Implementation of Speed Checker for Highways using Microcontroller

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Abstract— this project is to develop a device to detect rash driving on highways and to alert the traffic authorities in case of any speed violation. Accidents due to rash driving on highways are on the rise and people are losing their lives because of other mistake. In present system, to detect rash driving police has to use a handheld radar gun and aim at the vehicle to record its speed if the speed of the vehicle exceed the speed limit, nearest police station is to informed to stoop the speeding vehicle. This an ineffective process as after detecting one has to inform the same a of time is wasted. The proposed system will check on rash driving by calculating the speed of a vehicle using the time taken to travel between two set points at a fixed distance. A set pints consists of pair of sensors comprising of an IR transmitter and an IR receiver, each of which are installed on either sides of the road.

Key words: Traffic Pattern, Microcontroller

I. INTRODUCTION

A system designed to record and report on discrete activities within a process is called as Tracking System. In the same procedure we have developed a methodology of vehicle speed & direction system for robotics to control and achieve accurate direction speed for a class of non-linear systems in the presence of disturbances and parameter variations by using wireless communication technique. While driving on highways, motorists should not exceed the maximum speed limit permitted for their vehicle. However, accidents keep occurring due to speed violations since the drivers tend to ignore their speedometers. This speed checker will come handy for the highway traffic police as it will not only provide a digital display in accordance with a vehicle's speed but sound an alarm if the vehicle exceeds the permissible speed for the highway. The system basically comprises two IR LED's Transistor & receiver sensor pairs, which are installed on the highway 100cm apart, with the transmitter and the receiver of each pair on the opposite sides of the road. The system displays the time taken by the vehicle in crossing this distance from one pair to the other from which the speed of the vehicle can be calculated as follows: Here, Distance is the total distance between the pair of sensors. Time is the interval between crossing the first sensor and second sensor. Microcontroller 8051 is the heart of the system, which control all the function of the circuit. It measures the speed and control the circuit through a programming flashed inside 8051. IR sensor are used as a pair of eye that keep watching the speed of each vehicle crossing the sensors. A seven segment display is used to display the total speed of the vehicle (After calculation is done inside controller.

II. PROPOSED MODEL

In this section, we have designed a highway speed checker circuit to detect the rash driving using different electronic components such as timer, counter, logic gates, seven segment display and all other components. Fig.2 shows the typical block diagram of speed checker to detect rash driving on highways using a Timer which consists of sensor module, logical module, power supply, sound detector and display module. Further logical module comprises timers, NAND gates and decade counters.

A photodiode used as sensor is a type of photo detector capable of converting light into either current or voltage, depending upon the mode of operation. Photodiodes are similar to regular semiconductor diodes except that they may be either exposed (to detect vacuum UV or X-rays) or packaged with a window or optical fibre connection to allow light to reach the sensitive part of the device. Many diodes designed for use specifically as a photodiode will also use a PIN junction rather than the typical PN junction. When a photon of sufficient energy strikes the diode, it excites an electron, thereby creating a mobile electron and a positively charged electron hole. If the absorption occurs in the junction's depletion region, or one diffusion length away from it, these carriers are swept from the junction by the built-in field of the depletion region. Thus holes move toward the anode, and electrons toward the cathode, and a photocurrent is produced which goes to the Timer. In this case, we use micro controller

III. METHODOLOGY

This system has been designed assuming that the maximum permissible speed for highways is either 40kmph or 60kmph as per the traffic rule. Before operation, using a multimeter we have to check whether the power supply output is correct. If yes, apply power supply to the circuit by flipping switch to 'on.' In the circuit, we use long wires for connecting the two PHOTO DIODEs, so that we can take them out of the PCB and install on one side of the highway, 100 meters apart. We have installed two IR Diode transmitters (such as IR Diode torches) on the other side of the highway exactly opposite to the PHOTO DIODEs such that IR Diode light falls directly on the PHOTO DIODEs. Reset the circuit by pressing RESET switch, so the display shows '0000.' Monika Jain et al, International Journal of Computer Science and Mobile Computing, Vol.4 Issue.4, April- 2015, pg. 613-619 © 2015, IJCSMC All Rights Reserved 616 Using switch S1, select the speed limit (say, 60 kmph) for the highway. When any vehicle crosses the first IR Diode light, PHOTO DIODE1 will trigger IC1. The output of IC1 goes high for the time set to cross 100 meters with the selected speed (60 kmph) and LED1 glows during for period. When the vehicle crosses the second IR Diode light, the output of IC2 goes high and LED2 glows for this period. Piezo-buzzer sounds an alarm if the vehicle crosses the distance between the IR Diode set-ups at more than the selected speed (lesser period than preset-period). The counter starts counting when the first IR Diode beam is intercepted and stops when the second IR Diode beam is intercepted. The time taken by the vehicle to cross

both the IR Diode beams is displayed on the 7-segment display. For 60kmph speed setting, with timer frequency set at 100 Hz, if the display count is less than '600' it means that the vehicle has crossed the speed limit (and simultaneously the buzzer sounds). Reset the circuit for monitoring the speed of the next vehicle.

Since the system comprises two laser transmitters-LDR sensor pairs, which are installed on the highway 100 meters apart, with the transmitter and the LDR sensor of each pair on the opposite sides of the road. The installation of lasers and LDRs is shown in fig 3 below. The system displays the time taken by the vehicle in crossing this 100m distance from one pair to the other with a resolution of 0.01 second from which the speed of the vehicle can be calculated as follows: Speed (kmph) = Distance/ Time = 0.1 km (Reading x 0.01)/ 3600 Or, Reading (on display) = 36000/ Speed. As per the above equation for a speed of 40 kmph the display will read 900 (or 9 second), and for a speed 60 kmph the display will read 600 (or 6 seconds). Note that the LSB of the display equals 0.01 second and each succeeding digit is ten times the preceding digit. You can similarly calculate the other readings (or time).

IV. CIRCUIT DIAGRAM

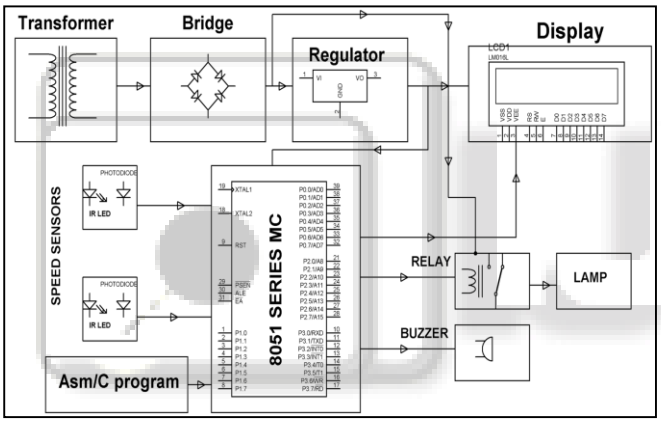

Fig. 1: Circuit Diagram

A. Algorithm

- Give the power supply at pin 40
- Reset the circuit, here the LCD display 0000
- Select the speed limit
- When the vehicle passes the first sensor (IR Diode)LED 1 glows controller starts counting
- When the vehicle crosses second IR diode here second LED glows and controller stops counting
- Note the time taken by the vehicle to reach second sensor from first IR diode using formula calculate speed
  Speed = ratio of time taken by vehicle to cross two transmitters and distance between them
- If the speed is greater than the selected speed the buzzer rings and it is displayed on LCD screen
- If not, it returns to first step

This algorithm is repeated for all vehicles

V. ADVANTAGES AND APPLICATIONS

1) The circuit is also running on +5V which is easier to generate.
2) They reduce the risk of accidents.
3) It is easy to implement.
4) It reduce the effort of many men
5) Bridge construction.
6) Highways.
7) Two lane road construction.
8) Emergency response.
9) Event Traffic control.

VI. CONCLUSION

Since number of accidents on highways increases day by day so it is necessary to check speed of the vehicles on highways so as to remove accident cases and to provide a safe journey by controlling high speed of the vehicle. It also minimizes the difficulties of traffic police department and make ease to control the rash driving on highways. The police can perform their duties while sitting in control room and can provide their service with more ease and accuracy. This concept can be extended in future by integrating a camera with the system which could capture the image of the number plate of the vehicle to sends that to the traffic authorities.

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