

Modern Speed Controlling System for an Automobile Vehicle

Mr. Raxit K. Bhatt¹ Dr. D. M. Patel²

¹Student ²Research Guide

^{1,2}L.C. Institute of Technology, Bhandu, India

Abstract— Now a day speed of vehicle become a critical issue. So, for that there is option of vehicle speed control. By use of this vehicle speed should be controlled but if there is an emergency case at that time speed is an important. So, for that situation there is need to controlling a speed with various situation in that vehicle may work on both way. One way is bound way and another way is free way. If those both things are done at time than it is easy to drive vehicle. It may be known as two way speed controlling system for vehicle for that there is need to change in working of fuel injection pump. For that case it may be work as a dual mode by putting another accelerator cable. So, this system may work as dual mode. Where it gives speed without opening of bound valve. It is not use by all it can only use by whom who know the password of that dual speed controller mode for other user system will work with a bound speed mode. In simple language it work with a security system.

Key words: Speed, Dual Control, Bound & Speed Mode

I. INTRODUCTION

Speed is defined as the rate at which someone or something moves or operates or is able to move or operate. In vehicle speed is displayed by speedometer. All vehicle have various representation of speed in. A speedometer or a speed meter is a gauge that measures and displays the instantaneous speed of a vehicle. Now universally fitted to motor vehicles, they started to be available as options in the 1900s, and as standard equipment from about 1910 onwards. Speedometers for other vehicles have specific names and use other means of sensing speed. For a boat, this is a pit log. For an aircraft, this is an airspeed indicator. Charles Babbage is credited with creating an early type of a speedometer, which were usually fitted to locomotives. The electric speedometer was invented by the Croatian Josip Belusic in 1888, and was originally called a velocimeter. Speed is represented in the form of km/hour or mile/hour. In speedometer there is another meter which represent the distance travelled by the vehicle in the form of kilometer or mile. This meter is known as an odometer. Odometer is also known as odograph. It may be electronic, mechanical or combination of the two.

II. HISTORICAL PERSPECTIVE

The word is speed is invented by Olaus Roemer in 1676 who was Danish astronomer. Speed is a measure of how quickly an object moves from one place to another. It is equal to the distance travelled divided by the time. It is possible to find any of these three values using the other two. The United Kingdom Stage Carriage Act 1832 first introduced the offense of endangering the safety of a passenger or person by 'furious driving'. [12] The first numeric speed limits were created in the UK by a series of Locomotive Acts (1861, 1865 and 1878); the 1861 Act introduced a UK speed limit of 10 mph (16 km/h) on open roads in town, reduced to 2 mph (3 km/h) in towns and 4 mph (6 km/h) in rural areas by the 1865 'red flag act'. The Locomotives on Highways Act 1896, which

raised the speed limit to 14 mph (23 km/h) (being the estimated speed of a horse being driven 'furiously') is celebrated to this day by the annual London to Brighton Veteran Car Run. Road speed limits are used in most countries to set the maximum (or minimum in some cases) speed at which road vehicles may legally travel on particular stretches of road. Speed limits may be variable and in some places speed is unlimited (e.g. on some Autobahn sections in Germany). Speed limits are normally indicated on a traffic sign. Speed limits are commonly set by the legislative bodies of nations or provincial governments and enforced by national or regional police or judicial bodies.

A. Types of Speed Limit

1) Maximum speed limit:

Most public roads in most countries have a legally assigned numerical maximum speed limit which applies on all roads unless otherwise stated; lower speed limits are often shown on a sign at the start of the restricted section, although the presence of streetlights or the physical arrangement of the road may sometimes also be used instead. A posted speed limit may only apply to that road or to all roads beyond the sign that defines them depending on local laws. In the European Union, large signposts showing the national (default) speed limits of the respective country are usually erected immediately after border crossings, with a repeater sign some 200 to 500 m (660 to 1,640 ft.) after the first sign. Some places provide an additional "speed zone ahead" ahead of the restriction and speed limit reminder signs may appear at regular intervals which may be painted on the road surface.

Signs are normally placed on both sides of the road and in some places there are small (less than 1/4 the size of the sign) rectangular orange reflector flags attached to both upper right corners of both signs. The speed limit sign marking the new speed zone may also have the orange flags; this practice can be observed in New York on highways where the speed limit varies such as New York State Route 17.

2) Minimum Speed Limit:

Some roads also have "minimum speed limits", where slow speeds can impede traffic flow or be dangerous. Signs often use blue circles based on the obligatory signs of the Vienna Convention on Road Signs and Signals. A Japanese minimum speed sign has the same design as a maximum speed sign, but with a horizontal line below the number. In the United States of America, they are also identical to their respective maximum speed limit signs with the exception of the text "MINIMUM SPEED". This minimum speed is not so common, as the risk usually raise with higher speed and not with lower speed.

3) Variable Speed Limit:

In 1965, the first known experiments with variable speed limit signs took place on a 30 km stretch of German motorway A8 between Munich and the border city of Salzburg, Austria. Mechanically variable message signs could display speeds of 60, 80 and 100 km/h, "danger zone"

or "accident". Personnel monitored traffic using video technology, and manually controlled the signage.[60] Beginning in the 1970s, additional advanced traffic control systems were put into service. Modern motorway control systems can work without human intervention using various types of sensors to measure traffic flow and weather conditions. In 2009, 1,300 km (810 mi) of German motorways were equipped with such systems.

A variable speed limit was introduced on part of Britain's M25 motorway in 1995 (on the busiest 14-mile (23 km) section from junction 10 to 16). Initial results suggested savings in journey times, smoother-flowing traffic, as well as a fall in the number of crashes, and the scheme was made permanent in 1997.[70] However a 2004 National Audit Organization report noted that the business case was unproved; conditions at the site of the Variable Speed Limits trial were not stable before or during the trial, and the study was deemed neither properly controlled nor reliable. Since December 2008 the upgraded section of the M1 between the M25 and Luton has had the facility for variable speed limits.[71] In January 2010 temporary variable speed cameras on the M1 between J25 and J28 were made permanent.

III. PROBLEM DEFINITION

- Accident due to hit and run are increasing day by day due to high speed of vehicle.
- If vehicle speed is bounded then it is not possible to unbound it at a time so if there is need to unbound of speed then visit to a garage is compulsory.
- The system which use as currently which is working in a single mode.
- If we want to free or unbound the vehicle of speed then we have to need to visit nearest garage for that.
- It is also time taking process because to unlock speed or to unbound or to free speed is time consuming.

IV. RESEARCH OBJECTIVE

- To reduce accident which occurs due to high speed.
- To use for in an emergency case by changing mode.
- To safe in mode of security because of that anyone have no permission to unlock dual speed mode.
- To design two way speed control mechanism for dual speed controlling system.

V. MODIFIED DESIGN OF SPEED CONTROL SYSTEM

A. Working

This dual way speed controlling system work in a very easy way. For that there is use of two accelerator cable and two accelerator pedal. Both the things are connected with a dashboard with the support of led touchscreen. When we press button then it moves or switches into a bounded condition and unbounded condition. For that there is use of security system to unbound speed. Speed is unbounded with the help of security system without password any person cannot open this system.

B. Speed Controlling Process

Components required the inbuilt pneumatic jack systems

- Perforated tube

- Activated charcoal
- Flanges
- lime water
- Fabricated chambers

1) Existing Speed Control Mechanism:

Now a days system which is used for controlling of speed is very simple and it has very low cost. In a current days vehicle speed is controlled by just adjusting lever. For that lever of vehicle is bound by small screw. It helps to stop the movement of accelerator pedal at some stage. It means it prevents from higher speed. So, as shown in figure it is understandable if the screw is attached to the lever then the vehicle speed is controlled because this screw might help to stop the accelerator pedal at some stage and at this stage or after this stage speed of vehicle is not increase. It means at this stage speed of vehicle is stable. Example. - if the vehicle is going on the speed of 60 and speed leever is bounded at speed of 80 then vehicle cannot move or cannot run over speed of 80 vbecausee it is cclear that lever is bounded at the speed off 80. So at that time vehicle speed is not go over the fixed speed.



Fig. 2.1: Existing speed control mechanism

2) Dual or Two Way Speed Control Mechanism

This system is completely different from existing speed control mechanism because this system consist of two accelerator cable and work with two accelerator lever also. In this system instead of an accelerator cable there is use of two cable and as same instead of a lever there is use of two lever to work as a dual mode. For this dual way mechanism there is sue of two way switch mechanism to transfer from one mode to another mode. For, this two way switching mode there is use of spring mechanism for shifting the lever position If we press the switch or two way switch button then it move toward the changing position of the system and move towards the variable position. There are two position for the working of the system as per mentioned below.

a) BOUND CONDITION

For this system or in this system the way of working is different as compare to existing speed control mechanism system. In this system way of working of control the vehicle speed is same as per simple system but in this system there is use of two accelerator cable. Now it is clear that in this system speed of vehicle is controlled by two mode. There is chance

of controlling speed by two way and it is remarkable note that the system is work better as compare to old system. In this system there is use of two accelerator cable to work with this mechanism. Two way switch mechanism also paly a very important role in this mechanism because it is the only useful mechanism which is used to shifting the control of the system. The components which are plays the role in this system are accelerator cable, spring, two way switch mechanism on the dash board. In this system vehicle speed is controlled very easily. In the bound contidion speed is bounded at some level or at some speed after reaching up to this level speed is not moves in upward direction. It means it will be stable at one level.

Example - If the speed of the vehicle is bound at the 80 km/h then if any vehicle which is running on the road which have conditon torun on 80 km/h or less than bounded speed. As shown in figure indicates the controlled mode of the speed. It means it shows that speed of vehicle over 80 km/h is not possible in this case. So, if there is any situation in which we need a higher speed on an emergency bases than there is use of another method for this.



Fig. 2.2.1: Vehicle speed in bounded mode of 80 km/h

b) **NORMAL CONDITION**

This mechanism is also working in a free mode compare to existing meethod. This is great feature of this system. In this mode there is no any speed limit or restriction. It is totally free. So if there is any emergency siituation then it is easy to drive fast in this mode and complete the target. For this mechanism there is no use of screw to bound speed. There is free movement of lever and also acceleator pedal. So as shown in above figure it is clear that in this method there is no speed limit.



Fig. 2.2.2: Vehicle speed in free mode

3) **Components and Their Properties**

There is main use of accelerator cable, spring and modular switch to shifting the movement of the system.

a) **Accelerator Cable**

It is generally used for all vehicle of automobile. It is made of graded aluminum, pvc and stainless steel. On this there is layer of rubber to protect it from wear. Some other propeties and feature of this cable are as below.

- Reliability
- Flexibility
- Corrosion & weather resistance
- Friction free cable
- High performance
- Impact & heat resistance
- Easy to handle & install



Fig. 2.3.1: Accelerator Cable

b) **SPRING**

Springs are flexible machine elements used for controlled application of force (or torque) or for storing and release of mechanical energy.

Types of spring

- Helical Spring
- Leaf Spring
- Spiral Spring
- Special Spring
- Helical Spring

This spring have two shapes. Round Shape and Rectangular shape. Compression, Tension and Torsion of the spring are as below.

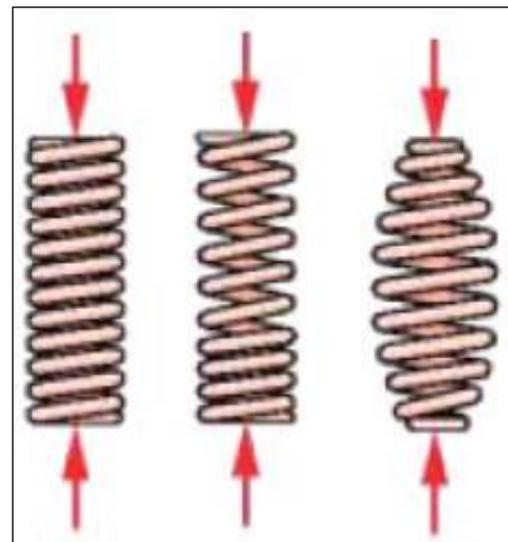


Fig. 2.3.2: Compression on spring

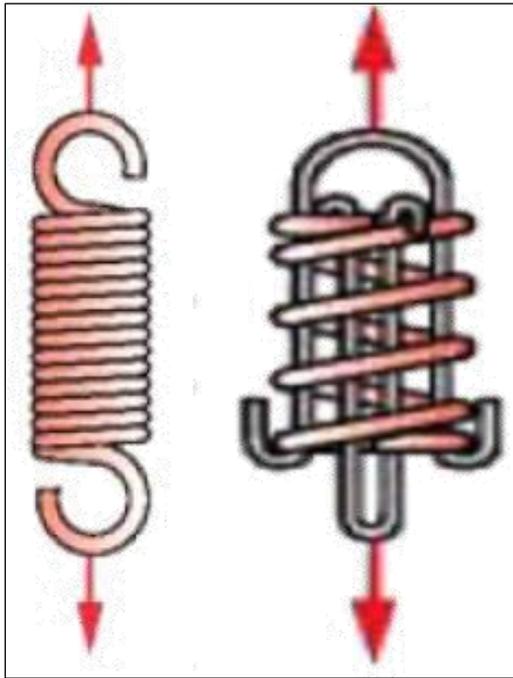


Fig. 2.3.3: Tension on spring

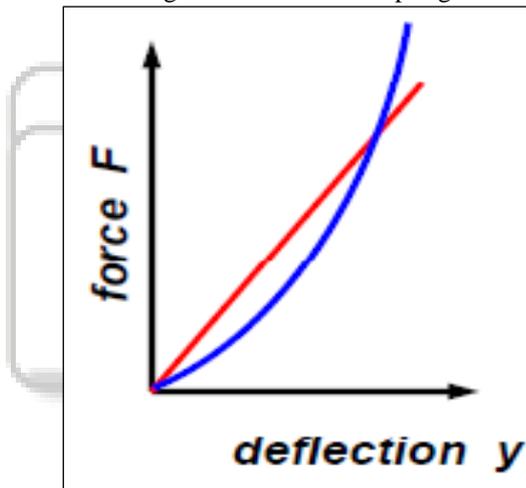


Fig. 2.3.4: Deflection vs Force on spring

Material and their properties related table is as below.

Material	ASTM No.	Exponent m	Diameter, in	A_1 , kpsi-in ^{m}	Diameter, mm	A_1 , MPa-mm ^{m}
Music wire	A228	0.145	0.004-0.256	201	0.10-6.5	2211
OQ&T wire	A229	0.187	0.020-0.500	147	0.5-12.7	1855
Hard-drawn wire	A227	0.190	0.028-0.500	140	0.7-12.7	1783
Chrome-vanadium wire	A232	0.168	0.032-0.437	169	0.8-11.1	2005
Chrome-silicon wire	A401	0.108	0.063-0.375	202	1.6-9.5	1974
302 Stainless wire	A313	0.146	0.013-0.10	169	0.3-2.5	1867
		0.263	0.10-0.20	128	2.5-5	2065
		0.478	0.20-0.40	90	5-10	2911
Phosphor-bronze wire	B159	0	0.004-0.022	145	0.1-0.6	1000
		0.028	0.022-0.075	121	0.6-2	913
		0.064	0.075-0.30	110	2-7.5	932

Fig. 2.3.5: Material and Properties

Graph of strength vs wire diameter is as below. Which shows about the strength of the material on the base of wire.

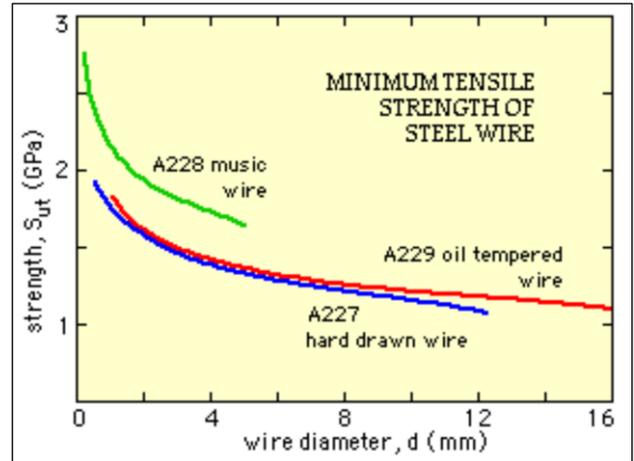


Fig. 2.3.6: Strength vs Wire diameter

c) Modular switch

Last component of the system is modular switch which is used as a shifting mechanism in the system. This modular switch is same as head light switch which is used in two wheeler. As shown as above this switch is working as shifting device which is used to change the position of the accelerator lever.



Fig. 2.3.7: Modular Switch

4) Security System:

a) EC based security system

This dual way or two way speed controlling system working based on security system. For this security purposes there is use of EC based control circuit. This circuit may connect to the system and place a secure connection to switching between mechanism. The dual way speed controlling mechanism system requires security because if there more than one driver in home then it is useful.

Example: Assume a father has son and he has a boiling blood because of his young age. He wants to drive his father's car but his father has worried about his driving. He doesn't want that his son drive car in a full speed. So, he can place this two way speed control system for his son safety. This system restricts the speed of vehicle so son is not able to drive over the controlled limit. So, father will be happy by using this system in car. But often father or son or any other family member have to need to use of speed in emergency case at that time this system might be helpful. At the time of emergency there is need of registered finger or password or mobile number. For that any one person of the family member is registered with his finger and an only single mobile number. So, if father's finger is registered to open a lock or for switching a mechanism then it only accepts this finger. If there is any other person will drive the vehicle and he needs to drive fast during emergency then he/she can use password. If he/she does not know the password then he can generate OTP by entering the mobile number. This OTP will

be forwarded to the registered number and by asking OTP lock will be open. Fingerprint Scanner or device is placed in a system. This fingerprint device very simple as usual which is generally available in the market. So, as shown as above EC based security system is work and the another thing is that this security system is also work with mobile application.



Fig. 2.4.1: Fingerprint Scanner

b) Mobile Application Based Security System

Now, there is another security system which is used to unlock the speed control mechanism. In this method there is use of mobile application which will be provided to users. By installing this app smartphone is connected to the system and it is used to unlock this system from application by just smartphone. This device has also three protection options which are Fingerprint, Password and OTP based solution. If finger option is already available in mobile then it is done directly from mobile. If smartphone has not fingerprint then there are two options to unlock the system one is password based and another is OTP based.

VI. CONCLUDING REMARKS

In this dissertation work vehicle speed control system is very useful because of that there are so many chances of getting positive stuff. The results are concluded as follows:

- 1) This vehicle speed control system may replace older speed controlling mechanism in a very easy way.
- 2) The material used to manufacture second accelerator pedal is not so costly but it is lengthy to adjust and make it.
- 3) It can directly use to control vehicle speed in two modes. It means it is very usable to control speed and also useful to drive vehicle in free mode.
- 4) This is helpful for those parents who are worried about their children's driving and they don't wish their children drive at high speed.

REFERENCES

- [1] B.Devikiruba, "Vehicle Speed Control System Using GSM/GPRS" Sum Two Software Pvt Ltd, Tamilnadu, India. 2013, 983-987.
- [2] S Nagakishore Bhavanam and Vasujadevi M, "Automatic Speed Control and Accident Avoidance of vehicle using multi sensors", Gunter university, India 2014.
- [3] K.Govindaraju, S.Boopathi, F.Parvez Ahmed, S.Thulasi Ram, M.Jagadeeshraja, "Embedded Based Vehicle Speed Control System", PG student, 2014.

- [4] SanjibanKundu, SandipanKundu, "Flexible Vehicle Speed Control Algorithms for Eco Driving" State University of New York University at Buffalo.
- [5] International journal of engineering trends and technology, volume 3, 2012.
- [6] C. Rommerskirchen, M. Helmbrecht, and K. Bengler, "Increasing complexity of driving situations and its impact on an ADAS for anticipatory assistance for the reduction of fuel consumption," in Proc. IEEE Intelligent Vehicles Symp, 2013.
- [7] S.Kundu, et al. "Vehicle Speed Control Algorithms for Data Delivery and Eco-Driving", in ICCVE 2014.
- [8] O. Servin, K. Boriboonsomsin and Barth, M. "An energy and Emissions Impact Evaluation of Intelligent Speed Adaptation," Intelligent Transportation Systems Conference, ITSC '06. IEEE, 2006.
- [9] B. Asadi and, A. Vahidi "Predictive Cruise Control: Utilizing Upcoming Traffic Signal Information for Improving Fuel Economy and Reducing Trip Time," IEEE Transactions on Control Systems Technology, 2010.
- [10] Kupper, Location-based Services, Fundamentals and Operation. West Sussex: John Wiley & Sons Ltd, England, 2005.