



EMBEDDED AND IOT BASED ACCIDENT DETECTION SYSTEM FOR SMART VEHICLES USING NODEMCU

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Abstract :

The Internet of Things (Arduino UNO) has endless possibilities for public and private use. Automotive manufacturers are interested in Arduino UNO applications to improve vehicle safety, meet customer needs and ultimately deliver products that maximize profits. The healthcare industry wants to know how Arduino UNO can increase the speed and accuracy of communication. This article describes the possibility of installing a vehicle with technology that can detect the situation and immediately notify first responders. Thanks to this embedded system, accidents are prevented and necessary precautions are taken in this system. Ambulance and police agencies can easily locate the location as the location is sent to the smart device via a mobile phone connection along with a Google Maps link. Motors, buzzers, LEDs, etc. all these devices are connected to the central microcontroller. We will use blink sensors to detect sleep and by setting a time limit we will be able to warn the driver if he is sleepy. Temperature sensors help us detect engine temperature and we can warn the driver if the engine is hotter than normal. Alcohol sensors can help us detect whether the driver is drunk. If he is drunk, the car will sound an alarm and the engine will stop. The GPS6m module gives us the current position, speed, time and date of the vehicle at a particular location. After a simple accident, everything will be fine, so the driver in this situation can again show the ambulance and the police station. The Nodemcu microcontroller sends an email alert to the Arduino UNO with the location of the police control room or rescue team. The main purpose of our study is that the face sensor makes a sound and turns off the engine when the driver approaches the eyes or sleeps.

Index Terms – UNO, Accelerometer 335, GPS, vibration sensor, eye blink sensor ,GSM 900,nodemcu

I.INTRODUCTION

The increase in population causes an increase in traffic and accidents. The number of accidents, injuries and deaths per million people worldwide has increased significantly over the years. The main reasons for this are increased traffic, changing traffic conditions and lack of traffic control. According to the World Health Organization (WHO) Global Road Traffic Report, India ranks first in the world in terms of road deaths. 13 million people died in traffic accidents in India in 2014&2015. According to the investigation, the causes of accidents include excessive speeding, drunkenness, inadequate use of helmets and car seats, child restraint system, bad police, bad roads, etc. It is located. higher. Many lives were lost due to inadequate emergency services and unknown accident locations.

II. BLOCK DIAGRAM:

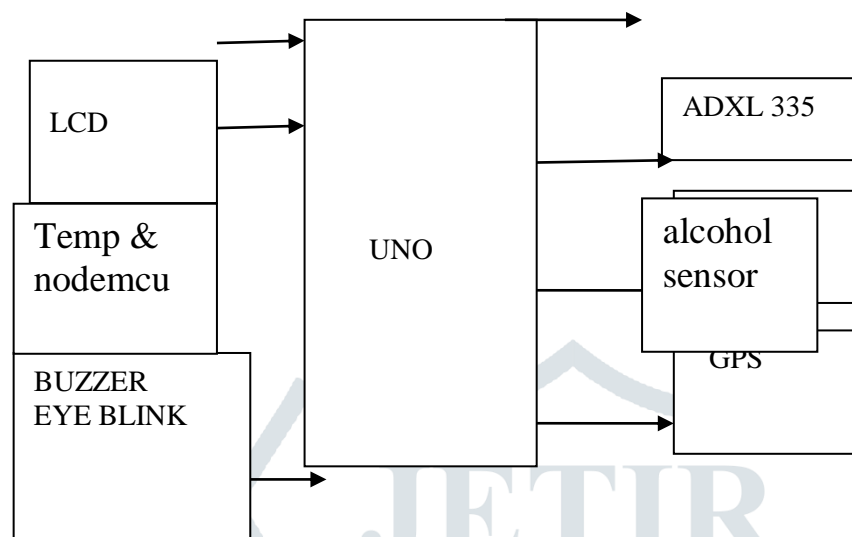


Fig. System design diagram

The 335 sensor used to detect force, pressure or strain applied on a vehicle during accident. This produces analogue signals which are converted to digital signal by Arduino. and Accelerometer which is connected to microcontroller is used for detecting the tilting angle and speed drop and acceleration of vehicle. Based on threshold values and inputs from these sensors as soon as an accident is detected the SIM900 module will get activated. Using GPS module NEO6M the coordinates of accident are taken and those coordinates are sent to Emergency contact and Health care using SIM900 which is GSM module for sending a SMS. The camera is set at the dashboard of the vehicle which clicks the image of the driver and sent to the server along with the exact GPS coordinates using wi-fi module nodemcu. At the server the image along with exact coordinates and will be sent to nearby Hospitals and Emergency Contacts of the person.

III.SENSOR AND WORKING

a) **SIM900A** – SIM900A is quad band (850/900/1800/1900MHz) GSM/GPRS module. It is used to send SMS, transfer data and voice hence used in the embedded customer application. It requires SIM card for service to activate. It requires external power supply to work. After accident is detected, GSM module sends system generated messages to nearby emergency health care and pre-set contacts.



Fig. SIM900A

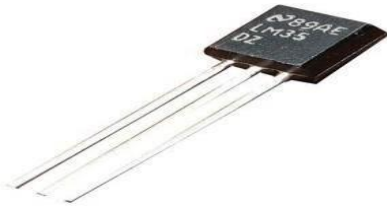
EYE BLINK SENSOR

The eye blink sensor senses the eye blink using infrared signal. The variation across the eye will vary as per the eye blink. If the eye is closed the output is high otherwise the output is low.



TEMPERATURE SENSOR (LM35)

LM35 is a precision Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C . It can easily be interfaced with any Microcontroller that has ADC function or any development platform like Arduino.



ALCOHOL SENSOR (MQ-3)

MQ-3 module is suitable for detecting Alcohol, Benzene, CH_4 , Hexane, LPG, CO. Sensitive material of MQ-3 gas sensor is SnO_2 , which with lower conductivity in clean air. When the target alcohol gas exists, the sensor's conductivity is more higher along with the gas concentration rising. MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor. This sensor provides an analog resistive output based on alcohol concentration. When the alcohol gas exists, the sensor's conductivity gets higher along with the gas concentration rising.



ACCELEROMETER (ADXL 335)

An accelerometer is a device that measures proper acceleration. Proper acceleration, being the acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system. For example, an accelerometer at rest on the surface of the Earth will measure an acceleration due to Earth's gravity, straight upwards (by definition) of $g \approx 9.81 \text{ m/s}^2$. By contrast, accelerometers in free fall (falling toward the center of the Earth at a rate of about 9.81 m/s^2) will measure zero.



b) **NEO6M** - It's a fully functional and independent GPS receiver module. It needs satellite connection to work. It gives latitude, longitude, date, time, altitude etc. data which is received by satellite. External antenna is used to catch the satellite signal. It takes 3V to 5V of power supply. It does not work on cellular network hence does not require any network or sim card for its function.

c)

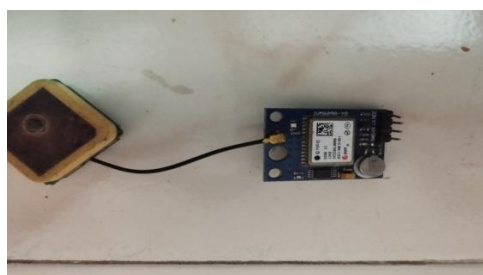


Fig. NEO6M

- **ULTRASONIC SENSOR :**

The HC-SR04 is a range sensor that allows for contact distance measurements ranging from 2 cm up to 400 cm. This sensor operates by emitting a pulse and calculating the time it takes for the echo to return. The object's distance is determined by calculating it using the speed of sound.

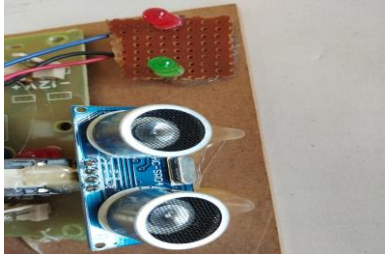


fig HC-SR04

- **MOTOR DRIVE :**

The L293D is an integrated circuit motor driver known for its H bridge configuration. When it comes to operating DC motors in robotics and other related sectors, it is the recommended choice. This integrated circuit is noteworthy for its ability to regulate the speed and direction of two DC motors.

IV.CONCLUSION

In this article, as a result of all the analysis and research we have done, we decided that this system can help detect the situation in a short time using sensors, coordinate the accident scene and send it to the nearest health and emergency center. Contact them to inform them of the situation. Additionally, the images captured can help understand the extent of the user's injury. The parameters used to measure collisions are speed, angle, and response to external force or stress. The system, whose capabilities have been expanded, can also be used to prevent vehicle theft using GSM and GPS. The system is automatic, low-cost, energy-saving and easy to install in the vehicle. Unfortunately, in case of an accident, the system detects it and uses the GSM module with the help of GPS to show the exact location and notify emergency centers. This helps rescuers be notified quickly, thus saving many..

V. RESULTS AND DISCUSSION



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