Car Overspeeding Detection

[1]Madhura Joshi, [2]Harini Sankar, [3]Adarsh Kumar Singh, [4]Harshad Dharmadhikari, [5]Pushkar Sathe

[1,2,3,4,] Students, [5]Professor

[1, 2,3,4,5] Department of Electronics and Telecommunication,

[1, 2,3,4,5] SIESGST, Nerul, Navi Mumbai, India

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Abstract: This is a traffic control system which includes a device that performs detection of vehicle speed which is running above specified speed on highways and other roads as well as notifies authorities in an event of violation of rules. In earlier times, a lot of ideas were implemented to detect harsh driving or overspeeding of vehicles. Many of these system require human intervention and a lot of efforts which is very hard to implement. In this project we are designing the system that aims at early detection of over speeding vehicles and alert of those to the concerned authorities wirelessly. This in turn prevents occurrence of road accidents. The safe speed limit is specified by the authority which is responsible to control this system. The vehicle speed limit is depending on the traffic at particular location. System will capture the speed of vehicle and the time taken by vehicle to travel from one point to end point and it will display it on LCD where system is deployed. In addition to this, the buzzer gives a sound alert to the police and sends the required vehicle details and other details to the authority via ZigBee.

Index Terms **- RFID, ZigBee, LCD, IR Proxy Sensor, Microcontroller**

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I. INTRODUCTION

A large number of road accidents occur all over the world. The major cause of many of these traffic collisions is rash driving. A total of 4,74,084 traffic accidents were reported during the year 2001 in India. According to the analysis chart as shown in fig1[3], the number is increasing day by day. The traffic has increased considerably in India and yet there are no efficient measures to .control this traffic or monitor the speed of the running vehicles. Thus, to overcome this problem and reduce the number of death rates occurring due to traffic collisions introduction of new innovative speed enforcement technology is necessary.
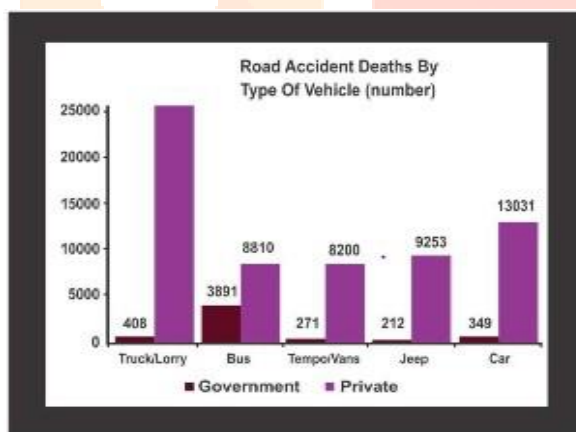

Figure 1. Road accident analysis chart

In the present system, to detect rash driving, police uses a handheld radar gun and aims at the vehicle to record its speed. If the speed of the vehicle exceeds the allowable speed limit, the nearest police station is informed to stop the speeding vehicle. This process is more time consuming and as compared to the continuous increase of traffic this system cannot be trusted with the lives of people.

Our proposed project aims to develop a wireless system that detects cars driving at speeds over a specified limit and inform concerned authorities immediately. This system does not need any human interception and a lot of time is saved effectively .The time required for a particular car for moving from one point to other is first calculated on the basis of the time required the speed of the car is determined. This data is then transmitted to the concerned police authorities at a remote location wirelessly.

The mechanism consists of a transmitter and receiver pair that works in combination to detect the vehicle. The details of the vehicle are read by the RFID reader and stored in the system database. The microcontroller calculates the speed of the vehicle based on time needed and displays the speed on LCD screen. The buzzer alarm sounds if an over speed is detected. This system is designed in such a way that, if a specific car over speeds once then a certain amount of fine is cut from the owners' account and if the same car crosses the speed limit thrice then the owner's license gets cancelled.

II. RESEARCH METHODOLOGY

1. Background Overview

A. Overspeed Detector For Vehicle Control System

Sibley, Henry C. (Adams Basin, NY) Auer Jr., John H. (Fairport, NY) Smith, Willis R. (Rochester, NY)
What it claimed is:

1.An over speed detector for vehicle control system comprising sensing means for generating an alternating current actual speed signal for the vehicle and sensing means for delivering an alarm signal whenever the actual speed signal is indicative of a speed above a selected speed limit wherein the improvement comprises:

2. An over speed detector according to claim 1 including said control and switching means comprises:

The above invention relates to the overspeed as a reason for vehicle control systems and particularly detectors that are used in systems for controlling the increase in number of vehicles automatically from centralized locations. The automatic vehicle control systems that are handled without operator need more security and supervisory subsystems for safe and accurate operation. In general, an automatic vehicle overspeed control system is necessary in order to provide a safe drive for the public. The supervisory subsystems carry out the functions such as performance monitoring, routing etc. It is the main objective of this system to handle the proper arrangement, its limitations, and advantages according to the specified arrangement. The other objective is to provide an improved position, direction and safe speed of the vehicle. The more important thing is to design an optimum system to maintain proper communication between the vehicle and the center in a secure way.

B. Development of Vehicle Tracking System using GPS GSM Modem.

(IEEE 2013, Authors: Pham Hoang Oat, Micheal Drieberg and Nguyen Chi Cuong, Electrical and Electronics Engineering Department, University Technology PETRONAS)

This paper presents the development of the vehicle tracking system's hardware prototype. Specifically the system will utilize GPS to obtain a vehicle's co-ordinate and transmit it using GSM modem to the user's phone through the mobile network. The three main components of the systems are the GPS receiver module, GSM module and Arduino microcontroller. The GPS receiver module's main function is to obtain the vehicle's coordinates. The se coordinates are the location information to the GSM to be transmitted through the mobile network to the user when requested or on a periodic basis.

C.RFID Based Automatic Speed Limit Warning System.

In the above paper, investigation is done on the automatic speed limit transmission based on RFID technology. The present speed detection systems include GPS systems and get recognition based on real time image processing. GPS based systems detects the location of vehicle by GPS navigation system. Satellite signal is received by GPS Sensor and calculates the location of the vehicle. The system finds the location of the vehicle on the road map and indicates the corresponding speed limit according to the speed limit stored in database. Cameras installed in front of the vehicle capture the images in front of vehicle. Accordingly, algorithms are prepared to identify the speed limit signs on roads by processing the captured images. In this research paper, the speed limit is stored in RFID tags that are embedded in the sign posts at points on the roads. As soon as the vehicle passes the point, the RFID reader will take the data of the corresponding speed limit information from the tags.

2. Proposed System:

In this system, we are mainly using Microcontroller AT89C51 and ZigBee technology which is very helpful in communication because its low power consumption limits transmission distance to 10-100 meters and great efficiency. Also we are using RFID cards and IR sensors and LCD display which will help us to detect and display the speed of any vehicle passing through the area where this system is implemented. Power supply of LM78XX series which will help to provide us fixed voltage for system.

This project has been designed assuming that the maximum permissible speed for highways is either 40 kmph or 60 kmph as per the traffic rule. Our main purpose is to detect speed of over speeding vehicle. This system can display the exact value of vehicle's speed detected with the respective time duration. Before starting the operation, we have to verify whether the power supply output is proper. If yes, apply power supply to the circuit by keeping switch to ON.
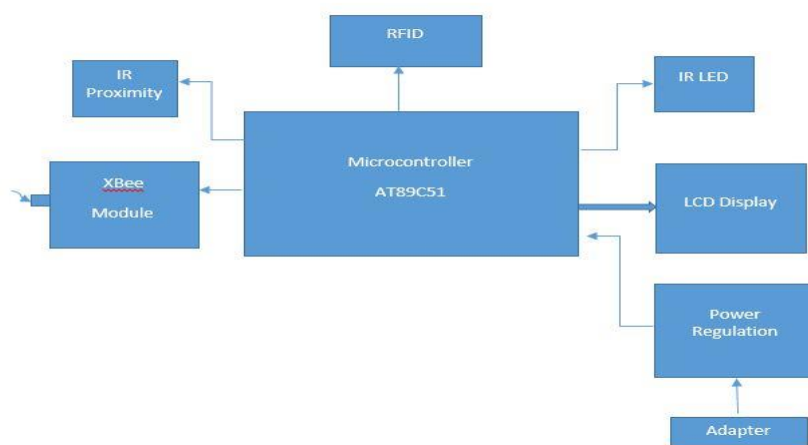

3. Working Explanation:

- In this system, we will install Two IRs and RFIDs 100 meters apart on one side of the highway.
- In the system there will be IR Tx and Rx on either sides of road , photodiodes are installed such that IR light falls directly on it.
- First of all, we reset the circuit, so display will show 0000 reading. Then speed limit either 40 kmph or 60 kmph will be adjusted as maximum speed allowed. When any vehicle crosses first IR Diode light, Photodiode 1 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.

- Buzzer will sound the alarm if the maximum permissible speed is violated by vehicle between the two point of IR sensors.
- The time taken by the vehicle to cross both the IR Diode beams is calculated in the microcontroller and at the same time the speed of the vehicle is displayed on LCD screen.
- If any vehicle crossing these two points with time resolution of 0.01 seconds from which the speed of vehicle can be calculated as:-

$$\text{Speed (kmph)} = \text{Distance}/ \text{Time}$$

$$\text{Speed} = 0.1 \text{ km}/(\text{Reading} * 0.01)/ 3600 \quad \text{or reading (on display)} = 36000/ \text{Speed}.$$
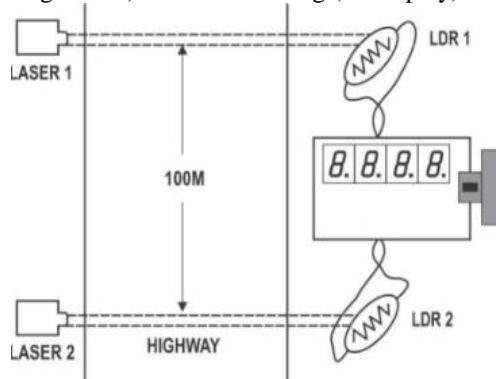
- As per the above equation for a 40 kmph the display will read 9 second, and for a speed 60 kmph the display will read 6 seconds.

- The RFID reader gets the vehicle details (no) that has over speeded and sends it to the authorities via ZigBee wirelessly.
- If any car crosses the speed limit then the system gives an alarm and a certain amount of fine is deducted from the owner's account and a record of it is maintained in the database by the police authority. If the same car overspeeds thrice or more times, the owner's license gets cancelled automatically.

4. Enhancements

A. Advantages
- Effective method to record vehicle speed.
- Does not need any human interception.
- Records car speed as well as wirelessly informs authorities of over speeding detection.

B. Future modifications
- The CCTV Camera can be installed on highways along with speed detector. If any vehicle has violates the maximum speed limit then this implementation of CCTV will be triggered to take a picture of the vehicle.
- Major benefit is adding voice announcement system. By adding this in system, it will notify the driver that vehicle has crossed the over speed conditions.

III. CONLCUSION

The car over speeding detection system reduces the number of road accidents and provides a safe journey by controlling the speed of vehicles, in turn avoiding traffic collisions. Thus, the work of the traffic police authorities is minimized and they can control the rash driving of cars efficiently and accurately with ease by just sitting in the control room. In future, this concept can be further extended by integrating a camera with this system that will capture the picture of the over speeding vehicle's number plate and send it to the police authority for further process.

IV. ACKNOWLEDGMENT

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