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# Vehicle Speed Detector using Arduino Uno

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**ABSTRACT:** This project presents a device to detect rash driving on highways and to alert the traffic authorities in case of any violation. In past, lot of devices to detect rash driving on highways has been made. Most of the approaches require human concentration and involve a lot of effort, which is difficult to implement. In this project we intend to design a system aimed at early detection and alert of dangerous vehicle driving patterns related to rash driving. The entire implementation requires an IR Sensors, a control circuit and a buzzer. The speed limit is set by the police who use the system depending upon the traffic at the very 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 LCD .

## I. INTRODUCTION

India is a country where the maximum number of deaths occurs due to road accidents and most of these occur due to over speeding. Various attempts have been made to produce reliable and efficient means of detecting over speeding vehicles. The hand held over speeding detector is one such device. The disadvantage of such a device was that it was heavy and required expert hands for its operation; also by the time a speed reading is obtained, the vehicle would have gone.

Rash driving is the cause of many road accidents all over the world. A total of 4,73,084 traffic accidents were reported during the year 2001 in India. The traffic population has increased considerably in India as there is no means to control or monitor the speed of vehicles running on roads. This system proves highly effective in detection of over speed driving. It is not at all necessary that such accidents are results of driving under the influence of alcohol as even a person who hasn't consumed alcohol can drive in a reckless manner [3]-[5]. To overcome this problem and decrease death rate due to accidents, introduction of new and innovative speed enforcement technology is necessary. Nowadays, rash driving causes a serious danger to the driver as well as general public.

### The main objectives of the project are:

1. To setup a connection between the two RFID readers and Arduino Uno.
2. Audible and visual alerts through LCD and Buzzer
3. Alert message using GSM technology.

### 1.1 Project Overview:

This project develops a system that could monitor the speeds of vehicles through the use of RFID technology and able to inform who exceeds the speed limit by sending a message to the owner of the vehicle. The monitoring system station consists of two RFID readers and a Central Control Unit, which is Arduino Uno. Each car has its RFID tag. Two RFID readers are connected to the Central Control Unit, which is collecting data from them. The RFID reader will scan all the vehicles which are passing through it even the vehicle speed is lower than the speed limit. The time count will start when the vehicle pass through the start RFID reader and stop when the vehicle pass through the stop RFID reader. The time difference for a vehicle to pass through two consecutive readers are calculated. With the calculated time difference and pre stored constant distance the speed of the vehicle is calculated. A buzzer will sound up to alert the driver and a text message will send to the driver if the vehicle exceeds the speed limit.

**1.2History and Future:**

In this project we are going to develop a vehicle speed monitoring and enforcement system by using RFID technology. This system not only can calculate the vehicle speed and compare the calculated speed with the pre stored speed but also manage to send a text message to the driver mobile phone if the value of calculated speed is higher than the pre stored speed to inform them about the speeding violation. The idea of this system make the driver hard to recognize the enforcement zone and cause the driver to reduce the vehicle speed to avoid being fined. By using this system, the speeding violations issue in Malaysia would decrease significantly.

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purpose of automatically identifying and tracking tags attached to objects. The RFID system is composed of two main components, which are the RFID reader and RFID tag. The tag is composed of a microchip connected to an antenna, the microchip can store a maximum of two kilobyte of data, which can include the information of the product, destination of the product and the manufacturing date. RFID tags can be either passive, active or battery-assisted passive. An active tag has an on board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery.

In order to retrieve data from the tags, RFID reader is needed. The RFID reader can be either passive or active. The passive reader can only receive radio signals from the active tags. Active reader can transmit interrogator signals and also receives authentication replies from the tags.

RFID technology is progressing every day and has proven its importance. RFID is widely using in pharmaceuticals industry, healthcare industry, agriculture, livestock tracking, human identification and lot more area. RFID isn't a new technology, but people are beginning to pay attention to this technology which can directly benefit their daily life in unexpected ways.

In this project, two active readers and multiple passive tags are used to monitor the vehicle speed. The RFID readers transmit radio waves and received by the tag. These radio waves activate the microchip of the tag and then the data get transmitted. This system once completed can be installed on demand in high accident zones to monitor the vehicle speed.

**II. LITERATURE SURVEY****Paper 1:-MANNED SPEED TRAPS**

In order to reduce the number of speeding violation, many traffic regulators use speed trap devices which act as manual patrolling methods (Kevin Ransom, 2016). Speed trap systems have been implemented on demand in high accident zones in many countries as a way to control the vehicles speed. In Malaysia, manned speed trap is one of the methods that used to arrest the speeding drivers. A manned speed trap is a method that one or more police officers intentionally hiding themselves in any place in order to catch the speeding drivers. For example, the police officers can hide themselves in a low ditch, behind the billboard, a place which next to a sharp turn or anywhere that the drivers cannot see them. This action may help to reduce the presence of the police officers so that they can easily to arrest the speeding drivers. In this case, when the police officers believe that the car is speeding, they will flip on the Doppler gun that transmits radio waves at particular frequencies.

**Paper 2:-DOPPLER GUN**

The Doppler gun is a device used to measure the speed of moving vehicles and has been widely used by police officers to arrest the speeding drivers by detecting the shift of frequencies which caused by Doppler Effect. The Doppler Effect can be described as the change in frequency or wavelength of a wave caused by the motion of the observer relative to the wave source. When the target is approaching, the reflected frequency will be higher than the transmitted frequency. Conversely, when the target is receding, the reflected frequency will be lower than the transmitted frequency. Doppler gun has been widely used within the country because the size of the Doppler gun is smaller and convenient to move from one location to another location. Besides, the price of the Doppler gun is only RM2600 and is cheaper compare to the other devices which used to monitor the vehicle speed.

**Paper 3: - VEHICLE LICENSE PLATE RECOGNITION**

Vehicle License Plate Recognition (VLPR) is a technology that can detect the vehicles on monitored roads and automatically extract vehicle license plate information for processing. VLPR technology is one of the important aspects in the intelligent traffic system and it is widely been used. By using image processing, pattern recognition, computer vision and other technologies, it analyzes the images or video sequences of the vehicles captured by the camera to obtain the unique license plate number of each vehicle, thus completing the recognition process. Through some subsequent processing means, it can be implementing into different sectors such as parking management, traffic flow measurement, vehicle positioning, red light enforcement, highway toll station, vehicle speed monitoring, and so on. The license plate number is the only “identity” of the vehicle.

**Paper 4:-IMAGE PROCESSING**

Image processing is a technology that can convert an image into digital form and perform various image processing techniques such as image enhancement and restoration, noise removal, image histogram, image compression, image segmentation, image difference, image classification and image transformation to extract useful information from the image (Ekta Saxena and Mrs. Neha Goswami, 2015). Image processing is a type of signal disbursement in which input is an image, like video frame or photograph and output may be image or characteristics associated with that image.

**III. BLOCK DIAGRAM AND HARDWARE DISCRPTION**

**3.1 BLOCK DIAGRAM**

In this chapter the block diagram of the project and design aspect of independent modules are considered.

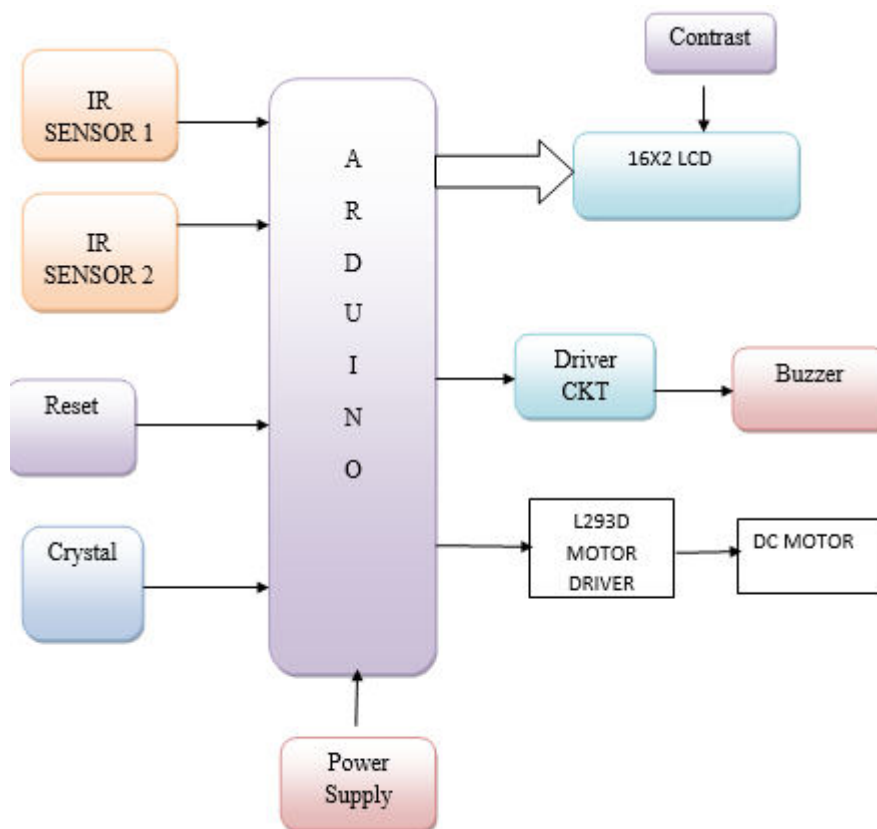


Fig 3.1 Block diagram of the system design

**The Main Blocks of this project are:**

- 3.1.1 ARDUINO UNO
- 3.1.2 IR SENSOR
- 3.1.3 L293D
- 3.1.4 BUZZER
- 3.1.5 LCD
- 3.1.6 POWER SUPPLY
- 3.1.7 DC MOTOR
- 3.1.8 Micro controller (16F877A)

**3.2 Standard LCD 16x2 Display**



Fig: 3.2 Micro-controller

- A standard LCD 16x2 display is use to display the calculated speed and the pre stored speed for this project. This standard LCD 16x2 display is connected to the Arduino Uno by using jumper cable.

**3.3 PIN DIAGRAM**

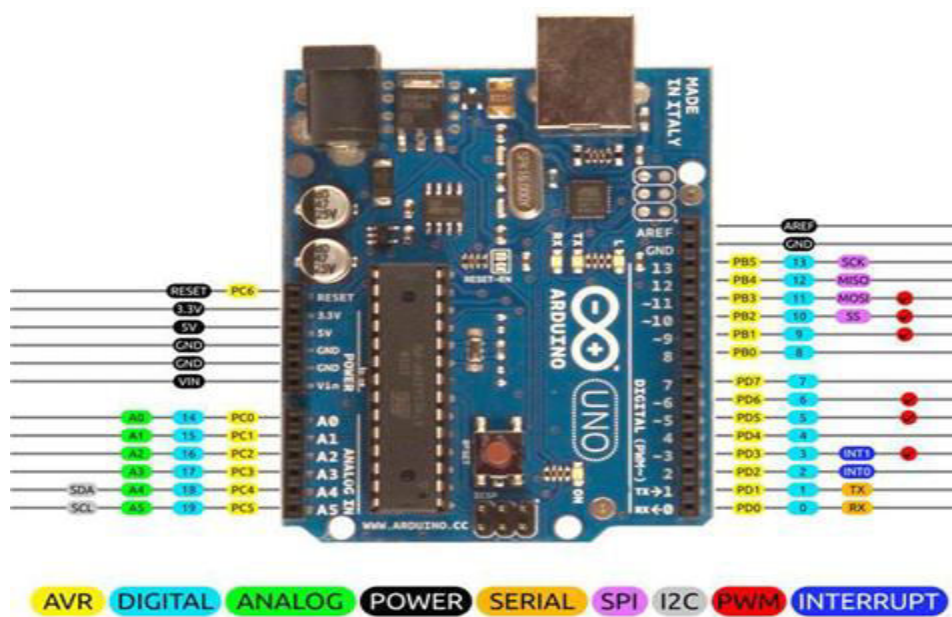


Fig 3.3: Pin Diagram of PIC16F877

RFID reader (Stop)	Arduino Uno
3.3V	3.3V
RST	Arduino Pin 7
GND	GND
MISO	Arduino Pin 12
MOSI	Arduino Pin 11
SCK	Arduino Pin 13
SDA (SS)	Arduino Pin 8

- The entire system of this project generally involves Arduino Uno. The two RFID readers (MFRC522) were connected to Arduino Uno by using jumper cable to perform read function for the system. The wire connection for start RFID reader is as table 5-1-1-T1. The wire connection for stop RFID reader is as table 5-1-1-T2. Besides that, a figure of Arduino Uno pin diagram and the actual setup with RFID readers are also shown.

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