

Vehicle Speed Monitoring

¹V.Sriram Adithya, ²S.Sri Sowmya, ³R.Vamsi Krishna, ⁴S.G.S.Raghavendra, ⁵Dr. Y. Rama Krishna

¹Department of Electronics and Communication Engineering, Gudlavalleru Engineering College.

²Department of Electronics and Communication Engineering, Gudlavalleru Engineering College.

³Department of Electronics and Communication Engineering, Gudlavalleru Engineering College.

⁴Department of Electronics and Communication Engineering, Gudlavalleru Engineering College.

⁵Department of Electronics and Communication Engineering, Gudlavalleru Engineering College.

Abstract -In this paper we present a design and implementation of a system, which provides a simple way to traffic authorities for monitoring of all the vehicles from the control room itself and can collect fine through automatic vehicle speed warning system. This system will allot a unique account to every vehicle where fine will be collected when the vehicle crosses permitted speed level through that account and recharge can be done when balance is less. It also generates an automatic alert message regarding over speed. This alert consists of speed of vehicle, location of speed limit breakage, vehicle number and amount remaining in the users account.

❖ **Key Words:** Arduino Mega, RFID technology, IR Sensors, Arduino, GSM module.

1.INTRODUCTION

Usually on highways, there will be a certain speed limit to be followed depending on the area. However, the majority of accidents are due to over speeding and the solution to detect over speed of any vehicle on road is not efficient. Hence, careless driving has increased as proper action is not being taken against them. The current methods used by traffic authorities lack efficiency to detect over speeding. Firstly, for the given number of roads, the number of assigned traffic police is not sufficient to observe each and every vehicle. Secondly, it is difficult for the assigned traffic police to provide the exact details about the violation of the speed limit of a vehicle, as they were moving at high speeds. In addition, it is also difficult to monitor the vehicles, violating the speed limit, during night times and poor weather conditions.

Normally, traffic police use radar guns to find the vehicle speed. If over speed is detected, police have to chase and stop the driver to book the speed ticket or to inform the nearest police station to stop the vehicle. This process become over burden for the police persons due to heavy traffic and more traffic violations. In addition, the patrol officers can't get the correct vehicle number as they are moving at high speeds. Also, some people drive even faster to escape from the police to avoid a penalty. With day-by-day increasing traffic, an efficient and automatic method is required. The proposed system provides an automatic way to catch the over speeding vehicles and an auto way of debiting penal amount from traffic rules violators.

2. Body of Paper

2.1 LITERATURE REVIEW

A number of vehicle speed monitoring and tracking systems exist in the market as listed below

1. LASER Speed gun
2. RADAR Speed gun
3. Speed camera
4. Fleet monitoring system

Though police forces use radar or laser speed guns for measuring speed, enforcing speed limits and collecting revenue. Besides that, laser beam or radar signal from the speed gun can be affected by atmospheric conditions, especially on humid, foggy or rainy days, which can significantly reduce the operating range of the speed gun. Moreover, when the laser beam bounces off more than one solid object (stationary or moving), reflection errors occur, producing an incorrect speed reading on the speed gun. Furthermore, refraction errors can produce incorrect speed readings, where light is refracted differently by hot air than cooler air, a spot of air rising from the roadway can confuse the laser gun. If the speed cameras are the only way to make drivers slow down, and they work effectively, then there should be a great number of these cameras everywhere is a cost-effective method.

2.2 Theme of the project

The main theme of Automatic vehicle speed warning system is to develop and implement a real time system which alerts vehicle owners and collects penalties automatically with less human involvement. This system can compete with people-based management models where traffic police are involved to monitor the speed and collect fines accordingly. This system also paves the way to a new digital way of collecting fines online. If more than three rule violation tokens are marked on a vehicle, traffic authorities can take necessary disciplinary actions.

2.3 Components used

- Arduino Mega
- GSM module
- RFID reader (EM18)
- RFID tags

- IR sensors
- LCD Display
- 4 * 4 keypad
- Potentiometer
- PCB board
- Connecting wires

2.4 Block diagram

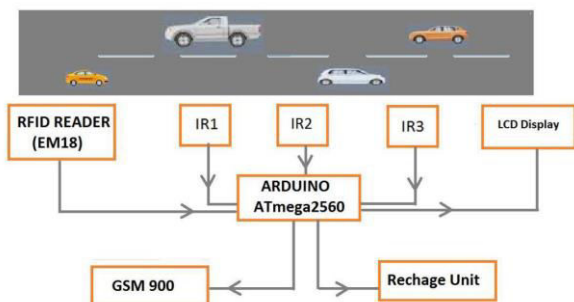


Fig 2.4: Block Diagram

In this project, practically 3 IR sensors connected to Arduino Atmega2560 are used to calculate the speed of the vehicle using speed time relationship. An RFID reader is used to collect the information of vehicles using RFID tags attached to vehicles. This information is proceeded to Arduino mega. LCD display, Recharge unit and GSM module are connected to Arduino so that if speed exceeds zone limit, alert will be sent through them.

2.5 Circuit diagram

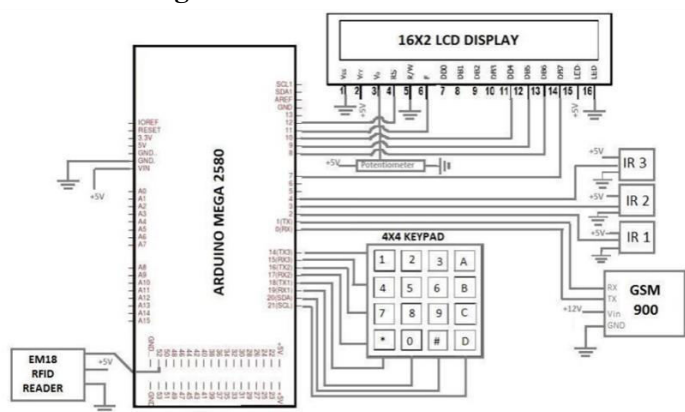


Fig 2.5: Circuit diagram of automatic vehicle speed warning system

In this project practically 3 IR sensors are placed beside each other with specific distance 'D' say 10CM. These sensors are connected to 2,3,4 pins of Arduino Mega and given +5V and GND external supply. When the vehicle crosses the IR sensor, the internal timer of the Arduino counts the time between activation of the next sensor and recorded in Arduino as 'T'. Speed will be calculated by using simple distance time relationship $S = D/T$. Vehicle will be identified by RFID technology as RFID EM18 reader will continuously emit electromagnetic waves. These waves will reflect back at

RFID tags in the vehicle with 12 digit unique identification code. Average speed at two points i.e., between 3 sensors is compared with the speed limit of the particular area where the system is placed. If the speed exceeds the speed limit, over speed will be displayed on the 16*2 LCD display at nearby traffic authorities. This display is connected to 7-12 pins of Arduino Mega and +5V supply is given using potentiometer. By using the GSM900 module, an alert message will be sent to the vehicle owner's number. This alert message will consist of vehicle number, location of rule violation, Remaining balance in the unique account of the vehicle owner. The receiver pin of GSM module is connected with the transmitter pin of Arduino and the transmitter pin of GSM module is connected.

2.6 Software implementation

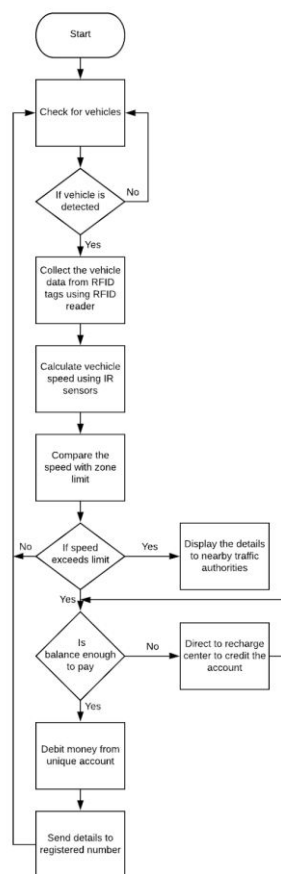


Fig 2.6 :Flow chart

2.7 Results

In practical implementation, 3 RFID cards of vehicles are detected, as their speed exceeds the limit automatic challan is generated and fine amount is debited from the unique account of each owner. We presented the Screen shots of vehicle owners alert message as below.

In this project, design and implementation of a real time automatic speed warning system is completed. Different speed monitoring and tracking systems are studied and used as reference to complete this project. As the speed can lead to higher impact on crash energy as well as are associated with high risk of losing control of the vehicle, there is an essence in developing a warning system. An automatic fine collection system is proposed and results are observed.

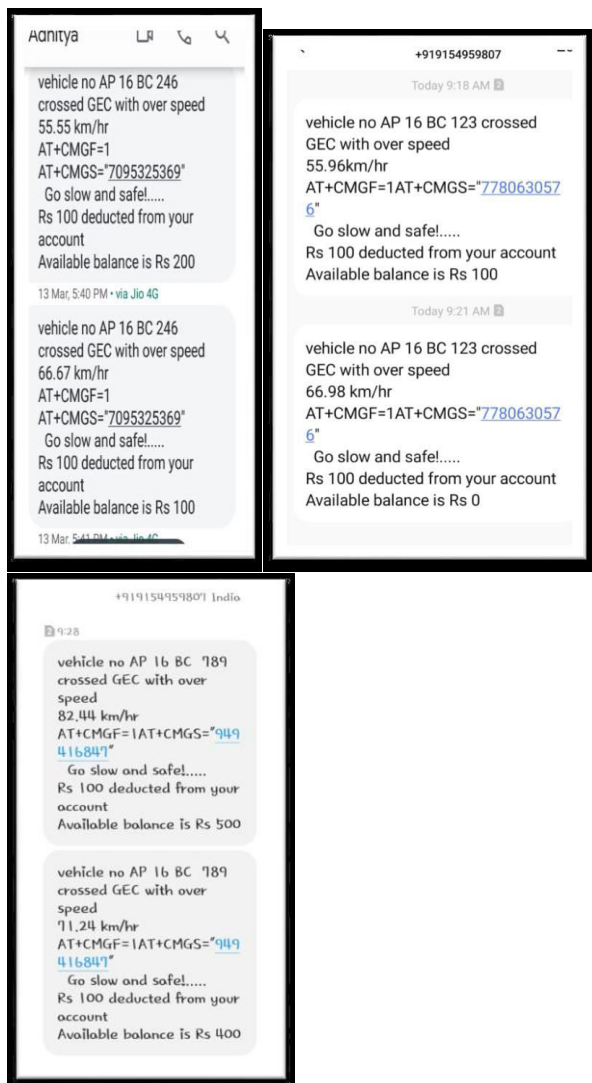
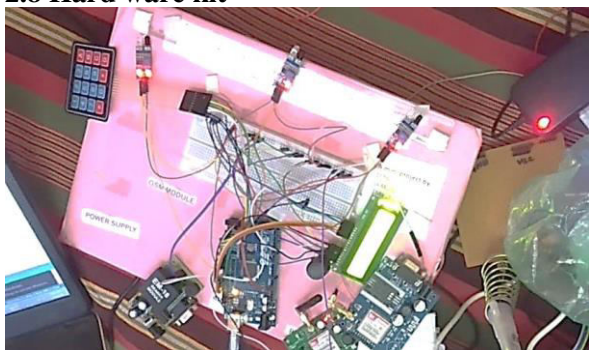


Fig 2.7: Screen shots of Results

2.8 Hard ware kit



3. CONCLUSIONS

3.1 ADVANTAGES

- Surveillance will be available round the clock.
- Consumes less power.
- A novel way of cashless fine collection.
- Simple circuit connections.

3.2 DISADVANTAGES

- Two systems must be used for double line roads.
- Sensitive circuit components.

3.3 APPLICATIONS

This automatic speed warning system can be implemented at

★ Highways (National Highways, State level Highways).

★ Inside university campus areas or inside any company's premises.

★ School zones.

★ Heavy traffic areas in cities.

3.4 FUTURE SCOPE

Proposed unique accounts of vehicle owners can be maintained by Fastag services that are collecting tollgate charges on highways.

ACKNOWLEDGEMENT

We are very glad to express our deep sense of gratitude to Dr. Y. Rama Krishna Professor, Department of Electronics and communication engineering for guidance and cooperation for completing this project. We convey our heartfelt thanks to him for his inspiring assistance till the end of our project.

We convey our sincere and indebted thanks to our beloved Head of the Department Dr. V. V. K. D. V Prasad for his encouragement and help for completing our project successfully.

We also extend our gratitude to our Principal Dr. P. Ravindra Babu, for the support and for providing facilities required for the completion of our project.

We impart our heartfelt gratitude to all the Lab Technicians for helping us in all aspects related to our project.

REFERENCES

1. Ravi Kishore, Kodali., Sairam, M.: "Over Speed Monitoring System", IEEE comm .Magazine, may 2017.
2. Eugenia Rumbidzai, Matingo.: "Design of an Automatic Vehicle Speed Limit Notification and Warning System": Researchgate.net.
3. Swati, S.Sarowar., Prof. Seema, M. Shende.: "Over Speed Violation Management and Control of Vehicle Based on Zigbee", International Journal of Engineering Research and General Science Volume 3, Issue 1, January-February, 2015, ISSN 2091-2730
4. WHO, Decade of action for road safety 2011-2020, saving millions of lives.
5. <https://electronicsforu.com/electronics-projects/speed-checker-for-highways>.

