



## MICROCONTROLLER BASED INFRARED CAR SPEED POST

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### Abstract

*This paper presents a device designed to detect over-speeding on highways and sound an alert to the traffic authorities in case of any violation. Similar devices aimed at detecting over-speeding were made in the past. In most of earlier devices human intervention is needed and this consume more time and cost. In this paper we intend to design a system aimed at instant detection of vehicle speed, give an alert of over-speeding to the security personnel and capture the picture of the speed limit defaulter for record keeping. The entire implementation requires a Laser transmitter, and a photo detector as the receiver, dc power supply, a control circuit, a buzzer and a camera. The speed limit is set by the user who uses the system depending upon the traffic regulation at the given 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 liquid crystal display. Once a vehicle crosses the speed limit, a buzzer sounds an alert while the camera snaps the picture of the vehicle focusing on the plate number.*

**Keywords:** Laser, Violation, Photo Detector, Speed limit, Camera, Traffic...

### INTRODUCTION

The proposed system aims at developing a standalone device that detects cars driving at speeds over specified limit and inform concerned authorities immediately. This speed detection systems will serve as an alternative to previous

hand-held radar guns used by police personnel which allow them to check car speed manually on the spot in order to take further decision. This system first calculates the time taken by the moving car to travel from first gate to the second. Based on this data it calculates the car speed. The mechanism consists two laser sensor transmitter-receiver pairs set for vehicle over-speed detection purpose. Signal are fired two times and each time after firing the microcontroller processes the received (reflected) signal and calculate the time required by vehicle to travel from one point to the other. Depending upon this time it now calculates vehicle speed as well as displays this on an LCD display. It sounds a buzzer alarm if an over speed vehicle is detected.

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 [5][6]. 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" [4] to invade their lives [3].

### **Statement of the Problem**

According to the Q2 (second quarter) of the year 2017 road transport data in Nigeria 2,503 road crashes occurred in Q2 2017. Speed violation is reported as the major cause of road crashes in Q1 (first quarter) and it accounted for 44.44% of the total road crashes reported. Loss of control and dangerous driving followed closely as they both accounted for 12.92% and 8.06% of the total road crashes recorded [1].

A total of 8,270 Nigerians got injured in the road traffic crashes recorded within the period under review. 7,805 of the 8,270 Nigerians that got injured, representing 94% of the figure, are adults while the remaining 465 Nigerians, representing 6% of the figure are children. 6,217 male Nigerians, representing 75%, got injured in road crashes in Q2 while 2,053 female Nigerians, representing 25%, got injured [1].

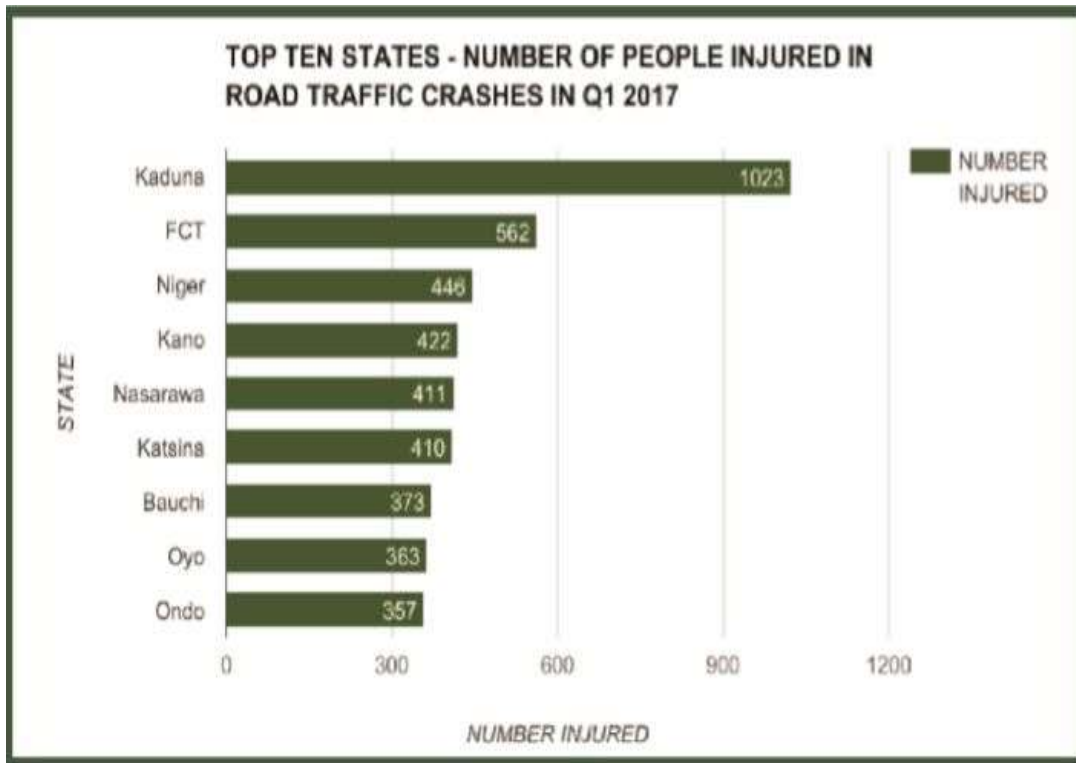


Fig. 1: Top ten states with the highest number of casualties due to accidents in Nigeria

A total of 1,466 Nigerians got killed in the road traffic crashes recorded in Q1. 1,363 of the 1,466 Nigerians that got killed, representing 93% of the figure are adults while the remaining 103 Nigerians, representing 7% of the figure are children. 1,164 male Nigerians, representing 79%, got killed in road crashes in Q1 while 302 female Nigerians, representing 21%, got killed [2].

It is evident therefore that Hardly a week pass by without having a mind-boggling headline on the pages of national dailies narrating story of accidents across the nation's Highways. Earlier this year (February 2018), about twenty students from Misau LGA of Bauchi State lost their lives in a road accident on their way to Kano for an excursion. Although detailed report is not yet released by the police, but it is most likely that speed violation was the cause of the accident. This ugly train has claimed thousands of lives. Government effort is seen in the construction of new road and maintenance of new ones. However considering the carelessness leading to reckless driving on the part of road users, it therefore became imperative to come up with a device that will assist authorities in law enforcement.

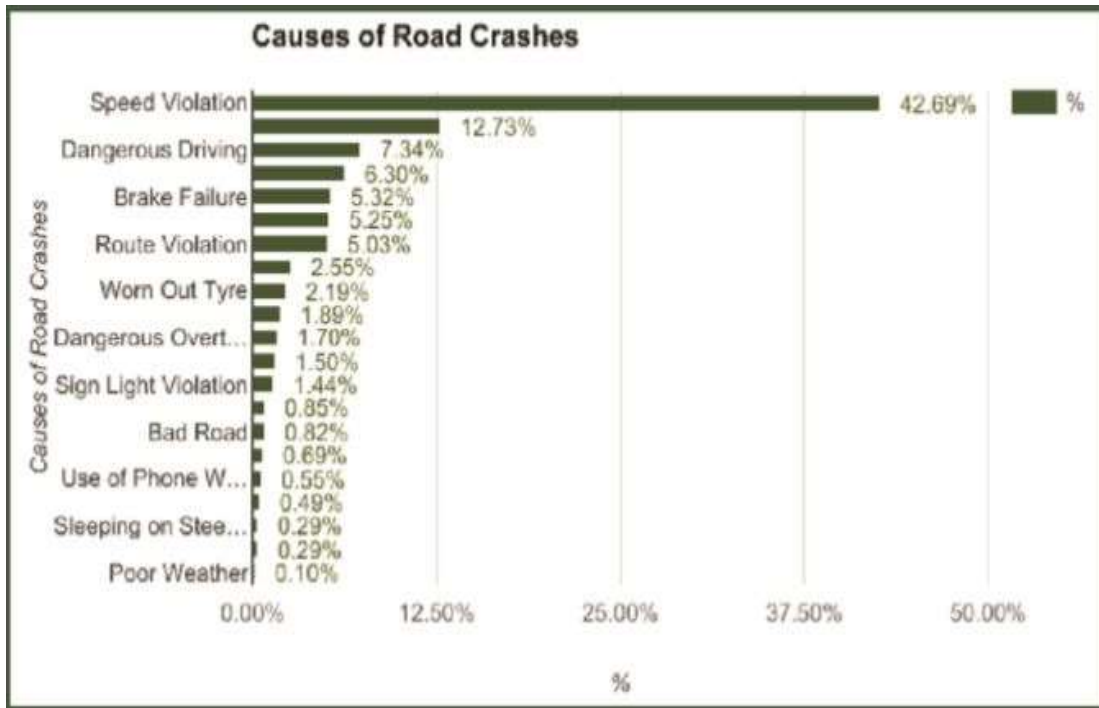


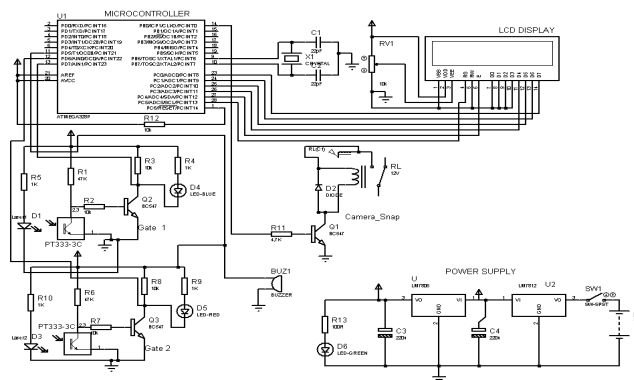
Fig. 2: Chart indicating percentage of road crashes in Nigeria segregated by cause

## 2.0 Methodology

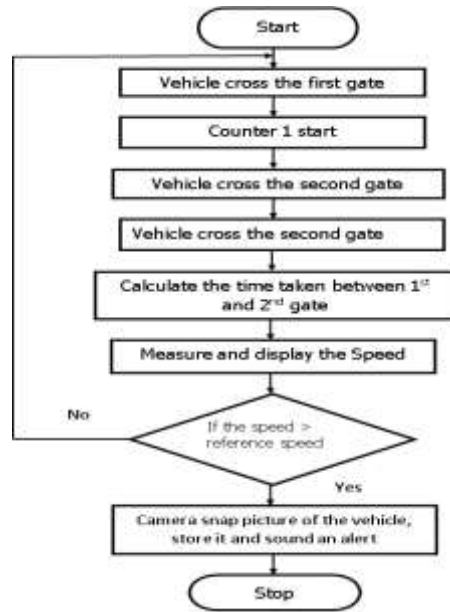
Considering the at traffic location where it was tested, this system has been designed assuming that the maximum permissible speed is 60 km/hr. For mobility, dual rail power supply of 12V and 5V dc sourced from (19V dc) was used. Long connecting wires were used for inter-phasing the two photo detectors to the circuitry so as to provide the required distance (10 meters). Two laser transmitter were installed at the opposite side of the road with each set to directly focus on one of the sensors. After checking the outputs of the power supply using multimeter and having set the apparatus as shown in Fig.1, If yes, apply power supply to the circuit by putting the switch button ON. If alignment is achieved the message "Sensors Aligned" will be displayed on the LCD else the sensor laser pair has to be readjusted to ensure alignment.

Using the assumption stated above the speed limit (reference speed 60km/hr) was set in the program uploaded onto the microcontroller (ATMEGA 328P-PU). Two identical switching units made up of BC107 , resistors and light emitting diode(indicators) each connected in common emmitter configuration were used for the two sensors. In addition to this 12V Relay was used for switching the camera. The sequence of operation is described in the flowchart below:

### Circuit Diagram



### Flowchart



**Table -1:** Sample Table format

(speed limit = 60 km/hr )			
Vehicle Type	Speed(Km/hr)	Buzzer	Camera
Car	100	Yes	Yes
Truck	57	No	No
Tricycle	82	Yes	Yes
Car	45	No	No
Motorcycle	108	Yes	Yes



Fig.1 system setup and sample snap shot of violators

## CONCLUSIONS

This device once completed can be used by security operatives for speed monitoring on our highways. Furthermore, addition of peripheral devices such as camera embedded into the device creates an avenue for gathering comprehensive information about the speed limit defaulter in a situation where the system is placed in a remote location for capturing the pictures of speed limit violators which will be sent to the relevant authorities wirelessly. Conclusion content comes here

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