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Vehicle Overspeed Indication to Traffic Control Room Through GSM

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Abstract
This paper 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 paper 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. Once the vehicle over speed detected, an SMS alert is sent to the department and live streaming of that location is also done using USB Web camera.

Keywords:
"IR transmitter", "IR receiver", "Speed control", "Buzzer", " Raspberry pi", "GSM".

I. INTRODUCTION
Rash driving is the cause of many road accidents all over the world. A total of 4,73,084 traffic accidents were reported during the year 2001 in India. The road accident analysis chart [1], [2] sorted by the rate of road accidents is shown in fig. 1. The traffic population has increased considerably in India as there is no means to control or monitor the speed of vehicles running on roads. This system proves highly effective in detection of over speed driving. It is not at all necessary that such accidents are results of driving under the influence of alcohol as even a person who hasn't consumed alcohol can drive in a reckless manner [3]-[5]. To overcome this problem and decrease death rate due to accidents, introduction of new and innovative speed enforcement technology is necessary. Nowadays, rash driving causes a serious danger to the driver as well as general public. Despite the fact that rash driving is a serious problem, its current methods of detection by patrol officers lack sufficiency [6], [7]. First of all, given the huge mileage of driveways, the number of patrol officers is far from enough to observe and analyse every driver's behaviours.

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Second, the guidelines of rash driving patterns are only descriptive and visual observations cannot specify the details of driving at night or in poor weather. In the present system, to detect rash driving police has to use a handheld radar gun [8], and aim at the vehicle to record its speed. If the speed of the vehicle exceeds the speed limit, the nearest police station is informed to stop the speeding vehicle. This is an ineffective process as after detecting one has to inform the same and a lot of time is wasted. With the number of vehicles increasing day by day, this method cannot be trusted with the lives of people. After keeping all these considerations in mind, we have designed a model of highway over-speeding vehicledetecting circuit to control rash driving by the use of different electronic devices such as timer, counter, logic gates, seven segment display and several other components. Though the proposed model can also be designed by using microcontroller but due to its high complexity and high cost, use of timer is preferable over microcontroller.

A wide range of sensor technologies are also available, such as inductive loops, video, ultrasonic detectors, microwave detectors and radar based detectors. The history of speed enforcement is replete with examples of new enforcement techniques; subsequent negative public reaction and resistance; and finally, assuming survival through legal challenges to these techniques. The public's distrust of the use of high technology by enforcement officials is often evidenced by claims that the technology is simply another attempt by an article of Time magazine, "Big Brother Is Driving" to invade their lives. The advantage of our proposed over speed driving warning system is that it 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 will also sound an alarm if the vehicle exceeds the permissible speed for the highway, an SMS alert is sent to the department and live streaming of that location is also done using USB Web camera.

II. METHODOLOGY

The block diagram developed for our project is shown below which includes all the concepts that are explained below. The block diagram which we included here can be considered as a combined module of the concepts we chose to show as a prototype for the project. The first and the foremost thing which can be considered as the heart of our project is the raspberry pi board. We use two IR sensor sets for entry and exit of the vehicle. These IR sensors are connected to the raspberry pi board. These sensors help in calculating the speed of the vehicle. Once over speeding is detected, the buzzer rings and an SMS alert is sent to the traffic control room through GSM module. Live streaming of the location is also done using Wi-Fi, USB web camera and web page. This module is given power supply through the Regulated power supply unit.

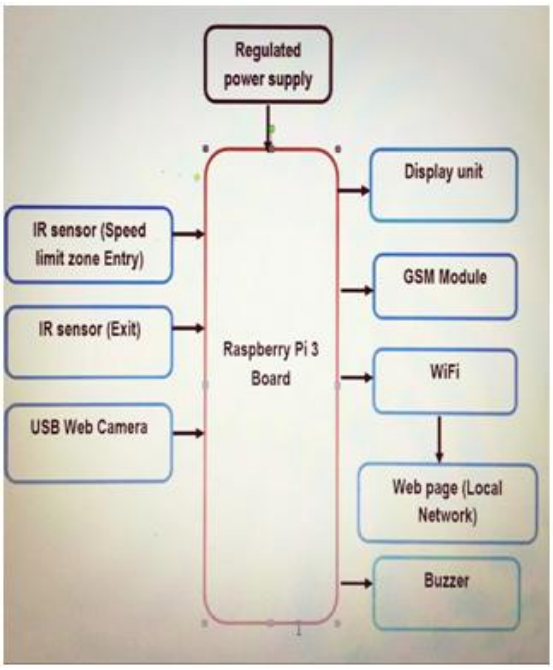

Fig.1: Proposed block diagram

III. CONCEPT OF THE PROJECT

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 control their speed according to them, and reduce the

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speed if they find it to be exceeding and beyond their control. A highway speed checker comes handy for the traffic police, especially against the speed limit violators because it provides the live location to the control room as well as sends an SMS alert if the vehicle exceeds the permitted speed limit. The makeup of these highways, sometimes leads to accidents because most of the times, there is no rule to govern speed limits on these highways. To overcome this problem, we have implemented a circuit called as a speed detection circuit for highways. This kit is inexpensive and it is used for considering the average and high speed of vehicles that move on the highways or roads.

IV. ARCHITECTURE OF OUR PROJECT

The architecture of our project is presented in the form of a block diagram below. Our project starts with detecting over speeding vehicles on highways. The technology used in our project is the Raspberry pi 3. The IR sensors and the GSM module are interfaced to the Raspberry pi 3 board. The IR sensors are placed at a distance on the highways. These sensors detect over speeding vehicles and send the information to the board. This information is then sent to the GSM module. The GSM module then sends an SMS alert to the control room as per the code logic. A web camera is also used for our project to live stream the location to the control room through which the information of the vehicle can be obtained.

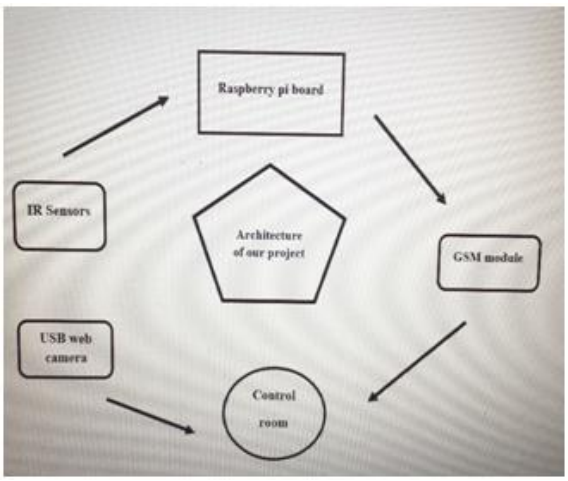

Fig.2: Basic architecture of project

IV. BRIEF INFORMATION ON RASPBERRY PI

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation . It does not include peripherals (such as keyboards and mice) and cases. However, some accessories have been included in several official and unofficial bundles. Several generations of Raspberry Pi's have been released. All models feature a Broadcom system on a chip (SoC) with an integrated ARM-compatible central processing unit (CPU) and on-chip graphics processing unit (GPU).Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3 Model B+; on-board memory ranges from 256 MB to 1 GB RAM. Secure Digital (SD) cards in Micro SDHC form factor (SDHC on early models) are used to store the operating system and program memory. The boards have one to four USB ports. For video output, HDMI and composite video are supported, with a standard 3.5 mm tip-ring-sleeve jack for audio output. Lower-level output is provided by a number of GPIO pins, which support common protocols like I²C. The B-models have an 8P8C Ethernet port and the Pi 3 and Pi Zero W have on board WI-FI and Bluetooth. The Raspberry Pi 3+ uses a Broadcom BCM2837B0 SoC with a 1.4 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache.

V. WORKING PRINCIPLE

This system has been designed assuming that the maximum permissible speed for highways is either 40 kmph or 60 kmph 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.' The main aim of the project is to measure the speed of vehicles and to intimate it to the traffic control room, if the vehicle exceeds its maximum speed limit. Here we will place two IR transmitter receiver pairs with some distance, along the road. And by calculating the time difference between the activation of two IR receivers as per the code logic, the

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speed of the vehicle can be calculated. The heart of our project is the raspberry pi board to which the two IR sensor sets are interfaced. The GSM module, the display unit, the buzzer are also interfaced to the raspberry pi board. If any vehicle crosses the speed limit i.e. if the time between the activation of two IR sensors is less than the time limit, the buzzer rings and an SMS alert is sent to the traffic control room through the GSM module as per the code logic. A USB web camera is placed at the location. The traffic control room uses Wi-Fi and a local web page to live stream the location to get the details of the vehicle that crossed the speed limit. The 16X2 LCD display unit is used to display the speed status of the vehicle. The circuit uses standard power supply comprising of a step-down transformer from 230v to 12v and four diodes forming a bridge rectifier that delivers pulsating dc which is then filtered by an electrolytic capacitor of 1000µf. The filtered dc being unregulated IC LM7812 is used to get 12v constant output at its pin no 3 irrespective of input dc varying from 9v to 14v. The input dc shall be varying in the event of input ac at 230volts section varies in the ratio of v1/v2=n1/n2. The regulated 12volts dc is further filtered by a small electrolytic capacitor of 0.1 µf for any noise so generated by the circuit. This is used as the supply for different ICs in the circuit.

VI. RESULTS

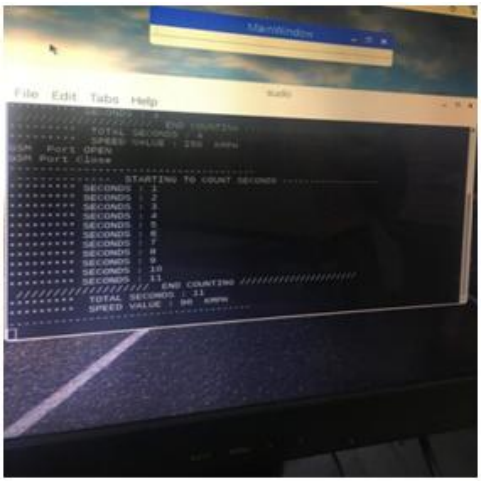

Fig.3: Sensors data monitoring

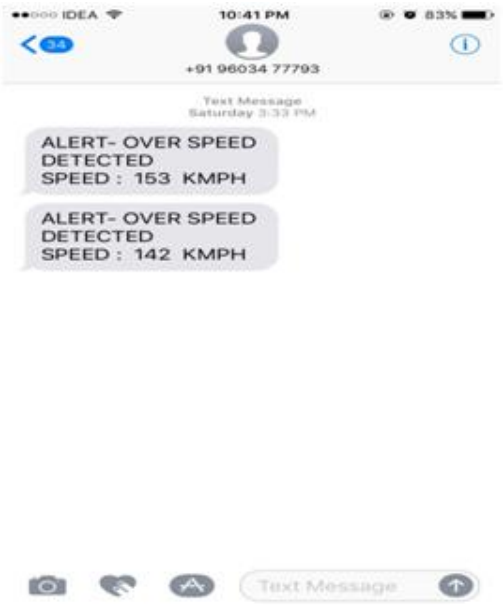

Fig.4: Vehicle over speed Message received

Fig.5: Live streaming of a location

VII. 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 project is extended by using a USB webcamera with the system which live streams the location to the traffic department.

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