Intelligent Speed Control System for Automobiles

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Abstract- In this paper an automatic vehicle speed control system for automobile is discussed. The objective is to develop a model that reduces accidents on the road and preserve the lives of human beings especially children and the old people. The system consists of Radio Frequency (RF) transmitter and receiver to set the limit speed. The speed of the automobile is continuously monitored and it is given to the embedded system. The system cuts off the fuel supply when the speed is above the set speed and the automobile speed reduced. The driver has to adjust the speed within the set speed so that the automobile is continuous to run.

I.INTRODUCTION

In the modern era, the automobiles have increased in a large number. Accidents have also increasing nowadays and many lives had gone. The main reason is that many persons are driving in a higher speed than the indicated speed given by the roadways of government. It is the duty of each person to reduce the accidents on the road. One way is to limit the speed by a semi-automatic system given in this paper.

Embedded system is playing a vital role in the control, monitoring of many equipments in the field of engineering, medical, aerospace, process control and many more applications. Embedded system is a system that is used for a particular purpose of application. The system deals in this paper also consist of a microcontroller which senses the motor speed and control the fuel depending upon the limit speed.

II.OVERALL SYSTEM

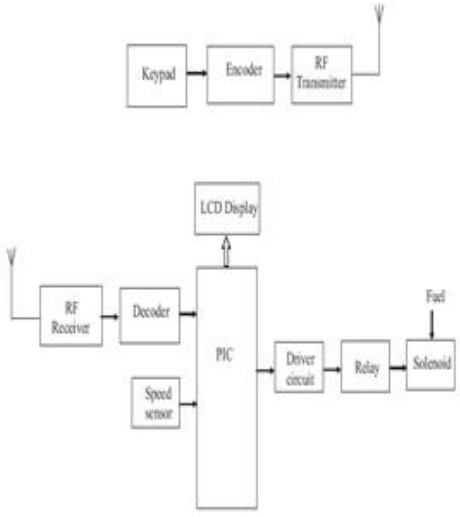

Fig.1 Block Diagram

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The main theme of this system is to control the speed in the speed limit regions in the road. The keypad is used to set different speed limits. The speed limit is encoded and it is modulated with a carrier frequency of 433 MHz. The RF transmitteris used to send the modulated signal[1]. The RF receiver present in the automobile system detects the signal and separates the speed limit with the carrier frequency. the speed is sensed and it is compared with set speed and if exceeds the relay is cut off by the microcontroller. Once the speed is within the set speed, relay is made on.

III. RF TRANSMITTER SECTION

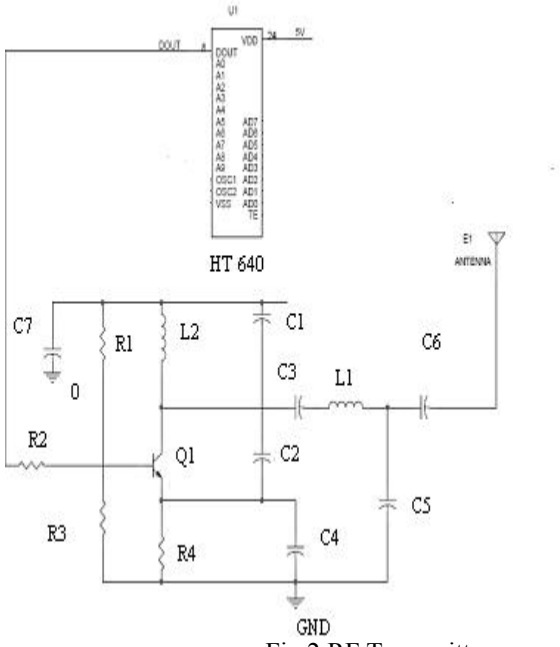

Fig.2 RF Transmitter

The keypad consists of eight key in which each key represents the one operation. The key board is interfaced with encoder data lines. If any one key is pressed the corresponding signal is given to encoder.

In this circuit HT 640 is used as encoder. They are capable of encoding 18 bits of information which consists of N address bit and 18-N data bits[2]. Each address/data input is externally trinary programmable if bonded out. It is otherwise set floating internally. The encoders offer flexible combination of programmable address/data is transmitted together with the header bits via an RF or an infrared transmission (IR) medium upon receipt of a trigger signal. The capability to select a trigger type further enhances the application flexibility of the encoders.

In this circuit the input signal to be encoded is given to Address/Data (AD7-AD0) input pins of encoder. The encoder output address pins are shorted so the output encoded signal is the combination of (A0-A9) address signal

and (D0-D7) data signal. The output encoded signal is taken from 8th which is connected to RF transmitter section.

IV.RF RECEIVER SECTION

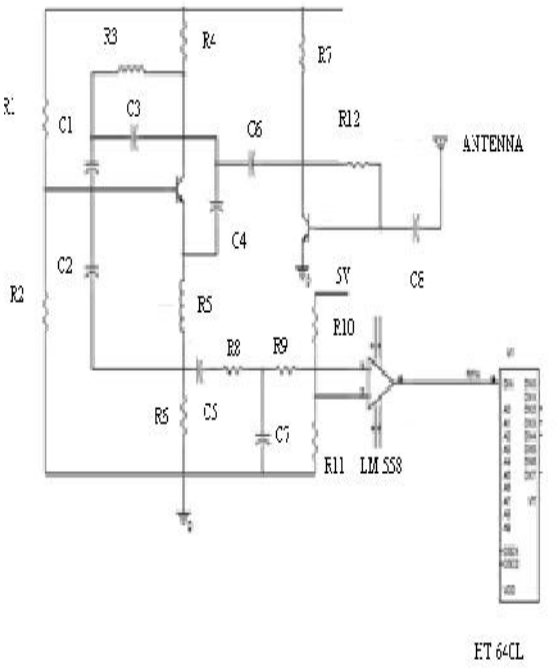

Fig.3. RF Receiver

The RF receiver is used to receive the encoded data which is transmitted by the RF transmitter. Then the received data is given to transistor which acts as amplifier. Then the amplified signal is given to carrier demodulator section in which transistor Q1 is turn on and turn off conducting depends on the signal. Due to this the capacitor C14 is charged and discharged so carrier signal is removed and saw tooth signal is appears across the capacitor. Then this saw tooth signal is given to comparator. The comparator circuit is constructed by LM558. The comparator is used to convert the saw tooth signal to exact square pulse. Then the encoded signal is given to decoder in order to get the decoded original signal.

In this circuit HT648 is used as decoder. For proper operation a pair of encoder/decoder pair with the same number of address and data format should be selected. The decoder receives serial address and data from that series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. It then compares the serial input data twice continuously with its local address. If no errors or unmatched codes are encountered, the input data codes are decoded and then transferred to the output pins[3].

The 3^{18} decoders are capable of decoding 18 bits of information that consists of N bits of address and 18-N bits of data. To meet various applications they are arranged to provide a number of data pins whose range is from 0 t08 and an address pin whose range is from 8 to 18. In addition, the 3^{18} decoders provide various combinations of address/ data numbering different package.

In this circuit the received encoded signal is 9th pin of the decoder. Now the decoder separate the address (A0-A9) and data signal (D0-D7). Then the output data signal is given to microcontroller .

V.SPEED MEASUREMENT MODULE

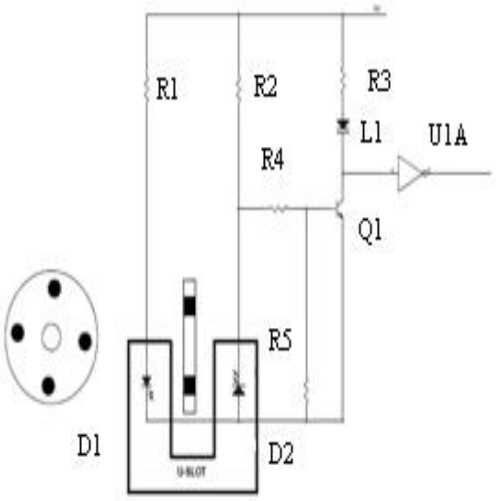

Fig.4 Speed measurement module

This circuit is designed to monitor the speed of the motor. The holes type pulley is attached in the motor shaft. The pulley is rotated across the USLOT. The USLOT consists of IR transmitter and receiver.

Infrared transmitter is one type of Light emitting diode (LED) which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other.

When supply is ON, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected to base of the switching transistor through resistors. When motor is not rotating the IR transmitter passes the rays to the receiver. The IR receiver LED is conducting due to that less than 0.7V is given to transistor base so that transistor is not conducting. Now the supply voltage +5V is given to the input of the inverter (IC7404) and zero taken as output. When motor is rotating, the pulley attached in the shaft also rotating, so it interprets the IR rays between transmitter and receiver. Hence IR receiver LED is not conducting due to that more than 0.7V is given to base of the transistor. Now the transistor is conducting so it shorts the collector and emitter terminal. The zero voltage is given to inverter input and +5v is taken in the output. Hence depends on the motor speed the zero to 5v square pulse is generating at the output which is given to microcontroller in order to count the pulse. This pulse rate is equal to the speed of the motor.

VI.SPEED CONTROL MODULE

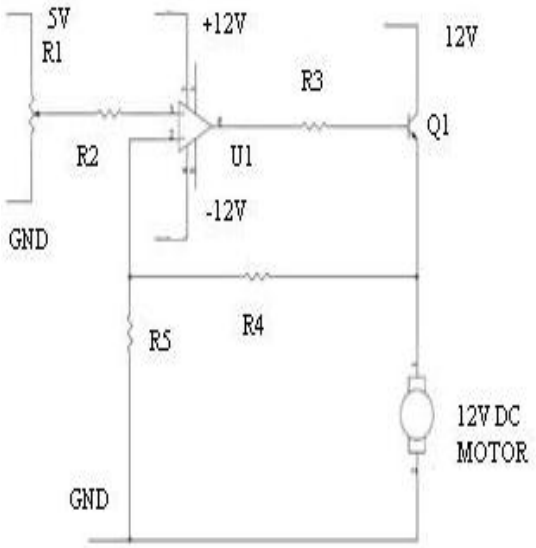

Fig.5 Speed Control module

This circuit is designed to control the speed of the 12v motor. Here the variable resistor is used to give the different voltage signal to amplifier circuit. The amplifier circuit is constructed by the LM 741 operational amplifier. The variable voltage is given to non inverting input terminal. Then the amplified signal is given to SL 100 power transistor. The 12v motor is connected in the transistor side. Depending on the amplified signal current through the transistor is controlled due to that the motor speed is controlled.

VII.RESULTS

The reading of relay output voltage, position, and speed are measured. This is done before and after setting the speed limit. The readings tabulated in this table 1 are by setting the speed limit 70 rps.

Table1.Speed of motor and Relay output

Sl. No.	**Setting the limit speed**	**Speed of the motor (rps)**	**Relay Position**	**Relay Output Volts**
1	Before	120	ON	0.2
2	Before	30	ON	0.2
3	After	24	ON	0.2
4	After	45	ON	0.2
5	After	100	OFF	11.7
6	After	30	ON	0.2
7	After	80	OFF	11.7
8	After	51	ON	0.2

From the reading, before entering it to the speed limit 70 rps, the system is free to move in any speed. During this time, relay remains off .When after setting the speed limit, whenever the system is crossing the speed limit relay will be activated and its position is made off.

The different voltages are applied to the motor and its corresponding speed are noted and tabulated in Table 2.

Table 2 Input voltage and speed of motor

Input Voltage (volts)	**Speed of the motor (rps)**
0.3	0
0.59	6
0.81	24
1.21	42
1.42	51
1.89	75
2.24	93
2.8	120
2.99	132
3.67	165
3.97	180
4.26	195
4.63	213
5.14	240
7.06	252
7.5	255
8.1	255
9.1	255

VII.CONCLUSION

The main contribution of this paper is to create an social awareness about the safety of other human beings. The system provided in the automobile ensures the safety of people riding as well as other living beings in the road .The main advantage of this system all the automobiles are forced to run in the speed limit given by the roadway authorities given by the government.

The further investigations can be done to control the gear rather than control the fuel so that automatic speed control can be achieved.

IX. REFERENCES

[1]. Balluchi, A., Benvenuti, L., Di Benedetto, M.D., Pinello, C. and Sangiovanni-Vincentelli, A.L., Automotive engine control and hybrid systems: challenges and opportunities. Proceedings of the IEEE. v88 i7. 888-912.

[2] Kassem, N. Microsoft Corp., Redmond, WA, USA Kosba, A.E.; Youssef, M.;VRF-Based Vehicle Detection and Speed Estimation vehicular Technology Conference (VTC Spring), IEEE (2012).

[3]. Puleston, P.F., Spurgeon, S. and Monsees, G., Automotive engine speed control: a robust nonlinear control framework. IEE Proceedings - Control Theory and Applications. v148 i1. 81-87

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