Research Journal of Applied Sciences 12 (1): 26-30, 2017
ISSN: 1815-932X

A System for Issuance of Alert to the Driver on over Speeding with Android as Base Platform

Shriram K. Vasudevan, P.B. Sajan and N. Hari Prasanth
Department of Computer Science and Engineering, Amrita School of Engineering,
Amrita VishwaVidyapeetham University, Coimbatore, India

Abstract: Over speeding of vehicles is one of the major reasons for the occurrence of accidents these days. Several methods have been adopted to solve this problem but most of them are largely ineffective, manually operated or depends upon the user's ability to be alert while using them. The objective of this research is to provide an automatic speed alert and reporting system using Android which can inform a driver about his speed limit and alert him if he exceeds the permitted speed limit. The speed detection mechanism we have proposed helps in analysing the factors determining the reliability of travel speed in order to construct a methodology for the estimation of travel speed based on global positioning system and consequently to enhance the estimation process to be more economical and accurate. The driver will also be alerted to slow down the vehicle if there are any schools, hospitals or any such crowded area's in a near distance of his current location using the Google Maps API. Using this the driver can also check for the nearby hospitals or petrol bunks in case of any emergency.

Key words: GPS, google maps android, speed alert, accident avoidance system, travel speed, wireless network, google map based monitoring

INTRODUCTION

Android is one of the most trending technologies of the modern world and the smart mobile phone built using android is also the most commonly used technological device these days so it would be apt to use this technology in the process of determining the speed of a vehicle. The vehicle speed alert system is used to develop a technique for estimating the travel speed of a vehicle using GPS and its supporting technologies in smart mobile phone using the Android platform and also alert the user during a constant speed increase which can lead to an exceed in the permitted limits also the driver will be alerted to slow down when there is a school, hospital, etc. in a near distance of his current location using google maps API. The driver can also check for the nearby hospitals or petrol bunks in case of any emergency.

A methodology for travel speed estimation needs to be developed first and the reliability of the estimated travel speed in terms of accuracy needs to be evaluated. In the recent years although, we have witnessed many technologies which can detect the speed of a vehicle but none of them have the capability to alert the user in case of over speeding. Using the Google Map based monitoring it is not limited to find the location of the target but also calculates the distance travelled between the two stations (Verma and Bhatia, 2013). Android smartphones today are equipped with numerous sensors which can help in safety enhancement of the driver on the road (Fazeen *et al*., 2012). The use of GSM and GPRS also plays an important role for the estimation of travel speed (Devikiruba, 2013).The improved vehicle navigation system minimizes the GPS low dynamic limitations by using a zero motion detection system. Although, many works have taken place in this field but it was found out that the available systems were slow and did not provide the user with the accurate speeds also it showed a time lag with the real time speed of the vehicle. The results also showed trade-offs between the sampling ratios and the reliability of the section speed (Quiroga and Bullock, 1999) (Fig. 1 and 2).

Literature review: A safe drive support system includes a memory unit for storing road-map data including a safe driving area data, a present location detecting unit for detecting a present location of the vehicle. A GPS car navigation system derives GPS position update information from motion of the car along the actual track. Turns along the track are detected when they actually occur and are compared with the predicted turns so that

Corresponding Author: Shriram K. Vasudevan, Department of Computer Science and Engineering, Amrita School of Engineering, Amrita VishwaVidyapeetham University, Coimbatore, India

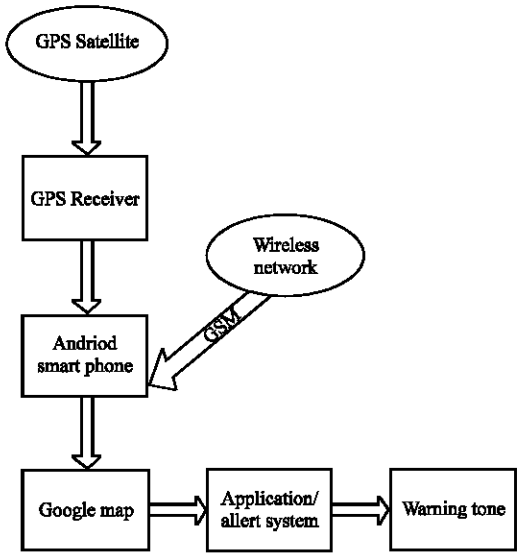

Fig. 1: Block diagram of working architecture of the alert system

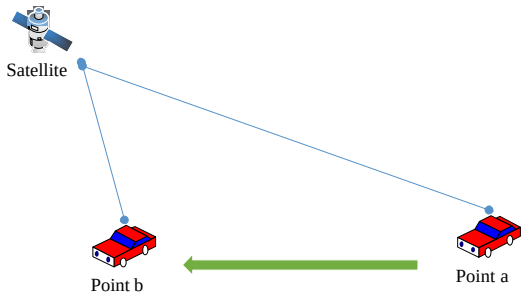

Fig. 2: GPS signals received from the satellite

the time and position at the actual turn can be used to update the then current GPS derived position of the vehicle.The use of GSM and GPRS also plays an important role for the estimation of travel speed (Kodavati *et al*., 2011).

The improved vehicle navigation system min the GPS low dynamic limitations by using a zero motion detection system.When a vehicle travels the road with the posted speed limit, it is often appropriate to monitor adherence by the vehicle to the posted max speed. The adherence does not have to be a strict one. It is sufficient for the vehicle to travel within 5-10 m h^{-1} of the posted maximum speed. Using the google map based monitoring it is not limited to find the location of the target but also calculates the distance travelled between the two stations (Verma and Bhatia, 2013). Android smartphones today are equipped with numerous sensors which can help in safety enhancement of the driver on the road (Fazeen *et al*., 2012).

MATERIALS AND METHODS

Proposed system

Location finder: The location finder researches with the help of the global positioning system which is a satellite based navigation system and is the most commonly used mobile applications in a smartphones, it can be of help for finding the source and destination of the user. One of the advantage of using a GPS is that it does not require an active internet connection to use it. Thus, it is possible to use it in places where internet connectivity is not available. Using gps the google maps works perfectly, with the help of it, it is possible to find the nearby areas much earlier than it is reached.

In our proposed system GPS plays an important role for finding the speed of the vehicle. Speed can be calculated using the formula total distance covered divided by the time taken to cover the distance. It can be represented as:

$$X = \frac{D}{T} \quad (1)$$

The speed of the vehicle while travelling is calculated at regular intervals between two GPS points. A clock present inside the GPS receiver which is a very accurate clock, is used for measuring the time taken by the vehicle in travelling between these two GPS points or locations.

Wireless cellular network: Wireless cellular network is a computer network using radio signals distributed over a wide geographical area. Using the wireless network provided by the network operators in our smartphone it is possible to know under which circle or tower the smartphone is being used. The user's smartphone searches for the nearby network signal in the antennas or tower's provided by the operator at different locations. The wireless network senses the signal strength it receives from an antenna and if the strength is weak it automatically looks for a nearby antenna with a stronger signal strength.

The network antennas are present at a minimum gap of around 0.8 m at different locations. Using it also the speed at which the user is travelling can be calculated. By the method of finding the distance travelled between two network locations and the time taken to cover the distance. But, unlike that of the GPS the provided location may not be precise. The precision of finding the geo location is high where advanced forward link methods are possible that is the mobile device is within the range of a min 3 cell sites and the precision is at its lowest when only a single cell-site can be reached.

Wireless network is mainly based on signal strength it receives from the nearest tower of the network operator so in our proposed system the speed calculation using

Fig. 3: Using google map API to find the nearby places of emergency

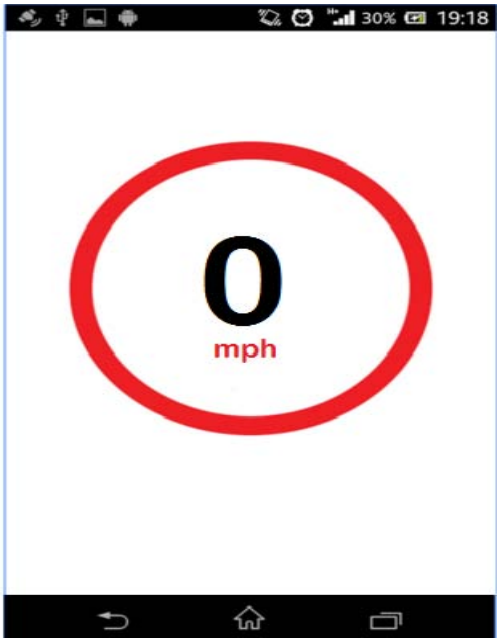

Fig. 4: Displaying the speed of the vehicle at still position

the wireless mobile network is kept as a second option in case's if there is a problem with the GPS system. The process of finding the nearby locations using the Google Maps is possible only with an active internet connectivity using the wireless network the speed at which the data's can be obtained basically depends upon the wireless connectivity that is being used by the user the 3G wireless networks can provide a speed 5-10 times greater than the dial-up telephone networks whereas the new 4G and LTE networks can provide even greater speed (Fig. 3 and 4).

Speed detector: In our proposed system the speed detector helps in calculating the speed at which the vehicle is moving based on the data it receives from the global positioning system and also it coordinates with the google maps in identifying the path that is being travelled to check for the maximum speed limit allowed in that area. The speed detector continually detects the speed of the vehicle from the input provided by the GPS and it displays it in the user's smartphone. The speed detector can calculate the speed of the vehicle using GPS more accurately than the traditional speedometer's which are used in the vehicles because those speedometers mostly depend on the wear and tear of the vehicle in showing their speed but in contrast the GPS based speedometers would be more accurate and precise because it basically depends on the data's it receives from the satellite.

Alert system: The alert system works in coordination with the speed detector and the google maps. First it will check for the location in the google maps and fix the max allowed speed limit in that area and then it coordinates with the speed detector and looks for a constant increase in the speed of the vehicle to provide an alert to the user if he over speeds the vehicle than the permitted limits in the

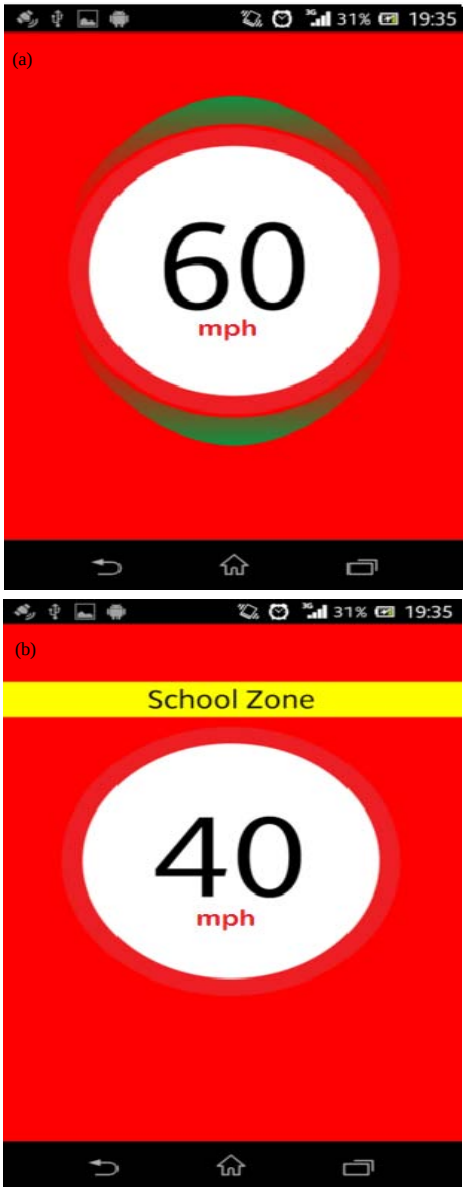

Fig. 5: An alert being issued when the vehicle crosses the: a) Speed limit; b) School zone

form of a warning tone in the users smartphone that he needs to slowdown which will help the user to reduce the speed of his vehicle.

One of the major things the alert system has to take care is that it needs to provide alert to the user only if there is a constant increase in the speed of the vehicle because the vehicle can brake at any point and the speed of the vehicle could be decreased so it has to check for a constant speed increase which can lead to over speeding of the vehicle to provide the alert (Fig. 5).

RESULTS AND DISCUSSION

Initially, we decided to build an alert system which could help the driver's in cases of over speeding the vehicle un-intentionally that is in cases where he doesn't know the permitted speed limits of an area by alerting them using their smartphones. Later, we thought of making it more effective by adding the feature of alerting the driver to slow down the vehicle if there are any schools, hospitals or any such crowded areas in a near distance of his current location using the google maps API.

In our research we have also found out that the speed indicated using the in-built speedometer is not as precise compared to that of the speed we found using GPS. As, vehicle speedometer depends mainly on the wheel size and also the general wear and tear of the wheel can lead to inaccuracy. Using this the driver can also check for the nearby hospitals or petrol bunks in case of any emergency. As one could argue that some of the luxury cars have the inbuilt features for alerting the driver in cases of over speeding but this system could be found useful for a large section of the society who doesn't own an expensive car. This would be found useful not only for 4-wheel driver but also for those who drive 2 wheelers. All you need is just a smartphone with the application in it.

CONCLUSION

We have created an android application that can be used in place of the traditional vehicle speedometer's for both 2 and 4 wheelers which can provide the user with precise speed of the vehicle using the GPS technology as the vehicle speedometer depends mainly on the wheel size and also the general wear and tear of the wheel can lead to inaccuracy in displaying the speed of the vehicle in speedometer. The display of alert and also the speed of the vehicle was achieved in a smooth and uninterrupted manner with the help of GPS and its supporting technologies.

The system poses to be user-friendly by providing accuracy and high precision. The system also is linked with the google maps which can be used to know the nearby locations in cases of emergency. There are chances for enhancement in this research where the proposed system can be linked to the central console display monitor of the vehicle so that the driver can look in for the data's easily and also provide more details about the vehicles locations, permitted speed limit of the current locations in the display monitor.

The challenges that has to be overcome is that if the GPS does not work in certain areas then in our system, we

have provided the use of wireless mobile network to provide the location data's but it doesn't provide precise data so, an alternate method needs to be found which can provide the location data's with the highest precision so that the system can work to its best efficiency. The industry-based application can also be created to provide a speedometer in the vehicle based on GPS to provide high efficiency using the base work we have created which would be a very challenging one.

REFERENCES

Devikiruba, B., 2013. Vehicle speed control system using GSM/GPRS. Int. J. Comput. Sci. Inf. Technol., 4: 983-987.

Fazeen, M., B. Gozick, R. Dantu, M. Bhukhiya and M.C. Gonzalez, 2012. Safe driving using mobile phones. IEEE. Trans. Intell. Transp. Syst., 13: 1462-1468.

Kodavati, B., V.K. Raju, S.S. Rao, A.V. Prabu and T.A. Rao et al., 2011. GSM and GPS based vehicle location and tracking system. Int. J. Eng. Res. Appl. IJERA., 1: 616-625.

Quiroga, C. and D. Bullock, 1999. Travel time information using global positioning system and dynamic segmentation techniques. Transp. Res. Rec. J. Transp. Res. Board, 1660: 48-57.

Verma, P. and J.S. Bhatia, 2013. Design and development of GPS-GSM based tracking system with Google map based monitoring. Int. J. Comput. Sci. Eng. Appl., 3: 33-40.