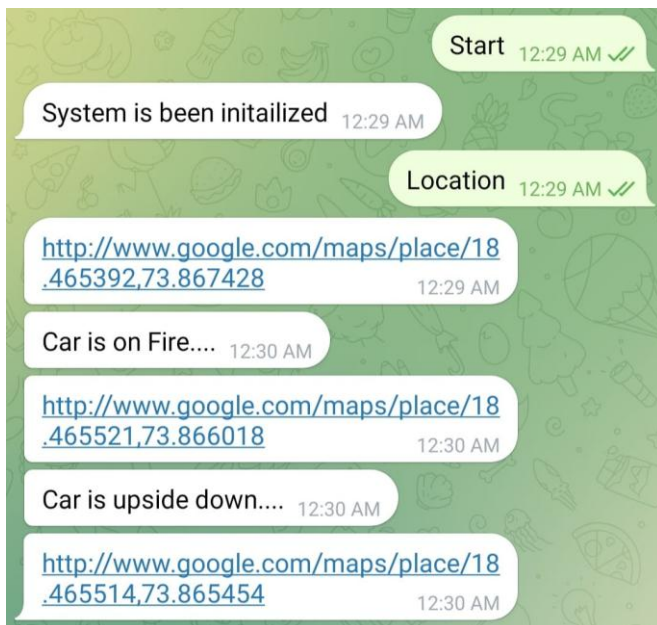


Fig. 12. Telegram Bot Output

6. SMART ACCIDENTAL SYSTEM AS A VEHICLE LOCATION TRACKER

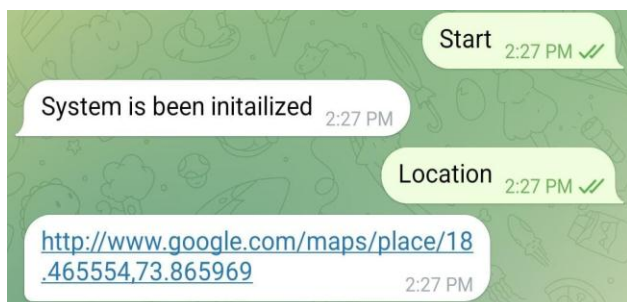


Fig. 13. Regular Location Tracker

One of the prominent advantage of the proposed system is, apart from detecting the accident and sending the alert message along with the message, the proposed model can also be used to simply track the location. Whenever the user needs to know where his car currently is, he can simply type or send a message "Location" and the bot will respond in the form of google maps link which will provide the exact location of the car.

As shown in (Fig. 13) when the system is initialized and if any user want the location of the car he simply types the "Location" to get the google map link.

The \$GPGLL string mentioned in (Fig. 5) is the main string through which we are able to get the location. The major drawback of the system is, if the GPS module is not able to get the signal (No red light blinking) then it is impossible to get the location. So it is important to place device in open environment.

When the device is fresh it takes time to catch the location, but later onward it can catch the open environment signal easily.

7. FLOWCHART OF VEHICLE TRACKING SYSTEM

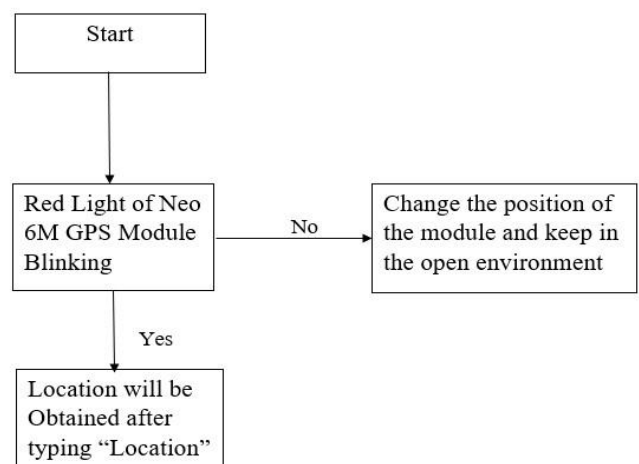


Fig. 14. Location Tracker System Flowchart

8. CONCLUSION

Day by day accidents are increasing in India because of, victim not getting help at proper time. The model designed can be a solution to this problem. While designing this model we have ensured that the model must have a high accuracy and must detect the accident immediately, because of the angle of accelerometer set at 461-539 as soon as the tilt happens alert signal gets generated along with location also the flame sensor works fine with great accuracy. The system is fully dependent on internet, so in

some remote areas it is difficult to get the location of car when the accident occurs. Accidental rates can be reduced if proper help is provided and the rules are followed. The proposed system can be used as an efficient solution to help victims when an accident takes place.

9. ACKNOWLEDGEMENT

We are sincerely thankful to Paras Palli and Prof. Ajay Talele, for their consistent guidance, encouragement and motivation throughout the period of this work. We are thankful for his right guidance when the model was not working properly sometimes, because of him we were successfully able to implement this model.

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