

# SYSTEM FOR HIGH -WAY OVER SPEED DETECTION WITH VEHICLE RECOGNITION

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## ABSTRACT

This paper reports development of a message system with over speed detection and vehicle recognition for highways. The special feature of this system is creating a single message with speed detection, and vehicle recognition simultaneously. There are four main segments in this project. Vehicle speed calculation, Image capturing of vehicle, and if vehicle speed exceeded with reference speed then creates a message combine with above calculated speed with captured image. Finally sends this generated message to the particular destination over the network. Ultrasonic distance sensor is used to measure the distance of a vehicle passed within a specific time period. Distance between moving vehicle and sensor was calculated using an output pulse that corresponds to the time required for the burst echo to return to the sensor and echo pulse width. Using above parameter the speed was calculated. The records of speed and image are automatically entered to a database. After generating a combined message of speed and image, it will be send to the monitoring station. Implementation of this system will be able to increase the efficiency of traffic system in highways.

**Keywords:** Ultrasonic distance sensor, Burst echo, Echo pulse width

## 1. INTRODUCTION

Transportation is most important factor for development of a particular country and it is mainly based on the road network. Highways should be in good condition with a smooth surface and road markings. There are lots of benefits that can be gained by using highways. Time saving is the most valuable benefit. Motorists should have better considerations about their driving speed and speed limits they can use. Already there exists a method to detect over speeds in highway. Traffic police is deployed with speed guns to check the speed of vehicles running on the express high-way. When a vehicle is detected with

exceeding maximum speed, the traffic policemen send a message to the next monitoring station over the phone. This process is less efficient and also it is difficult to identify particular vehicle. The main objective of this project is to overcome the above drawbacks through an accurate and efficiency manner with better evidences to proof speed of the relevant vehicle. This system can be placed at any point on the highway with proper positioning. Manual operators are not required to carry out this process.

## 2. EXPERIMENTAL

In this system, Ultrasonic distance sensor is the component used to measure the distance of a vehicle passed within a specific time interval. Ultrasonic distance sensor detects vehicle, by emitting a short ultrasonic burst and then detecting the echo, under control of a host microcontroller trigger pulse. The sensor emits a short ultrasonic burst (40 kHz). This burst travels through the air, hits on moving vehicle and then bounces back to the sensor. This sensor provides an output pulse to the host that will terminate when the echo detected, hence the width of this pulse corresponds to the distance to the target. Similarly it emits another subsequent ultrasonic burst according to the desired time period. After getting two distances, it calculates the difference of the distance. Moving speed of the vehicle is calculated using above parameter and time period of two emitted subsequent burst. Here microcontroller is used to calculate the speed using variance of the distance. Finally created message is sent to another point as an attachment by using DotNet(.NET) socket programming. Whole process in this project is combination of several separate processes.

### 2.1 Vehicle presences and speed detection

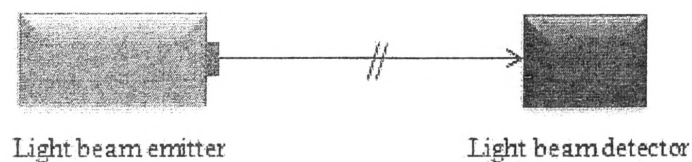


Figure 1: Schematic diagram of vehicle presence detector

An IR sensor is used to detect presence of the vehicle. Whenever IR ray is interrupted by a vehicle, the count up timer is stopped and sensor emits the ultrasonic burst according to the microcontroller trigger.

### 2.2 Image capturing process

Ultrasonic sensor enables by interruption of the light beam. And image capturing process of the camera is enabled for another trigger output of microcontroller.

### 2.3 Transmission of message to the monitoring station.

Created message with vehicles speed and image is sent to the monitoring station using DotNet (.NET) socket programming. DotNet is a new framework developed for web-based and windows-based applications within the Microsoft environment. The framework offers a fundamental shift in Microsoft strategy. It moves application development from client-centric to server-centric.

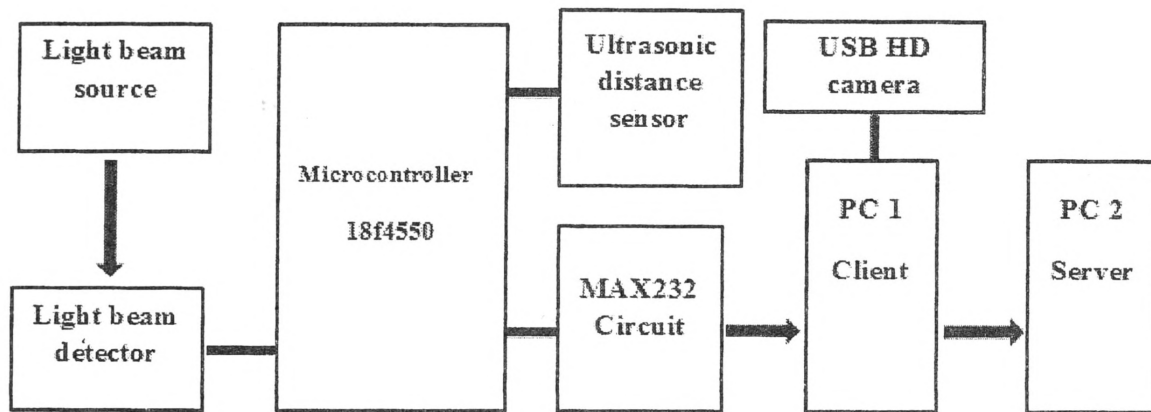


Figure 2: Block diagram of the system

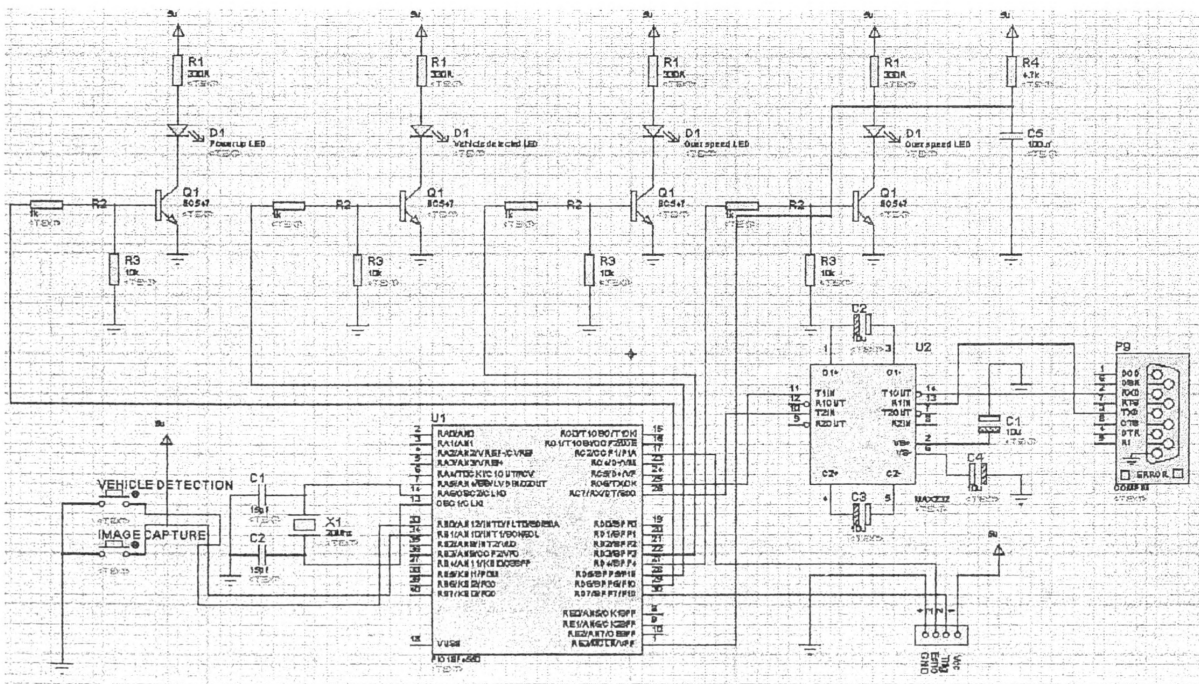


Figure 3: Circuit diagram of the system

### 3. RESULTS AND DISCUSSION

Sensor positioning is directly affected to the final result. If the sensor is more than 3 meters away from the vehicle, it cannot measure the accurate distance. Because the range of Ultrasonic distance sensor is 3 centimeters to 3.3 meters. Also it is need to give better consideration for reflective angle. There will not be reflections back towards the sensor for improper angles.

Speed of the sound waves are depends on surrounding temperature in air. In this project temperature is also affected to the measured distance between vehicle and sensor. But the variations of the distance have been used for speed calculation. Therefore temperature effect can be neglected in this situation.

The circuit has been tested by using a moving vehicle with known speed and observed the operation of system. Also more observations were obtained for a better verification of the system, by varying reference speed level (Maximum Allowable Speed)in the MikroC code. Below table shows the observations for a vehicle with  $40\text{kmh}^{-1}$  speed.

Table1: Observation for a moving vehicle with a known speed.

Reference speed level in the MikroC code ( $\text{kmh}^{-1}$ )	Image captured or Not
30	✓
38	✓
40	×
45	×
47	×
100	×

### 4. CONCLUSION

The project “*system for high-way over speed detection with vehicle recognition*” has been successfully designed and tested. This implementation is based on speed detection by using Ultrasonic sensor, image capturing and transmitting message from particular point to another destination. Maximum speed limit of this system can be adjusted by changing the variable of

reference speed in MikroC code. This system could be useful in increase efficiency of the vehicle tracking process and reduce risk of accidents in highways due to over speed.

### **ACKNOWLEDGMENTS**

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