



SMART TRAFFIC CONTROL SYSTEM

Darshan N. Dodal¹, RutikS.Katkamwar², Sarang D.Lakade³¹Dept. of Electronics and Telecommunication Engineering, Dr.N.P.Hirani Institute of Polytechnic,Pusad,darshan.dodal@gmail.com²Dept. of Electronics and Telecommunication Engineering, Dr.N.P.Hirani Institute of Polytechnic,Pusad,rutikkatkamwar12334@gmail.com³Dept. of Electronics and Telecommunication Engineering, Dr.N.P.Hirani Institute of Polytechnic,Pusad,saranglakade.frd@gmail.com

Abstract

Now a days we people are living in the fast moving era, science is also developing with the same speed .Along with development we people are facing a major problem of increase in road accidents. To prevent road accidents we need to follow safety rules as well as we need to change the way we live in that is to make our surroundings smart enough to provide a helping hand in preventing accidents. Here comes the idea of SMART TRAFFIC CONTROL SYSTEM. This paper includes a smart traffic system based on RF technology to prevent the accidents caused due to violating the traffic signals. This works on simple RF transmitter receiver principle. It also shows a cost effective way to use this technologies in our cities.

Keywords: - RF technology, traffic signals, safety rules, smart traffic control system

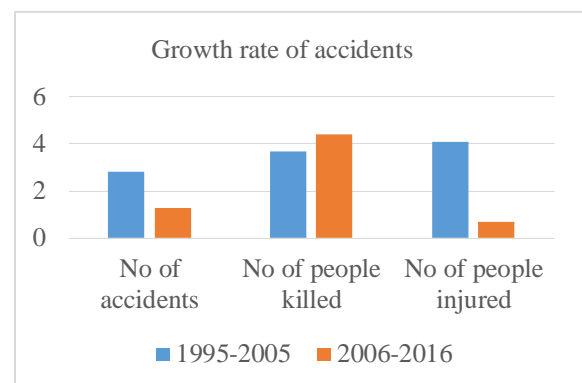
1. INTRODUCTION

Technology in developing our surroundings is increasing day by day. Cars and other vehicles are developing with a lot pace and the efforts to prevent road accidents are still at ease which is fetching us to increased road accidents. In India 1214 road crashes occur every day, over 1,50,000 people per year are killed in road accidents out of which 75,200 are caused by breaking the traffic signals, which is half of the total death[2]. So we must have to overcome this.

Through this presentation we want to present our idea to help in reducing road accidents. By using the technology we are about to present in this paper, we can minimize the amount of road accidents caused due to breaking of traffic signals and collision of vehicles, in a cost effective way. The Two ways are by using Smart Traffic control system and anti-collision system. This uses RF and Infrared technology respectively.

Table1: Annual accident data from 2005-2015 [2]

Year	Number of Accidents		Number of Persons		Accident Severity*
	Total	Fatal	Killed	Injured	
2005	4,39,255	83,491 (19.0)	94,968	465,282	21.6
2006	4,60,920	93,917 (20.4)	105,749	496,481	22.9
2007	4,79,216	1,01,161 (21.1)	114,444	513,340	23.9
2008	4,84,704	1,06,591 (22.0)	119,860	523,193	24.7
2009	4,86,384	1,10,993 (22.8)	125,660	515,458	25.8
2010	4,99,628	1,19,558 (23.9)	134,513	527,512	26.9
2011	4,97,686	1,21,618 (24.4)	1,42,485	5,11,394	28.6
2012	4,90,383	1,23,093 (25.1)	1,38,258	5,09,667	28.2
2013	4,86,476	1,22,589(25.2)	1,37,572	4,94,893	28.3
2014	4,89,400	1,25,828(25.7)	1,39,671	4,93,474	28.5
2015	5,01,423	1,31,726(26.3)	1,46,133	5,00,279	29.1



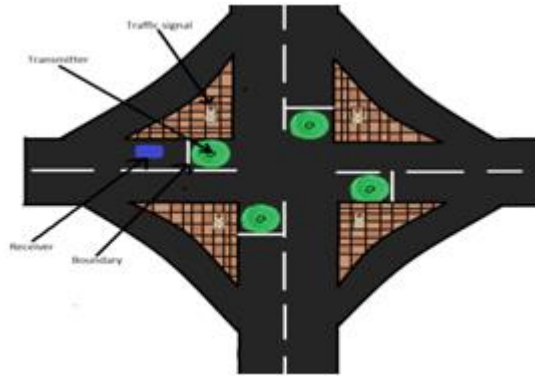


Fig-1: Illustration of a square in city

Functional diagram:-

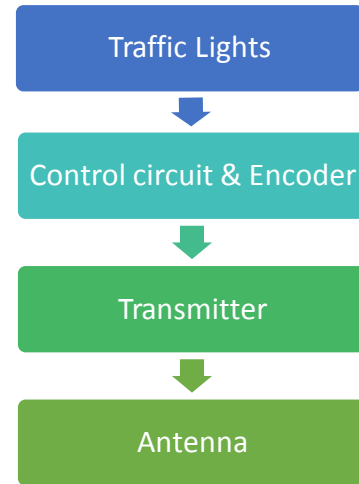


Fig-2: Functional diagram transmitter section.

2. SMART TRAFFIC CONTROL SYSTEM

Smart traffic control system works on basic transmitting and receiving principle through RF. At every square, traffic signals are assigned and also a border is fixed beyond which no vehicles are allowed to pass when the signal is RED. But some cross the border and try to break the traffic signal which causes accidents. The simple solution to prevent this is, to use a transmitter at the signal. When the traffic light is RED, the transmitter will also turn ON and start sending signals in its range. Now every vehicle will have receiver inbuilt in it so that if the vehicle cross the border it will enter into the range of transmitter and the receiver in the vehicle will receive the signals from the transmitter and the vehicle will be automatically stopped. This uses automatic braking system controlled by a servo motor. Both the transmitters and receiver will work at frequency of 433MHz because a cost effective transmitter and receivers are available at this frequency.

This system is divided into two sections:-

1. Transmitter section
2. Receiver section

2.1 Transmitter section:

Transmitter section consist of a transmitter which is used to send the stop signal to the receiver. The transmitter is connected directly through Red light of traffic signal as long as the traffic signal is RED, the control circuit will turn ON. The function of control circuit is to encode the signal and transmit it. The control circuit may be connected directly to RED light or through the timer circuit of traffic signals. The function of an encoder is to convert the parallel input data into serial output data and send it to transmitter. The encoder here we are using is 4 bit IC which can be used to encode 4 bits of parallel data into serial data. Here we need only one bit, others may be left open.

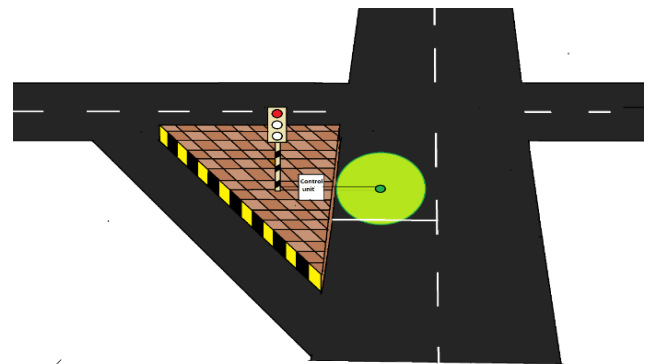
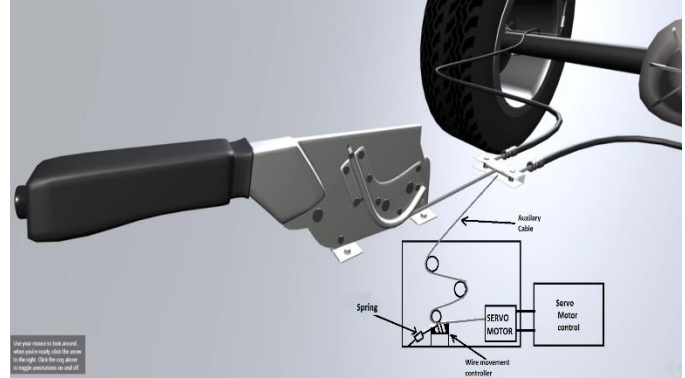


Fig-3: Transmitter section.

required range. The range of the transmitter can be decided by the applied voltage. The one we are using works on 5v to 12v. Greater the voltage greater its range will be. The voltage has to be selected according to range. The antenna is connected directly to the transmitter which requires very short length.

2.2 Receiver Section:

Functional diagram:-



use of handbrake stretches the auxiliary cable, the wire movement controller provides extra space for the cable to adjust itself without being stretched. The other end of auxiliary cable is attached to the servo motor. The servo motor provides flexibility to use i.e, the angle of rotation of the shaft of servo motor can be controlled. The required angle of rotation of the servo motor is decided according to the angle required for the handbrake. Now, when the receiver receives the transmitted signal, it gets decoded in the original form and this provides an activating pulse for a servo controller, this makes the servo motor to rotate and the brakes get applied and the vehicles stop.

3. Benefits of Smart traffic control system

- Designing of the circuit is very easy and complexity is very less.
- Cost of manufacturing is less.

4. Future Scope

The braking system here comprises of servo controller and servo motor which can be eliminated in future by connecting the decoder circuit to the Automatic Braking System on which the automobile manufacturers like Audi, Mercedes are working.[4]

5. Conclusion

The smart traffic control system reduces the number of accidents caused by breaking the traffic signals. We need to use this system, government should take effort to focus on use and development of this system. This is a basic version of the system, more advancements could be done by further research. This system proves to be effective in cities where traffic jam is common. Many of such systems are discovered in order to prevent road accidents. These systems have higher costs with very less effect. Smart traffic control system has very less production cost and very simple but very effective. It forces the people to follow the traffic rules and regulations even if they try to break.

References

[1]. Digital Electronics(OXFORD Publications) by G.K.Kharate

Fig-4: Functional diagram of Receiver section

Receiver section is installed in vehicles. The function of the receiver is to receive the stop signal sent by the transmitter. A receiver module is used so as to carry out the receiving process. It is tuned at the same frequency as that of transmitter (433 MHz).The output from the receiver is decoded by the decoder. This decoder will convert the serial data back to original one that is parallel. [3]Here decoder IC HT12D will be used which is available in pair with HT12E. The control circuit will have the servo motor control system to rotate the servo motor at a required angle. As long as the receiver is receiving the signal from the transmitter, the servo motor will rotate at a required angle and once transmitter is disabled the servo motor shaft will reach back to its original position. Now the servo will control brakes in the vehicles, the brakes will be same as the original ones the only difference will be, an extra cable will be provided, connected to servo motor. This cable will work as an auxiliary cable which will be used only during the auto braking.

Braking system Parking brake system of a car is illustrated in the fig-5, an auxiliary cable is attached to the brake compensator of the handbrake through a wire movement controller. The wire movement controller moves to and fro whenever the handbrake is in use. The

Fig-5 : Braking system of cars

- [2]. Accidents data obtained from http://pibphoto.nic.in/documents/rlink/2016/jun/p20166905.pdf&ved=0ahUKEwidg9Cyk7nWAhVIVLwKHeSeBRMQFgiTATAR&usg=AFQjCNHICSgqedo3Iw_N1Zg0U8F0sTcGqA
- [3]. Information of Encoder HT12E & Decoder HT12D from <https://electrosome.com/ht12e-encoder-ic-remote-control-systems/&grqid=Rpnn8jGA&hl=en-IN>

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