ISSN 2348-1196 (print)
International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online)
Vol. 5, Issue 2, pp: (238-245), Month: April - June 2017, Available at: www.researchpublish.com

Monitoring Driver Behaviour by Red Light Running For Preventing Traffic and Collision Caused by Vehicle

[1]K. Kasiyammal, [2]S. Kayalvizhi

Department Of Computer Science and Engineering, Easwari Engineering College, Chennai, India

Abstract: **In case of popularity, many unique traffic problems are directly caused by the high density of Vehicles in particular, road traffic safety has been the main concern for the vehicle riders. Vehicle collision and traffic avoidance system that can identify red-light runners (RLRs) at intersections will be discussed. When the RLR behaviour is detected, the system would advise the RLR to slow down immediately and warn nearby vehicles on the intersecting road in real-time. In particular, not to consider the infrastructure-based solutions such as those utilizing radar or a camera. This is because, in addition to high implementation costs, collisions can be only avoided at intersections where such infrastructure configurations are deployed. Instead, an advance an on-vehicle solution using Smartphone carried by vehicle riders. Smartphone provide a useful platform that has a high penetration rate, more than sufficient computational power, inertial sensors to reflect the driving behaviour, and the communication capability to transmit and receive information from other vehicles. By using this behaviour we will easily avoid the traffic and collision between vehicles.To avoid the majority of injuries and deaths in traffic accidents, Red app can be used. Advantage of Red app low cost effective, feasible on regular priced vehicles are included.**

Keywords: **Red App, red-light-runner, vehicle, collision avoidance.**

I. INTRODUCTION

A. Background and Motivation:

A total of 9,951 vehicles were involved in the fatal crashes at traffic signals in 1999 and 2000.Based on the Fatality Analysis Reporting System crash database, with 20 percent of these vehicles failing to obey the signals. The total number of road accidents is increased by 2.5 percent from 4, 89,400 in 2014 to 5,01,423 in 2015. The total number of persons was killed in road accidents increased by 4.6 percent from 1, 39,671 in 2014 to 1,46,133 in 2015. Road accident injuries have also been increased by 1.4 percent from 4, 93,474 in 2014 to 5,00,279 in 2015. The severity of road accidents are measured in terms of number of persons killed 100 accidents has increased from 28.5 in 2014 to 29.1 in 2015. The Compound Annual Growth Rate (CAGR) number of road accidents as well as the number of persons injured in the country during the decades 1994 -2004 and 2005-2015 declined from 2.8 percent to 1.3 per cent and from 4.1 percent to 0.7 percent respectively. However, the CAGR in respect of the number of road accident fatalities, increased from 3.7 per cent to 4.4 percent during the same period.

In spite of its popularity, many unique traffic problems are directly caused by the high density of vehicles. Red lights and stop lights are designed to manage traffic and keep drivers safe. Most of the drivers does not obey the rules of red lights and stop signs, but those who don't can end up at the stop signs causing serious injuries and sometimes even fatalities. Unfortunately, many drivers disregard their own safety and the safety of others simply because they are in a hurry to get somewhere or they are distracted while driving and don't even realize they failed to stop at an intersection point. Just

about everyone has run a red light or a stop sign on accident before, but some drivers that are speeding up excessively or driving recklessly speed up during a yellow light and end up causing a major accident. Most accidents where a driver speeds up to avoid stopping at a red light are severe and cause serious injuries to both parties.

B. Relationships between Red Light Running Violations and Crash Frequency, Severity, and Vehicle Conflicts:

Traffic signals are installed to separate the conflicting of the traffic movements (called conflicts) through intersections. Those conflicts create crash potential. For example, if a vehicle from each of two crossing streets attempts to enter an intersection at the same time, the paths of the crossing vehicles meet in the intersection and a crash can occur. Figure 1 illustrates the vehicle conflict points that occur within a typical intersection.

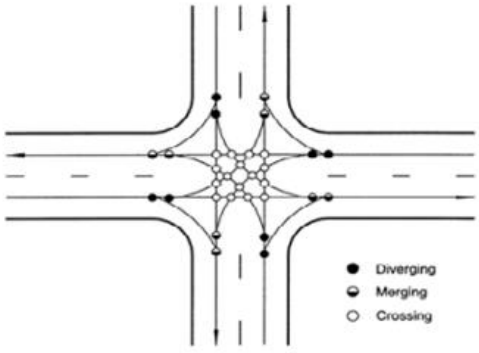


Figure 1: Traffic Conflict Point in a Typical Intersection

Present Redeye, a Smartphone-based collision avoidance system to prevent accidents caused by RLR vehicle. To the best of our knowledge, this is the first study to propose such a system without the need of deploying additional components in the road infrastructure. The Smartphone onboard on a vehicle utilizes a RLR classifier to predict whether the rider will run the red light a few seconds before it reaches the intersection. If that is the case, the system would advise the RLR to decelerate immediately; and use the Wi-Fi radio is to broadcast a warning message to neighbouring vehicles; the warning message is then presented to the drivers or the riders of these vehicles in time so that they can slow down or stop the vehicles to prevent the collision. Even in the case that a collision cannot be avoided, with one or more riders or drivers react to the warnings the severity of the crash can be greatly reduced.

C. Advantages:

In this paper, we present Redeye, a Smartphone-based collision avoidance system to prevent by RLR vehicle. The Smartphone utilizes a RLR classifier to predict whether the rider will run the red light a few seconds before it reaches the intersection point. (1) Advice the RLR to decelerate immediately; and (2) use the Wi-Fi radio to broadcast a warning message nearby vehicles.

The system has the following advantages by using the Smartphone.

• **Low cost:** In this project Smartphone is utilized that is already owned by the rider. A Smartphone today has Global Positioning System (GPS) and accelerometers to provide the information about the location and then the behavior of the vehicle.

• **Function at every intersection:** An infrastructure-based system is designed to detect the RLR only at the intersection where it is installed. Our system, due to its installation in the Smartphone on the vehicles, can detect RLR at any intersection, as long as the map database in the Smartphone recognizes the current location as the neighboring area of an intersection point.

II. BACKGROUND INFORMATION ON RED-LIGHT RUNNING BEHAVIOR

At the intersections point, there is usually a stop line a road segment before it enters the area that two or more road segments intersect. The stop line usually located at 5 to 10 meters away from the intersecting area. (see fig 2)

ISSN 2348-1196 (print)
International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online)
Vol. 5, Issue 2, pp: (238-245), Month: April - June 2017, Available at: www.researchpublish.com

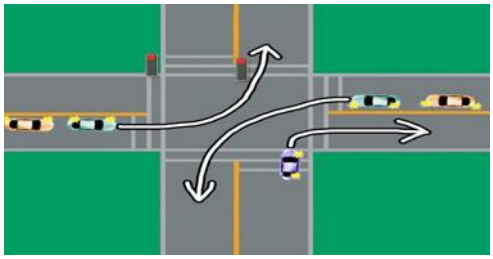


Figure 2

Fig. 2 The stop line and the intersecting area Traffic lights are operated by the traffic police but nowadays timer is set for every change in the color of light. The time duration for each color is:

- 150 seconds maximum for RED light
- 25 seconds minimum for GREEN light
- 5 seconds are reserved for YELLOW light.

III. RELATED WORK

Kuang-Shih Huang et al (2016) [1] proposed Collision avoidance system due to RLR. Red Eye is an app developed on the android platform. It will send the warning message through mobile phone that the intersection point yet to reach at 5ms so that the vehicle speed should be reduced and to avoid collision between the vehicle. An android app will send the warning message by transmitter i.e. traffic signal status and the receiver i.e. mobile phone. The receiver will receive the message by video or audio. SVM is a well-known algorithm for solving supervised learning problems. We choose SVM for 2 reasons first, due to practical reasons we are not able to collect RLR from intersection points with real-world traffic and the obtained data set is relatively small. Second, SVM is implemented and distributed as a software library for various programming languages, including Java; and thus utilizing it on the Android platform requires little efforts. The sensor noises are collected by GPS and Accelerometer. If the scooter is started the data collector periodically obtains data from the GPS, the accelerometer, and the camera in the Smartphone. Issues in this paper are GPS is measured for shortest distance and it is not implemented for the entire vehicle

Rajneesh Tanwar et al (2016) [2] proposed Dynamic traffic light system is a concept of controlling the time duration of RED and GREEN light according to traffic flow or by sensing flow of traffic on road in movement. Global Positioning System which will convey the details of traffic flow and by considering that, time slots are provided to traffic lights. As GPS data is a real time captured data so timing synchronization is essential for proper allocation of time slots to each and every color for even functioning. This method is cost effective and easily maintainable. This frame work will also save time and drop a bit of pollution created by vehicles.

Y M Jagadeesh et al (2015) [3] proposed Dynamic traffic light system through IR sensor the ATT can be reduced by switching the signal. The density of the vehicle is low at the road side then signal can be automatically changes to red signal and if where the density of the vehicle is more the signal can be changes to green. According to the density of traffic the signal is changes by the microcontroller. One disadvantage of most conventional vehicle detection methods in a traffic control system is that they can have control only by the human. The line which has less traffic frequency gives its own time to the other line which has high traffic frequency.

Donia Zaheri et al (2015) [4] proposed Due to the traffic congestion and increase of users on road it is difficult to identify the people who are breaking the traffic rules. An algorithm for identifying RLR from radar trajectory data. The traffic violation detection process was helpful in identifying and penalizing the vehicles that violated the red light at any of the traffic signal junction. When vehicles are fully stopped for epoch of time, this condition is known as a traffic jam. In the first step, all vehicles are hypothesized and in the second step, all hypotheses are verified and classified into vehicle and non-vehicle classes. Recent algorithms utilize radar for dilemma zone Protection. However, verification of the number of red light runners requires additional video detection.

Arash Jahangiri et al (2015) [5] proposed a large number of crashes occur at signalized intersections due to traffic violations, specifically RLR [1]. The time required for the endangered driver to react, which is equivalent to the

perception reaction time. The time required for the endangered driver to stop at the stop bar, which was obtained with respect to the stopping sight distance and equations of motion. The monitoring period corresponding to the yellow onset. It uses the Machine learning techniques, namely Support Vector Machine (SVM) and Random Forest (RF), were adopted to develop prediction models.

Dixiao Cui et al (2014) [6] proposed method uses a robust lane marking detection algorithm, as well as an efficient shape registration algorithm between the detected lane markings and a GPS based road shape prior, to improve the robustness and accuracy of global localization of a road vehicle. It uses a method called robust lane marking detection algorithm, as well as an efficient shape registration algorithm between the detected lane markings and a GPS based road shape prior, to improve the robustness and accuracy of global localization of a road vehicle. It has been extensively tested in an autonomous vehicle in real urban environments. Test results are encouraging, and show the efficacy and robustness of the proposed method.

IV. PROPOSED WORK

The proposed operations of Traffic Light Controller to detect vehicles are mounted on road. The presence or absence of a vehicle is sensed which mounted on each road. This acts as an input to the TLC unit. This input signal indicates the length of vehicles on each road. The TLC unit generates output signals for Red, Green and Yellow Signal and monitors their timings taking into consideration the length of vehicles on each road. The same information is transmitted to the mobile user which will request for congestion status. If a vehicle driver at junction sends sms on GSM mobile phone to TLC unit, the driver will get message indicting congestion status of road. In addition to above, in the emergency mode, for a vehicle like ambulance, fire fighter or police car, the signals are altered for the fast and easy movement of these vehicle. If an emergency vehicle is passing by the route A-B-C-F, the signals on the roads which are crossing this route will be immediately made red to stop vehicles on these routes. This is a very important feature which is very useful in case of emergency.

It proposed the use of vehicle-to-vehicle roadside communications to warn nearby vehicles, as well as dynamically extending the all-red period when RLR is detected to provide a stop or go advices to the drivers approaching the intersection. When the RLR is detected the message is send to the drivers about the traffic light status and if the red is detected the message is shown in the RedApp and then the vehicle is stopped.

TRAFFIC LIGHT:

Traffic lights are operated by the traffic police but nowadays timer is set for every change in the color of light. The time duration for each color are:

- 150 seconds maximum for RED light
- 25 seconds minimum for GREEN light
- 5 seconds are reserved for YELLOW light.

Traffic lights can have both positive and negative effects on traffic safety and traffic flow figure 2.1 red light runners

Figure 3: Red Light Runners

ISSN 2348-1196 (print)
International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online)
Vol. 5, Issue 2, pp: (238-245), Month: April - June 2017, Available at: www.researchpublish.com

V. SYSTEM ARCHITECTURE

The system architecture of the proposed system is given in the figure 4. Descriptions about the devices are listed follows.

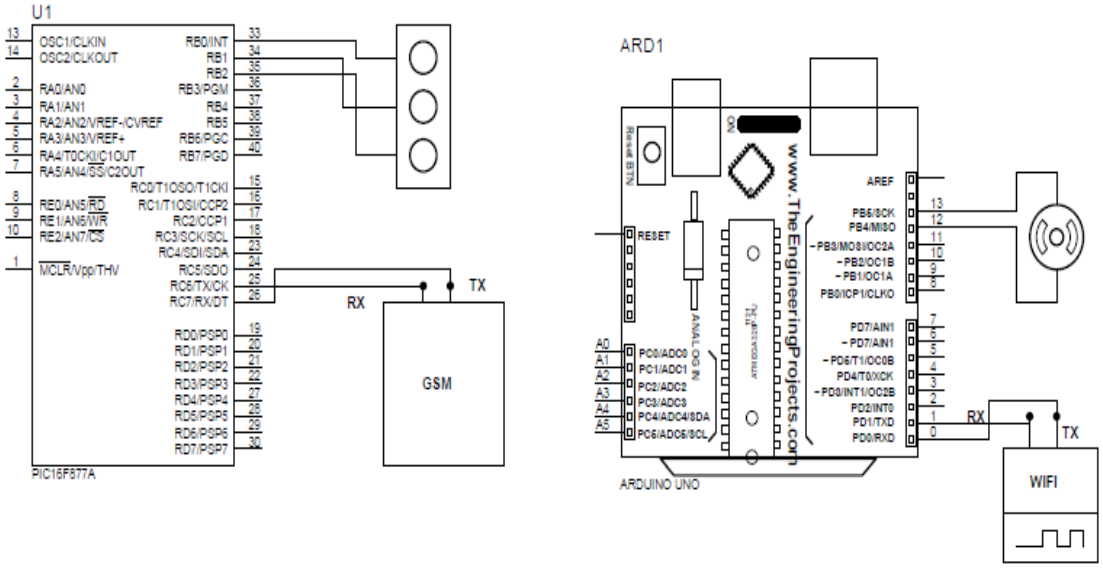
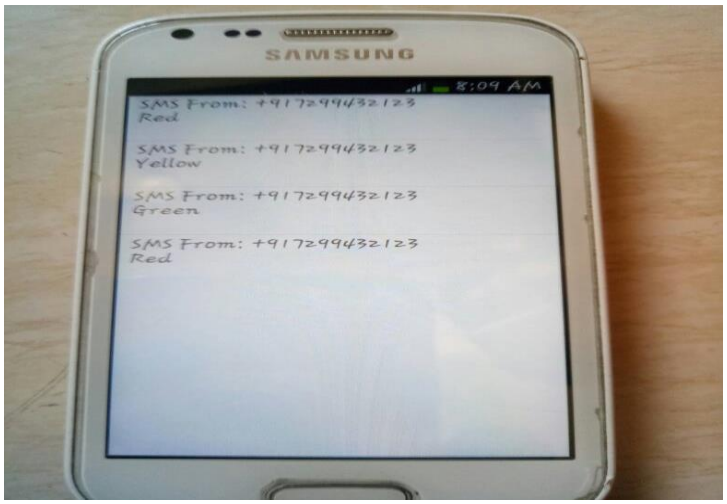


Figure 4: System Architecture

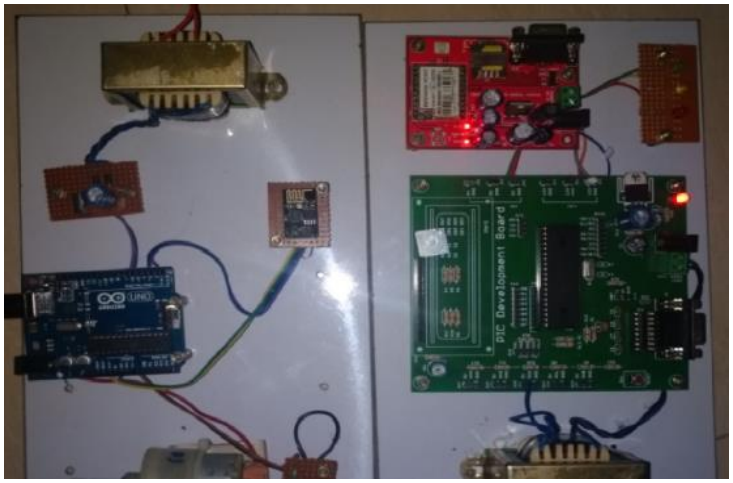
WORKING:

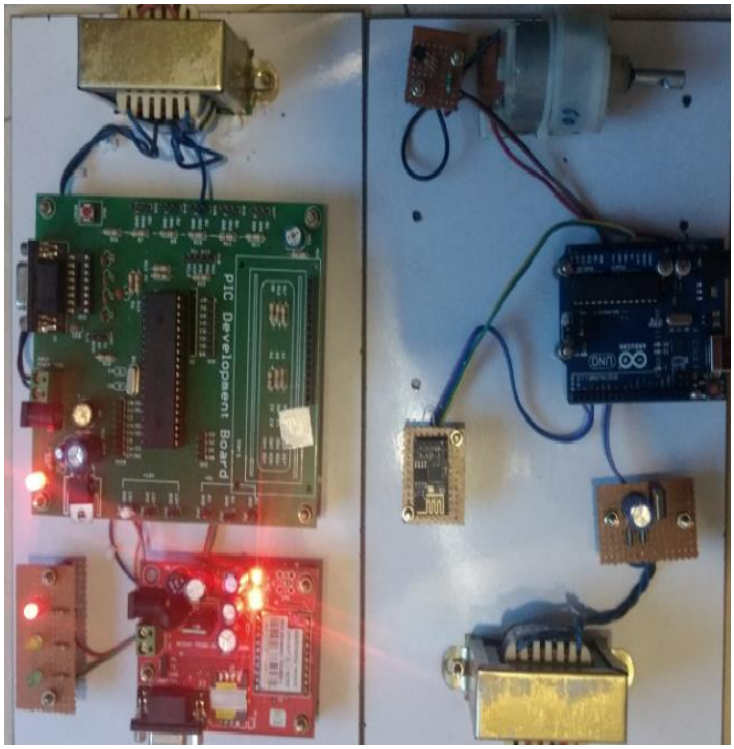
In the above block diagram of traffic light controller, a motor and a drive circuit is used, and three LEDs are used for the purpose of traffic light control. A PIC Microcontroller is the brain of this whole project and is used to initiate the traffic signal at the intersections on road. The LEDs are interfaced to the Microcontroller and are powered with 5v power supply. The LEDs get automatically switched on and off by making the corresponding port pins of the microcontroller high, based on the PIC microcontroller and its programming done by using PIC CCS software. At a particular period of time, only the green light holds ON and the other lights remains OFF, and after sometime, the changeover traffic light control from green to red takes place by making the succeeding change for glowing of yellow LED. This process continues as a cycle and the timing for changing the LEDs can be displayed in this project. This traffic light control system can be further enhanced in such a way to control the traffic signals automatically based on the traffic density on roads with the help of GSM modules which sends the message to the users phones through RED app and may get received by the users, if there are no vehicles on either side of the road which leads to power consumption.

VI. SCREEN SHOTS

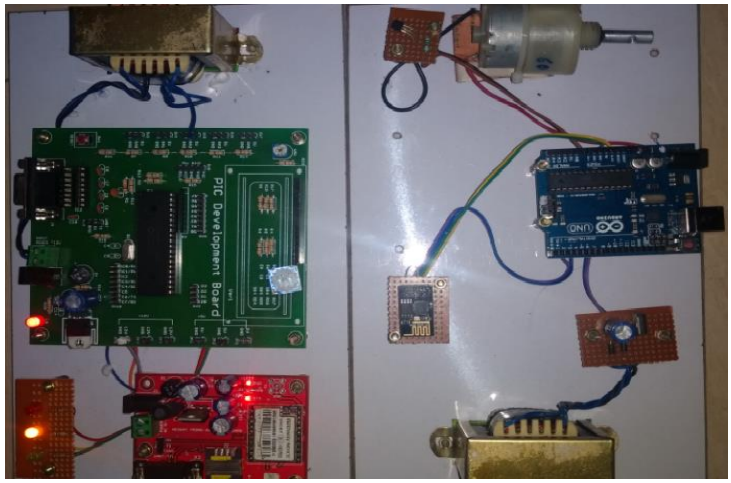


Redeye App Message



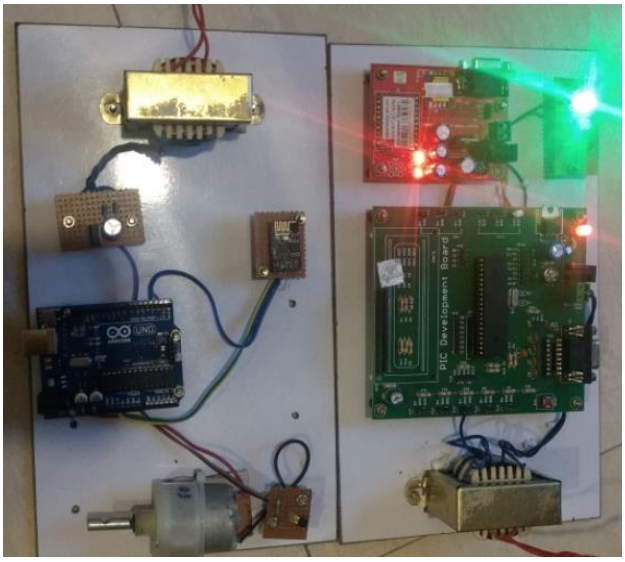


RED LIGHT



YELLOW LIGHT

ISSN 2348-1196 (print)
International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online)
Vol. 5, Issue 2, pp: (238-245), Month: April - June 2017, Available at: www.researchpublish.com



GREEN LIGHT

VII. CONCLUSION

The work described the objectives, Redeye, a collision avoidance system which can prevent collisions caused by RLR Vehicles. The proposed system utilizes Smartphone for predicting RLR behaviours, which is achieved by advancing for designing RLR classifiers that are able to handle sensor noise collected by GPS and accelerometers. Once the RLR patterns are detected, the rider would be advised to decelerate immediately and nearby vehicles would receive repeating warning messages via built-in Wi-Fi radios in Smartphone, so that possible collisions can be avoided.

The improvement of town traffic condition is largely dependent on the modern ways of traffic management and control. Advanced traffic signal controllers and control system contribute to the improvement of the traffic problem. The traffic signal controller is introduced in this project with powerful functions and hardware interface. This project has two major phases. The first stage is to design a program, which consists of reading, research, planning and designing a program. Design a traffic light using the state machine is very difficult compare to design using the logic gates. Microcontroller Embedded C Language was chosen to write a program code for simulation only to get a timing diagram. After that, second phase is to continue with the hardware implementation using the gate logic and the interface light is using LED. The blinking is depending on the state machine transition. GSM Interface is also provided for sending traffic alerts signals for drivers on road and precautions be taken not to indulge in traffic congestion. It is observed that the proposed Traffic Light Controller is more efficient than the conventional controller in respect of less waiting time, more distance traveled by average vehicles and efficient operation during emergency mode and GSM interface. Moreover, the designed system has simple architecture, fast response time, user friendliness and scope for further expansion.

REFERENCES

[1] A. Jahangiri, H. Rakha, and T. A. Dingus (2015), “Predicting red-light running violations at signalized intersections using machine learning techniques,”in Proc. Transp. Res. Board Annu. Meet., Art. ID 15-2910.

[2] D. Z. Sarabi and M. Abbas sep (2015), “An algorithm for identifying red light runners from radar trajectory data,” in *Proc. IEEE Int. ITSC*, pp. 2683–2687.

[3] Dixiao Cui, Jianru Xue*, Shaoyi Du, and Nanning Zheng (2014), Real-Time Global Localization of Intelligent Road Vehicles in Lane-Level via Lane Marking Detection and Shape Registration, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2014) September 14-18, 2014, Chicago, IL, USA.

[4] G. Aoude, V. Desaraju, L. Stephens, and J. How June (2012) “Driver behavior classification at intersections and validation on large naturalistic data set,” IEEE Trans. Intell. Transp. Syst., vol. 13, no. 2, pp. 724–736.

[5] Kuang-Shih Huang, Po-Jui Chiu, Hsin-Mu Tsai, Member, IEEE, Chih-Chung Kuo, Hui-Yu Lee, and Yu-Chiang Frank Wang (2016) Redeye: Preventing Collisions Caused by Red-Light-Running Scooters with Smart phones, IEEE.

[6] Liping Zhang, Senior Member, IEEE, Lanjunang, Kun Zhou, and Wei-bin Zhang march(2012), Dynamic All-Red Extension at a Signalized Intersection: A Framework of Probabilistic Modelling and Performance Evaluation, IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, VOL. 3, NO. 1.

[7] Mohammed Elhenawy, Arash Jahangiri, Hesham A. Rakha*, Ihab El-Shawar AHFE 2015, Classification of driver stop/run behavior at the onset of a yellow indication for different vehicles and roadway surface conditions using historical behaviour by Virginia Tech Transportation Institute, 3500 Transportation Research Plaza, Blacksburg, VA 24061, USA, 6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences.

[8] P.-J. Chiu and H.-M. Tsai dec(2012), "An intersection collision avoidance system for scooters utilizing non-line-of-sight links," in Proc. IEEE Globecom, pp. 49–55.

[9] Rajneesh Tanwar, Gursewak Singh Sidhu, Rana Majumdar, Abhishek Srivastava, (2016), Removing Traffic Congestion at Traffic Lights Using GPS Technology, IEEE.

[10] Y M Jagadeesh, G. Merlin Suba, S Karthik, and K Yokesh (2015), Smart Autonomous Traffic Light Switching by Traffic Density Measurement through Sensors, International Conference on Computers, Communications, and Systems.