

# Speed Warning System Using Arduino and GSM Module

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**Abstract:** The Over Speed is the major cause for increase in the occurrence of accidents nowadays. Many methods are being used for over speed monitoring. However, these methods require lot of man power. In this project, we present the design and execution of a system, which provides a simple way to traffic authorities for monitoring of all the vehicles from the control room itself. This system calculates the speed and the maximum speed allowed in the respective area. The speed and the over speed of vehicle calculated will be sent to the control room using GSM technology. If the speed of any vehicle exceeds the speed limit, the driver is alerted through a buzzer indicating the same. If the driver still does not drive within the speed limit, an SMS is sent to traffic authorities. Accordingly an Over speed ticket can be issued against the same vehicle.

**Keywords-** Arduino Uno, solar panel, GSM Module.

## I. INTRODUCTION

The number of road accidents kept increasing yearly that created problems such as traffic congestion, problem to deal with traffic monitoring and accident that gave negative impact to the road users. Traffic congestion became worse when the accident occurs in high risk areas such as in highway. It was due to the number of vehicles kept rising from 326815 to 477204 cases for over 10 years. The major cause to road accident was mostly caused by human speeding.

Automated Enforcement System (AES) is a speed camera placed at several locations along highways. Their main goals are to discourage speeding, to increase safety and traffic flow to avoid congestion during peak hour [1]. The aim of this project is to develop speed warning system by using solar power energy to reduce the road accidents. This system is designed to detect the speed of vehicle with effective cost.

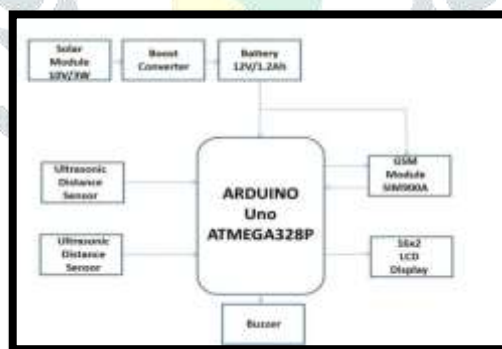


Fig. 1.

This system uses two ultrasonic sensors for speed measurement which requires Arduino 2560 to process the data measured by ultrasonic sensor. This sensor determines the speed measurement due to the major factors of road accident so that people are able to recognize their speed along a highway depending on the light indicator. This system is functioned as warning system to alert the people about their speed in the highway. In the development of this project, 12 Volts solar panel is used to supply the system in terms of saving environment and energy wastage. Electricity is produced from the light intensity of the sun through the solar panel. It contributes to the decrease of harmful greenhouse gas emission. Fig.1. shows the block diagram of the system.

## II. SPEED DETECTION SYSTEM

The ultrasonic sensor is used to detect the speed of the vehicle. The common technique is to calculate the speed detection by knowing the distance and time. Where, the distance is set to be constant at 1 meter. As shown in equation 1, the speed

measurement is calculated:

$$= \frac{d}{(t_n - t_0)}$$

$d$  = the real distance between two marking points (start point and end point) measure in meter

$t_n$  = the start time measured in seconds  $t_o$  = the end time measured in seconds

### III. SYSTEM DEVELOPMENT

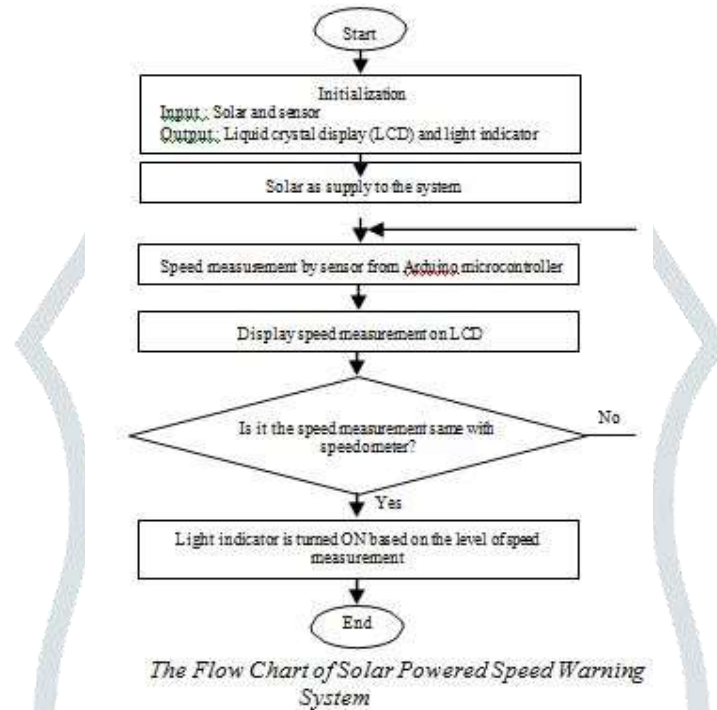


Fig. 2.

Fig. 2. shows the flow chart of a project to develop the system. This system consists of input and output to design the flow of the process. Firstly, the solar panel is being setup with the battery. They are connected with the charger controller and the system itself. Solar panel acts as input to give a supply to the whole operation system. After being setup, the hardware is designed that includes LCD display, relay, Arduino 2560 and ultrasonic sensor. The sensor acts as input to initialize the project that send the information to the Arduino for data processing.

The hardware development of solar powered speed warning system is shown in Fig. 3. The purpose of this system is to focus in development of speed warning system by using solar power energy. The solar panel is used to generate electricity directly from the sun to supply the system in terms of saving the environment and energy wastage. It contributes to the decrease of harmful greenhouse gas emission [2].

The energy is stored to the battery while the charger controller is used to keep the battery from overcharging.



Fig. 3.

Fig.4. shows the flow chart of speed measurement which indicates the process to determine the speed of the vehicle by using



two ultrasonic sensors. When both ultrasonic sensors received a signal and the distance is detected up to 6 meters of the vehicle, the sensors start to read the data which include the time taken that has been programmed. Speed measurement is set to be constant. The distance is set at 1 meter between both the sensor and time taken is getting along both of the sensor. All of this process is repeated until an accurate speed is gained.

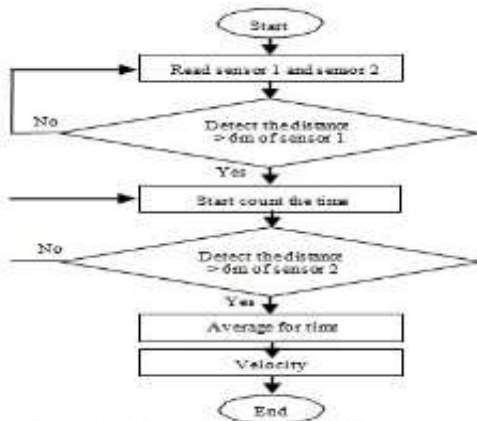
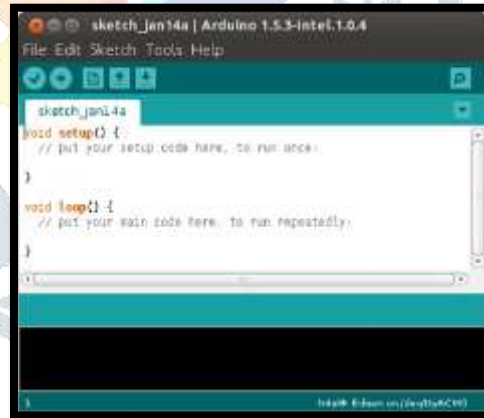


Figure 4: The Flow Chart of Speed Measurement

Fig.5.

#### IV. OPERATION

**Arduino Uno** is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started.



#### SPECIFICATIONS AND FEATURES

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50 mA

- **ARDUINO IDE SOFTWARE:**

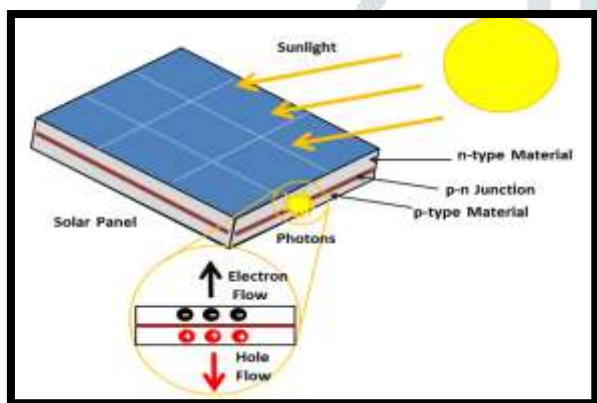
The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

### SOLAR PANEL

Solar panels absorb the sunlight as a source of energy to generate electricity or heat. A photovoltaic (PV) module is a packaged, connect assembly of typically 6x10 photovoltaic solar cells.

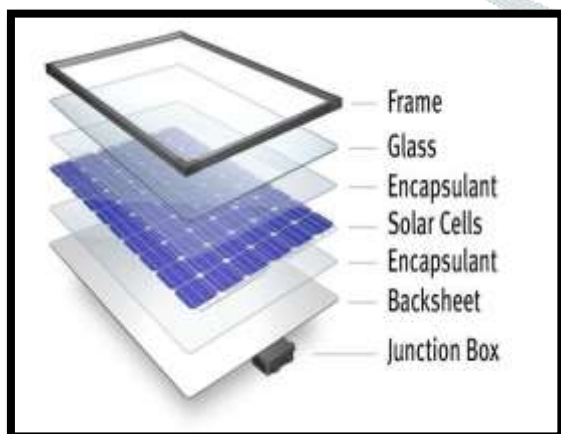


### PHOTOVOLTAIC EFFECT



Photovoltaic effect, process in which two dissimilar materials in close contact produce an electrical voltage when struck by light or other radiant energy.

### SOLAR PANEL LAYERS



### FACE-PLATE (ESG)

The first layer is a 4mm thick ESG glass plate (safety glass), which is not only impact-, pressure- and temperature-resistant, but also shock-proof.

### UPPER ENCAPSULATING FILM (EVA)

A plastic layer made from EVA (ethylene vinyl acetate) or a cast resin layer is inserted as the upper moisture barrier. The plastic films are welded (laminated) onto the solar cells at temperatures around 150°C forming a water-proof corrosion protection.

### SOLAR CELLS

Single solar cells, interconnected with each other, produce electric power.

#### LOWER ENCAPSULATING FILM (EVA)

A plastic layer made from EVA (ethylene vinyl acetate) or a cast resin layer is inserted as the lower moisture barrier. The plastic films are welded (laminated) onto the solar cells at temperatures around 150°C forming a water-proof corrosion protection.

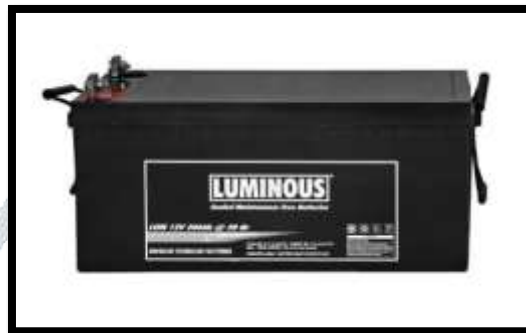
#### TEDLAR LAMINATED FILM

A plastic layer made from polyvinyl fluoride, better known under the trade name Tedlar and ICOSOLAR, or a glass plate is used as finish on the back side.

#### FRAME

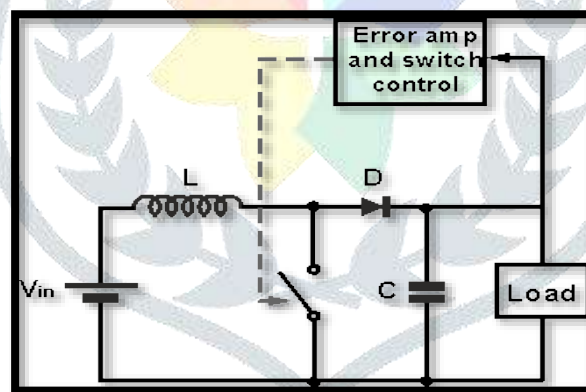
To give stability to the different layers and to facilitate the assembly, the module is enclosed in an aluminum frame.

### LEAD ACID BATTERY



The storage battery or secondary battery is such battery where electrical energy can be stored as chemical energy and this chemical energy is then converted to electrical energy as when required. The conversion of electrical energy into chemical energy by applying external electrical source is known as charging of battery.

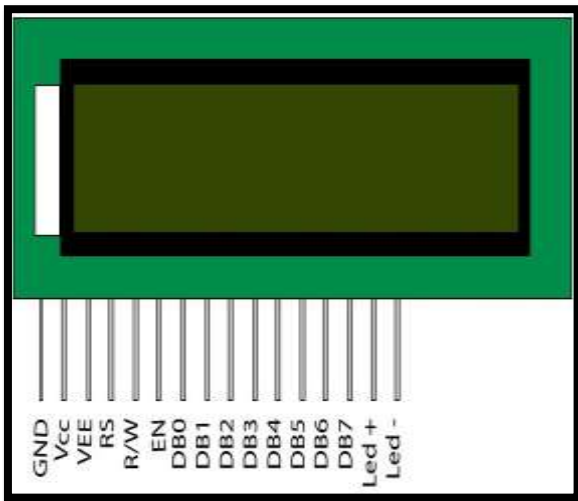
### BOOST CONVERTER



A boost converter (step-up converter) is a DC-to-DC power converter that steps up voltage (while stepping down current) from its input (supply) to its output (load).

### LCD (LIQUID CRYSTAL DISPLAY)





LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on .

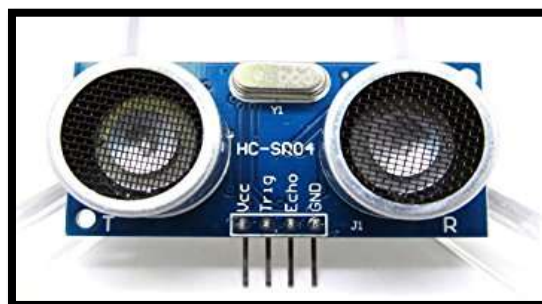
**FEATURES**

- Dual-Band GSM/GPRS 900/ 1800 MHz
- RS232 interface for direct communication with computer or MCU kit
- Configurable baud rate
- Power controlled using 29302WU IC.
- ESD Compliance.
- Enable with MIC and Speaker socket.
- With slid in SIM card tray.
- With Stub antenna and SMA connector
- Input Voltage: 12V DC.
- High quality PCB FR4 Grade with FPT Certified.

**APPLICATIONS**

- Industrial automation.
- GPRS based data logging.
- GPRS and GPS application.
- Home automation.
- Health monitoring.
- Agriculture automation.
- Vehicle tracking.

**ULTRASONIC DISTANCE SENSOR**



The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other

receives them, (like a tiny microphone).  
The speed of sound is approximately 341 meters (1100 feet) per second in air.

#### Features

- Power Supply: +5V DC
- Quiescent Current: <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance: 2cm – 400 cm/1" – 13ft
- Resolution: 0.3 cm
- Measuring Angle: 30 degree
- Trigger Input Pulse width: 10uS

#### VI. CONCLUSION

The Program is successfully uploaded in Arduino hardware using Uno IDE Software. And the model is made to run by putting an obstacle using our hand. Our hand is placed in front of Sensor 1 and within quick time, hand is again placed in front of Sensor 2, then a LCD Display shows the over speed reading. Also the message is sent to the nearest traffic police station.

Based on the analysis of road accident that was predicted by Malaysian Institute of road safety research (MIROS), the number of road accidents continued to increase from 8,760 in year 2015 and up to 10,716 in year 2020 [3]. So it becomes an important project which must be installed on roads and in thus we can reduce rash driving in the country.

#### REFERENCES

- [1] M. K. Hamzah, P. NG. Choy, F. H. Khairudin, M. A. Yusof, "The Automated Speed Enforcement System – A Case Study in Putrajaya", Proceedings of the Eastern Asia Society for Transportation Studies, Vol.9, 2013.
- [2] G. R. Arash, D. Abbas and M. R. Karim, "Vehicle Speed Detection in Video Image Sequences Using CVS Method", International Journal of the Physical Sciences Vol. 5(17), pp. 2555-2563, 18 December, 2010.
- [3] Royal Malaysia Police, Road Accident Statistics Malaysia 2007. Percetakan Nasional Malaysia Berhad, Kuala Lumpur, 2007.