Advance Accident Prevention and Rapid Rescue System

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Abstract - The proposed project presents a comprehensive vehicle monitoring and safety system designed to enhance road safety by detecting overspeeding, alcohol consumption, and accidents, and by alerting relevant authorities promptly. The system integrates multiple sensors and technologies to ensure robust and real-time monitoring through GPS Tracker. GPS tracker is employed to continuously track vehicle speed, generating alerts when speeds exceed preset safe limits. Simultaneously, alcohol detection is facilitated through breathalyzer sensors, which monitor the driver's breath for alcohol content, triggering alerts if the levels exceed legal limits. In the event of any deviations from the defined safety parameters, the system sends immediate alerts to predesignated authorities, providing crucial information for timely intervention.

Additionally, the system is equipped with accelerometers and gyroscopic sensors to detect sudden impacts indicative of an accident. Upon sensing an accident, the system autonomously sends an emergency alert to the authorities, including precise GPS coordinates of the accident site. This ensures rapid location tracking and timely assistance to the victims. The integration of GPS technology not only aids in accurate location identification but also enhances the efficiency of emergency response teams in reaching the accident site swiftly.

Overall, this project aims to significantly reduce response times in emergencies, curb instances of drunk driving, and promote adherence to speed regulations. By leveraging advanced sensor technologies and automated alert mechanisms, the system offers a proactive approach to vehicle safety, potentially saving lives and reducing the severity of accident-related injuries through prompt intervention..

*KeyWords***:** Breathalyzer sensors- MQ3 , GPS tracker, Accelerometer Sensor.GSM Module,Arduino Uno

1.INTRODUCTION

In an era where transportation forms the backbone of modern society, ensuring road safety remains a pivotal concern. Over speeding, and Drunk driving are prevalent issue, significantly escalates the risk of accidents and endangers lives on the road. To address these critical challenges, the project focuses on the detection and monitoring of vehicle over speeding and drunk driver through advanced technological means.
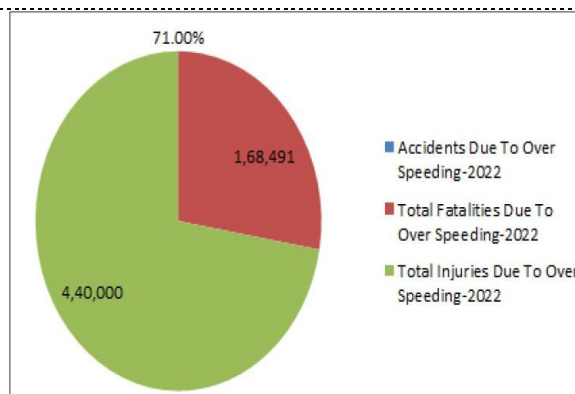

Fig-1.1:Accidents due to over speeding

A large number of road accidents occur all over the world. The major cause of many of these traffic collisions is rash driving. Over speeding is accounted for 72.3 % of total road accidents ,71.2% of total deaths and 72.8 %of total injuries annually on road, The investigation conducted by the World Health Organization in 2008 shows that about 50%–60% of traffic accidents are related to drunk driving.
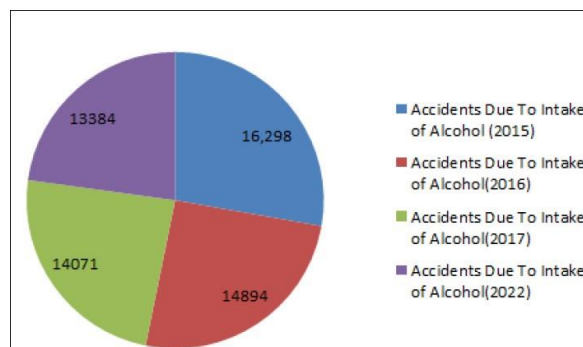

Fig-1.2: Accidents due to intake of alcohol

In the present system, to detect rash driving, police uses a handheld radar gun and aims at the vehicle to record its speed. If the speed of the vehicle exceeds the allowable speed limit, the nearest police station is informed to stop the speeding vehicle. This process is more time consuming and as compared to the continuous increase of traffic this system cannot be trusted with the lives of people.

The proposed project aims to develop a wireless system that detects cars driving at speeds over a specified limit and inform concerned authorities immediately. This system does not need any human interception and a lot of time is saved effectively .The system continuously track the speed of vehicle

through GPS tracking model installed in the vehicle and alert the nearest road authority if the vehicle is over speeding.

The mechanism consists of a transmitter and receiver pair that works in combination to detect the vehicle. And if the Driver has consumed alcohol The alcohol detector is made up of the alcohol sensor, Direct Current power supply, LM 393 Operational Amplifier .The system is divided into sections; the interlock section and the monitoring section. The interlock section is made up the MQ-3 Sensor (alcohol sensor) which senses the alcohol molecules in the air breathe by the driver, an ATMEGA 393 microcontroller, LED, Wireless Fidelity (Wi-Fi) modem, The monitoring system is a webpage built to view the BAC concentration levels of the driver The system is powered by a 5-V DC source. The system has two thresholds, first(pre-drunk threshold) for communicating the BAC level and coordinates of the vehicle to the monitoring system and the second (drunk threshold) for sending alert message to the authorized person.

When it comes to Detection of accident If an accident occur in a national highway roads and no one there to rescue the person who met with an accident this may be due to lack of emergency facilities and rescue team to overcome these drawbacks the project proposes this method which can automatically indicate the device for vehicle accident. This project can be used to protect the people from the risk as soon as possible after occurrence of the accident wasting the time may lead to death. so this system will detect the accident within the less time and convey the information to the police station and to rescue system after a few seconds.

The location of the accident place will be detected by GPS by tracking, the vehicle GSM controller is used to save the mobile number in the EPROM and send the message to require person when an accident occurred. In the system through GPS module the location of vehicle accident is tracked and the message is transmitted through GSM modem. Switch is provided to terminate the message sending when there is no severe injury. By this method the time of rescue system can be saved. Accident is detected using a vibration sensor. By this method the emergency facility will be efficiently used during the road accidents. Accelerometer sensor can be used in a car alarm application. By this sensor dangerous driving can be detected. Due to advancement technology. There is need for the identification of exact vehicle location, better data transfer facilities freedom to motoring the software.
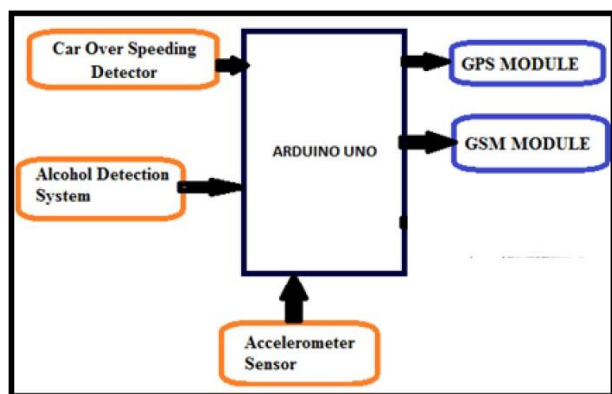
2. METHODOLOGY

Fig-2.1: Block Diagram

By interconnected network of physical devices, vehicles, appliances, and other objects embedded with sensors, software, and network connectivity. These devices collect and exchange data, enabling them to communicate and make intelligent decisions.

Connected sensors like MQ3-Alcohol Sensor, ADXL335-Accelerometer sensors, and IR proximity sensor to the Arduino Uno, creating a sensor array. Then establish a reliable serial connection between, GSM Module, GPS Module, wi-fi module and Arduino Uno for seamless data transmission. To sense and alert the respective authority and rapid rescue team in case of any abnormality and emergency.

The core of this setup includes and Arduino UNO microcontroller, which acts as the central processing unit for data aggregation and decision making. Connected to the Arduino, it have a GPS module to constantly monitor the vehicles position and speed. Alcohol sensor is connected to detect alcohol levels in the drivers breath.

To communicate alerts and emergencies, there is GPS and GSM Module that allows the Arduino to send real time messages and location details to designated emergency contacts or rescue teams.Accelerometer sensor is connected to detect the crash based on the sudden change in the meridians.
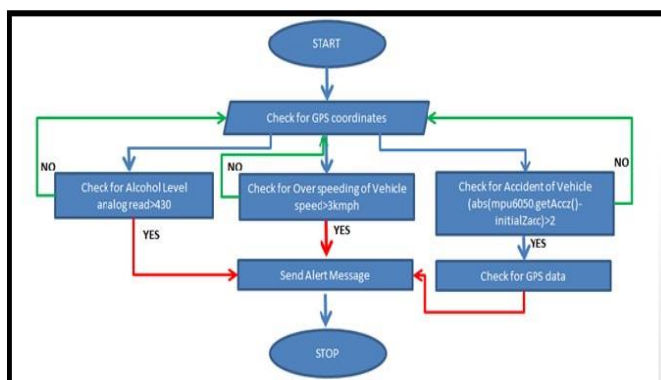
2.1 FLOW CHART

Fig-2.2 Flow Chart

The System after initiated check for the latitude and longitude coordinates and keeps a continuous track of them for the entire operations of the system. There are three main factors the proposed system encounters, those are presence Alcohol level in the vehicle cabinet , over speeding of the vehicle and the accident of the vehicle.

As shown in the above flow chart, if the detected alcohol level exceeds the preset analog reading i.e (>430),the sensor transmits the trigger signal to the Arduio UNO board to send the Alert SMS to the authorized person or emergency contact which is been saved in the GSM board. Similarly if the car speed increases the preset value (i.e >3kmph) the GPS sensor sends a trigger signal to the Arduio UNO board to send the Alert SMS to the authorized person or emergency contact which is been saved in the GSM board.

Incase of vehicle crash if the absolute value of the accelerometer sensor changes above the preset valve (i.e >2),the accelerometer sensor sends trigger pulses to the arduino uno boards to communicate with the GPS module and GSM Module to send the alert message along with the location of accident caused at.

If the measure values of the sensors are within the respective limit of the present values, there are no trigger pulses sent to the Arduino UNO board and hence, no SMS Alert received.
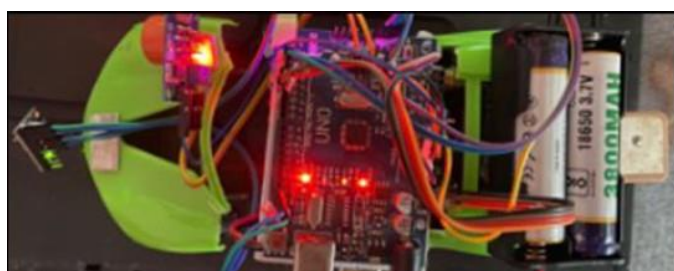
3. RESULT AND DISCUSSION

Fig-2.3:Module

The impressive results in detecting and responding to risky driving behaviors effectively. Through rigorous testing and evaluation, this project have successfully demonstrated the system's ability to detect over speeding, alcohol consumption by drivers, and accidents automatically.

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The GPS module continuously tracks the vehicle's position and speed, enabling real-time monitoring of driving behavior. When the vehicle exceeds predefined speed limits, alerts are triggered, and relevant data, including the vehicle's location, is sent via the GSM module to the designated rescue team or authorities. This proactive approach allows for immediate intervention and enforcement of speed regulations.

Furthermore, the alcohol sensor plays a critical role in preventing drunk driving incidents. By analyzing the driver's breath for alcohol content, the system can disable the vehicle's operation if the driver is deemed impaired. Alerts are then sent to inform authorities of the detected alcohol consumption and the vehicle's location, facilitating prompt intervention.

In terms of accident detection, the accelerometer sensor proves vital. Sudden changes in acceleration or deceleration indicative of a crash prompt the system to automatically send distress messages containing the vehicle's precise location to the rescue team. This rapid response capability significantly reduces emergency response times and enhances the likelihood of providing timely assistance to those involved in accidents.

Overall, the project's successful implementation showcases the feasibility and effectiveness of utilizing advanced sensor technology coupled with Arduino-based processing for enhancing road safety. The system's ability to detect and report overspeeding, drunk driving, and accidents in real-time ensures a proactive and efficient approach to mitigating road risks and safeguarding lives on the road.
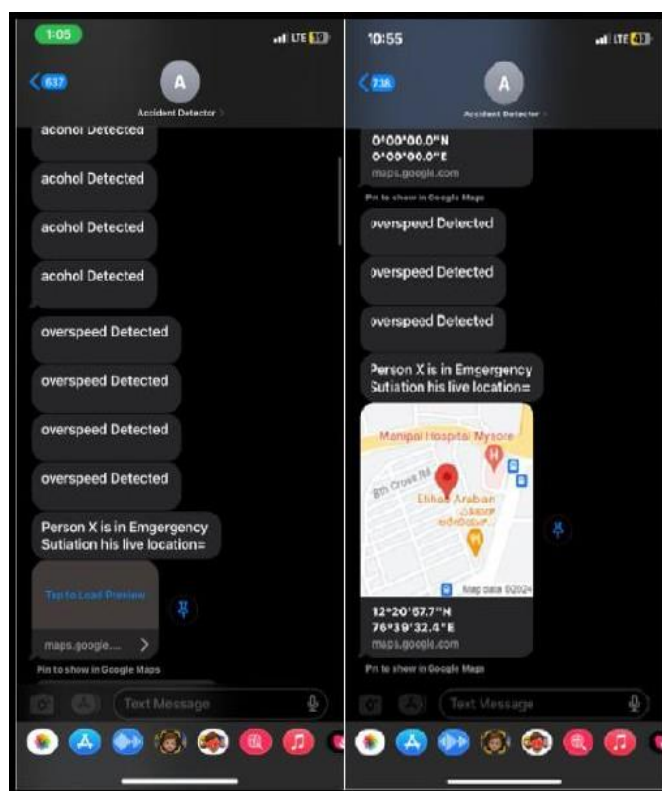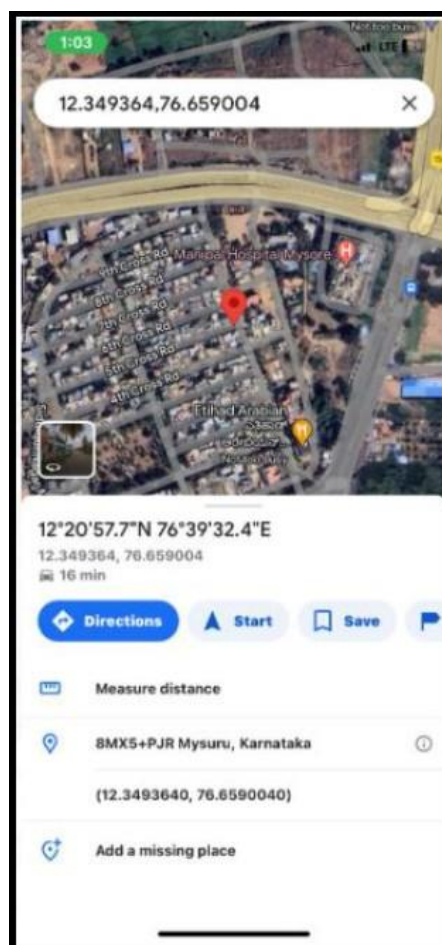

Fig-2.4:SMS Alert

Fig-2.5 Location Tracking

3.1 ADVANTAGES

1.It has fast recovery and quick process that reduces time for rescue the victim

2. It has good network coverage and location tracking system.

3.The device is a wireless monitoring and user-friendly operation.

3.2 APPLICATIONS

1.It can be used for theft tracking of the vehicle

2.Parental control and teen monitoring

3.Insurance Telematics

4. CONCLUSIONS

This project can track and prevent drunk driving, monitor vehicle speed, and respond to accidents with automated notifications to emergency services marks a significant step forward in enhancing road safety. By integrating alcohol consumption detection systems into vehicles, coupled with real-time monitoring of speeding behavior, this project addresses critical factors contributing to road accidents.

The ability to promptly notify emergency rescue teams with precise accident locations is a game-changer, potentially reducing response times and improving outcomes for those involved in accidents. This technology not only emphasizes preventive measures but also facilitates rapid emergency response when incidents occur.

Moving forward, this project underscores the importance of leveraging technology for public safety initiatives. Further enhancements could involve refining alcohol detection accuracy, optimizing speed monitoring algorithms, and expanding the system's reach to more vehicles and regions. Ultimately, the goal remains clear: to create safer roads by proactively addressing risk factors and ensuring swift, effective responses to emergencies on the road.

4.1 FUTURE SCOPE

1.Enhanced Data Analysis: Implement advanced algorithms for real-time data analysis of alcohol levels and driving behavior. This could involve machine learning techniques to predict patterns of impairment based on alcohol consumption, vehicle speed, and driving style.

2.Integration with Vehicle Systems: Develop seamless integration with vehicle sensors and systems to gather real-time data on speed, acceleration, braking, and other driving parameters. This may involve collaboration with automobile manufacturers to embed such functionalities into new vehicles.

3.Mobile Application Development: Create a user-friendly mobile application for drivers that provide feedback on their alcohol consumption levels and alerts them if they are unfit to drive. The app could also monitor vehicle speed and issue warnings if the driver exceeds safe limits.

REFERENCES

1 Sanjana. K.R, et. al proposed "An Approach on Automated Rescue System with Intelligent Traffic Lights for Emergency Service" in the year 2018

2 Bankar Sanket Anil, Kale Aniket Vilas, Prof. S. R. Jagtap proposed an" Intelligent System for Vehicular Accident Detection and Notification" in the year 2018

3 NajiTaaib Said Al Wadhahi, et. al proposed "Mishaps Detection and Prevention System to decrease Traffic Hazards utilizing IR Sensors" in the year 2021

4 Nicky Kattukkaran et. al proposed an " Intelligent Accident Detection and Alert System for Emergency Medical Assistance" in the year 2020.

5 Sibley, Henry C. (Adams Basin, NY) Auer Jr., John H. (Fairport, NY) Smith, Willis R. (Rochester, NY) proposed "Overspeed Detector For Vehicle Control System"

6 Pham Hoang Oat, Micheal Drieberg and Nguyen Chi Cuong, Proposed "Development of Vehicle Tracking System using GPS GSM Modem":IEEE 2013

7 Killoran, A., et al.: Review of effectiveness of laws limiting blood alcohol concentration levels to reduce alcohol-related road injuries and deaths. Final report. Centre for Public Health Excellence (NICE), London (2010)

8 Lee, J.D., et al.: Assessing the feasibility of vehicle-based sensors to detect alcohol impairment. National Highway Traffic Safety Administration, Washington, DC (2010)

9 James, N., John, T.P.: Alcohol detection system. IJRCCT 3(1), 059–064 (2014)

10 Phani, S.A., et al.: Liquor detection through automatic motor locking system: in built (LDAMLS). Int. J. Comput. Eng. Res. (IJCER) 4(7), 2250–3005 (2014)