Automatic Vehicle Over Speed Detection Alert and Controlling System on Highway

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***Abstract* - In today's environment, road accidents are relatively common. The primary cause is inattentive driving. The need to check speed is critical, and various approaches havebeen utilized in the past. However, as technology advances, various regulating organizations are requesting some form of computerized equipment to combat the problem of fast driving. In this scenario, we'll introduce a system that will recognize vehicles that are travelling faster than the posted maximum speed limit on the highway. This suggested project describes a system that detects a vehicle's excessive speed and alerts the appropriate individual by sounding a buzzer and sending text messages to their mobile phones. In addition to these capabilities, we use a Renesas microprocessor, LCD, and IR sensor technology to detect speed in speed restricting zones. GSM is used to send SMS alerts to relevant users about tool charging. This project is appropriate for both school and hospital zones. This suggested idea will help to prevent road accidents while also reducing manual labor and saving time.**

Key words:- IR Transmitter-Infrared remote control;IR Reciever;GSM -Global System for Mobile;Speed control

I. INTRODUCTION

Many road accidents occur as a result of rash driving around the world. In India, a total of 4,49,002 road accidents were reported in 2019. The rate of vehicle growth is expanding rapidly, causing traffic congestion to deteriorate. During peak hours, most Indian cities face a slew of traffic-related issues, including traffic congestion, accidents, pollution, and other issues. As India's traffic grows, it becomes increasingly difficult to control or monitor the pace of moving vehicles on the road.

Uncontrolled urbanisation and widespread use of private vehicles are the primary causes of traffic congestion in such places. People confront numerous issues as a result of traffic, including increased commute time, health issues, and accidents. In India, nearly 3.54 lakh people died in road accidents in 2020. Proper and improved traffic management ensures that traffic flows uniformly and systematically, as well as playing a critical part in reducing global warming. Over speeding isthe cause of the majority of fatal accidents. As the vehicle's speed rises, so does the risk of an accident or injury. When a vehicle is travelling at a high rate, stopping requires a wide distance, and controlling such a vehicle is difficult. Controlling a vehicle that is travelling at a low speed is challenging, but it is easy to control a vehicle that is moving at a high pace. Nowadays, young people are intrigued by driving fast cars, which leads to violations of traffic rules and regulations. If traffic management tracks over speeding vehicles and fines the drivers, they will not drive at high speeds in the future and will rigorously follow traffic rules and regulations, reducing the frequency of accidents and injuries and ensuring public safety to some extent. Furthermore, by utilising this technique, the stolen vehicle will be easily tracked by using RFID technology. We hear about highway accidents all the time these days And, in the vast majority of cases, the primary cause of the accident is a violation of the speed limit, sometimes known as over speeding. Almost every feature of the highway must be present. For the sake of driving safety, a signboard displays the maximum speed limit; yet, many continue to disregard the highway speed limit. As a result of this situation, we added another feature to our project: overspeed detection and penalty collection for speed limit violators. Two infrared sensors are used to create this function.

II. LITERATURE SURVEY

Monika Jain [1] demonstrated a system that detects reckless driving and warns traffic authorities if a violation is detected. The major goal of this frame is to build a system that detects and alerts vehicles driving patterns that are linked to rash driving. The speed limit varies according to traffic. For the management of speed violations, this gadget provides reports, displays, and a data basesystem.

Ni Hlaing et al. [2] developed a system that detects vehicle speed on roads, highways, and other surfaces. If the speed exceeds the set limit, data will be transferred to the PC (Personal Computer) at the time the camera is turned on. It takes a picture of a car thatis travelling too fast.

Amarnarayan et al. [3] developed a speed estimating system that warns drivers about driving conditions, is robust and dependable, and aids in avoiding traffic jams, which is a major issue that has recently gotten a lot of attention. Road tolls were imposed throughout Europe in the twentieth century to fund the development of highways.Bridges and tunnels are examples of specialised transportation infrastructure. On a 50 - kilometer toll collection centre, control gates, and onboard units, one of Europe's countries (Italy) charges motorway tolls (OBI). The Global System for Mobile Communication (GSM) and the satellite-based Global Positioning System (GPS) are combined in the NATCS (GPS). The OBUs calculate toll fees using GPS technology and subsequently send the data to the NATCS computer centre. We employ a system with control gates equipped with digital short range communication (DSRC) detection devices and high definition cameras to identify the plate numbers of many vehicles. According to sometechnological parameters, this technology will cost motorists a lot of money.

III. METHODOLOGY

We used several electronic components such as a timer, counter, logic gates, seven section display, and other components to design a highway speed checker circuit to detect rash driving. depicts a typical speed checker block diagram. With the help of the Timer, it can detect high-speed driving on highways. Sound detector, power, logical, sensors, and display modules are all included. Timers, NAND gates, and decade counters make up the rest of the logical module.

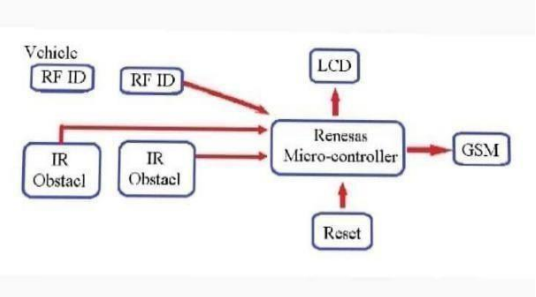

Figure 1: Vehicle speed detector block schematic

We employed a photodiode as a sensor in this model, and it assisted us in converting light into current or voltage, depending on the mode of operation. Photodiodes are similar to conventional semiconductor diodes, except that they can either be exposed or have an optical fibre connection that allows light to reach the device's deligated section. A large number of diodes are manufactured and employed in specific applications such as photodiodes and pn junctions. When a high-energy photon strikes the diode, it excites one electron, resulting in a mobile electron and a positively charged electron hole. If the absorption happens in the depletion zone of the junction, or one diffusion length away from it, the built- in field of the depletion region sweeps these carriers away from the junction. As a result, holes migrate toward the anode and electrons go toward the cathode, resulting in a photocurrent. This is sent to the Timer as a result of the production. In this situation, we'll utilise a 555Timer IC, which is an integrated circuit or chip that can perform awiderange of timer and multi-vibrator functions. The 555 has threemodes of operation: Monostable mode: the 555 acts as a "one-shot" in this mode. Timers, a missing pulse detector, and other devices are examples of applications. Pulse-width modulation (PWM), capacitance measurement, and so on. The 555 Ic has an oscillator, therefore it's instable and runs continuously. LED and light flashers, pulse generation (PG), logic clock, alarm security, wave position modulation, and other applications are just a few of the possibilities.

If the DIS pin and capacitor are not required, the 555 Timer will behave like a flip-flop. Bounce-free latching switches, for example, are one of the many applications. A step- down transformer from 230v to 12v and four diodes creating a bridge rectifier deliver pulsing dc, which is subsequently filtered by a 1000f electrolytic capacitor. The output pin number of the LM7812 IC is always 3 and the input dc voltage ranges from 9 to 14 volts. In the event that the input ac voltage varies, the input dcvoltage must change in the ratio of v2/v1=n2/n1. A tiny filter further filters the controlled 12 volts dc. We utilised a 0.1 micro farad electrolytic capacitor. Electrolytic capacitors are utilised ina variety of circuits. A buzzer is an audio signalling device that ispowered by oscillating electronic circuits and piezoelectric audio amplifiers. When a button is pressed, a click, a ring, or a beep is heard. If the vehicle passes the gap between the IR Diode set-ups at a speed greater than the chosen speed, the piezo-buzzer emits an alarm.Figure 3 depicts the buzzer's sound- emitting principle. Simultaneously, the time taken by the vehicle to intersect both diodes is displayed on the 7-segmentdisplay if the speed is high.

Distance/Time = 0.1km*1/((Reading*0.01)/3600)
= Speed in kilometres per hour (kmph). Alternatively, 3600/Speed
= Reading the Display

For a 40 kmph speed, use the equation above.The reading display will read 900 or 9 seconds for a speed of 60 kilometres per hour, and 600 or 6 seconds for a speed of 60 kilometres per hour (visible to the LSB display). The supplied digit, 0.01sec, is 10 times the previous digit; the reading is calculated using the same approach.

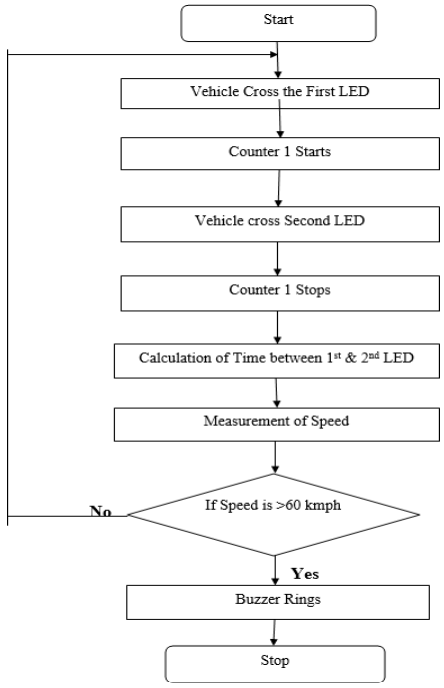

Fig 2: Flow chart

This entire procedure is broken down into the following steps:
Step 1: Turn on the supply by switching the switch. Step 2: Reset the circuit to '0000' on the display.
Step 3: Set the speed restriction to 60 km/h.
Step 4-When any vehicle passes across the first IR Diode light, PHOTO DIODE1 activates IC1, causing LED 1 to shine for a shorttime.
Step 5-When the vehicle passes through the first IR diode light andinto the second IR diode light, the output of IC2 is high, and LED2illuminates.
Step 6- If the car exceeds the speed restriction (60 km/h), the piezo- buzzer will sound.
Step 7- The distance between the first and second IR diodes is counted.
Step 8: On the 7-segment display, the time it takes for the vehicle to
pass both IR Diode beams is displayed.

IV. RESULT

Different vehicles are present on roadways, and we set different speed limits for each vehicle. As a result, many accidents occur as a result of speed differences, which drivers must be aware of in order to limit the number of accidents. If the car exceeds the speed limit, the piezo-buzzer emits an alaram and takes a snapshot of the vehicle's licence plate. When a vehicle exceeds the speed limit, the traffic police department takes appropriate action and imposes a punishment on the vehicle.Because of the design of these routes, accidents do occur occasionally because speed restrictions are rarely enforced. We devised a circuit known as a speed checker for highways in order to address these issues. The speed checker kit is a low-cost device that detects the speed of moving cars on a road or highway.

V. CONCLUSION

Accidents are increasing in frequency and severity, particularly on highways, and the death rate is rising as well. Controlling the vehicle's speed restriction is critical for reducing the number of accidents and ensuring a safe travel for passengers. It also makes it easier to manage reckless driving on highways, which is a challenge that the traffic police agency faces. Police officers can conduct their tasks orjob while sitting in the department's control room, allowing them to provide more efficient and accurate service.This concept can be expanded in the future by combining a camerawith the system, which will aid in the capture of a vehicle's image as well as its licence plate number, which will be sent to the traffic authorities.

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