ISSN XXXX XXXX © 2018 IJESC

Research Article Volume 8 Issue No.3

Highway Overspeed Detecter and Alarming System

Mohammed GufranHaseeb[1], Ankit Kumar [2], Sujeet Kumar Horo[3], Ashish Tiwary[4]
Student of B. Tech [1, 2, 3], Assistant Professor[4]
Department of Electronics
GIET, Gunupur, Odisha, India

Abstract:
This project presents a device to detect rash driving on highways and to alert the traffic authorities in case of any violation. In past, lot of devices to detect rash driving on highways has been made. Most of the approaches require human concentration and involve a lot of effort, which is difficult to implement. In this project we intend to design a system aimed at early detection and alert of dangerous vehicle driving patterns related to rash driving. The entire implementation requires an IR transmitter, an IR receiver, a control circuit and a buzzer. The speed limit is set by the police who use the system depending upon the traffic at the very location. The time taken by the vehicle to travel from one set point to the other is calculated by control circuit and displays that on seven segment displays. Moreover, if the vehicle crosses the speed limit, a buzzer sounds alerting the police.

Keywords: light transmitter, LDR, Microntroller, piezo electric buzzer.

INTRODUCTION:

The Road safety is one of the major aspects in the present environmental and social safety. The increasing trend of road vehicles create serious traffic problem. Presently the control of the road safety is mostly manual and slowly the electronic is entering in this field. The electronic sensors are more accurate and reliable also. The high-speed drivers are always create problem not for them but also for the others traveling on the road. There are so many concepts used to detect the over speed of the vehicles but the light sensing method out of which Doppler method. Photo sensing method vibration methods are quite popular. The Doppler method is an expensive one and vibration method is not an accurate but the photo sensing method is quite reliable and also cost effective. This sensor can be used in the High Ways to automate the transistor is in cut-off state i.e. is in OFF state thus the buzzer does not gets activated.
security system. The sensor designed in this project work is smart sensor which detect the over speed of the vehicle. If the vehicle runs with in a safe speed limit then the detector doesn't react but when the speed detector find a over speed then automatically the sensor issue signal to the base station and the output is feed to a latch to blow a alarm continuously until reseated.

The use of electronic sensors can maintain database also it is possible to interface all the sensors to a network and monitor centrally regarding the safety aspect of the important road segment also monitor and capture the data base of the vehicles. The application of smart sensors can enable to achieve all the above facility but the electronic sensors are the starting point for this type of sensors.

COMPONENT USED-

Light transmitter:
A Led is used as a Light transmitter.

LDR
A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it.

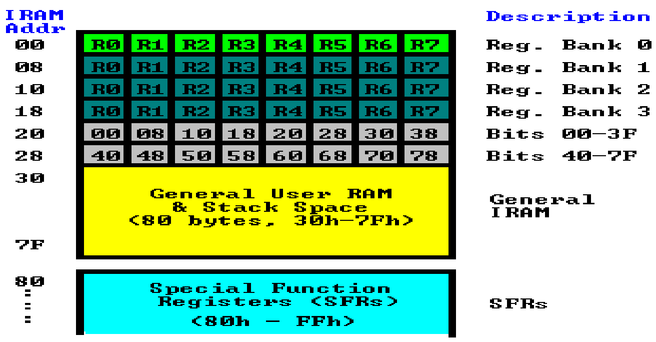
MICROCONTROLLER (AT89C2051)
Low-voltage, high-performance CMOS 8-bit microcomputer with 2KB of flash programmable and erasable read-only memory. The device is manufactured using Microchip high-density non-volatile memory technology and is compatible with the industry-standard MCS-51 instruction set. This versatile 8-bit CPU with flash provides a highly flexible and cost-effective solution for many embedded control applications.

PIEZO ELECRTIC BUZZER:-
It is a device that converts electrical signal to an audible signal (sound signal).The Microcontroller cannot drive directly to the buzzer, because the Microcontroller cannot give sufficient current to drive the buzzer for that we need a driver transistor (BC547), which will give sufficient current to the buzzer. Whenever a signal received to the base of the transistor through a base resistance (1.5k) is high, the transistor comes to saturation condition i.e. ON condition thus the buzzer comes to on condition with a audible sound. Similarly, whenever the signal is not received to the base of the transistor.

CODE MEMORY: Code memory is the memory that holds the actual 8051 program that is to be run. This memory is limited to 64K and comes in many shapes and sizes: Code memory may be found *on-chip*, either burned into the Microcontroller as ROM or EPROM. Code may also be stored completely *off-chip* in an external ROM or, more commonly, an external EPROM. Flash RAM is also another popular method of storing a program. Various combinations of these memory types may also be used--that is to say, it is possible to have 4K of code memory *on-chip* and 64k of code memory *off-chip* in an EPROM. When the program is stored on-chip the 64K maximum is often reduced to 4k, 8k, or 16k. This varies depending on the version of the chip that is being used. Each version offers specific capabilities and one of the distinguishing factors from chip to chip is how much ROM/EPROM space the chip has. However, code memory is most commonly implemented as off-chip EPROM. This is especially true in low-cost development systems and in systems developed by students.

ON-CHIP MEMORY:

As mentioned at the beginning of this chapter, the 89C51 includes a certain amount of on-chip memory. On-chip memory is really one of two types: Internal RAM and Special Function Register (SFR) memory. The layout of the 89C51's internal memory is presented in the following memory map:



As is illustrated in this map, the 8051 has a bank of 128 bytes of *Internal RAM*. This Internal RAM is found *on-chip* on the 8051 so it is the fastest RAM available, and it is also the most flexible in terms of reading, writing, and modifying its contents. Internal RAM is volatile, so when the 8051 is reset this memory is cleared. The 128 bytes of internal ram is subdivided as shown on the memory map. The first 8 bytes (00h - 07h) are "register bank 0". By manipulating certain SFRs, a program may choose to use register banks 1, 2, or 3. These alternative register banks are located in internal RAM in addresses 08h through 1Fh. We'll discuss "register banks" more in a later chapter. For now it is sufficient to know that they "live" and are part of internal RAM. Bit Memory also lives and is part of internal RAM. We'll talk more about bit memory very shortly, but for now just keep in mind that bit memory actually resides in internal RAM, from addresses 20h through 2Fh. The 80 bytes remaining of Internal RAM, from addresses 30h through 7Fh, may be used by user variables that need to be accessed frequently or at high-speed. The Microcontroller as a storage area for the operating stack also utilizes this area. This fact severely limits the 8051's stack since, as illustrated in the memory map, the area reserved for the stack is only 80 bytes--and usually it is less since this 80 bytes has to be shared between the stack and user variables.

SRF DESCRIPTIONS: There are different special function registers (SFR) designed inside the 89C51 micro controller. In this micro controller all the input , output ports, timers interrupts are controlled by the SFRs. The SFR functionalities are as follows. This section will endeavor to quickly overview each of the standard SFRs found in the above SFR chart map. It is not the intention of this section to fully explain the functionality of each SFR--this information will be covered in separate chapters of the tutorial. This section is to just give you a general idea of what each SFR does.

P0 (Port 0, Address 80h, Bit-Addressable): This is input/output port 0. Each bit of this SFR corresponds to one of the pins on the Microcontroller. For example, bit 0 of port 0 is pin P0.0, bit 7 is pin P0.7. Writing a value of 1 to a bit of this SFR will send a high level on the corresponding I/O pin whereas a value of 0 will bring it to a low level.

Programming Tip: While the 8051 has four I/O port (P0, P1, P2, and P3), if your hardware uses external RAM or external code memory (i.e., your program is stored in an external ROM or EPROM chip or if you are using external RAM chips) you may not use P0 or P2. This is because the 8051 uses ports P0 and P2 to address the external memory. Thus if you are using external RAM or code memory you may only use ports P1 and P3 for your own use.

SP (Stack Pointer, Address 81h): This is the stack pointer of the Microcontroller. This SFR indicates where the next value to be taken from the stack will be read from in Internal RAM. If you push a value onto the stack, the value will be written to the address of SP + 1. That is to say, if SP holds the value 07h, a PUSH instruction will push the value onto the stack at address 08h. This SFR is modified by all instructions which modify the stack, such as PUSH, POP, LCALL, RET, RETI, and whenever interrupts are provoked by the Microcontroller.

Programming Tip: The SP SFR, on startup, is initialized to 07h. This means the stack will start at 08h and start expanding upward in internal RAM. Since alternate register banks 1, 2, and 3 as well as the user bit variables occupy internal RAM from addresses 08h through 2Fh, it is necessary to initialize SP in your program to some other value if you will be using the alternate register banks and/or bit memory. It's not a bad idea to initialize SP to 2Fh as the first instruction of every one of your programs unless you are 100% sure you will not be using the register banks and bit variables.

DPL/DPH (Data Pointer Low/High, Addresses 82h/83h): The SFRs DPL and DPH work together to represent a 16-bit value called the *Data Pointer*. The data pointer is used in operations regarding external RAM and some instructions involving code memory. Since it is an unsigned two-byte integer value, it can represent values from 0000h to FFFFh (0 through 65,535 decimal).

Programming Tip: DPTR is really DPH and DPL taken together as a 16-bit value. In reality, you almost always have to deal with DPTR one byte at a time. For example, to push DPTR onto the stack you must first push DPL and then DPH. You can't simply plush DPTR onto the stack. Additionally, there is an instruction to "increment DPTR." When you execute this instruction, the two bytes are operated upon as a 16-bit value. However, there is no instruction that decrements DPTR. If you wish to decrement the value of DPTR, you must write your own code to do so.

PCON (Power Control, Addresses 87h): The Power Control SFR is used to control the 8051's power control modes. Certain operation modes of the 8051 allow the 8051 to go into a type of "sleep" mode, which requires much, less power. These modes of operation are controlled through PCON. Additionally, one of the bits in PCON is used to double the effective baud rate of the 8051's serial port.

TCON (Timer Control, Addresses 88h, Bit-Addressable): The Timer Control SFR is used to configure and modify the way in which the 8051's two timers operate. This SFR controls whether each of the two timers is running or stopped and contains a flag to indicate that each timer has overflowed. Additionally, some non-timer related bits are located in the TCON SFR. These bits are used to configure the way in which the external interrupts are activated and also contain the external interrupt flags which are set when an external interrupt has occurred.

TMOD (Timer Mode, Addresses 89h): The Timer Mode SFR is used to configure the mode of operation of each of the two timers. Using this SFR your program may configure each timer to be a 16-bit timer, an 8-bit auto reload timer, a 13-bit timer, or two separate timers. Additionally, you may configure the timers to only count when an external pin is activated or to count "events" that are indicated on an external pin.

TL0/TH0 (Timer 0 Low/High, Addresses 8Ah/8Ch): These two SFRs, taken together, represent timer 0. Their exact behavior depends on how the timer is configured in the TMOD SFR; however, these timers always count up. What is configurable is how and when they increment in value.

TL1/TH1 (Timer 1 Low/High, Addresses 8Bh/8Dh): These two SFRs, taken together, represent timer 1. Their exact behavior depends on how the timer is configured in the TMOD SFR; however, these timers always count up. What is configurable is how and when they increment in value.

P1 (Port 1, Address 90h, Bit-Addressable): This is input/output port 1. Each bit of this SFR corresponds to one of the pins on the Microcontroller. For example, bit 0 of port 1 is pin P1.0, bit 7 is pin P1.7. Writing a value of 1 to a bit of this SFR will send a high level on the corresponding I/O pin whereas a value of 0 will bring it to a low level.

SCON (Serial Control, Addresses 98h, Bit-Addressable): The Serial Control SFR is used to configure the behavior of the 8051's on-board serial port. This SFR controls the baud rate of the serial port, whether the serial port is activated to receive data, and also contains flags that are set when a byte is successfully sent or received.

Programming Tip: To use the 8051's on-board serial port, it is generally necessary to initialize the following SFRs: SCON, TCON, and TMOD. This is because SCON controls the serial port. However, in most cases the program will wish to use one of the timers to establish the serial port's baud rate. In this case, it is necessary to configure timer 1 by initializing TCON and TMOD.

SBUF (Serial Control, Addresses 99h): The Serial Buffer SFR is used to send and receive data via the on-board serial port. Any value written to SBUF will be sent out the serial port's TXD pin. Likewise, any value which the 8051 receives via the serial port's RXD pin will be delivered to the user program via SBUF. In other words, SBUF serves as the output port when written to and as an input port when read from.

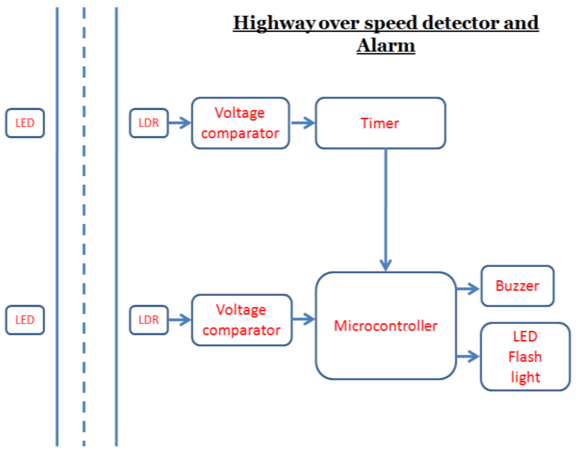
P2 (Port 2, Address A0h, Bit-Addressable): This is input/output port 2. Each bit of this SFR corresponds to one of the pins on the Microcontroller. For example, bit 0 of port 2 is pin P2.0, bit 7 is pin P2.7. Writing a value of 1 to a bit of this SFR will send a high level on the corresponding I/O pin whereas a value of 0 will bring it to a low level.

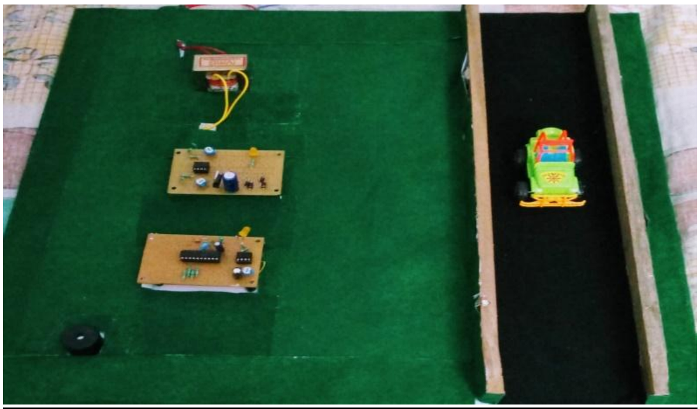
Programming Tip: While the 8051 has four I/O port (P0, P1, P2, and P3), if your hardware uses external RAM or external code memory (i.e., your program is stored in an external ROM or EPROM chip or if you are using external RAM chips) you may not use P0 or P2. This is because the 8051 uses ports P0 and P2 to address the external memory. Thus if you are using external RAM or code memory you may only use ports P1 and P3 for your own use.

IE (Interrupt Enable, Addresses A8h): The Interrupt Enable SFR is used to enable and disable specific interrupts. The low 7 bits of the SFR are used to enable/disable the specific interrupts, where as the highest bit is used to enable or disable ALL interrupts. Thus, if the high bit of IE is 0 all interrupts are disabled regardless of whether an individual interrupt is enabled by setting a lower bit.

P3 (Port 3, Address B0h, Bit-Addressable): This is input/output port 3. Each bit of this SFR corresponds to one of the pins on the Micro controller. For example, bit 0 of port 3 is pin P3.0, bit 7 is pin P3.7. Writing a value of 1 to a bit of this SFR will send a high level on the corresponding I/O pin whereas a value of 0 will bring it to a low level.

DESIGN PRINCIPLE: There are two pairs of Light Transmitter and receiver and a counter unit works in synchronization with mono-shot pulse. One set of LIGHT Tx-Rx pairs put at the entry of the sensing zone and other pair of LIGHT Tx – Rx put at the exit of the sensing zone. Both the output connected to a Microcontroller, One receiver is directly connected and another is through a monoshot/Timer. When the vehicle entry in the sensing zone the entry sensor sends a trigger pulse to one mono-shot. The sensing zone is set to limit the speed of the vehicle with in 60 Km/hr. The distance kept between the sensors is 10mtrs so the time taken to cover the sensing zone is approximately .06 sec. If any vehicle cover the sensing zone with a time period less than 0.6 sec then it is automatically understood that the vehicle is running at a higher speed then 60 km/hr. when the vehicle moves with in the safe limit then it is automatically reset and indicate safe but the speed of the vehicle exceed the limit then it declare unsafe In this design the entry sensor trigger the mono-shot which is designed to stay high for .6 Sec. If the vehicle crosses the exit point sensor within that 0.6 sec then pulse generated feed to a Microcontroller for sampling as an indicative pulse of over speed detection and blows an alarm with a dummy camera flashing.





RESULT:

While driving on highways, drivers should not exceed the maximum speed limit permitted for their vehicles.
However, accidents keep on occurring due to speed violations as drivers follow their speedometers and controltheir speed according to them, and reduce the speed if they find it to be exceeding and beyond their control. Ahighway speed checker comes handy for the traffic police, especially against the speed limit violators because itprovides the digital display as well as buzzing sound or alarm to detect any vehicle speed if the vehicle exceedsthe permitted speed limit. The makeup of these highways, sometimes leads to accidents because most of thetimes, there is no rule to govern speed limits on these highways. To overcome this problem, we haveimplemented a circuit called as a speed checker for highways. This kit is inexpensive and it is used forconsidering the average and high speed of vehicles that move on the highways or roads.

CONCLUSION

Since number of accidents on highways increases day by day so it is necessary to check speed of thevehicles on highways so as to remove accident cases and to provide a safe journey by controlling high speed ofthe vehicle. It also minimizes the difficulties of traffic police department and make ease to control the rashdriving on highways. The police can perform their duties while sitting in control room and can provide theirservice with more ease and accuracy. This project is developed and tested in the laboratory and found to operating satisfactory in the test condition.The accuracy is very high.

FUTURE SCOPE:

This concept can be extended in future by integrating a camera with thesystem which could capture the image of the number plate of the vehicle to sends that to the traffic authorities.

REFERENCES:

[1] Dinesh Mohan, Omer Tsimhoni, Michael Sivak, Michael J Flannagan Road safety in India: challenges and opportunities – Repost number UMTRI-2009-1 http://www.deepblue.lib.umich.edu

[2] ManishaRuikar, National statistics of road traffic accidents in India, Journal of Orthopaedics, Traumatologyand Rehabilitation, 23 Sep. 2013, vol. 6, issue 1, pp. 1-6

[3] Daniel Brookoff, Charles S. Cook, Charles Williams, and Calvin S. Mann, Testing Reckless Drivers for Cocaine and Marijuana, The New England Journal of Medicine, Aug. 25, 1994, pp. 518-522

[4] JiangpengDai , Jin Teng , XiaoleBai , ZhaohuiShen,and Dong Xuan Mobile phone based drunk driving detection in Pervasive Computing Technologies for Healthcare (Pervasive Health), 2010 4th International Conference .http://ieeexplore.ieee.org

[5] Available on [https://medvinlaw.com/reckless-driving-in-virginia-while-intoxicated-or-with-elevated-blood-alcohol-level-bac-new-2013-case-law/]

[6] Lafayatte police department Advanced roadside interview techniques for petrol officers.

[7] Harper Finch Lawyers, Speed Detection Methods. Available on: [http://www.trafficlawqld.com.au/HarperFinchLawyers2056/Page/21590/SpeedDetectionMethods.aspx]

[8] Available on: [http://www.cnet.com/news/police-radar-gun-that-shows-if-youre-texting/#!]

[9] Available on: [http://en.wikipedia.org/wiki/LIDAR_speed_gun]

[10] Available on: [https://www.elprocus.com/speed-checker-to-detect-rash-driving-on-highways/]

[11] Shyr-Long Jeng, Wei-HuaChieng, and Hsiang-PinLu Estimating Speed Using a Side-Looking Single-Radar Vehicle Detecter, IEEE Transactions on Intelligent Transportation Systems, Vol. 15, No. 2, April 2014, pp. 607-614

[12] I. S. Kim, K. Jeong, and J. K. Jeong, Two novel radar vehicle detectors for the replacement of a conventional loop detector, Microw. J., vol. 44, no. 7, pp. 22–69, 2001

[13] H. Rohling, Some radar topics: Waveform design, range CFAR AND target recognition, in Advances in Sensing with Security Applications. New York, NY, USA: Springer-Verlag, 2006, pp. 293–322.

[14] S. J. Park, T. Y. Kim, S. M. Kang, and K. H. Koo, A novel signal processing technique for vehicle detection radar, in Proc. IEEE MTT-S Int. Microw. Symp. Dig., Philadelphia, PA, USA, Jun. 2003, vol. 1, pp. 607–610.

[15] Available on [http://content.time.com/time/magazine/article/0,9171,860106,00.html]

AUTHORS

Mr. Mohammed GufranHaseeb is pursuing his Bachelor's degree in Applied Electronics and Instrumentation Engineering. From GIET Gunupur, Odisha, India.

Mr.Ankit Kumar is pursuing his Bachelor’sdegree in Applied Electronics and Instrumentation Engg. From GIET Gunupur, Odisha, India.

Mr.Sujeet Kumar Horo is pursuing his Bachelor’sdegree in Applied Electronics and Instrumentation Engg. From GIET Gunupur, Odisha, India.

Mr.AshishTiwary has done his M.Tech in Applied Electronics and Instrumentation from GIET Gunupur. Presently he is working as an Assistant Professor in Department of Electronics in GIET Gunupur, Odisha, India. His field of interest is Automation, Embedded systems and PLC.