

CONCEPT OF VARIABLE SPEED CONTROL DEVICE FOR VEHICLE

Koustubh Deshmukh[†], Shubham Bhadane[†], Shubhada Lande[†], Tejaswini Kumbharde[†]

Dr. Shivprakash B. Barve*

[†] UG Scholar, Mechanical Engineering Department, MITCOE, Pune, Maharashtra, India

*Professor, Head of Mechanical Engineering Department, MITCOE, Pune, Maharashtra, India

Abstract

For today's life the control of the speed of vehicle has become mandatory and very essential for life purpose. Thus, the prior aim is to control the speed of the vehicles in different areas of cities as well as in the speed restricted zones such as hospitals, schools, colleges, parks, more people populated zones, speed breakers areas, etc. In today's day to day fast life people in the world tends to lose their self-control on their vehicle. They drive in such a high speed which can be dangerous for themselves as well as for the surrounding. Even the monitoring of police is not sufficient in such cases. Some situations can also be fatal. In automobiles from the inputs received through the accelerator pedal position sensor to the Electronic Control Unit we control the throttle position so that the variation according to the load and speed can be arranged. However in this model the input of pedal position from sensor is received to a microcontroller unit which acts as an primary interface with the input and then transmits to the ECU. [1] There are RFID Tag zones which are programmed in such a manner that whenever the RFID reader comes in proximity to its zone this Tags get actuated. In this actuation vehicle's speed is controlled through the code signal automatically due to the microcontroller unit installed in the vehicle. Such tags are placed mostly in the accident prone areas where speed reduction is mandatory.

Keywords: Speed Control, Smart Transportation, Road Safety, Less accidents, Safe Life

1. Introduction

An engineer is always working towards challenges of bringing concepts and ideologies which will bring ease in his life. He has to overcome many obstacles to full fill his ideas and concepts into reality. It has become day to day problem of road accidents. Most of these accidents are caused by the vehicles are driven at high speeds in the places where sharp turnings and junctions exist. Driving vehicle in such accident prone zones had become prime reason for accident deaths. Hence prime steps are needed to be taken to reduce these accidents. Many system are developed to prevent these road accidents. Cruise control system (CC) is one of such systems which are capable to maintain the speed according to the driver's will. One of the later evolution of this Cruise Control System is ACC (Adaptive Cruise Control) which maintains the vehicle at safer distance from the preceding vehicle so that probability of accident can be reduced especially in traffic zones. Whereas these systems don't have ability to detect the sudden turnings where the speeds of the vehicles have to be decreased to avoid the accidents. Curve warning systems have been developed further to detect the sudden curved roads by using Global Positioning System (GPS) and the digital maps which is obtained

from the Geographical Information Systems (GIS). It is used to inform the danger levels for driver while approaching the curved road. However these maps needed regular updating and cannot be useful in there is unexpected turn or road diversion etc. Another benefit of the system is lowered fuel consumption. As we can restrict the speed limit to the extent of better mileage.

2. Literature Review

1. Radio Frequency Identification (RFID)- This system is designed and implemented by Almomani & Hiasat. It detected cars and manage the traffic. They implemented the system with the help of Global System for GSM. This system includes the various components major component is Radio Frequency Identification, Transponders. Which placed wherever on the road and collect the real - time data. And collected information is send to the server which is stationary.
2. Global data collection system - In another study, the system in which a car alerting speed limit as well as crash detection system along the road. This system uses following system technology.

- Micro-Electromechanical Systems [MEMS]
- Radio Frequency (RF)
- Global Positioning System (GPS)
- Global System for Mobile Communications (GSM)

The main objective of the global data collection system is to design a suitable and smart display controller which also suitable for cars dashboard. And also gives the warnings of road speed limits and crash of speed limit of driver.

3. Speed lock microcontroller system - This system is developed by the Prof. from Dept. of MACE, Kothamangalam, they introduced a way of controlling speed in speed zone area without drivers input. One RFID component that is RFID reader is attached the vehicle and second RFID component that is RFID Tag in the speed restriction zones. These tags are specially programmed to send the signal when RFID reader comes in range. That is when vehicles enters in speed restriction zone then they read the signal send by RFID Tag. The speed of vehicles is controlled by automatically with various microcontroller present in the vehicle.

3. Need of Speed Control

3.1 Problem Statement

- In today's era people drive vehicles at very high speed even if it is restricted in some areas neglecting public safety^[1].
- The traffic incharge are unable to control them efficiently. Also, it's impractical to remotely monitor these areas/zones completely.
- Over-speeding is one of the reasons of accidents. Also, drink and drive, distraction during driving, breaking traffic signals, failing to wear seat-belts, cutting lanes, etc. are some of the reasons.

3.2 Objective

- We emphasis on automatically controlling vehicle's speed at certain speed restricted zones.
- It gives a new way for control of vehicles within certain speed limit in restricted zones without interrupting driver.
- By implementing such system problems like over-speeding and rash-driving can be reduced to a large extend, thus helping in reducing total number of accidents occurring in our country.

- By implementing this system we can lower the fuel consumption. As the speed can be restricted to certain limit of better mileage.

4. Concept of Variable Speed Controller Device

Speed controlling is much older idea. It was used for many different purposes. Generally, speed of vehicle is controlled using brakes. In this case, the efficiency of vehicle gets reduced, as we work against the driving force provided by engine. In some cases, the speed is also varied by accelerator pedal. The varying pedal position is monitored using sensors and fed to a control unit known as Electronic Control Unit^[3]. ECU determines the throttle valve position based on position of accelerator pedal. There are many sensors involved in such system. Also the inputs received from these sensors are used. The change in position of throttle valve causes speed change of vehicle.



Over speeding Vehicle approaching Speed limit zone

Speed of vehicle controlled as it enters Speed limit zone

Fig.1 Speed Control Principle

Whereas in this proposed automobile speed control device, speed of vehicle is controlled irrespective of pedal position. This is directly controlled by manipulating the movement of the throttle valve. Throttle valve position is controlled with the help of servo motor which is operated by Micro-controller.

5. System Working

- 1) This project is based on EMBEDDED and Radio Frequency Technology.
- 2) When a vehicle enters a Speed controlled Zone then the signal will be detected by the Receiver Rx.

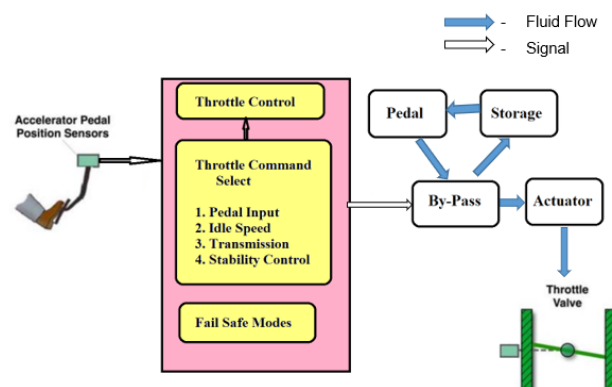


Fig.2 Speed Control Working Principle

- 3) Signals are transmitted by Transmitter Tx which is already placed in speed restricted zone which is assigned with that certain speed limit value. The Signal received will be decoded by the microcontroller. The driver is alerted using LCD screen provided for the speed reduction.
- 4) According to signal received the servo motor is actuated as per the output provided by ECU.
- 5) The servo is programmed for the speeds to its corresponding positions. This controls the position of throttle valve which is responsible for power input to the engine.
- 6) The output speed gained by the vehicle is also measured and compared with the required one. This gives the further manipulations necessary in the servo position which in turns in the speed of the vehicle.

6. Conclusion

- This project would decrease the numbers of accidents in highways and near Ghats.
- Cost is low and easily implementable.
- This technique can be implemented with GPS and other wireless techs for adding more features.
- Vehicle efficiency is increased due to working in ideal range.
- Difficult in case of failure of RF transmitter.
- RF Modules are to be protected from environment Hazards.

7. References

- [1] Leena Thomas , Swetha Annu James, Seril Joseph , Arya K B, Tedik Narah , Obang Pangu, 'Automatic Speed Control of Vehicles Using RFID', IJEIT, Volume 3, Issue 11, May 2014.
- [2] Lujaina Al-Shabibi, Nadarajan Jayaraman, Oman Jayavrinda Vrindavanam, "Automobile Speed Violation Detection System using RFID and GSM Technologies", International Journal of Applied Information Systems (IJAIS) – ISSN : 2249-0868 Foundation of Computer Science FCS, New York, USA Volume 7– No.6, July 2014.
- [3] Gummarekula Sattibabu, B. V. V. Satyanarayan, V. V. Satyanarayana Kona, "Automatic Vehicle Speed Control With Wireless In-Vehicle Road Sign Delivery System", International journal of technology enhancements and emerging engineering research, vol 2, issue 8 32 issn 2347-4289.