

SPEED CONTROLING USING DISTANCE DETECTOR IN MOVING VEHICLE

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Abstract- *Many accidents may be saving if emergency service detector can detect the distance between upcoming object with running vehicle, and alert the controller. This paper is proposed to provide compatibility in Doppler radar and Speedometer with EDR. This Doppler radar will monitor speed of a vehicle and compare with the inbuilt detect system of speed. We set different parameter for speed according to object availability in path and set speed criteria according to them. For measuring the distance between vehicle and object we use PLD that coupled with microcontroller.*

Keywords- *Doppler radar, Speedometer, PLD, microcontroller, EDR, object, vehicle*

Related Work:

Many papers already exist based on Accident Alert System but most of them have drawbacks do deduct actual accident. They have improper methodology and lack of technologies. In recent published paper, used ADRS (Accident Detect and Reporting System) to detect the accidental condition by sensor output devise. RF transmitter module interfaced with microcontroller to transmit the accident information to nearby service provider [1]. But these systems are not fulfilling the actual problem of occurring accidents. Then other paper published to overcome the drawbacks of previous systems.

The Alarm system is based on ARM and GPS technology [2]. When accident occurred alarm can be realized. All the states of vehicle, user and alarm type transmitted to the pre-defined treated center. But due to some delay of alarm transmit time and respond of the team to the handled accident situation make this system less efficient.

Another paper was proposed based on wireless In-vehicle Electronic data recorder [3]. It installed easily in driver cabin. Purpose of interfacing this system to monitor the basic element of traffic safety: driver, vehicle and road. Simulator is used to monitoring the all states.

But these all papers could not find the way to control the speed of vehicle. So this paper published to detect the distance between two moving objects. All the methodology and principles will be described in detailed section with different module.

Introduction:

In today's fast growing world, speed of vehicle and control on speed is much considerable issue. Many researches already had been completed to improve these types of problems. But mostly recent techniques failed to provide compatibility of speed control devices. This paper proposed to overcome the limitation of compatibility among the speed controlled devices and emphasize on the accurate statistics of

data such as time, distance between moving object in different scenarios.

For make it more compatible and feasible here used Doppler radar that works on principle of Doppler Effect. In next section it describe in details. Doppler radar placed in vehicle in such a way from there it can emit continuous signals like microwaves. This radar system is based on sound, frequency, medium and listener.

EDR (Event Data Recorded) is also inbuilt in vehicle to record continuous statistics. This recorder system is developed on microcontroller. For measuring the speed of vehicle speedometer mounted on vehicle.

PLD (programmable Logic Device) is installed to control the speed of vehicle according to statistics of other moving object as different parameter. PLD have capability to produce relevant warning signals instantly according to compared statistics.

Work plan:

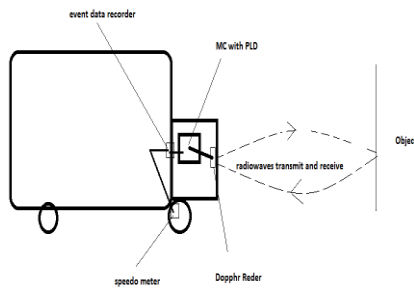


Fig.1 working model between vehicles

Doppler Rader:

Rader is object detection system that used to detect distance between objects using radio waves by continuous transmitting signals and receive back the signals in predefined directions [5]. This radar is following the principle of Doppler so called Doppler radar. These determine the directions, speed, and altitude of targeting object.

A. Principles

A radar system coupled with transmitter that emits pulses in predetermined directions. When these collide with an object they are reflected in many directions

[5]. The radar signals that are reflected back towards the transmitter in same direction are record distance, speed, altitude. When objects are move then slightly change occurs in frequency. Received signals are mostly weaker than transmitted signals. To receive signals same strength use signal processing.

B. Reflection

Reflection of waves is measured by wavelength. Two conditions are there for measured the reflections. If wavelength is short then reflection will be so high. If wavelength is high then reflection will be poorly measured. Reflection is done only through outer surface of target object. The effeteness' of reflection depends on –gain of transmitter, aperture (area) of receiver, propagation factor, cross section of target, distance from transmitter to target and target to receiver.

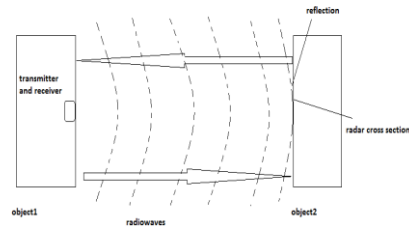


Fig.2

wave reflection by Doppler radar

C. Radar equation

Receiving Power is defined as followed formula:

$$P_r = (P_t * G * A * \sigma) / ((4\pi)^2 R_r^2 R_t^2)$$

P_r = transmitter power of receiver

G = gain of transmitter

A = area of receiving device

σ = radar cross section of target object

R_t = Distance from transmitter to target object

R_r = Distance from target object to receiver

D. Distance measurement:

By using this formula of power receiver we can find distance from transmitter to target and target to receiver.

$$Rr^2.Rt^2/2 = (Pt*G*A*o)/(4\pi)^2 Pr$$

By dividing the product of transmit and receiving time by 2 easily get distance.

Frequency Modulation:

It is another way to measure the distance between objects. It is more accurate measure of distance rather than previous method. Amount of frequency changed is used to measure the distance.

Previous method, Amount of frequency changed is used to measure the distance.

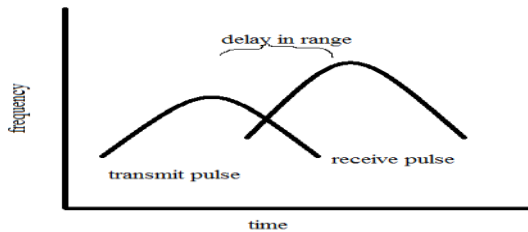


Fig.3 freq v/s time in Doppler radar

Speedometer:

Modern speedometer is electronic meter use to monitor current speed. It contain rotation sensor mounted on the wheel shaft that transmit a series of electronic pulses whose frequency measures the speed of wheel.

Event Data Recorder:

It is electronic device installed in vehicle's speedometer to record the statistics of current event. Current data directly goes into EEPROM. This recorded data help to compare speed of moving vehicle and controlled predefined speed.

PLD with Microcontroller:

Programming logic that already installed a program in hardware is called as programming logic Device. This PLD coupled with microcontroller to control the speed of moving vehicle according to measured distance between other vehicles. In PLD installed program have different distance module with different predefined

speed. This PLD measured distance compared with data of EDR (Event Data Recorder) that recorded through speedometer. Some statistics like distance between object and predefined speed describe as follows:

Distance between object (in meter)	Predefined Speed (kmph)
15	44
14	42
13	40
12	38
11	36
10	34
9	32
8	30
7	28
6	24
5	20
4	18
3	15
2	10
1	4
0	0

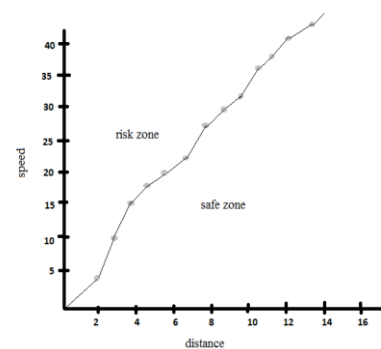


Fig.4 graph between speed and distance

This predefined speed compared with speedometer speed and decrease with respect to distance.

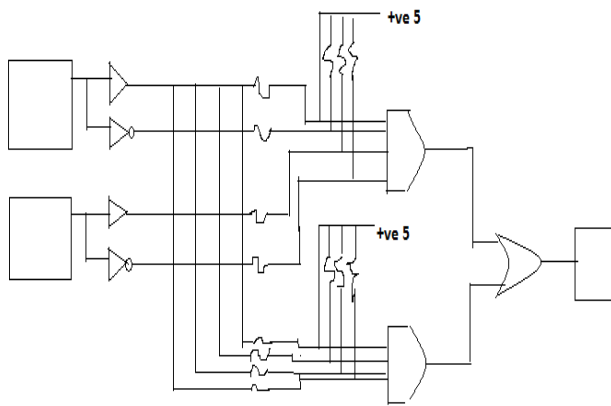


Fig.5 Programming Logic Array

Microcontroller is a hardware device that contains integrated circuit, processor, memory, Input/output peripherals. Microcontroller is designed for embedded application that dedicates a particular task [4]. This microcontroller is speed control microcontroller because its PLD functionality predefined in form of programming logic.

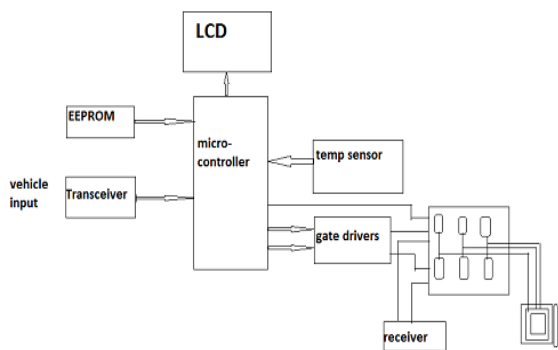


Fig.6 vehicle microcontroller

Conclusion:

Here different parameter of distance in PLD controlled the speed of moving vehicle. By control the speed according to distance could be overcome the number of accident. If distance decreases then speed of vehicle will be decreases according to pre described table. If distance between vehicles is more than 15 meter then distance detector will not control the speed of moving object. In this way, using coupling between devices can reduce the no

of accident that occurs due the speed factor and collision between vehicles also.

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