

Speed Control System Using Wheel Degree Analyzer in Moving Vehicle

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Abstract: In nowadays life vehicle safety is major issue. Most of the accident occurs due to collision between vehicles in same as well opposite direction. Some resource based on speed control already exists based on distance between vehicles. But controlling of speed according geographically has not been figure out. This proposed paper relates the vehicle to the road map and speed of vehicle is control on basis of upcoming road turn. Here speed of vehicle controlled on basis of changed in degree of moving wheels in vehicle.

Key words: Staring • Degree Analyzer • Wheel • Gyroscope • Rotational Speed Sensor • Microcontroller

INTRODUCTION

In current scenario vehicle accident is global issue. Different way that have occurrence of the vehicle accident chances. Like road curve, unbalanced road plane, flow of many vehicle in improper manner. But any way we have to try to reduce the chance of accident. Here this proposed paper focus on accident occurs because of road curve. This paper overcome the accident situation that occur in road turn with high speed, In such condition both control speed and rotate the staring is not possible.

So here propose an idea that can be control speed as per rotation of the wheel in moving vehicle. Some devices are embedded to make an integrated device called as wheel degree analyzer with speed controller. Some brief introduction of these individual are as follows:

Gyroscope is a device used for measuring the angular movement. This device is work on principle of angular momentum. In mechanically structure it is a spinning disk having rotator, axle with free rotation. Its structure is design like that its part can rotate freely to observe any orientation.

Rotational speed sensor is also a device coupled on disk of wheel. It is work on principle of magnetism. Magnetic disk is placed in wheel such a way that magnetic field can be generated and it can count the rotation of wheel. Using sensor signal pass to the speedometer.

Microcontroller is a universal device that has different form and version based on system and working principle. It has PLA (programming logic array) to simulate input from different part of independent devices. CPU and memory chip also placed inside to digital processing and storing the result.

Related Work: Many researchers have been done based on accident control system but they are not efficient to prevent accident. Main factor of accident cause due to lack of control on speed. In previous published paper used accident analyzed and reporting methodology (AARM) to supervise the accident scenario and reports it to nearest accident control office. It uses wireless devices to report the control office [1]. It was not sufficient system because it detects the scenario after accident but do not able to control speed.

Another paper published having Global packet Switching Technology and Alarm remote mechanism (GPST and ARM) [2]. Some parameter are predefined to the alarm device like pressure, collision etc. When this parameter face abnormal condition then alarm will ring. Due to increase volume GPST will enable to transfer information to remote location. It was much efficient to previous research but time delay makes it less efficient.

After that EDR based paper was proposed. It is based on wireless digital technology using device In-vehicle wireless Digital data recorder [3]. It should be

installed in vehicle machinery. It was proposed for monitoring the situation of driver, road map and real time event occurred in moving vehicle. Simulate the device with ordinary control devices of vehicle.

Than another paper published based on speed controlling was totally different to previous researches. It is based on distance detector in moving vehicle [4]. Various devices like Doppler radar, speedometer and microcontroller were embedded to design complete set of speed controlling machine. But embedded of devices was so complicated task and not compatible with normal budget.

But these papers are not sufficient to overcome the accident due to vehicle speed. So the objective of this paper being publish to overcome the circumstance of accident caused by geographical or road map like curve on road. Fully functionality with proper system design is described in next section.

Speed Control System

Gyroscope: Gyroscope is a device work based on principle of angular momentum. It use for measure the orientation like rotation, movement. Here this device is mounted on wheel track to take input signals as angular change in wheel. When driver round the staring then wheel will be moved and then gyroscope measures the angular changes in wheel position.

For measuring angular change there are some formulas defined for it. These are based on torque, spin and moment of inertia.

$$L = I.W$$

Here L= Angular momentum

I = moment of inertia (a measurement of an object with respect to its rotational velocity)

W=angular velocity

Total angular momentum as rotational generator

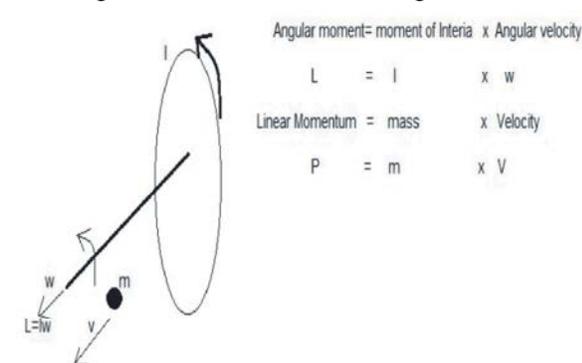


Fig. 1: Angular momentum

$$R(n, \phi) = \exp(-i/h\phi J.n)$$

Is the rotational operator, where

ϕ is angle

n is axis

J is rotational generator Gyroscope device consist with a rotator to rotate about the axis, this rotator mounted on inner ring. This ring is used for oscillation in outer ring set of two rings. The outer ring which is gyroscope frame is mounted as pivot about an axis to support. Both inner and outer gimbals are perpendicular to each other. The inner gimbal has capability to rotate in both directions.

Rotational Speed Sensor: It is work on principle of magnetism. Magnetic disk is placed in wheel such a way that magnetic field can be generated and it can count the rotation of wheel.

Magneto Resistive Sensor Element: M R sensor works based on magnet resistance effect. Magnet resistance effect has the capacity to change the resistivity in presence of external magnetic field. When no external current supply to the material than it utilizes its internal magnetism.

Principle of Speed Measurement: When motion is provided to wheel then it charges the MR sensor. After charging of MR sensor they create the magnetic field effect between passive targets and active targets wheel.

Passive Targets Vehicle: Sensor is fixed with permanent magnet and passive target has non symmetric toothed wheel. Because of magnetic field bend according to

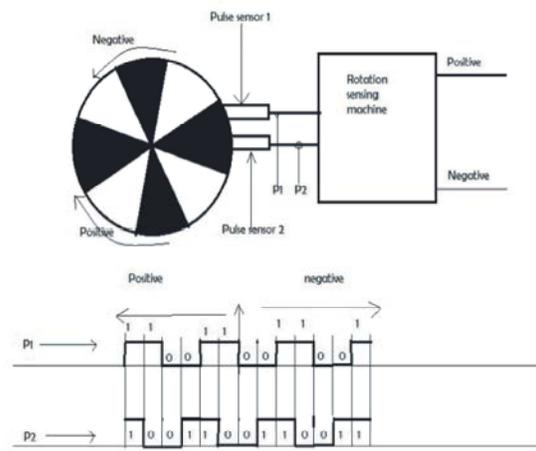


Fig. 2: Rotational speed sensor

sensor will measure accurate rotation of wheel. Then create alternative field and it send as output signal in Y-axis direction according to wheel position. The amplitude of sensor output depends upon magnetic field strength of biased magnet, distance between target and magnet, structure of target also.

Active Target Wheel: Active targets are not magnetized as passive targets. In active targets alternative magnetic poles are fixed. No magnet is required for perform operation, target has capable to provide working field. Below figure shows clear description of Active target wheel.

PLA with Microcontroller: Programming logic array are the input sequence work on PLD (programming logic device) coupled with microcontroller. These inputs simulate by simulator installed in PLD. Here PLA access two different type of parameterone from Gyroscope and other from rotational speed sensor. From First device it takes varied angle and from second device it takes speed. Then these signals send to microcontroller. Where it works on predefined criteria for speed control based on varies angle.

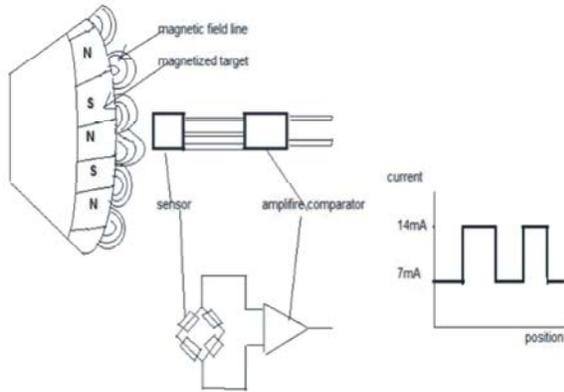


Fig. 3: Active target wheel

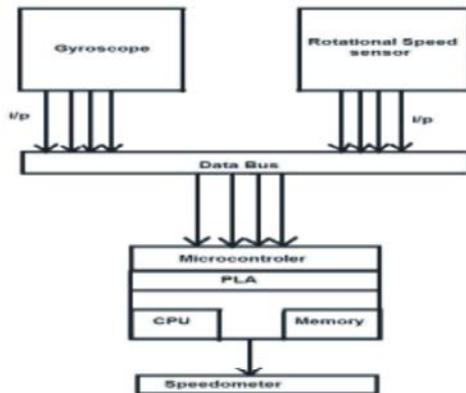


Fig. 4: Architecture of Integrated devices

Microcontroller: It integrated on chip with various components like PLA, CPU, BUS interface, Memory, RAM etc. This hardware installed in devices according to expected functionality of devices. General structures of integrated devices are described below as diagrammatically.

Speedometer: Through cable output signals are sending to the screen or monitor called as speedometer in digital form. It is located in front of driver so can see it clearly and take decision to control speed.

CONCLUSION

Here we create an embedded system using different devices in such a way that can realize the proposed ideas in real time environment. To do this we compare the output signal of gyroscope with output signal of rotational speed sensor. And these signals send to PLA as a input and processed in way if driver forgot to minimize speed in turn then it will automatically decrease the speed as per change of angle. So in this way road turn accident can be saved.

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