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Automatic Traffic Information System Without Gps

Melvin F. And P. Muthu Subramanian

***Abstract*:** In a densely populated country like India, traffic and accidents are major problems. To overcome this, the government has to enlarge roads and introduce many infrastructures to reduce the traffic problems, but it's not possible make infrastructural renovations in every requisite place. In order to reduce the traffic and road accidents this project introduces a TRANSCEIVER which is more or less like radar and it also uses a DIRECTION SENSOR – (like "cherry SD1012"). Each vehicle has these two modules and each vehicle transmits and receives the signals of the vehicles around the range of the transceiver (say 500m). With the reception of these signals from the vehicles around the specified range the traffic density can be found and we can prompt the user to take a different route or to slow down their speed using software programs from the received data. In order to know the vehicles that are going in the direction of the user, a direction sensor is used. If N number of vehicles are going in a direction (say north), then the TRANSCEIVER will filter the other signals and it will receive signals only from vehicles which are heading in the same direction, so the number of signals received is directly proportional to the traffic density, there by using algorithms we can instruct the user to either slow down or take detour. Using this same principle, by receiving the data from the upcoming traffic signal, we can also know the status of the signal and using algorithms we can instruct the user to either slow down or speed up, in this case traffic signals from a junction are given directions (north, south, east and west) so only the information of the traffic signal which matches the direction of the users' vehicle will be received and other signals can be attenuated. Thus the DIRECTION and TRANSRECIEVER module together helps to know the locations of vehicles. Once these modules implemented in all vehicles this project finds various applications in ambulance path clearance, traffic police department surveillance, public transports, accident location etc.

***Keywords*—**Traffic reduction, Automation, Speed ontrol, Transciever, traffic surveillance

I. Introduction

In this busy world we spend major part of our utility time in transportation, due to the great increase in the traffic density our travel time has increased although our vehicle speeds have increased. Huge amount of fuel is being wasted every day due to inefficient distribution of traffic on roads. To avoid all this we can distribute the huge amount of traffic in alternate roads. For this we should know the traffic information ahead us. This system helps in retrieving the traffic information without the help of Global Positioning System (GPS). This system works with two main modules *the direction sensor* and *transceiver*. This system works in low power hence it can work with the power of the vehicle's battery. This system finds a lot of applications like ambulance path clearance, traffic police department surveillance, public transports, accident location etc.

This unit is user interactive, where a Graphical User Interface (GUI) is present and the user can interact with the system. The display is used to specify the traffic density information and also allows the user to show the alternate paths available. This unit also helps in alarming the civilians about the path of the ambulance and alerts them to give way for them. This unit also helps in giving information about the traffic signals and their timings. So in this paper we are to discuss the overall system design, working and the pros and cons of this system.

II. System Design

The overall system design can be explained in three parts

1. Vehicle mount
2. Traffic Signal mount
3. Speed trap

i. Vehicle mount

The design of the vehicle mount can be explained with the block diagram in *Fig 1.*

A. Direction sensor

The direction sensor is one of the primary module of this system where it specifies the present direction of the vehicle, this information is used by the processor to filter the vehicles which are on the way of the particular user.

B. Vehicle Details

Each vehicle has it own features like speed, size, registration number etc. all this detials of the locomotive is sent to the processor so that it can send those details through the transreceiver

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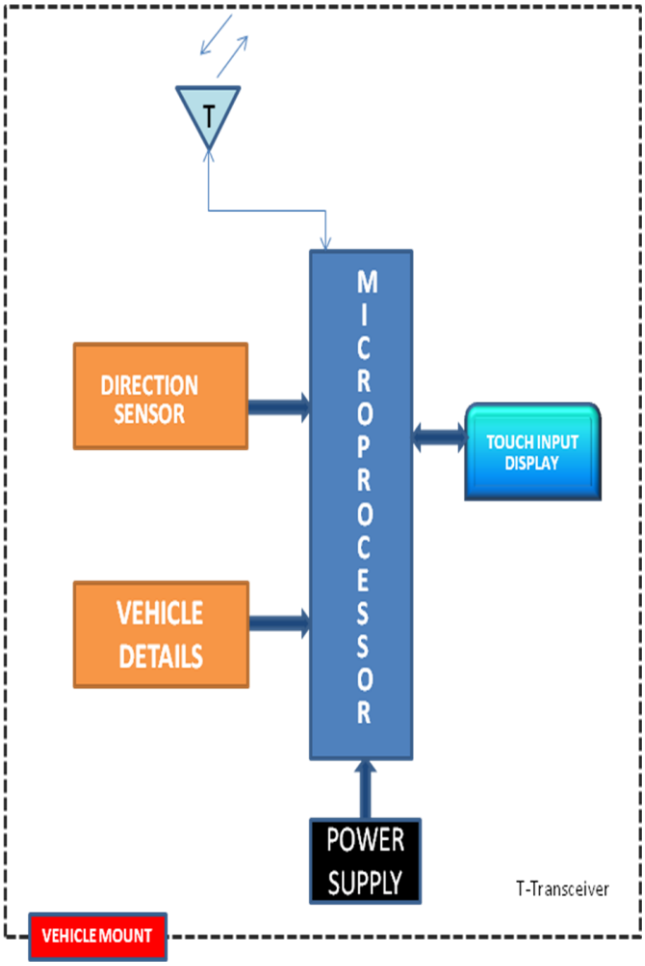

Fig 1. : The design of this vehicle mount is shown in the block diagram

D. Vehicle Details

Each vehicle has it own features like speed, size, registration number etc. all this detials of the locomotive is sent to the processor so that it can send those details through the transreceiver

E. Transceiver

The transrecevier which is the most important component, it sends and receives signals to proximity vehicles. The signals are generated by the microprocessor ,they include the direction details and the vehicle details. The transreceiver module can be zigbee, RFID modules etc. . Theirmust be above 1 kilometers..

F. Microprocessor

Microprocessor process all the data from direction sensors and the vehicle details to the transreveiver it also process the data received from the proximity vehicles and displays the results in the touch display.

G. Display

It displays the results generated by the microprocessor it also receives the input from the user.

ii. Traffic Signal mount

The design of the traffic signal mount can be explained with the block diagram in *Fig 2.*.

A. Direction detail

Each junction of the road has four signals, here we are going to assign each signal with directions so the signal detail will be always transmitted.

B. Signal timing

Each signal has its own time gap between green and red and that timing is sent to microprocessor and sent to the transceiver and then to vehicles coming in that direction.

The working of the transceiver and microprocessor is discussed in the earlier segments.

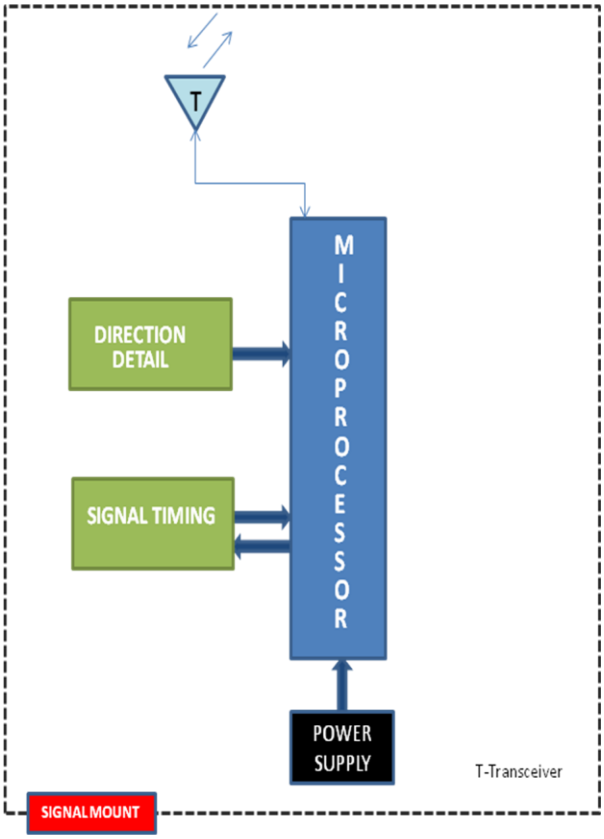

Fig 2. : The design of this traffic signal mount is shown in the block diagram

iii. Speed trap

The design of the vehicle mount can be explained with the block diagram *Fig 3.*

Two of this unit must placed at a distance of 500m to 1000m when the vehicle passes the first unit it receives the signal of the vehicle and notes the time it crosses and the next unit which is placed at a distance also receives the signals and time of crossing with the help of the elapsed time we can know the speed of the

vehicle. The working of the transceiver and microprocessor is discussed early

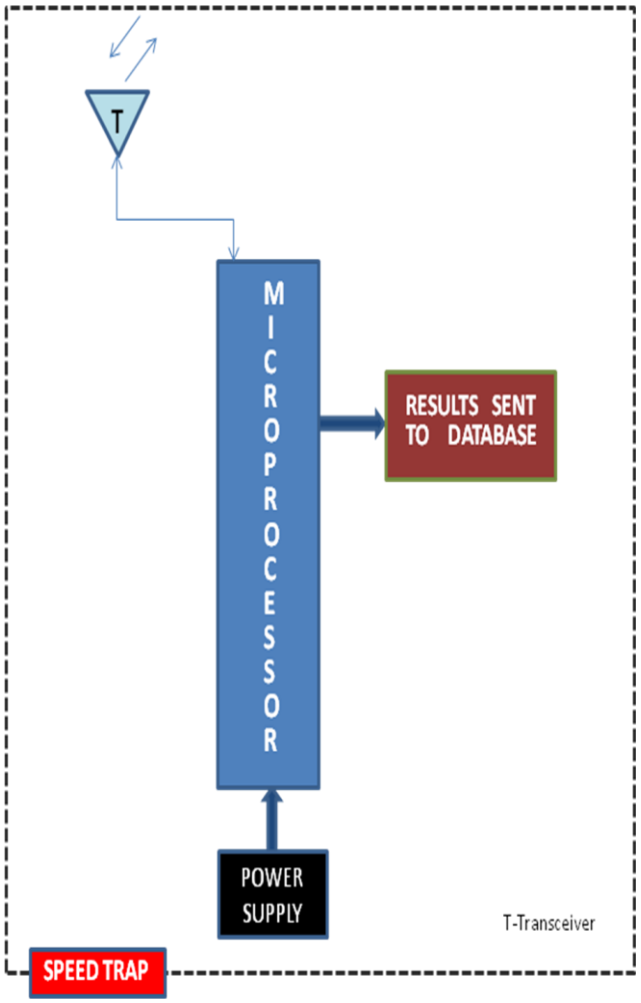

Fig 3. : The design of this speed trap is shown in the block diagram results *sent to database*

III. Working

The working of the unit can be explained with the above block diagrams each vehicle will have the *vehicle mount* on it .It can be powered by the vehicle itself. The direction sensor present in this unit detects the direction of the vehicle heading and sent to the processor and *the vehicle details* is sent to the processor along with direction details. Now the processor sends to the proximity vehicles with the help of transceiver. The other vehicles heading to the same direction in the road receives the signal of these vehicles, so thereby number signals received by a vehicle is directly proportional to the traffic density of that place. All the details received is processed by the microprocessor and with back running algorithms the results are displayed in the screen present in the unit and now the driver can take decisions of his route and speed thereby reducing the fuel wastage and his time.

The *signal mount* which is present on the signals always sends data to the vehicles about the time gap between green and red signal so and these signals received by the vehicles in that place they can slow down or speed up their car thereby saving time and fuel, also the signal mount receives the signals of the vehicle present in that particular road and with the algorithms it can carry the duration of green signals according to the number vehicles in that road.

The speed trap mechanism has two units, placed at a distance of 500m or 1000m when the vehicle passes the first unit it receives the signal of the vehicle and notes the time it crosses and the next unit which is placed at a distance also receives the signals and time of crossing with the help of the elapsed time we can know the speed of the vehicle and thereby it will be useful for the traffic police department.

Ambulances while travelling to the hospitals with the victim in it, it has it reach the hospital as fast as possible so the traffic must be cleared , by giving unique identity to the ambulances we can design the vehicle mount microprocessor of the ambulance to give alarms to the vehicles in front of them.

IV. Applications

- Traffic density information.
- Ambulance path clearance.
- Signal trespassing prevention.
- Speed trapping.
- Public transport timings information.
- Accident location detection and tracking the vehicle.
- Vehicle theft prevention.

V. Advantage and Disadvantage

Advantages:

- It does not need gps and satellites.
- Cost is low.
- Implementation in vehicle is easy and it's small in size.
- It has wide variety of application in all fields of transportation.
- It can be used for both two wheelers and multi axle vehicles.
- Reduces the wastage of fuel and saves travel time.
- It provides all information mentioned above for free.

Disadvantages:

The range and number of channels of trans-receiver is now limited and the implementation in all vehicles will be mammoth project in terms of production.

VI. Conclusion

In this paper we have proposed our ideas of this system and in future with upcoming inventions in communication field this would be very easy to implement. In our forth coming papers we would like to publish our results of this project.

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References

[1] "ZigBee Wireless Networks and Transceivers" By Shahin Farahani

[2] Tung, H.; Tsang, K.; Chui, K.; Tung, H.; Chi, H.; Hancke, G.; Man, K., "The Generic Design of a High Traffic Advance Metering Infrastructure Using ZigBee," *Industrial Informatics, IEEE Transactions on* , vol.PP, no.99,pp.1,1,0doi: 10.1109/TII.2013.2280084

[3] Aisha Al-Abdallah, A.; Asma Al-Emadi, A.; Mona Al-Ansari, M.; Nassma Mohandes, N.; Malluhi, Q., "Real-time traffic surveillance using ZigBee," *Computer Design and Applications (ICCDA), 2010 International Conference on* , vol.1, no., pp.V1-550,V1-554,25-27June2010doi : 10.1109/ICCDA.2010.5540694

[4] Wei Shen; Wynter, L., "Real-time road traffic fusion and prediction with GPS and fixed-sensor data," *Information Fusion (FUSION), 2012 15th International Conference on* , vol., no., pp.1468,1475, 9-12 July 2012

[5] Mittal, A.K.; Bhandari, D., "A novel approach to implement green wave system and detection of stolen vehicles," *Advance Computing Conference (IACC), 2013 IEEE 3rd International* , vol., no., pp.1055,1059,22-23Feb.2013 doi: 10.1109/IAdCC.2013.6514372

[6] Introduction to Modern Traffic Flow Theory and Control: The **Long** Road to By Boris S. Kerner

[7] Building Wireless Sensor Networks: with ZigBee, XBee, Arduino, and Processing By Robert Faludi

[8] MSP430 Microcontroller Basics By John H. Davies

[9] RF Transceiver Design for MIMO Wireless Communications By Abbas Mohammadi, Fadhel M. Ghannouchi

Authors

P. Muthu Subramanian Asst.proffesor at Coimbatore Institute of Technology, ECE dept. pursed B.Tech ECE at Pondicherry University and M.E Embedded System Technologies at Anna Univetsity campus, Anna University Coimbatore. He is now pursuing Ph.d in Embedded Security.
Email ID:muthuspv@gmail.com

Melvin F. is pursuing B.E in Electronics and Communication Engineering in Coimbatore Institute of technology,Coimbatore-14.
Email ID: melvinthecoolguy@gmail.com
Ph:+91-95665-81840.