

# Vehicle Monitoring System using PIC Microcontroller

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**Abstract**— Although all roads have signboards indicating maximum speed limit for sake of driver's safety, but still people does not obey speed limit rules and cause accidents. The project aims in designing an efficient system which can automatically monitor individual vehicle speed and also count vehicles on road. The system is designed using PIC microcontroller, IR sensors, LCD and LED indicators. The Microcontroller is programmed using Embedded C language

**Keywords**- PIC Microcontroller, LCD, LED, IR Sensor, Proteus, PCB, PIC C compiler

## I. INTRODUCTION

Now-a-days we hear news about accidents on roads very frequently and the number of people killed and injured due to accidents on roads remains very high. The main reason for accidents is speed of vehicle. Although all roads have signboards indicating maximum speed limit for sake of driver's safety, but still people does not obey speed limit rules. The Road construction (width, thickness, type) depend on parameters like vehicle type, counts etc. Highway toll tax revenue estimates depend on vehicle type and count. The project aims in designing a system which can automatically monitor the individual vehicle speed and also count the vehicles on roads. The system is designed using PIC microcontroller, IR obstacle sensor pairs, LCD and LED indicators. Here two IR sensor1 and sensor2 are placed at fixed distance, whenever vehicle comes on the road the first IR sensor detect entry and second IR sensor cuts it detect exit, The microcontroller internal timer and counter starts and automatically calculate the speed and count of the vehicle. The entire hardware runs automatically with the help of embedded c programming dumped into microcontroller. This sort of project is important in traffic management, useful near schools and hospitals where vehicle speed must be less, identify vehicle speed violations and can reduce percentage of accidents on roads.

## II. LITERATURE SURVEY

Vehicle detectors could be categorized into two types:

- Hardware-based detectors- Based on electromagnetic principles and require dedicated hardware, microcontrollers, embedded system etc.
- Software based detectors - install cameras, take videos of traffic, detect vehicles, speed, count with sophisticated image processing techniques, MATLAB programming etc

A real time locating system automatically tracks and localizes people and objects. Muhammad Saqib et al, [1] propose a model for the speed monitoring of vehicles using wireless sensor network-based on real-time localization. The model is based on symmetric double sided two way ranging algorithm which has the ability to zeros out the effect of clock drifts between transmitter and receiver.

J.Pelegr et al, [2] made a new simple circuit to detect the magnetic perturbation caused by the cars with two GMR Magnetic Field Gradient Sensors located on the pavement of a high-way or fast road without wires. When a car passes above the board, a Microcontroller processes the signal of sensors to obtain the speed and length of the car in real time.

Hameed Hamada and Malathi [3] gives a new idea of speed detection devices with using the LASER beams. The designed system has the ability to detect the speed of the vehicle in the roads and the main highways and the places where the drivers can use of more speed while driving. The designed LADAR system is more reliable and results accurate

Pornpanomchai and Kongkittisan [4] research intends to develop the vehicle speed detection system using image processing technique Overall works are the software development of a system that requires a video scene, which consists of the following components: moving vehicle, starting reference point and ending reference point. The

system is designed to detect the position of the moving vehicle in the scene and the position of the reference points and calculate the speed of each static image frame from the detected positions. The vehicle speed detection from a video frame system consists of six major components.

A MATLAB algorithm is proposed by Ranjit et al, [5] and developed to associate the developed algorithm with real-time video sequence and images. Development of vehicle speed detection algorithm is based on the vector-valued function and motion vector technique that estimates the velocity of moving vehicle

Naveen Chintalacheruvu and Venkatesan Muthukumar [6] proposes an efficient video based vehicle detection system based on Harris-Stephen corner detector algorithm. The algorithm was used to develop a standalone vehicle detection and tracking system that determines vehicle counts and speeds at arterial road- ways and freeways. The proposed video based vehicle detection system was developed to eliminate the need of complex calibration, robustness to contrasts variations, and better performance with low resolutions videos. The algorithm performance for accuracy in vehicle counts and speed was evaluated. The performance of the proposed system is equivalent or better compared to a commercial vehicle detection system.

### III. PROJECT OBJECTIVES

Design and develop Vehicle Monitoring System which automatically monitors vehicle speed and count vehicles

### IV. IMPORTANCE OF PROJECT

- Effective traffic management
- Identify vehicle speed violations, enforce speed limit laws, limit speed in some school zone, hospitals zone or sensitive areas
- Highway toll tax revenue estimates depend on vehicle type and count.
- Road design depend on total number of vehicles

### V. SYSTEM REQUIREMENTS

#### (a) Hardware Requirements

- Micro controller (16F877A)
- Reset button
- Crystal oscillator
- Regulated power supply (RPS)
- LED indicator
- IR obstacle sensor
- LCD Display

#### (b) Software Requirements

- Express PCB – for designing circuit
- PIC C compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

### VI. SYSTEM DESIGN AND IMPLEMENTATION

The block diagram of the project vehicle monitoring system and design aspect of independent modules are considered. The Block diagram is shown in Fig 1

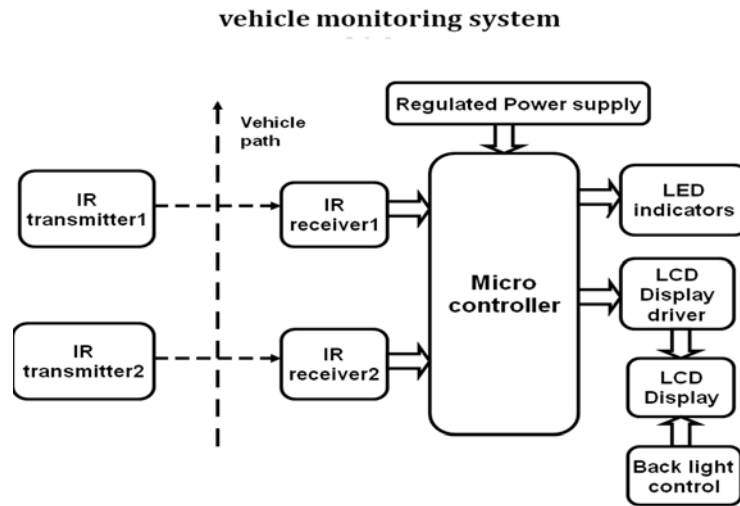
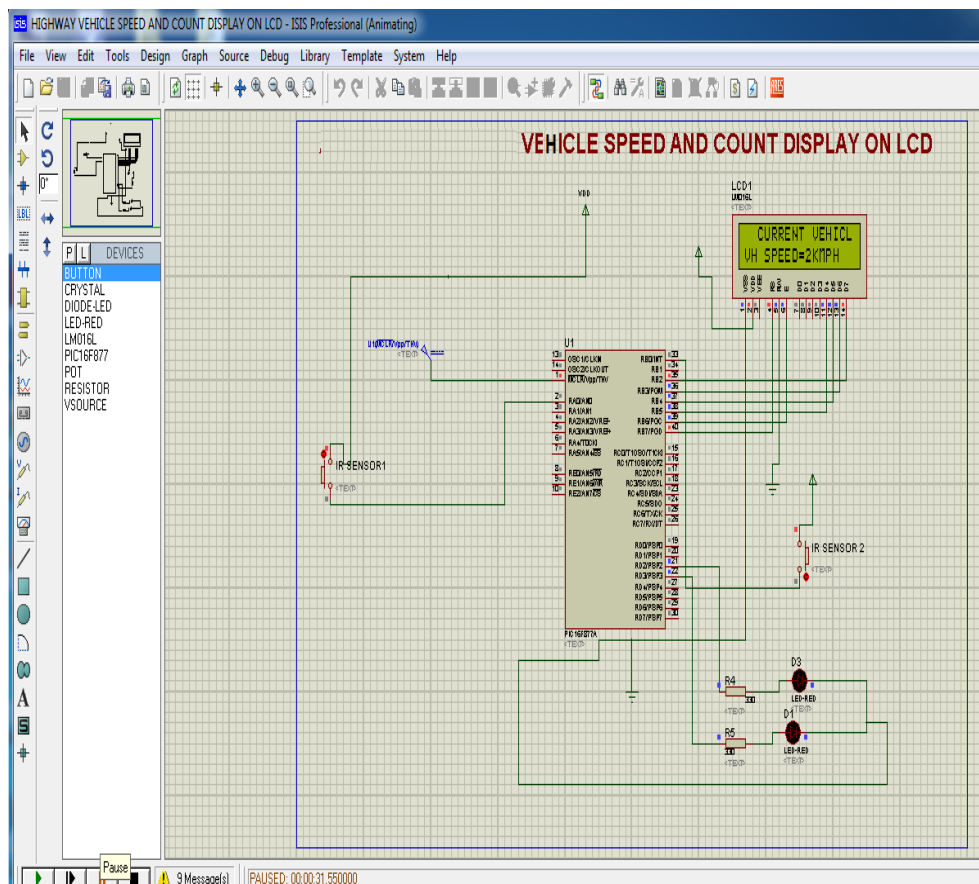


Fig 1: Block diagram of vehicle monitoring system

In vehicle monitor system, IR sensor1 and IR sensor2 is fixed at a distance. When vehicle comes on road the IR sensor1 detect vehicle entry and IR sensor2 detects vehicle exit. The microcontroller internal timer and counter starts and automatically, calculates vehicle speed and count the vehicle and displays on LCD. The entire hardware runs automatically with the help of embedded C programming dumped into PIC microcontroller. Circuit diagram is build from the block diagram in PCB. The circuit is tested in proteus software for simulation. The screen short of the proteus simulation is shown in Fig 2.



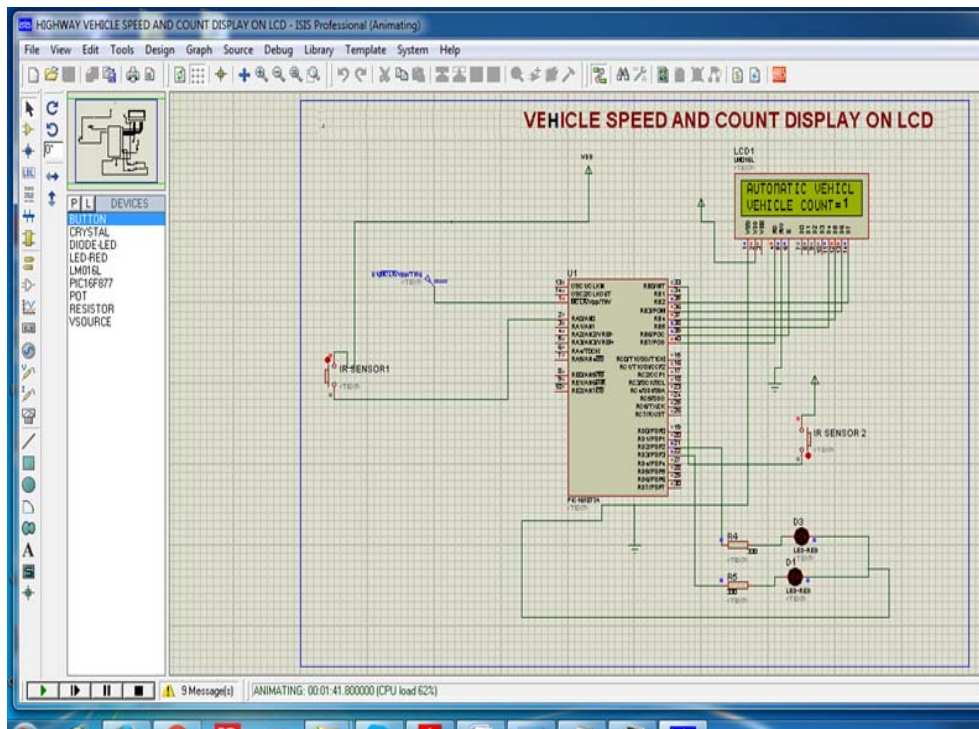


Fig 2: Proteus simulation of vehicle monitoring system

All hardware components and taken from the department / procured. The components are soldering, PCB, assembled to make complete vehicle monitoring system hardware as shown in Fig 3 according to simulation and circuit build in system design part.

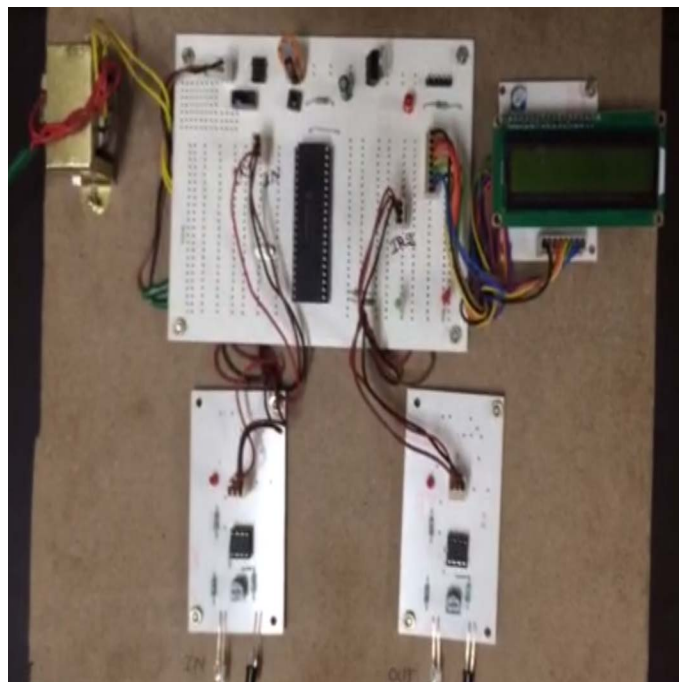


Fig 3: Photograph of vehicle monitoring system hardware

## VII. SYSTEM TESTING AND RESULTS

Vehicle monitoring system project is basically design an automated system which can automatically monitor the individual vehicle speed and also count the vehicles on roads. This system has successfully designed and tested. This system automatically calculates the vehicle speed and count & successfully displays on LCD as shown in Fig 4 &5.

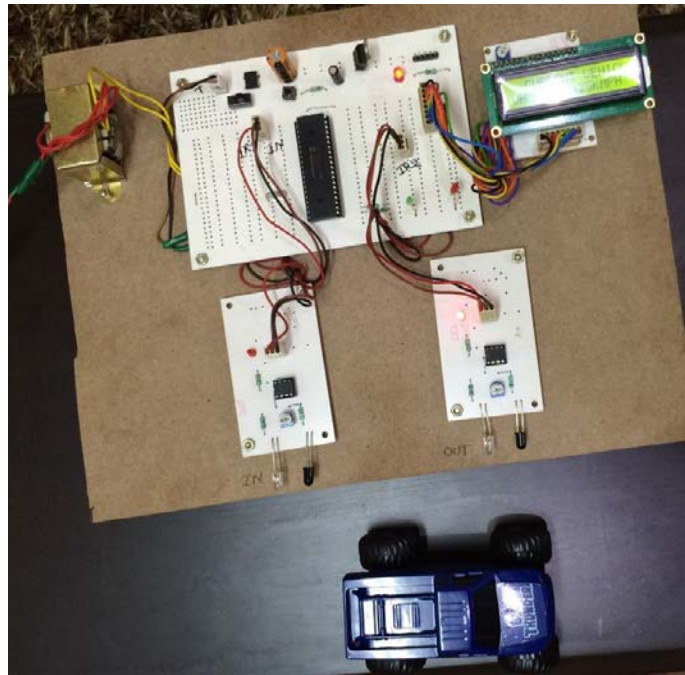


Fig 4: Photograph of vehicle monitoring system in testing stage

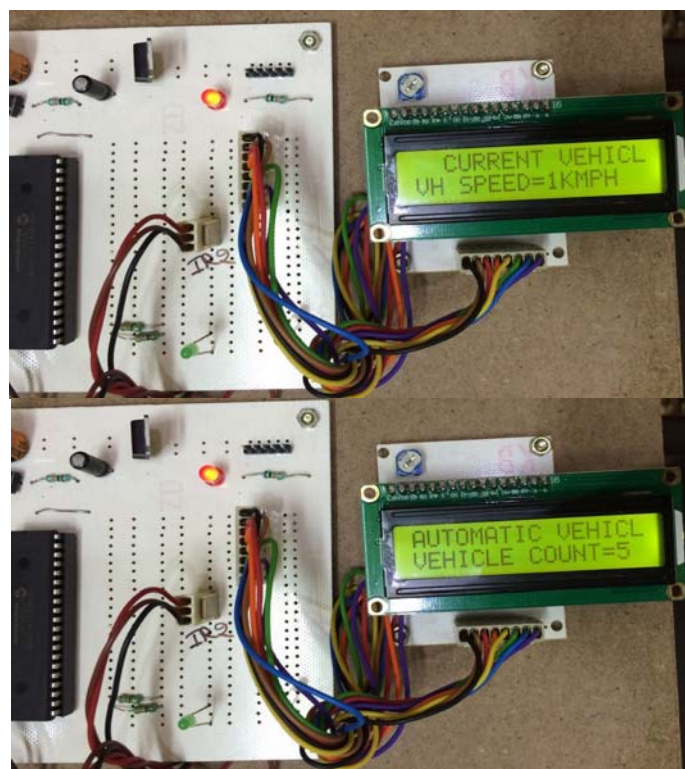


Fig 5: Results of vehicle monitoring system in testing stage

### VIII. CONCLUSIONS AND FUTURE WORK

The Vehicle monitoring system is successfully designed, implemented and tested. The entire hardware runs automatically with the help of embedded c programming dumped into microcontroller which calculates vehicle speed and count and displays on LCD. The Vehicle monitoring system project can be extended using ultrasonic sensor, GPS and GSM. By using ultrasonic sensor we can increase obstacle sensing distance to long. By using GPS we can get exact location of vehicle and also we can get SMS with time and date where vehicles cross the speed limit, so that we can avoid accident

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