ISSN:0975-9646

Rishabh Sonthalia et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 3 (2) , 2012,3833-3835

Intelligent Traffic

Rishabh Sonthalia, Utsav Salian, Vishal Singh, Dakshata Panchal

Computer Department, Mumbai University
St. Francis Institute of Technology.

***Abstract*— We propose an algorithm that provides for safer and faster crossing of vehicles at intersections without the need for stopping.**

The present traffic control system is quite static. A vehicle must wait at the intersection for a 'go' signal even if there is no conflicting traffic flow. We propose a system in which all approaching vehicles towards an intersection will be taken care by dynamically assigning time slots for their passage without any conflict at the junction. A vehicle thus need not wait at junction and move at a controlled speed for crossing the intersection in an interleaved manner.

A system built on such an algorithm will involve a controller for the intersection to which all vehicles can communicate. This controller will manipulate the vehicle by considering the other vehicles in its vicinity.

Keywords:Controller; Outer circle; Inner circle.

I INTRODUCTION:

The present traffic control scenario is static. It relies on predefined intervals allotted in every direction. As a result one has to wait at the traffic signal for the 'go' signal. Also the many accidents seen underscore the need for a better traffic control system.

In the current system, a stop signal tries to accumulate an amount of vehicles in one direction while the vehicles in the other direction traverse the junction. Then, after the specified time, the prior direction gets a 'go' signal.

However, a more dynamic System will allow for continuous and safer flow of traffic in every direction simultaneously.

One need not wait at the signal if there are no other contending vehicles. Also if the vehicle speed can be manipulated the intersection crossing will be more safer since other contending vehicles position an speed can be monitored and taken into account for.

We propose an algorithm which will, in real-time, account for all vehicles in the vicinity of an intersection and crossing without stoppage. Such a system will include a controller for the intersection which manages every vehicle in its ambit. The Controller monitors all the vehicles in its ambit of control and dynamically assigns time slots to all vehicles for its passage through the junction without stopping.

Since we have GPS navigation system, the vehicle positions can be calculated, and cruise control helps in controlling the vehicle speed, a simple communication over the Internet can allow passing messages among the vehicle and the controller.

Also we try to prioritize emergency vehicles' transport. Such vehicles can be recognized by the controller and assigned faster lanes for quicker transport. Thus, we can overcome the problem of ambulances getting stuck in traffic-jams.

II PROPOSED SYSTEM:

We propose an intelligent system which will take care of the congestion of the traffic at the junction where in all the vehicles will cross the junction with a constant speed in an interleaved manner without collision.

A Controller will be controlling all the vehicles in the vicinity of the junction. The controller will have its area of control within which it will be controlling vehicles. All vehicles should register themselves to the controller. There are two virtual concentric circles around the junction. When the vehicle enters the outer virtual circle, it will register itself to the controller by sending "Hello message" to the controller. Parameters of the hello message are current position, speed and intended direction. Each vehicle will have unique vehicle ID. All vehicles should be GPS enabled so that controller can constantly monitor and control vehicles throughout the area of control. At the inner circle, all vehicles move at a constant speed which is same for all vehicles. The controller will calculate the constant acceleration/deceleration for the vehicles during its passage from outer circle to inner circle.

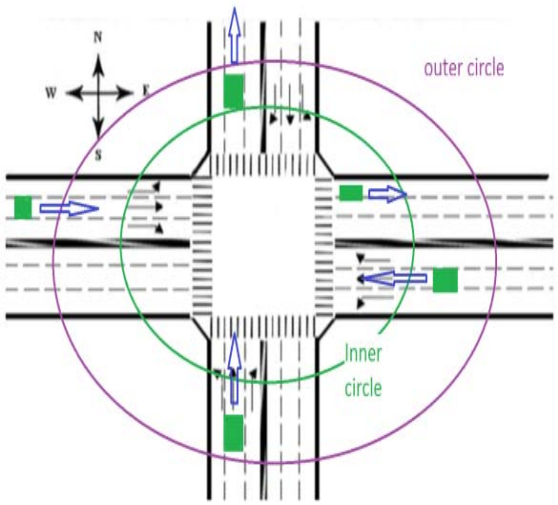


Fig 1:Control area with six lane intersection.

When vehicle leaves the control area in sends "bye" message to the controller so that controller deletes the entry of the vehicle from its registry.

III OVERVIEW OF THE SYSTEM:

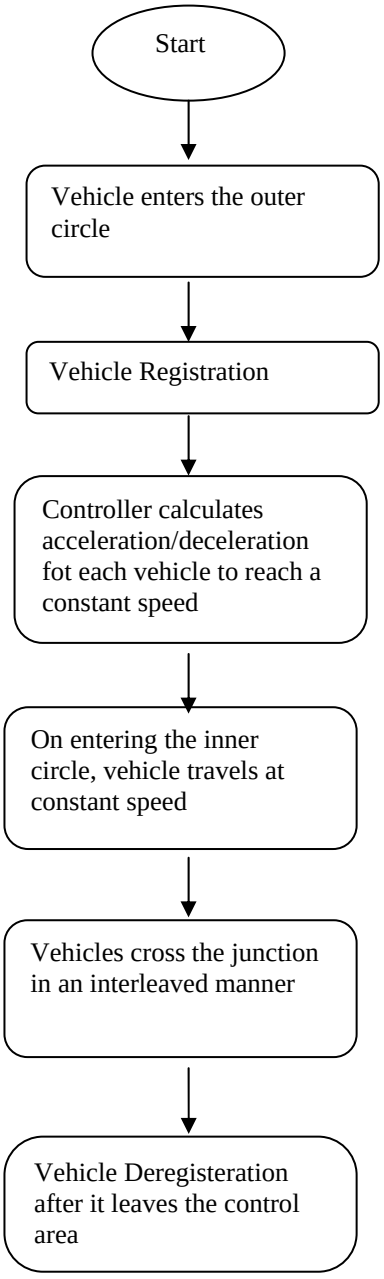
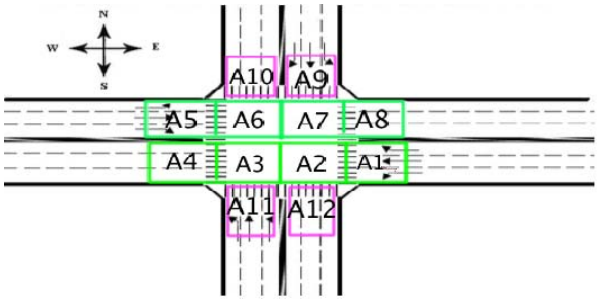
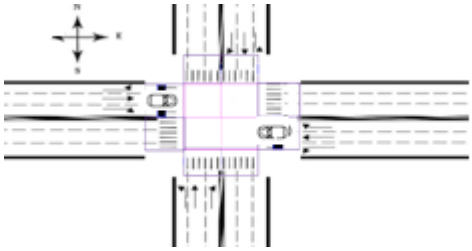


Fig .1 Vehicle at different stages of crossing

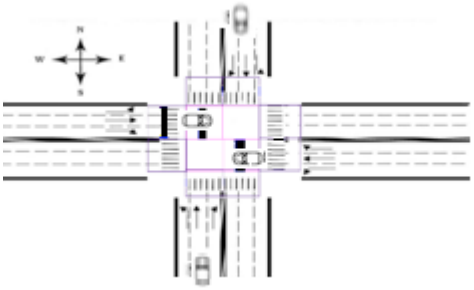
When vehicle enters the outer circle, it registers itself to the controller. At this stage, vehicle is completely under the Control of controller. The controller enables vehicle to accelerate/decelerate so as to attain a particular speed(constant speed).On entering the inner circle ,it travels with a constant speed .This constant speed is maintained by cruise control of the vehicle. This is important since humans cannot keep the speed of the vehicle constant. Vehicles maintain this constant speed till they cross the inner circle. The Constant speed of all vehicles in the inner circle helps vehicles maintain a constant inter-vehicular gap so that vehicles coming from different direction are interleaved while crossing the junction. After crossing the outer circle, vehicle registry is deleted.



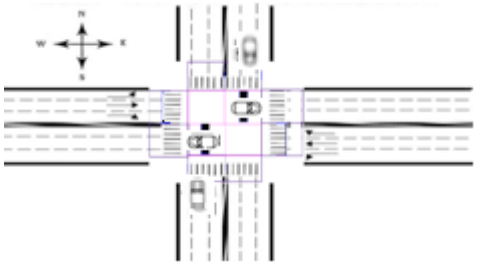
The fig. 2: Area division at junction



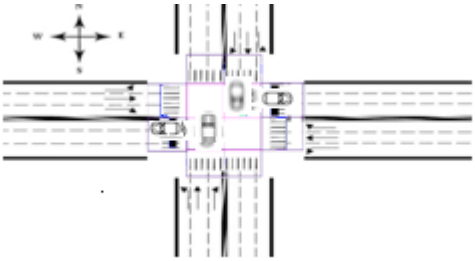
The fig.3 shows the junction at time slot 0 (t0)



The fig.4 shows the junction at time slot 1(t1)



The fig.5 shows the junction at time slot 2(t2)



The fig.6 shows the junction at time slot 3(t3)

Vehicles take four time slots to cross the junction (t0-t3). At the end of t3, a vehicle successfully crosses the junction. Vehicles travelling in opposite direction can cross the junction simultaneous. For eg. south-bound and north-bound vehicles can cross the junction at the same time without collision since they are travelling in the opposite direction. Similarly west-bound and east-bound vehicles can cross the junction at the same time. Therefore vehicles travelling in different directions are interleaved such that they cross the junction without collision.
Below is the illustration of vehicles crossing the junction in an interleaved fashion.

V1: East-bound vehicle
V2: West-bound vehicle
V3: North-bound vehicle
V4: South-bound vehicle

The fig.3 shows the junction at time slot 0(t0)
Vehicle V1 is in area A5 .Vehicle V2 is in area A1.

The fig.4 shows the junction at time slot 1(t1).Vehicle V1 is in area A6 .Vehicle V2 is in area A2. Both the vehicles are inside the junction.

The fig.5 shows the junction at time slot 2(t2)
Vehicle V1 is in area A7 .Vehicle V2 is in area A3 .Vehicles V3 and V4 have not yet entered the junction.

The fig.6 shows the junction at time slot 3(t3)
Vehicle V1 is in area A8 .Vehicle V2 is in area A4

At this stage north bound and south bound vehicles have successfully crossed the junction. At the same time, vehicle V3 and V4 have now entered the junction as shown in fig.6 V3 is in area A3 and V4 is in area A7. East bound and west bound vehicles also cross the junction in the similar manner , which is again then followed by crossing of south bound and north bound vehicle. It is because of this time slicing and interleaving that vehicles are able to cross the junction without stopping.

IV FUTURE SCOPE:

We assume that the proposed system is absolutely fail-safe. Communication between vehicle and the controller will not be lost. The cruise control of the vehicle will fail. An improved version will consider pedestrians crossing roads and the necessary diversion needed in case of accidents or mishaps.

V CONCLUSION:

The current system is static. All vehicles have to wait for a definite period of time before crossing the junction. As a result vehicles get jammed leading to traffic congestion. The current traffic system does not make provision for emergency vehicles like ambulances and fire trucks. They often get stuck up in the heavy traffic. This scenario can get worse considering the growing number of vehicles day by day. The current system would then be no use. Hence there is a need for an alternative system that can manage traffic more intelligently.
The proposed system seems to be an ideal solution. Above mentioned pitfalls of the current system can be overcome by the proposed system as vehicles are allowed to cross the junction at a constant speed without having to wait.

ACKNOWLEDGMENTS:

We would like to place on record our sincere thanks to Ms. Dakshata Panchal, our project guide. We extend our sincere thanks for her valuable guidance in development of this paper. We are grateful to all the people wsho extended their kind and generous support to us.

REFERENCES:

[1] Dan Shmuel Chevion, Dov Ramm, Yuval Shimoy, Ron Sivan, “Optimization of Vehicular Traffic Flow Through a Conflict Zone”, U.S. Patent Document, Patent No.: US 7,969,324 B2, June 28,2011.
[2] Senda, Y., Tanev, I., Shimohara, K., “On the possibility of Priority-Based Road Traffic Control”, IEEE SICE Annual Conference, pg. 1510 – 1513, 20-22 Aug. 2008.