Automatic Vehicle Speed Control System

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Abstract-Automatic Vehicle Speed Control System is designed to control the speed of the vehicle in specific zones to avoid the accidents in the low speed areas. In this system the low speed zone is considered to be the 100 meter earlier to the traffic signal. The case study and implementation is based on the light vehicle speed control, when the vehicle is running with full speed and gets entered into the low speed zone the speed of it will be automatically reduced to the allowed speed in low speed zone. The microcontroller will interface with the sensors to detect the speed of vehicle and based on this input the controller will take appropriate action and generate a control signal for the vehicle control system which then will activate the mechanism of the Speed control in the vehicle and the speed of the vehicle is reduced to the required speed in that zone.

Keywords – Microcontroller (AT89S52), LCD Display, IR Transmitter unit, IR Receiver, Speed Limiting Mechanism.

I. INTRODUCTION

Now–a-days lots of accident happen on the signal due to increase traffic and also due to rash driving of the drivers. As we know when we accelerate the vehicle the engine starts running at higher speed, and when more throttle is opened, the engine suctions sucks more quantity of load (air + fuel), which burns and produces more amount of energy in the form of radiations. In this system we have implemented the speed limiting mechanism which will be effective for the reduction of fuel towards the engine.

The objective of the System is to present a conceptual model of a microcontroller based Automatic variable electronic speed controlling. System that can be implemented to control the speed of any vehicle depending on the speed limit. In this system the main element is Speed Limiting mechanism. The Limiting mechanism is a device which is used for controlling speed of an engine based on the load requirement. The basic Limiting mechanism sense speed and sometimes load of a prime mover and adjust the energy source to maintain the desired level. So it‟s simply mention as a device giving automatic control or limitation of speed. The Limiting mechanism is control mechanisms and it works on the principle of feedback control. Its basic function is to control the speed within limits when load on the prime mover

changes. They have no control over the change in speed within the cycle.

II. WORKING

In car assembly carburetor work on petrol engine, a carburetor basically consists of an open pipe through which load p asses towards throttle valve of carburetor.

The pipe is in the form of venturi: it narrows in section and then widens again. Causing the air flow to increase in speed in the narrowest part. Below the venture is a butterfly valve called as throttle valve.

The throttle valve is connected to the accecerelator of engine (pedal). When pedal pressed the valve works, if maximum force applied on accelerator then the valve fully opens and large amount of mixture of fuel and air is passed through the throttle valve and simultaneously the speed of car increases. If less force applied on pedal then the valve close partially depending on the force applied on the pedal and accordingly the amount of mixture of air and fuel will be supplied towards the engine.
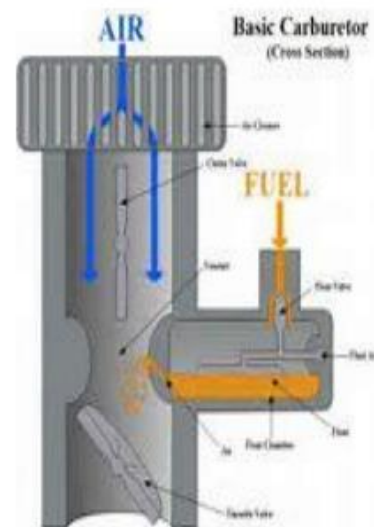

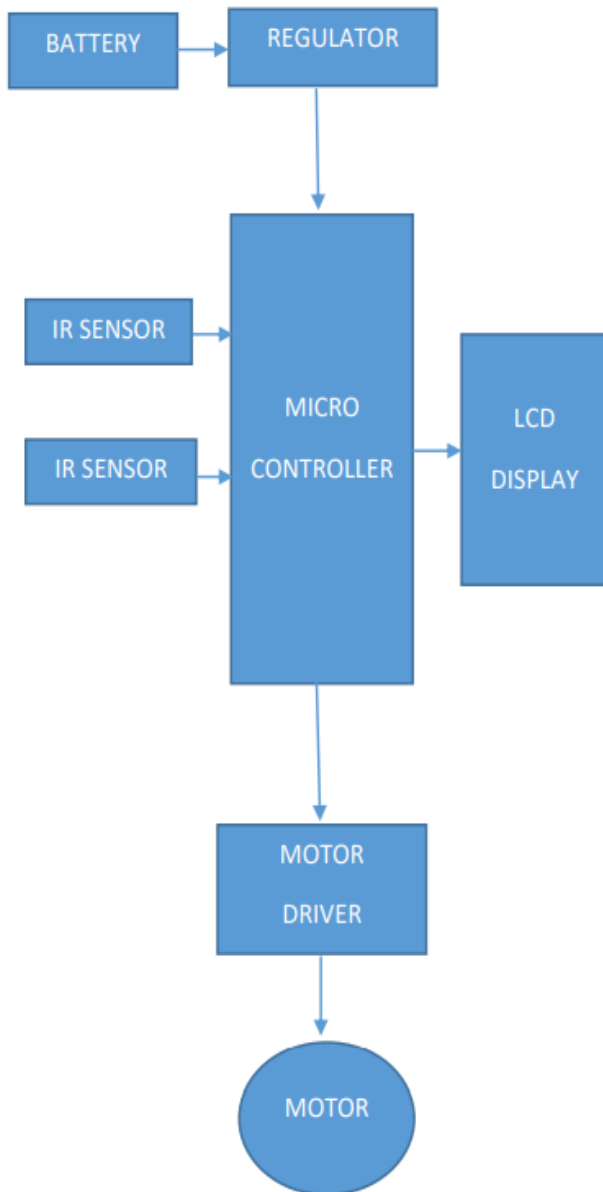Figure 1. Mechanism in vehicle.

III.   BLOCK DIAGRAM

Figure 2. Block Diagram of System

IV.   MICROCONTROLLER

Microcontroller is the heart of the System. It compares the speed of vehicle by sensor at low speed zone or signal zone maximum allowable speed and automatically regulates the speed of vehicle by activating the speed limiting mechanism. The speed of vehicle is reduced to the required in that zone.

The microcontroller which has been used in our system is the „AT89S52" which is typically 8051 microcontroller manufactured by Atmel.

V.   IR SENSOR

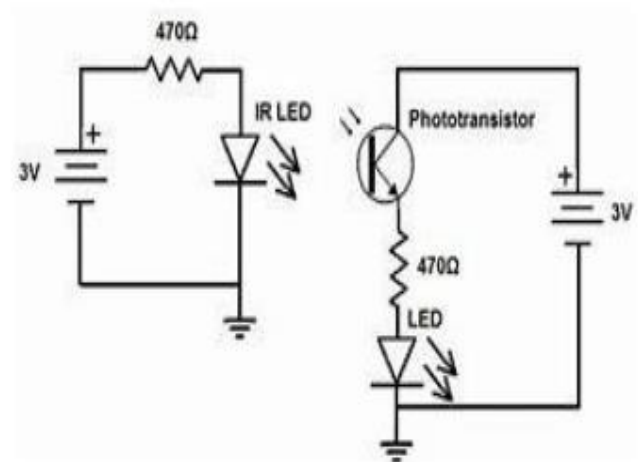Figure 3. IR Transmitter (white), Receiver (black)

Figure 4. Circuit Diagram of IR sensors

In this system we have used IR sensor as IR Transmitter unit and IR Receiver. The Transmitter unit which is to be placed at 100 meter earlier to the traffic signal.

The IR Receiver module is been implemented inside the car mechanism.

The Transmitter section includes an IR sensor, which Transmit continuous IR rays they are invisible to human eyes, and that battery regulator micro controller ir sensor ir sensor motor driver motor lcd display can be detected by an IR Receiver module. As soon as the Receiver module i.e. the car enters the low speed zone or signal zone the speed limiting mechanism starts operating and the microcontroller will generate control signal for the vehicle control system. Which then will activate the mechanism of the speed control in the vehicle and the speed of the vehicle is reduced to the require speed in that zone.

VI. MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. In this system we are using dc motor when the motor is interfaced with microcontroller, we can control the speed of vehicle by controlling the direction of rotating of flow valve automatically.

The motor has been implemented with an speed limiting mechanism in the vehicle. This mechanism is automatically activated in the low speed zone which access the vehicle and with respect to that the vehicle gradually decreases the flow of petrol. This is done by a throttle valve which has a spring action it allows to decreases the flow and simultaneously the vehicle decreases its speed as per the detection of the sensors.
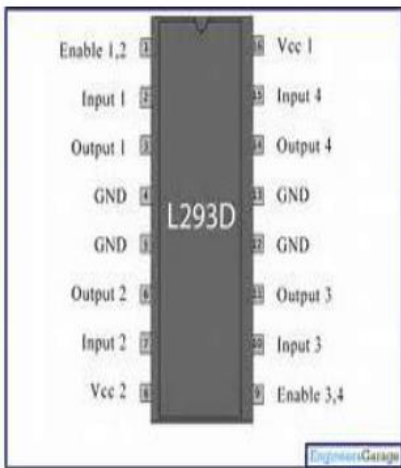
VII. MOTOR DRIVER

Figure 5. Pin Diagram of Motor Driver L293D

L293D is a dual H-bridge motor driver integrated circuit(IC). Motor driver"s acts as current amplifiers since they take a loecurrent control signal and provide a highercurrent signal. This higher current signal is used to drive the motors. In one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion. There are four I/Os to connect up to four DC motor. L293D had output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back emf output diodes are included within the IC. The output supply (VCC2) has a wide range from 4.5-36V, which has made L293d a best choice for dc motor driver.
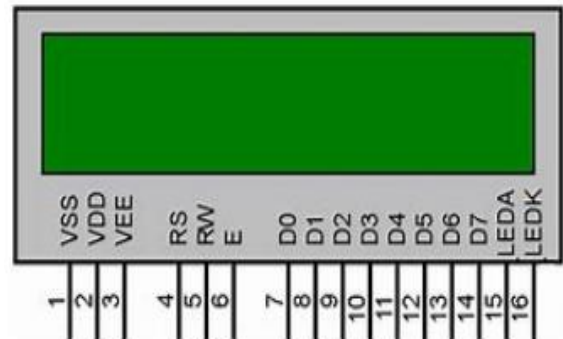
VIII. LCD

Figure 6. 16x2 LCD Display

A Liquid Crystal Display is an electronic device that can be used to show numbers or text. There are two main types of LCD display, numeric display, numeric display and alphanumeric text displays.

The display is made up of a number of shaped „crystal". In numeric displays these crystal are shaped into „bars" and in alphanumeric displays the crystals are simply arranged into patterns of „dots".

LCDs come in many sizes. The LCD which is been used in our system RG1602A the name indicates that display size is 16x2 characters, which is frequently used. It has 4-bit and 8-bit operation modes, 8-bit mode being easy to use, also offers various functions with its 16-pin configuration like power, contrast, control lines, data lines and backlight. There are 255 (2^8-1) ASCII values and the LCD accepts any character as input in the form of hexadecimal code through its 8 data pins (DB0-DB7) and displays the desired string (eg: zone A or zone B), character by character by incrementing the address at the 1x1 position of LCD.

In the system the 16x2 LCD will display the speed as the car will starts the speed will be 60km/hr let"s assume then when it reaches the low speed zone the speed limiting mechanism will operates in the car the controller signal will generate after detection of IR transmitter unit and Receiver. The mechanism will operate and the flow of fuel will get reduced at that particular low speed zone the decrease in speed will be display on 16x2 LCD display.

IX. RESULT

The program has been implemented in the microcontroller for the Automatic Vehicle Speed Control System. To automatically maintain the uniform speed of the engine within the specified limits, whenever there is a variation of the load. Using this speed limiting mechanism speed of the vehicle is control and accidents can be prevented.

Figure 7. Deactivated zone of 60rpm

Figure 8. Zone Activated of 30rpm

X. CONCLUSION

The discussed system can be designed to control the speed of vehicle in specific zones to avoid the accidents in the low speed areas. The vehicle will get detected in the low speed zone by the help of IR Transmitters and IR Receivers. As soon as the IR Receivers in the vehicle detects in the low speed zone the throttle valve in the speed limiting mechanism will closed and the flow of the petrol will decreases gradually. So hence the vehicle speed automatically lowers and therefore this system has a impacts to reduces the lives of people by accidents.

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