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Smart Traffic Assistance System

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Abstract: **Road traffic and congestions are experienced from the rise of automobile transportation. Now the amount of vehicle on roads are increasing, accident reports and pollution problems are also a threat for environment. The rise of congestions on traffic signal is severe, however control of traffic is necessary, it develop problems were a driver cannot make a proper decision. There have been many ideas proposed to address this issue like density based traffic signal, micro camera based traffic signal and sign detection, but these lack the assistance that can be provided to a driver and the particular environment that vehicles are facing. Hence we propose an ideal solution that assist driver in a traffic junction, providing the updated information about the traffic signal and necessary warnings.**

Key words: Signal zone, millis function, RF transmission and reception, magnetometer.

I. INTRODUCTION

The numbers of vehicle that appear on roads are increasing per day. Hence traffic congestion and road accidents also increased. Traffic light signals are necessary in any junction in order to control the excessive traffic through multiple ways. These are very much important in every junction in order to avoid excessive traffic congestion. Every signal has certain duration over which vehicles through particular lane are allowed to pass or stop that is informed through lights. Most of traffic lights will not have duration time that is displayed to alert the driver about the signal status. As Traffic congestion is becoming severe and unavoidable problem in both urban and rural areas a proper solution must be proposed.

There are several ideas which provide solution to most of transportation problems. Density based smart traffic control system, Traffic control system using image processing. Most of the variants of the above are based on various types of algorithms and image processing filters. [1]Developed a framework where real-time information of traffic signal is displayed. The primary concern is about the hardware development of both transmitter part and vehicle side receiver part. In this processes we use nrf transceivers, magnetometer, TFT display. The RF transmitter encode the traffic junction information and broadcast it within a range of 400-500metres, transmitted data will be based on the direction in which signals are placed. Receiver hardware on the vehicle will decode the data and display the signal information. Minimization of this equipment and incorporating more informatory assistance will be an additional step to vehicle to infrastructure communication.

2. EXISTING SYSTEM

Currently the situation on urban and rural roads are severe, the increased traffic violation and accidents led us to develop safer automobile solutions. From collision avoidance system to lane departure assistance system, transportation sector is made smarter every day. Even though we have lot of safety and security methods in this sector, we still face many issues.

Figure1.1: Accident statistics

Road fatality even with properly equipped vehicles is increasing, and it is not only due to imperfect driving condition, but also due to the driver and the driving vehicle. Traffic law violation and reckless driving must be controlled. Image processing is an area of interest were lot of contributions are provided, were preprocessing, detection and recognition using filters and learning algorithms which extracts features of control point or connected control points. Another method is vehicle to infrastructure implementation and complete control and transfer of traffic information through wireless medium like VANETs. Another method is Controlling vehicular traffic is one which

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is an innovative solution and are pooled taxi, encouraging public transportation etc..

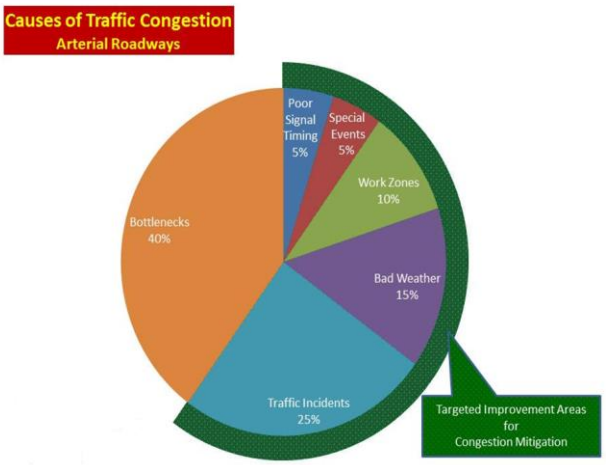

Figure1.2: cause of traffic congestion

Present solution to the problem faced on traffic signals is density based traffic controls, traffic sign detection through image processing. The implemented solution includes traffic signal information retrieval using mobile application [Enlighten] and connected vehicle implemented by Audi. Application combines GPS information with connected signals. It is based on real time traffic light and position information retrieval and providing necessary information to driver. Traffic technology service from Audi works on information from the centralized authority, which is equipped with onboard telematics and modem. These vehicles on reaching a particular signal will gain access to the data from traffic control system and uses machine learning process to predict upcoming traffic lights.

3. SMART TRAFFIC ASSISTANCE SYSTEM

Based on the necessary requirements required we come up with this system which is a complete solution to problems in a traffic signal junction. Smart traffic assistance system will help the driver make a quick decision entering in a signal zone. It is equipped with traffic signal replica, which provides the exact signal information of signal color and signal timings. This device is suitable to any traffic signal, which will be directly available to any vehicle within its zone. The device is categorized into two parts namely:

- Transmitter module.
- Receiver device with display.

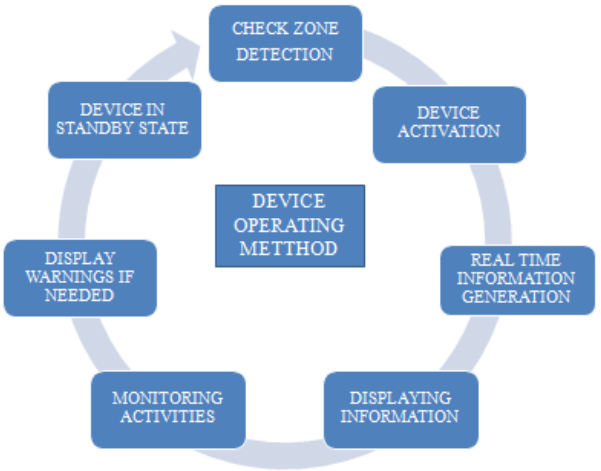

Figure1.3: Smart traffic assistance system operating method.

4. TRANSMITTER MODULE

Transmitter module is primarily required for this system. The module equipped with NRF24L01 along with an encoding scheme is developed. This module has to be kept on every signal junction programmed to encode the signal data of that particular junction. According to the 3 second rule which is followed on a traffic signal anywhere on the world we minimized the data encoded and broadcasted. In this method we propose a traffic signal system composed of red and green traffic signals, amber signals are not avoided, whereas the time for which amber signal will stay before a signal turns red is encoded along with the data.

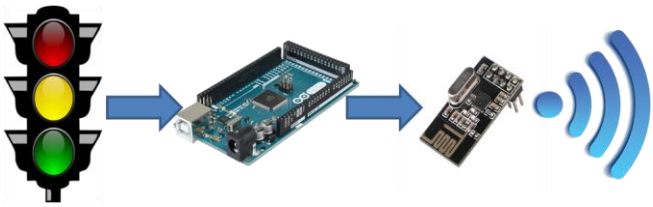

Figure1.4: Transmitter module

Primary experiments are done on a signal junction with four traffic directions; it can be made to work on T junction, bowtie, traffic circle etc.. Based on our experiment the device encodes data of red and green traffic lights, data of four red and four green traffic lights corresponding to four directions and four green traffic light for right or left turn is transmitted. Every signal has count timings and a predefined way in which the signal direction will change, in India it is

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usually 120, 60, 30 seconds for parallel crossings and 30, 15 seconds for sideway crossings. We developed a model with a 10 second parallel crossing and 5 second sideway crossing. Encoding and programming is done using Arduino mega 2560, and millis function is used in program to provide the count timings over which the traffic signal will change. The signal data is encoded based on the north, south, east and west directions; each encoded signal value is based on the direction in which vehicles are approaching.

Time(sec)	North Red	North Green	North East Green
0-1	0	1	1
1-2	0	1	1
2-3	0	1	0
3-4	0	1	0
4-5	1	0	0
5-6	1	0	0
6-7	1	0	0
7-8	1	0	0
8-9	1	0	0
9-10	1	0	0

Table1.1: Encoding logic for North side traffic signal

The above table is logic for sending encoded traffic signal for North side; similarly other direction traffic signals can be encoded. Logic 1 shows the signal light is active and logic 0 shows the signal light is off and this encoding logic is converted to string and transmitted by NRF module proving an excellent transmission range of up to 800 meters. Transmitted data includes the direction logic as of listed above which shows the status of traffic signal and the count which defines time left for traffic lights to switch its state.

5. RECEIVER DEVICE AND DISPLAY SYSTEM

Receiver module decodes and displays the updated traffic information. This module is kept on the vehicle; up on reaching a signal range the device starts receive the encoded data which is then further processed to give the driver the realistic signal information. The module has NRF24L01 configured as receiver, decoding method, magnetometer, and TFT display.

Once the vehicle equipped with the receiver module enter the broadcasting range, it will start receiving the data along with the count at that particular instant. The data is processed by predicting the upcoming signal change on the traffic signal from which it is receiving. The count value is updated every second once it is received and based on the count value the signal information on the vehicle is updated and the vehicle will receive this data until it drive past the broadcasting range.

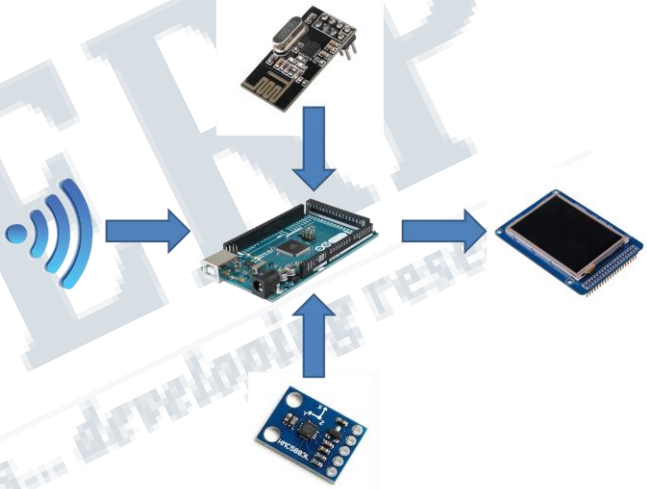

Figure1.5: Receiver module

Magneto meter will display the direction of travel, and the signal information which is displayed will have the direction of the signal. Thus driver will get the exact information of a signal junction, thereby allowing driver to choose the direction of travel and required action which is to be taken at an earlier time. Received data contained a 12 bit string value and four set of count timings, each value of 12 bit represents the signal color and the count defined the time left for the signal color to turn off and to turn on. In the experiment we took first received value of the signal model and processed it to provide the updated signal information until vehicle drive past the signal zone.

6. CONCLUSION AND FUTURE WORK

This paper proposes an efficient method to inform and alert drivers in a traffic signal. The transmission mechanism

which is employed in this method can be globalized and the initial cost of deployment is less comparable to the ones present and it will be readily available for use to any vehicles on road. This device will reduce the amount of traffic congestion, accidents and traffic violation and will assist the driver with only necessary updated information. The future work may focus on the ability of the product to predict stopping distance and also the lane assistance which is to be followed on a junction. It can be further modified to develop a smart vehicle which will reduce the speed and stops whenever informed by the device.

REFERENCES

[1] Yanmin Zhu, Member, IEEE, Xuemei Liu, Minglu Li, Member, IEEE, and Qian Zhang, Fellow, IEEE, "POVA: Traffic Light Sensing with Probe Vehicles," IEEE transactions on parallel and distributed systems, vol. 24, no. 7, july 2013

[2] Guo Mu, Zhang Xinyu, Li Deyi, Zhang Tianlei, An Lifeng, "Traffic light detection and recognition for autonomous vehicles," February 2015, 22(1): 50–56 www.sciencedirect.com/science/journal/10058885

[3] SelcanKaplanBerkaya, HuseyinGunduz, OzgurOzsen, CuneytAkinlar,SerkanGunal, "On circular traffic sign detection and recognition, " Expert Systems With Applications 48 (2016) 67–75

[4] Moises Diaz-Cabrera, Pietro Cerri , Paolo Medici, "Robust real-time traffic light detection and distance estimation using a single camera," ESWA 9762 7 January 2015

[5] M. Sajjad Hossain, M. Mahmudul Hasan, M. Ameer Ali, Md. Humayun Kabir , A B M Shawkat , "Automatic Detection and Recognition of Traffic Signs," 2010 IEEE Conference on Robotics, Automation and Mechatronics

[6] Kemal Kaplan, Caner Kurtul and H. Levent Akın, Senior Member, IEEE, "Real-Time Traffic Sign Detection and Classification Method for Intelligent Vehicles," 2012 IEEE International Conference on Vehicular Electronics and Safety July 24-27, 2012. Istanbul, Turkey