International Journal of Engineering & Technology, 7 (4.19) (2018) 507-509

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Automatic Speed Surveillance and Vehicle Alerting System Using Internet of Things (IoT)

Athira Gopal[1*], Haricharann D V[2], A Harikoushik[3], Ambrish V[4], Vineeth V V[5]

[1]*Department of Information Technology, Sri Krishna College of Engineering and Technology, Coimbatore.*
[2,3,4,5]*Department of Electrical and Electronics Engineering, Sri Krishna College of Engineering and Technology, Coimbatore.*
**Corresponding Author Email: athiragopal@skcet.ac.in*

Abstract

With the number of vehicles increasing day by day monitor report equally increasing traffic violation of speed limits, the numbers of accidents that are caused because of the speeding have increased at an exponential rate. There are existing law enforcements that do condemn these activities, but the human nature tends to break those. With an autonomous and automated system to regulate the Speed control by taking the advantages of advancements in technologies available can help to bring down the violations of law and thereby bringing the law enforcements at a stricter fashion. Automatic Speed Surveillance and Vehicle Alerting System Using Internet of Things (IoT) makes it easy for the Law enforcers to make the riders to follow the rules in a more permissive way without affecting the flow of traffic and the ride. Connected with Radio Frequency Identification and Wi-Fi with a Controller, the system, when implemented can bring down the speeding problem, with the controls lying on human hand for more accurate and real-time traffic monitoring, thereby not affecting the flow of traffic too. An Indigenous surveillance and alerting system autonomously files the reports when the limits are crossed, making the process of penalizing more sophisticated, thereby exploiting the full potential of the system.

Keywords: *Speed Surveillance, Internet of Things (IoT), Speed Control.*

1. Introduction

It is known that road accidents are increasing day by day. Numerous road accidents are happening because the automobiles are driven at higher speeds even in the places like sharp turnings and junctions exist. Running the automobiles at high speeds even at those places is the major cause for the accidents. 80% of road accidents are caused by human error says a report. Incidentally, the number of accidents for 100 vehicles in India is as high as 3.5 while the figure ranges from 0.4 to 1 in developed countries. Over-speeding usually remains the single biggest cause of road accident deaths in India with over 36% of all road traffic accident deaths occurring solely due to this reason.

The implementation of the proposed System yields a dynamic system where the speed controlling is needed according to the traffic and the flow can me set by the traffic controller and that will be transmitted by the beacon at the traffic signal sign boards and thereby the vehicle's driver will be notified. Violation of the Law for more than several times can be intimated through Internet of Things where all the vehicles are connected to the central server. After many Violations done, the vehicle can be made immobile until the fine levied is cleared and the case is closed. This provides a more secure and dynamic control system to the traffic controllers without needing to worry about the legal procedures that must be done manually which is time consuming and less efficient.

2. Literature Review

The Process of Speed Control in automobiles are done on a variety of types and based on various models proposed due course of the time. Every system has its own unique aspect to consider but if the systems try to achieve one thing in common, most of the systems have the basic infrastructure in common and they differ in the application part where the implementation and technology used may slightly differ[1].

A system has been developed, which considers the following points. The Speed of the Vehicle [11] [12] becomes the major Problem for any system, which is in the process of surveillance. The Vehicle can move at any speed given the control is with the commuter. To measure the speed within the vehicle, the vehicle has inbuilt accelerometer but to measure the speed of the vehicle on the exterior, there are special systems necessary. System uses GPS or the speed of the motor in the system to calculate the running speed of the vehicle[2]. This is one major advantage for most of the existing system. However, using a GSM Module can lead to failure of the intended target that the proposed system tries to achieve in its corresponding field. Controlling the speed of the vehicle by using an in-built autonomous system is commendable but that is a static limit that is fed into the systems cannot be apt for all the regions on which the vehicle tends to travel[3]. A static speed limit means no flexibility and if flexibility is removed, it cannot be made sure that the speed at which the vehicle can travel cannot always be the apt speed limit for all the regions in which the vehicle is travelling [10,13]. The Second Point to be noted in this paper is the application of the break sensors to reduce the speed of the vehicle. This concept can be taken forward to our proposed system where the speed can be gradually reduced based on this system[4].

Making the beacons an active transmitter of the signals is an innovative initiative, which can be incorporated with any kind of future speed control mechanism but it, needs more citation and improvements since the speed that is being fed into the beacon is still made manually and the process can be automated in future[5].

Therefore, the system being proposed can incorporate the Active transmitter [14] [15] beacons from this system where the active transceiver can be of a major role for the entire system, the process of speed control can be made more dynamic, and real time by making the vehicles to follow the rules imposed on them[6].
An Autonomous machine needs a processing system that can control not only the entire activities of the system on which the process is implemented, but also to perform the external commands received. So, a suitable Micro-controller is to be chosen for the proposed system so that the process can be more streamlined and autonomous in the implementation. And this should also be simple, portable and light weight so that the system can be implemented on a much larger scale[7].
Considering the potential of Internet of Things, linking of vehicles to a central server helps us to automate the process of fine collection, which helps us to be more productive and automated thereby enforcing the law at a stricter and more advanced manner by which the commuter can neither break the law nor forge it thus enabling a network of connected vehicles that follow the rules and move peacefully and in a clear flow[8]. Thus, making the system a self-sustaining one-point solution for the monitoring [16] – [18] of the overspeed vehicles, controlling the speeds of the vehicles on their own and the solution for some risk free and safe roads[9].

3. Objective

The main objective of the system is to provide a fully autonomous and flexible system for the process of speed monitoring and detecting to regulate the traffic that can occur at any point of the roads and this project helps in customizing the speed limits according to the live traffic of the region. Considering the potential of the applied Internet of things framework in the background, the vehicles that cross the overspeed limits the reports can be generated instantaneously and the commuter can be forbidden from taking the vehicle furthermore. The vehicle can be remotely locked from turning on again so that only after clearing of all charges on the owner of the vehicle will the vehicle be able to turn on again and continue the travel. This System makes it easy for the authorities to find and eliminate the over speed vehicles on the roads providing a safe and secure roadside for the fellow travellers on the roads.

4. Proposed System

In the proposed system, all the vehicles should be equipped with the automatic control system unit. This includes an RFID reader, a control board, an LCD screen, a buzzer and an ECU. Tags are installed at the beginning of speed limit zone and at traffic signal. When a vehicle enters the speed limit zone, or the speeds indicated by the beacons of the Sign Boards, RFID transceiver installed in the vehicle detects the tag code. This code indicates the speed which is to be maintained at that area. Transceiver transfers tag code to Control Board. When the controller gets the code, it senses the speed that is to be maintained in that area and registers. Then it compares the speed of the vehicle with the specified speed limit. If vehicle speed is lower or equal to the specified speed limit, no action is taken. But if vehicle speed is more the siren turns ON and the commuter is asked to reduce the vehicle speed down to the obtained limit. If the traveller reduces the speed, the vehicle can move. Instead if the speed is not reduced within the stipulated time, the Engine control unit (ECU) takes over and stops the vehicle and a notification is sent to the server that the speed limit has been breached in that vehicle.

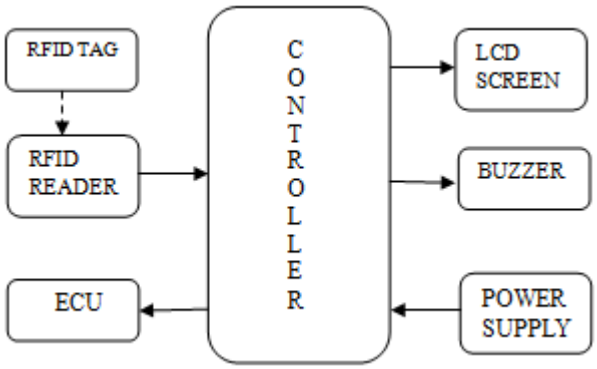

Fig. 1: Block Diagram of the entire proposed System

When this speed breach happens for more than the specified count that is registered in the server, the vehicle is not allowed to turn on after it is being turned off and it can again be turned on only after the clearance of the over speed charges that is imposed on that vehicle. This process ensures the active surveillance and fine imposition on the vehicle automatically and more accurately. Proposed system has the advantage that there is no available existing system that fully takes care of the problem statements. The application reduces the work of the users or the photographers to manually look into the process. Instead this system with a task manager and a checklist remains as a system of ease for every user.
The system mainly has seven important components: EM18 RFID Reader Module, Motor, LCD Display, Power Supply, Micro-Controller, Proximity Sensors and Drivers. The system board is based on EM-18 RFID module using the board with microcontrollers to read a card's data is very simple and requires just a serial connection. The board has a 5V voltage regulator, so it can be powered by 9~15V DC adaptor. The system purely is implemented on the speed of the motor and how it is operated and stopped. So, 10RPM 12V DC motors are used with Gearbox which can be scaled up to x1000 times so that it imitates an actual running motor. LCD Display displays the notification that should be notified to the user like the speed limits and the overspeed warnings. They are one of the most sophisticated display devices available. All components in the system runs in 12C DC Current which can easily obtained from the battery of the Moving vehicle. So in the prototype Step down transformer is used to reduce the current from 240V to 12V and an ADC to convert current from AC to DC Current. The major part in the entire system is the Micro Controller which is a general-purpose device that integrates several components of a microprocessor system on to single chip. Proximity Sensors are used to know the distance between the beacon and the vehicle. The Drivers are used in places where the DC Motor used needs to be controlled. The Drivers obtain signals from the Micro-Controller and controls the motor. This allows the micro-controller to feel less pressure and more smooth performance.

Advantages of Proposed System

- Full fledged implementation of the Speed Control System
- Real-Time Speed Limit Set-up
- Autonomous Control of speed in every individual vehicle.
- "Speed Limit crossed" Notification on every vehicle
- Autonomous Vehicle stopping mechanism without affecting the traffic.
- Speed Control is established based on the live traffic that is prevailing on the regions.

5. Conclusion

The research The Proposed System when implemented over a huge Geographical area, can be utilized for the monitoring of the traffic and control of it at a much advanced and automated way.

With an area specific speed limit setting with regards to the live traffic in that area can be more accurate than the static speed limit beacons that are erected in every area. This ensures the dynamic speed control over areas therefore making the control system more adaptive and responsive. The Fine collection and case imposing for the speeding violation is also automated. Thus, the commuter is made to follow the rules without being able to break the law of the region thus maintaining the flow and harmony of the traffic and reducing the death toll due to the overspeed accidents caused everywhere. This system can also be used to maintain safe roads in the regions so that the speed limits can be gradually increased on roads and therefore reducing the commute time for the travelers and all the other commuters on road, therefore reducing the work of the scrutinizers who are responsible for maintaining the harmony on road.

6. Limitations and Future Research

When this system is implemented on a large geographical area and at this potential, there are endless possibilities for future enhancements in this system. One of the Major enhancement that can be done in this system is the integration of Machine Learning and Artificial Intelligence into the system so that the Manual speed setup can be evicted, and a smoother speed limit is set automatically based on the traffic that is available in the roads at that particular point of time, and thus increasing the speed limits of the roads, providing safer roads over any region. With the enormous technological advancements, this system can also be integrated along with the Autonomous vehicles that are being developed so that the entire network of vehicles can communicate amongst themselves making the commuter to feel less pressure of driving and also giving the pleasure of the travel. The enhancements can make the system more autonomous, soothing and a lively system to implement on the roads.

References

[1] Jyothi Kameswari , M. Satwik, A. Lokesh and G. Venkateswara Reddy., "A Design Model for Automatic Vehicle Speed Controller" - International Journal of Computer Applications (0975 – 8887) Volume 35– No.9, December 2011

[2] Hua Chen, Lin Liu, Yu Zhang, Yantao Tian, "Adaptive Speed Control of Autonomous Vehicle under Changing Operation Conditions" 36th Chinese Control Conference, 2017, Dalian, China.

[3] D. A. Torse, Abhishek S Sutar, Pavan Andagi, Mukund Hanamshet, Mahesh Talwar," Speed Control of Vehicle Using Voice Commands", International Journal of Modern Trends in Engineering and Research (IJMTER) Volume 02, Issue 06, June– 2015.

[4] Ruikar M. National statistics of road traffic accident in India. J Orthop Traumatol Rehabil 2013.

[5] Jiandong Guo, Longlong Song and Pei Zheng, Hohhot Vocational College, Hohhot, China, "Simulation and Research of Driving Motor Speed Control System for Electric Vehicle" - International Conference on Sustainable Energy and Environmental Engineering (SEEE 2015).

[6] Shih-Nan Lu, Hsien-Wei Tseng, Yang-Han Lee, Yih-Guang Jan and Wei-Chen Lee, Department of Electrical Engineering, Tamkang University, Tamsui, Taiwan 251, R.O.C, "Intelligent Safety Warning and Alert System for Car Driving" - Tamkang Journal of Science and Engineering, Vol. 13, No. 4, 2010.

[7] Avvaru Subramanyam, K.Satyajesh, L.Bharhav Kumar, "High Way Vehicle Speed Control & Automatic Breaking System" - IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) Volume 9, Issue 3 (May - Jun. 2014).

[8] A.Vengadesh , K.Sekar, "AUTOMATIC SPEED CONTROL OF VEHICLE IN RESTRICTED AREAS USING RF AND GSM" - International Research Journal of Engineering and Technology (IRJET) Volume: 02 Issue: 09 | Dec-2015.

[9] Tom Igoe, Getting Started with RFID: Identify Objects in the Physical World.

[10] S.Sheeba Rani, R.Maheswari, V.Gomathy and P.Sharmila "Iot driven vehicle license plate extraction approach" in International Journal of Engineering and Technology(IJET) , Volume.7, pp 457-459, April 2018

[11] Ranjeethapriya K, Susila N, Granty Regina Elwin, Balakrishnan S, "Raspberry Pi Based Intrusion Detection System", International Journal of Pure and Applied Mathematics, Volume 119, No. 12, 2018, pp.1197-1205.

[12] K. Dasaradharami Reddy, S. Mohanraju, Dr.A. Jebaraj Ratnakumar, Dr.S. Balakrishnan, "Querying and Searching of Friendship Selection in the Social IoT, Jour of Adv Research in Dynamical & Control Systems. Vol.10, 11-Special issue, 2018, pp. 910- 914.

[13] V. Anandkumar, Kalaiarasan T R, S.Balakrishnan, "IoT Based Soil Analysis and Irrigation System", International Journal of Pure and Applied Mathematics, Volume 119, No. 12, 2018, pp.1127-1134.

[14] A. Jebaraj Ratnakumar, S. Balakrishnan, S.Sheeba Rani, V.Gomathi, "A Machine Learning Based IOT Device for E-Health Monitoring In a Cloud Environment", Invest Clin. Vol. 58, issue 3, pp. 287-299, 2017.

[15] S. Balakrishnan, A. Jebaraj Rathnakumar and K. N. Sivabalan, "Information Security in D-Media (Digital Media)", ARPN Journal of Engineering and Applied Sciences. May 2016, Vol. 11, No. 9, pp. 5707- 5710.

[16] S.Balakrishnan, Vinod K, B. Shaji. (2018). "Secured and Energy Efficient AODV Routing Protocol For Wireless Sensor Network", International Journal of Pure and Applied Mathematics, Vol. 119, No. 10c, 2018, pp. 563-570.

[17] S.Balakrishnan, J.P.Ananth, L.Ramanathan, S.P.Premnath, (2018). "An Adaptive Energy Efficient Data Gathering In Wireless Sensor Networks", International Journal of Pure and Applied Mathematics, Volume 118 No. 21, 2018, pp. 2501-2510.

[18] J.P.Ananth, S.Balakrishnan, S.P.Premnath, (2018). "Logo Based Pattern Matching Algorithm for Intrusion Detection System in Wireless Sensor Network", International Journal of Pure and Applied Mathematics, Volume 119, No. 12, 2018, pp. 753-762.