International Journal of Recent Advances in Multidisciplinary Topics
Volume 2, Issue 7, July 2021
https://www.ijramt.com | ISSN (Online): 2582-7839

Automatic Vehicle Speed Control and Accident Detection and Messaging System

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***Abstract*: Road accidents have been very common in the present world with the prime cause being the careless driving. The necessity to check this has been very essential and different methods have been used so far. However, with the advancement in the technology, different governing bodies are demanding some sort of computerized technology to control this problem of over speed driving. At this scenario, we are proposing a system to detect the vehicle which are being driven above the given maximum speed limit that the respective roads or highway limits. And if the person did not control his speed there is a chance of accident. if accident occurs, the location of the accident spot will be sent to nearest hospital and police station via GSM module. Our project will provide an optimum solution to this draw back. An accelerometer can be used in a vehicle alarm application so that dangerous driving can be detected.**

***Keywords*: Arduino, GSM, GPS, Sensors.**

1. Introduction

The main objective of this project is to control the speed of any vehicles in schools, hospitals and speed in restricted regions etc. Smart speed breakers are the traffic claiming devices where over speeding vehicles will activate the speed breaker and it will raise the speed breaker above the surface of the road. e. If the speed of the vehicle will be in the given allowed speed limit then the speed bumps will remain flat on the surface of the road and the vehicle can pass through it comfortably. If the vehicle does not slow down his speed limit then there is chance of accident occurrence and comes the second phase of the project which is accident detection and messaging system using GSM and GPS module. The system implemented by us aims at automatically detecting an accident and alerting the nearest hospital or medical services about the exact location of the accident. This system sends the basic information to the medical rescue team within a few seconds of an accident. This device can detect accidents and sends an alert message to rescue teams in significantly less time which will help in saving the lives of the people. The alert message contains the geographical coordinates, time and angle in which the accident has occurred. When an accident occurs, it is detected with help of a sensor which activates the device, the sensor gives its output to the microcontroller. The microcontroller sends the alert. We have used GPS and GSM module for our project. GPS (Global Positioning System) is a satellite navigation system used to determine the ground position of an object. It is a global navigation satellite system that provides geo location and time information to a GPS receiver anywhere on or near the Earth. Here GPS is used for both tracking and navigation. This enables a base station to keep track of the vehicles and navigation system helps the driver to reach the destination. GSM is an open, digital cellular technology used for transmitting mobile voice and data services. The GSM system is the most widely used cellular technology in use in the world today. It has been a particularly successful cellular phone technology for a variety of reasons including the ability to roam worldwide with the certainty of being able to operate on GSM networks. It is also highly economic and less expensive.

2. Literature Survey

In this research, Road accidents are major issue facing by people across worldwide and key reason of accidents is irresponsible driving on speed breakers and ditches affecting high causalities due to no warning symbols maintained roadside, absence of street lights, deficient construction etc. There is a lot of research work is in progress in computer science related resolution but no element in positions of a product. Author developed an Android application to explain this and have collected data from various parts of Karachi city to identify forthcoming speed breakers during vehicle drive and ditches within a 10-12-meter radius. The application along with vector machine will be able to exactly caution users forward of time and prevent accidents which has been trained with data collected from various devices. Speed breaker and ditch localities are loaded on the cloud machines and sorted using well-defined threshold. With limited power consumption, the model developed with expected speed breakers and ditches up to 85% exactness. Road traffic accidents have been recognized as one of the adverse elements which contribute to the

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suffocation of economic growth in the developing countries, due to the high cost related to them, hence causing social and economic concern. So, Traffic safety is an important key and plays an integral role in sustainable transportation development. Now days, the main negative impacts of modern road transportation systems are injuries and deaths in road accidents. The success of traffic safety and highway improvement programs hinges on the analysis of accurate and reliable traffic accident data. The present study provides a useful insight into the development of intelligent transport systems research fields revealing those scientific actors (authors, countries, and institutions) that have made the biggest research contribution to its development.

3. Methodology

The Proposed Automated Smart Speed breaker system with IOT which will be surfaced and will show up only if the vehicle speed is higher than permissible limits. To control lift of the speed breaker Arduino based board are preferred which triggers a motor for surfacing the speed breaker system, for real time control RTC circuit is used. Depending upon the speed of the vehicle and the distance of the vehicle from the speed breaker, the Arduino board sends a signal to buzzer to start the beep sound to warn the driver that its speed is beyond the permissible speed. If the speed of the vehicle will be in the given allowed speed limit then the speed hump will remain flat on the surface of the road and the vehicle can pass through it comfortably. If the speed is more than the allowed speed, then Arduino board sends a signal to servo 90 motor to rotate 90 degrees causing the speed hump to rise above the road surface.

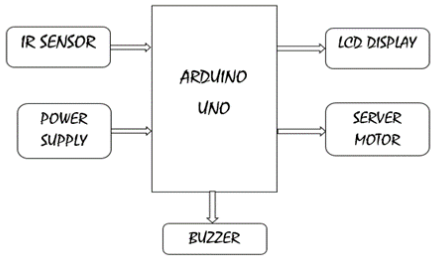

Fig. 1. Block diagram of Vehicle speed monitoring and controlling

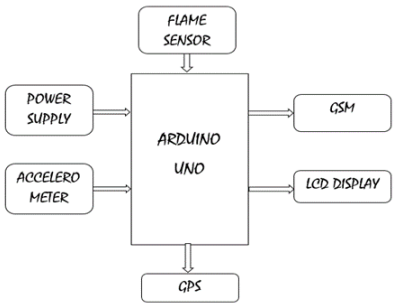

Fig. 2. Block diagram of Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS

In this era of large professional growth everybody is busy with their lives. People, especially in urban areas have to move from one place to another any time of the day with much of speed. Due to this reason and sometimes due to in efficient people in the driving seats road accidents are quite common thing that can happen. Road accidents can snuff out a life if the victim is not given proper medical attention at proper time. So, in this project we have planned to design a system that can detect road accident and identify the location through GPS. After that, through GSM interface this will be notified to the nearest emergency care unit so that the victim can get immediate medical attention.

4. Implementation

1) Sensor

For detecting the speed many sensors are used like weight or IR sensors. IR sensors are used in our project which is a multipurpose sensor, which can detect the vehicle speed. IR sensor emits the light, which is invisible to naked eyes but the electronic components can detect it. Our first module deals with the detection of vehicle speed on the road using IR sensors. IR sensors are placed at road at a distance from each other.

2) Arduino controller

The Arduino IDE provisions the languages C and C++ suing exceptional instructions of code structuring. The Arduino IDE provisions a software library from the Wiring project, which delivers various mutual input and output events. The Arduino controller is the key control unit of the system that will receive the input signals from the sensors, process it and according to it calculate the speed of the vehicle. In this module, IR sensors are used along with the Arduino board. Using IR sensors input speed of the vehicle is calculated.

3) Buzzer alarm

A buzzer or beeper is an audio signaling device which may be mechanical, electromechanical or piezoelectric. Here this work this buzzer will beep as the sensor sense the speed of the vehicle above the given speed i.e 20km/hr. Buzzer accepts the response send by together the sensor to the control unit and replies conferring to the code that loaded into the microcontroller. The speed breaker fitted with sensors senses the speed on the road and directs it to the Arduino microcontroller. This uses the information received from sensors and check whether it is above or below the permissible speed and if it is above the permissible speed then the buzzer will start sounding.

4) Speed breaker

In this module two proximity sensors are being used along with a microcontroller, led lights, buzzer and a servo motor. Using proximity sensors inputs speed of vehicle can be calculated by the microcontroller which based on its calculation controls the servo motor. If the vehicle speed is over set limit of 40km/hr. then the servo motor is triggered and the speed breaker is raised.

5) GPS module

GPS stands for Global Positioning System and is used to detect the latitude and longitude of any location on the earth, with the exact UTC time.GPS module is used in our project to track the location of the accident. This device receives the coordinates from the satellite for each and every second, with

time and date. In our project, we have used GPS module SKG13BL, which is a Ultra High Sensitivity and Low Power GPS Receiver Module

6) GSM module

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries

7) ADXL335 accelerometer

An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force.

8) Flame sensor

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includes an alarm system, a natural gas line, propane & a fire suppression system.

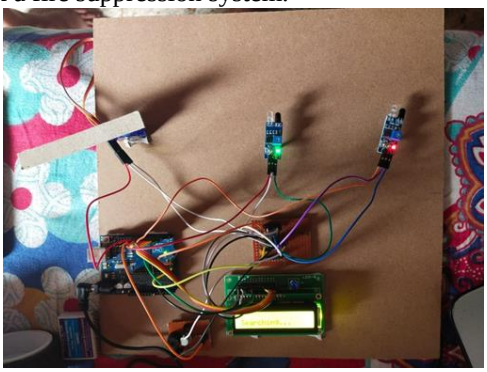

Fig. 3. Automatic vehicle speed monitoring and controlling

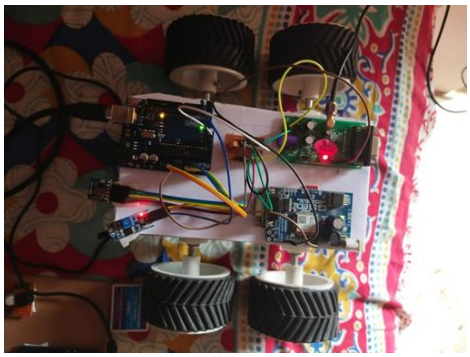

Fig. 4. Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem

5. Result and Discussion

After all the components are connected properly for the first function, If any vehicle travels within limit there will be no rise in the speed bakers and if any vehicle travels in the speed that exceeds our speed limit then the speed bakers will rise and in the LED it shows the speed limit at which the vehicle travelled. After all the components are connected properly for phase-2, the system is put into a moving car. If accident occurs, the acceleration due to the collision occurred is sensed by the ADXL335 Accelerometer and its x, y and z-axis ADC output pins are directly connected to Arduino ADC pin A1, A2, and A3. After successful compiling and uploading the program on Arduino IDE, the system is initialized successfully, the accelerometer is calibrated and the x, y and z samples of the vehicle are displayed on the output window. When the accelerometer is shaken abnormally, i.e., in case of an accident when there is an abrupt change of axis. Using GPS signal, the latitude and longitude of the current position of the vehicle. Will gives to the Arduino controller and Arduino controller will gives the signal to the GSM module to send SMS to the mobile number mentioned in the code and the latitude and longitude is also sent in the form of Google maps. The message is received in the specified mobile number along with the specific location.

Fig. 5. Exceeds our speed limit

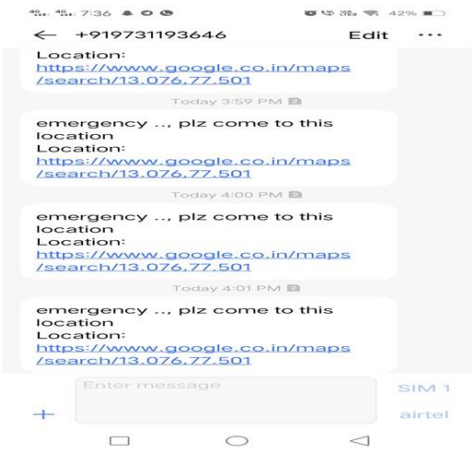

Fig. 6. Message received by the specified phone number

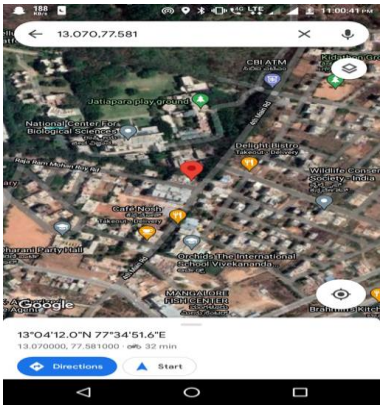

Fig. 7. Location of the accident sent via Google Map

6. Conclusion

We proposed and implemented a Smart Speed breaker system, Smart speed breakers are the traffic claiming devices where over speeding vehicles will activate the speed breaker and it will rise the speed bumps above the surface of the road.

If the speed of the vehicle will be in the given allowed speed limit then the speed bumps will remain flat on the surface of the road and the vehicle can pass through it comfortably. In implementation we will be using an iron finished flat speed breaker which is skilled of rising with the help of control circuitry of Arduino system. In this project we used an Arduino board and proximity sensors to detect the speed of vehicle and activate the speed breaker, buzzer is also used to warn the driver of speed breaker ahead of him. The main motto of the accident alert and detection project is to decrease the chances of losing life in such accidents which we can't stop from occurring. Whenever accident is alerted, the paramedics can reach the particular location to increase the chances of life. This vehicle tracking and accident alert feature may play a more important role in day-to-day life in the future. However, in some places where there is no provision of GSM networks it is difficult for communication.

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