

Automatic Vehicle Accident Detection and Prevention System

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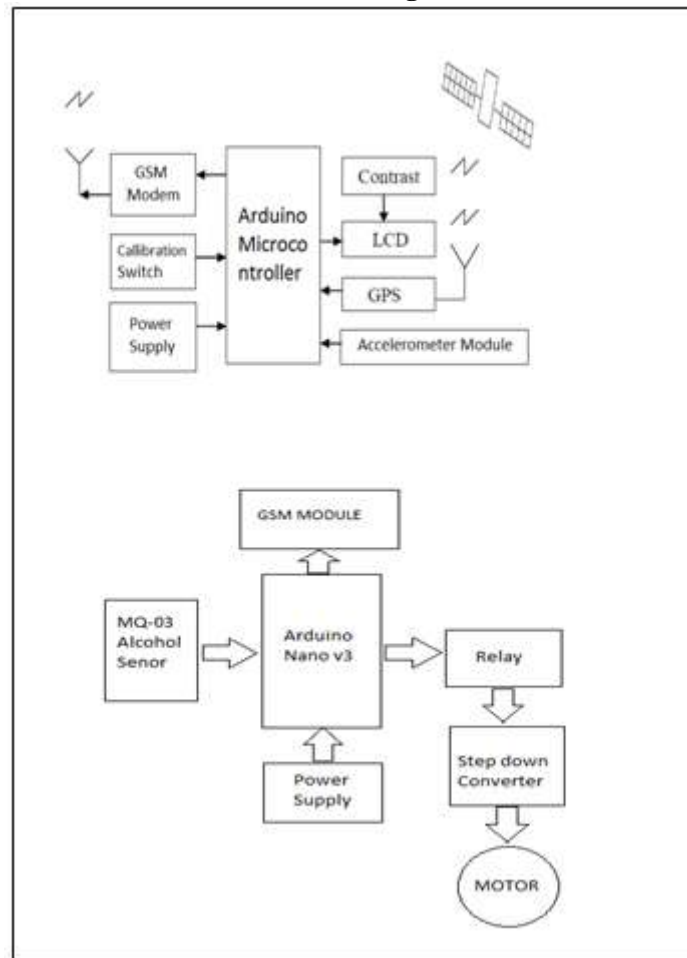
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Abstract—Nowadays due to increase in traffic many people are died on the road due to the accidents. The main reason is "delay in rescue". This problem is very big in developing countries, so we designed this project for saving the human lives. The alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. This design is system that sends the location of the site of incident, In the project GPS module is used to detect the exact current location of vehicle. At the time of accident accelerometer detects heavy shock and ARDUINO sends the location link of the vehicle to the relatives or friends, we can send the alert to multiple mobile numbers provided in program. Similarly the biggest cause of accidents is drunk driving. Most of the cases of drunk driving involves commercial vehicles such as cabs which causes big loss of human life. We cannot prevent drivers from consuming alcohol but we can prevent them driving the vehicle. Here we use alcohol sensor to continuously monitor the Blood Alcohol Content (BAC) from drivers breath and if it is found above legal limit then as SMS will be send to the police control room or owner of the vehicle and vehicle will fail to start if alcohol is detected before starting of the vehicle and if it found while it is running on the road then speed will be limited to as safe speed by system.

I. Introduction

The increase in number of vehicle has increased the traffic hazards and the road accidents occur frequently which causes huge loss of life due to the poor emergency facilities. Our project will provide an optimum solution to this problem. An accelerometer can be used as a crash or rollover detector of the vehicle during and after a crash. According to this project when a vehicle meets with an accident or if a car rolls over, accelerometer will detect the signal, and sends it to ARDUINO. ARDUINO sends the alert message through the GSM MODEM including the location to police control room including family members. So the police can immediately reach the location through the location given by the GPS MODEM in the alert message. If the person meets with a small accident then the alert message can be terminated by the driver by an I AM OKAY switch provided. Also to prevent the accidents caused due to consumption of alcohol an MQ-3 ALCOHOL SENSOR is placed on steering which monitor the Blood Alcohol Content (BAC) from drivers breath and if the it is above legal limit then an alert message will be sent through the GSM MODEM to the police control room or to the owner in case of the commercial vehicles such as Cabs and immediately system will apply limit on vehicle's speed such as 20KM/Hr, above which driver cannot drive the vehicle.

II. Block diagram



A. ARDUINO

Arduino is an open source hardware and software platform, which manufactures the single-board microcontrollers for building digital devices and interactive objects that can be sensed and controlled both physically and digitally. Its products are licensed under the GNU Lesser General Public License, permitting the manufacture of these boards and software distribution by anyone. Arduino boards are available in preassembled form and also as do-it-yourself (DIY) kits.

B. GPS (Global Positioning System)

GPS is used in vehicles for tracking and navigation purpose. Tracking systems keep track of the vehicles without the intervention of the driver whereas navigation system helps the driver to reach the destination. Whether navigation system or tracking system, the architecture is approximately similar. When an accident occurs in any place then GPS system tracks the position of the vehicle and sends the information to a particular person using GSM by alerting the person through SMS or by a call. GPS works in any weather conditions, anywhere in the world, without subscription fees or setup charges.

C. GSM (Global System for Mobile Communication)

A GSM modem is a device which can be either a mobile phone or a modem which can be used to make a computer or any other processor or microcontroller to communicate over a network. A GSM modem requires a SIM card to operate and operates over a network range subscribed by the network operator. It can be connected to a personal computer through serial, USB or Bluetooth connection.

D. ACCELEROMETER

Accelerometer is used to detect the sudden changes in velocity, it can separately detect the shock in X, Y and Z directions. We can use "vibration sensor" instead of accelerometer, but accuracy of vibration sensor is not too good. Accelerometer can detect the vibration in X, Y, Z direction, so it is also an important point.

E. 16*2 LCD DISPLAY

LCD (Liquid Crystal Display) is an electronic display module and has a wide range of applications. A 16x2 LCD display is basic module and is commonly used.. These modules are preferred over seven segments and other multi segment LED's. The reason is they are economical; easily programmable; have no limitation on displaying special characters ,animations and so on.A 16x2 LCD means it can display 16 characters per line and there are 2 such rows.

F. ALCOHOL SENSOR (MQ-03)

They are suitable for alcohol tester, Breathalyser. Structure and configuration of these gas sensor is composed by micro AL₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a body made up of plastic and stainless steel net. The heater provides necessary conditions for work of sensitive components.

III. Methodology

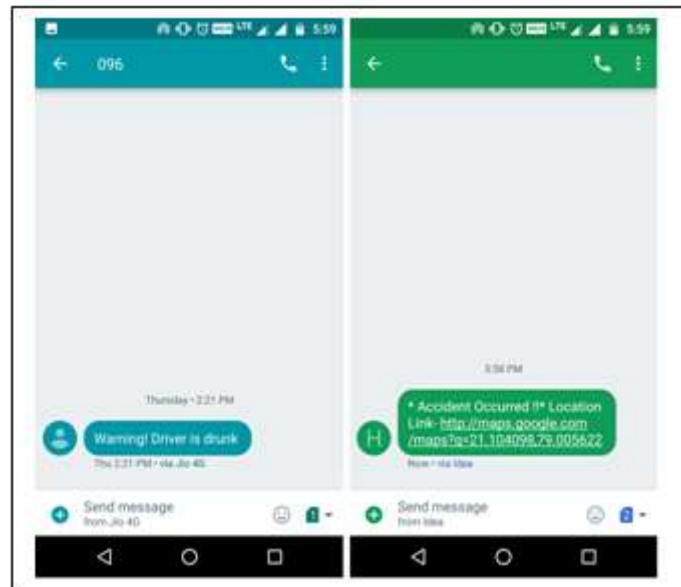
Arduino nano is used as controlling unit, it reads the values from accelerometer, when arduino reads any abnormal values(i.e When accident occurs), it retrieves the current location from GPS module, and send it to given mobile numbers over SMS by using GSM module. Before sending the SMS arduino activate the buzzer, after 20 seconds of beep SMS will be sent, but if someone press the "I AM OKAY" switch, message will not sent, which helps to prevent unnecessary SMS. MQ-3 ALCOHOL SENSOR is placed on steering which monitor the Blood Alcohol Content (BAC) from drivers breath and if the it is above 0.05% or 30mg alcohol in 100 ml blood then an alert message will be sent through the GSM MODEM. Limiting the speed of vehicle is possible in case of electric vehicles which will be achieved by reducing the voltage applied to the motor of vehicle using step down voltage converter and relays.

IV. Working model



V. Result

The mobile number of the receiver should be included in the software programming in order to receive the accident location link from the SIM card which we are using in GSM modem. Motor stops automatically when alcohol is detected and hazard LED lights on vehicle gets on. There is speed limit on the vehicle. Here one switch is provided to send a message we are safe, when there is no serious injury happen. Due to this we can save the valuable time of emergency medical services.



VI. Conclusion and future work

A very useful wireless system using Accelerometer and GPS tracking system has been developed for vehicle accident detection and prevention. This vehicle accident detection and prevention system will provide crucial information to the family members or friends in the minimum possible time. The important time between the accident and getting medical attention to the victim can often be the difference between life and death. This system provides better safety compared to no safety. In future we can interface this system with vehicle airbag system and eye blink system. This will optimize the proposed technology to the maximum extent and will deliver the best accident detection and prevention system for increased hazards of traffic.

References

- [1]. N.Watthanawisuth,T.Lomasanda.Tuantranont, “Wireless Black Box Using MEMS Accelerometer & GPS Tracking for Accidental Monitoring of Vehicles”, Proceedings of the IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI 2012) Hong Kong and Shenzhen, China, 2-7 Jan 2012.
- [2]. Saurabh c, V.R. kapur, Y.A.Suryawanshi, “ARM Hardware Platform for Vehicular Monitoring and tracking”, International Conference on Communication Systems and Network Technologies 2013
- [3]. “Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem” C.Prabha , R.Sunitha , R.Anitha, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering,ISSN ONLINE (2278-8875) PRINT (2320-3765)
- [4]. GPS: Theory and Practice, B. Hofmann-Wellenhof et al., Springer Verlag, 1992, ISBN 3-211-82364-6
- [5]. Understanding GPS: Principles and Applications (Artech House Telecommunications Library), Elliott D. Kaplan (Editor)
- [6]. Salas Jose, Namitha Mathew, X. Mary, “ARM 7 Based Accident Alert and Vehicle Tracking System”,International Journal of Innovative Technology and Exploring Engineering, Vol-2,Issue-4
- [7]. Dr. Kamal Jain and Rahul Goel “GPS Based Low Cost Intelligent Vehicle Tracking System” International Conference on Traffic and Transportation Engineering, Vol. 26, issue no. 36, 2012
- [8]. Abdallah Kassem, Rabih Jabr, Ghady Salamouni, ZiadKhairallah Maalouf Department of Electrical and Computer Engineering, Notre Dame University, “Vehicle Black Box System”, SysCon 2008 - IEEE International Systems Conference Montreal, Canada,pp.1-6, April 2008.
- [9]. Nimisha Chaturvedi, Pallika Srivastava .“Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem “,Volume: 05 Issue: 03 , Mar-2018
- [10]. Vikram Singh Kushwaha , Deepa Yadav, Abuyeed Topinkatti, Amrita Kumari . “Car Accident Detection System using GPS & GSM”, Volume 2 , Issue 1(Jan-Feb 2015), PP12-17
- [11]. Accelerometer <http://www.engineersgarage.com/articles/accelerometer>