

Constructing RADAR System Using LASER Beam

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Abstract- RADAR system with using LASER beam instead of the microwave signal which is used in the normal vehicle speed detectors is a good idea and it will make a stronger speed detector device as the powerful of the concentrated LASER beam as it is more powerful over the microwave RADAR devices. This paper gives some idea about the LASER RADAR systems. This designed system will be able to use the powerful light of LASER to detect the speed of cars especially in the main highways where more drivers exceed the speed limits. This design of the system is chosen as its more reliable and for its accuracy in result.

Keywords – LASER, RADAR, LADAR,

I. INTRODUCTION

Radio Detection and Ranging (RADAR) is a communication system which is using microwave signals to detect and range the objects in the sky or in any free places. These systems are popular in these days in most of the countries over the world. RADAR systems are started to use in long time ago. At the present the RADARs systems applications are increasing every day as the daily improvements of the technologies and its applications. It is used in airplanes control towers to detect and control the movements of the airplanes. Moreover, it is used in marines to detect and control the movement of incoming and outgoing ships. It is also used by meteorologists to detect any storms, thunder-storms, winter-storms and the other types of storms. Higher speed with more accuracy is one of the main things which the engineers are working hard to make the life easier by offering devices and technologies which offers high speed and more accuracy with less tolerance. Using the LASER (Light Amplification by Stimulated Emission of Radiation) beam instead of using the microwave signals in the RADAR systems giving it much powerful device for some applications. It also gives faster signal and faster results. Also, there is a fewer sources of the interferences can limit the signal. That is because of the higher and stronger light beam than the microwave signals, which will give much more clear data. There are some limitations of using the LASER RADAR instead of using the normal microwave RADAR systems. These limitations are that the LADAR speedometer device will work efficiently in the fixed way. Moreover, the small particulars may affect little the results of the LADAR system.

II. PROPOSED SYSTEM

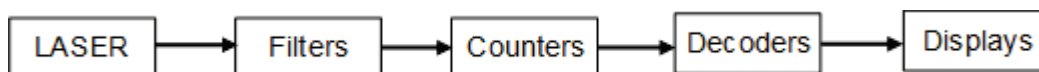


Figure 1. Block diagram of proposed system

A. IC 74160–

It is an integrated circuit used as counter. It has one input and four bits outputs which can give outputs from zero (0) till fifteen (15). Here, there is a need of AND gate (IC 7408) to restart the counting if it arrives to ten (10). So it will count from zero to nine only (0-9).

B. IC 7447–

It is an integrated circuit which is mostly used like decoder. This decoder converts the binary bits to Binary Coded Decimal (BCD) form, which is the input to the 7-segment display.

C. 7-segment display–

It is a display unit, which display the decimal form of a number according to the incoming binary bits. It has two types: common anode 7-segment display and common cathode 7-segment display. The used type will be the common anode 7-segment display in which the common pins of it will be connected to the positive voltage supply (5 volts).

D. Working Principle–

The laser will send its directed and concentrated light beam towards the street and if it hits the vehicle, the LASER beam will be reflected and returned back to the device. The received signal by the light sensors will be filtered using the passive filters to remove any unwanted signals (lower and higher unneeded frequencies). After the filtering stages the filtered signal enters the counters which counts it and send its output to the decoders. Decoders are integrated circuits, which converts the analogue signal to digital signal (decimal to BCD). The BCD code is shown on the 7-segments display. If the speed is more than 9, second stage of the circuit starts working it shows the tens and then the hundreds.

III. EXPERIMENT AND RESULT

The testing of the system is done using simulation in Proteus software. It is a simulation of the output of the project. It shows the 3-digit numbers on the 7-segment displays in kilo-meters per hour.

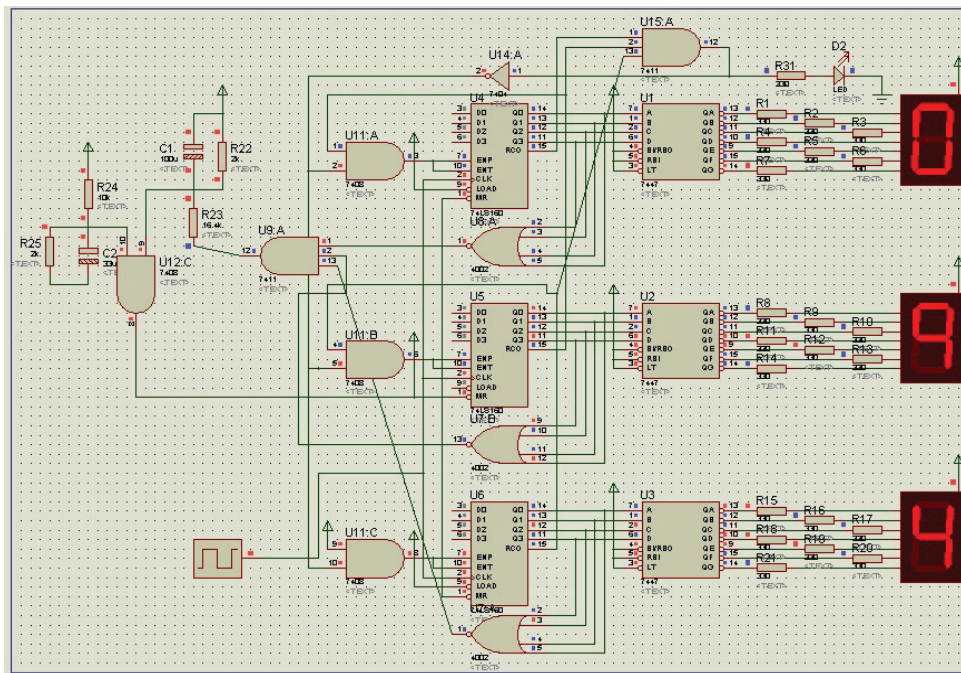


Figure 2. Simulation of the circuit

Table -1. Samples of the simulation output.

Try number	Speed detected
1	042
2	094
3	116
4	148

Table 1 shows that the proposed system has the ability to catch the speed of the cars and it can be displayed on the seven segment displays and whenever the speed is changed, the output also changes. It is designed to show the speed of the vehicles in kilometers per hour, so it is able to detect the speed from 1km/h till 999km/h.

IV.CONCLUSION

This paper is showing a model of car speed detection device using LASER. The proposed design is about the block diagram, working principle the simulation results. The main idea of the working principle of the system is when the LASER beam hits the vehicle, it reflects back and sensed by light sensor. The light sensor converts the detected signal to electrical current. This current will pass through filtering stage to remove any unwanted signals, then enter to the counter which counts the input and give the output to decoder, which converts the input to decimal form and the numbers will be shown on the 7-segment display. If the number is more than 9, it starts showing tens and hundreds.

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