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Study of Real-time Smart Traffic Controller

Vipin S. Bhure [1] Shrutika P. Chaware [2]

[1]*Asst. Professor, Department of Electronics & Communication Engineering, G. H. Raisoni Academy of Engineering & Technology*
[2]*Research Scholar, Department of Electronics & Telecommunication, G. H. Raisoni College of Engineering Nagpur, Maharashtra, India*
vipin.bhure@raisoni.net, shrutikachaware91@gmail.com.

Abstract– *The regulation stratagem for traffic intersections is very important due to its influence on people, environment, economy. The researchers are working on this topic during the last decade due to its effects on freight, transportation and delivery span. Continuous adaptive system is required to cope with this volatile problem to meet flow demand of vehicles. Different designs and modules have been proposed to overcome the delay problem at the intersections. Some of the research done is discussed in this paper to find competitive solution for flexible scheduling at the traffic junctions.*

Key Words- MSER, SURF, LED, PSO.

I. INTRODUCTION

Traffic signal regulation is an influential subject to find efficient strategy for enhancing transportability and overcome environmental problems related to time delays at junctions in cities. This problem of improficient regulation of traffic signal is observed regularly by the public annoying the drivers with negative influence on the economy. The opt-ionization of traffic regulating signal is being studied by researchers.

The traffic light at the junctions administers the flow of vehicles at the intersections. Generally, the green phase span of the signal grants the permission to the discharge of vehicles.

Some flows in the optimization techniques are due to the imperceptive of adaptability in regulation plans and rigidity of green span interval.

The major outcome of this research is to develop traffic regulation system with flexibility and continuous updating to match the real-time traffic demand and thus, lower the delay time at the intersections. Different scenarios have to be considered for this approach like traffic clogging impact, flow demand variations, systems breakdown, events and variant kind of traffic and vehicles. The consideration of priority vehicles like ambulance, police car, fire extinguisher etc. has to be done in the design of the controller at the intersections generally, the pre-set time regulated system in which span of each phase is predefined are used at intersections. Since, the requirement ever changing traffic of real world cannot efficiently used the preset time. The adaptive phase regulation works dynamically using the information of actual time outputs of vehicle density of flow.

II RELATED WORK

A Traffic clogging in citified area is a major concern of communication. It results in depletion of remunerative time, labour force littering of fuel, late distribution of commodities, pollution and many more. Especially during peak hours, the probe of two tecjglem of traffic congestion results in frittering of time. The flow at junction is regulated by customarily stationary pattern. The flow consistency does not vary the time span of signals. The proposed work aims at changing the time of the green signal with respective to the density of traffic using fuzzy inference system. For this the calculation is done using attribute identification and model subtraction methods. Identification of features takes a lot of time for processing while image subtraction coupled with fuzzy logic was found more connectable for charismatic traffic signal controlling. In this study the comparison of two techniques for traffic density identification is used. One is attributes Identification i.e. (SURF,MSER) and other is model subtraction process. The system input is traffic volume to controller and gives output in the form of green signal span syntactically. This value is explicated and forwarded to processor as a affirmative input. This regulates the span of LED for exhibition of green signal.

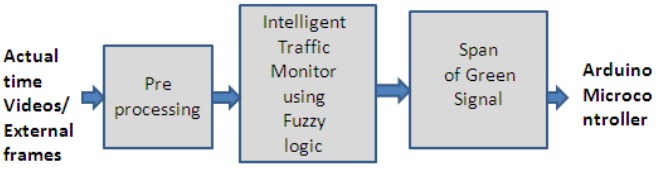

Fig 1- Block diagram of STCFIS

The captured actual time videos from different places at different timings are used for identification of vehicles, the density is calculated by both stated methods. Here for feature detection, two different methods are used i. e. SURF and MSER. For model subtraction, the less or no vehicle video is obtained as a background or reference image. The actual video is then subtracted from the reference or background image with no vehicles. For fuzzy inference system, the volume of vehicles on road is used as input whereas, timing of green signal is the output. Then on depending upon the density the span of green signal is decided using fussy fundamentals. Depending upon the effectiveness, the model subtraction was more felicitous. The proficiency of image subtraction was more than that of feature identification. Feature identification can be replaced by other effective method also traffic condition can be communicated or broadcasted for efficient flow of vehicles.

B The flow efficiency of vehicles can be improved by effectualization of traffic signal regulation. In this work, two fuzzy layers are used for regulating of traffic signal. The outer layer calculaties the exigency level of all signals phases and propel the phase with higest exigency. This system responds contiguously to real time environment. The second layer calculates the span or period of the present phase. This helps to present traffic jam. The membership function is optimized using particle swarm optimization (PSO) . Thus, efficiency of roundabouts is increased by using intelligent algorithm with controller.

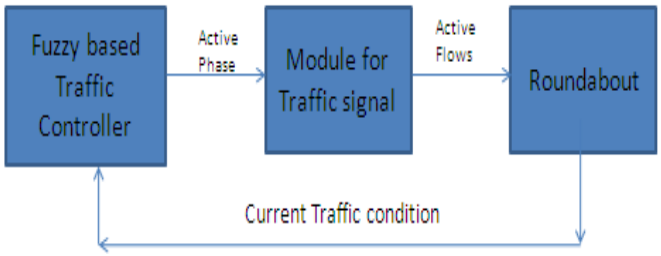

Fig. 2- Signalize roundabout

The real time data for traffic can be obtained using sensors and communication equipments. The span of the present green phase is calculated depending on pre-juidice threshold value. The fuzzy regulation process here termed as fuzzy turn and depending on the exigency, the change or jump is termed as Fuzzy Jump. The Fuzzy Jump is competent of continuously changing phase order. Thus, resulting in efficient actual time output. But continuously changing phase of signal may result in congestion. Depending upon direction, the ' Fuzzy mix' is used. Fuzzy mix is consolidation of 'fuzzy turn' & 'fuzzy jump'. The conventional function membership allotted can not measure optimal results. The combination of 'fuzzy turn' & 'fuzzy jump' i.e. fuzzy mix , surpass fuzzy turn and fuzzy jump. In results obtained revealed that under average vehicle day, the highest downtime observed for 'fuzzy-jump' & 'fuzzy turn' whereas 'fuzzy mix' & fuzzy mix opt- accomplish lesser downtime. Thus, PSO algorithm can be effectively used for improving round about efficiency.

C Here, using fuzzy neural network, the traffic signal and span of green signal depending upon the traffic condition with computation of alongside crossway. The system decides the san of green signal for an antecedent automobile. The system is designed depending upon priority of different types of vehicles and other automobiles. The results are obtained using SUMO i.e. Simulation of Urban Mobility, Ns2 and green light district process for the implemented system.

The Urbanization and transportation leading logging of traffic, slowing the vehicles speed and increasing the travel time with need of priority consideration for different priority vehicles. State vehicles eg. Ambulance, police vehicles, etc. information are gathered and conveyed to neighboring ways signals for deciding the span of signal for every flow direction.

The stages of traffic to classify traffic state are confined traffic, light corresponding flow, lumbering classifying flow, vast dynamic logging. The system has two stages one is fuzzy stage while other is neural stage for designing discreet system. An extensive design for conversation between vehicles for direction of state vehicles. Eg. ambulence, etc. The multi-staged system for traffic light regulation consist of vehicle identification state, and junction traffic regulation state. The junction flow control system has subsystems of the flow supervising state, dispatch state, stage regulation state and flow signal light state.

The adaptive flow control system is intelligently established using both fuzzy and neural network. The simulation of the proposed system is done using (SUMO) i.e simulation of Urban Mobility, NS2 and green signal district process. For various flow of vehicles environment, the result are beneficial for changing actual time vehicle flow regulation system. The adaptive regulation of traffic using neural training is useful for traffic signal regulation for analytical traffic regulation judgment process. Also, it is a good approach for traffic clagging management.

D Fuzzy regulation has shown excellent results in miscellaneous traffic circumstances hypothetically. The traffic signal regulation is a complex method to encounter equal period and extent under different traffic scenarios. Here, using matlab, the ambiguous multi-stage traffic light is regulated using fuzzy regulation scheme. The different directed flows of vehicles at traffic junction encounter for duration and place along with different priority vehicles. The escalation includes common lag, highest cavalcade or queue and number of gridlocked vehicles.

So, the traffic regulation is dependent on acclimatized interpretation and observations of traffic deviser. Accomplished planning and good concordance is needed for good traffic

regulation. Fuzzy regulation demonstrates good where rigorous mathematical script is difficult through traffic can be controlled by trained operator. For conglomerate situation with multi aspirations, fuzzy regulation gives good output.

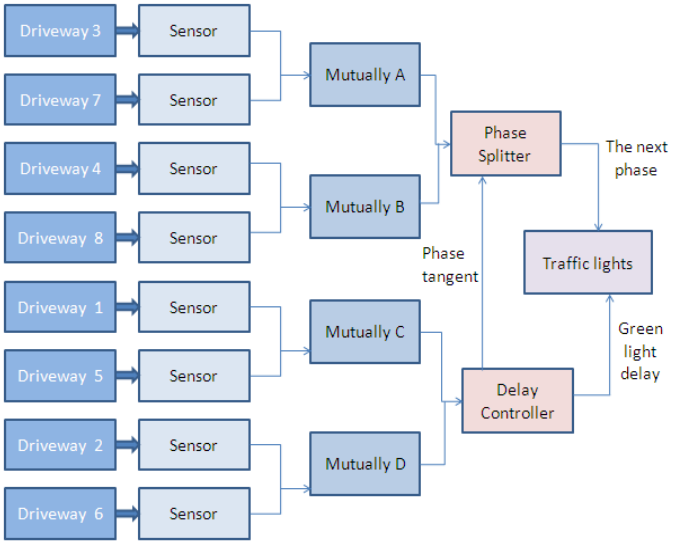

Fig. 3- Flow of Control

The Fuzzy regulator gives uprightness to different directions signal flow. The lagging time and flow density are considered for deciding phase duration. The mass traffic scenario decides the signal phase for constituting fuzzy regulation mode. It is used for deciding phase and regulate green signal lag. Different steps are used to decide the maximum and minimum green signal phase of each signal direction, delay time of green signal and phase distribution. Considering the predominant requirement of the density of the vehicle and log time fuzzy regulation process is used. Here fuzzy control method is used for traffic signal regulation which is useful for roundabouts with different goals. It is tested in actual time environment proving achievable result for traffic signal regulation.

E Two stage fuzzy regulation system for roundabout is contrived by studying megalopolitan traffic junction regulation. The extensor or adjoining of any phase is determined using discharge density and volume of vehicles. Matlab is used for simulation with common vehicle lagging for elaboration of the system. The proposed system can be used preferably cover span controlled and accession methods. Smoothness of the flow clogging is essential for urbanized or citified areas. Span control and anticipated methods are used conventionally are not fruitful for regulation of traffic. Fuzzy regulation is useful for controlling transportation systems with volatile and unpredictable features. The extension or adjoining of any phase is decided using traffic density by fuzzy regulation to enhance roundabouts vehicle efficiency.

The fuzzy regulator for traffic at junctions observes the vehicle density in each phase according to green and red light phase. The span is then extended or for adjourned current state according to the scenario or for upcoming state of signal.
The two level fuzzy regulators here for the junction has different functions. The first level regulates the green and red light coloration while second level is determination stage. The principal working here is initially, actual-time discharge of vehicle data is obtained, the vehicle density and discharge rate is observed for green and red light phase. The determination state then judge for extending or adjourning of the present state. The green phase regulator observes the first vehicle's arrival density of flow and discharge rate of flow. The red phase regulator observes the vehicle's density for red phase currently going on depending upon these acquired information the decision to extend or adjourn the state is decided for the current state. The simulation result obtained on matlab indicates that the two-level fuzzy regulator can certainly be used for the junctions to reduce the lagging time convential span control and detection regulation methods.

F The present traffic signal regulators are not efficient for growing number of vehicles. Frequent supervision of signals at junction is required. Prevention of traffic will be efficient for traffic flow smoothness by using perceptive traffic junction regulator. Here, sensor contrivance and regulation module is used to prevent clogging. The phase changing decision is done using space taken by vehicle on roads and overall free distance between vehicles.

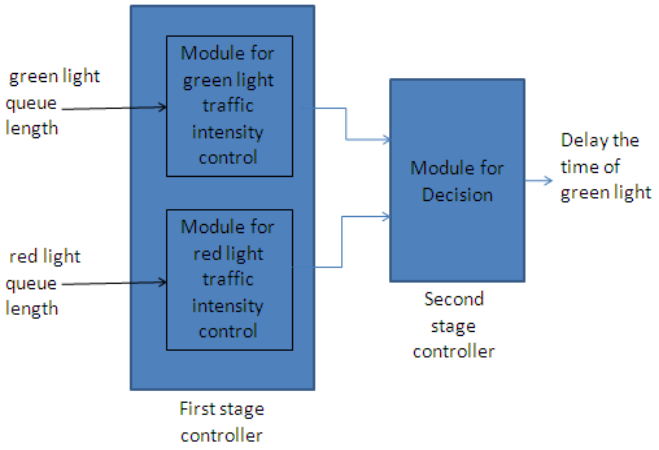

Fig. 4 -Two Stage Fuzzy logic

Here adaptive fuzzy regulators are used to obtain actual present traffic regulator with definite span for each flow. The fuzzy regulator consisting of two parts, One is dynamic part which gather data of vehicle's on road. The second part transfers the data to fuzzy regulator to calculate the span of phase. The result shows that fuzzy regulator can undoubtedly lower the lag time for vehicles in comparison to the predefined signal regulators. The

actual time scenarios can be worked using fuzzy regulator mimicking humans.

III CONCLUSION

Traffic regulation of signal at the intersections is a major issue in recent years due to urbanization. Different types of optimization techniques have been used by researchers like fuzzy regulation, PSO, neural network etc. To lower the delay time at the roundabouts. Effective optimization is the needs of the day of economy, environment and people to reduce the time spent at the junctions specifically for priority based vehicles. Different results indicated that fuzzy regulation can be used proficiently to overcome the problem of delays and effective regulation traffic flow at the traffic junctions.

REFERENCE

[1] *Radhika Patil, Anuradha Srinivasaraghavan Associate Professor St Francis Institute of Technology, University of Mumbai, Mumbai-400103, India "Smart Traffic Controller using Fuzzy Inference System(STCFIS)" 2016 2nd International Conference on Next Generation Computing Technologies (NGCT-2016) Dehradun, India 14-16 October 2016*

[2] *Yue-jiao Gong, Jun Zhang (Corresponding Author) Dept. of C.S., Sun Yat-sen University Key Laboratory of Digital Life, Ministry of Education Key Laboratory of Software Technology, Education Dept. of Guangdong Province, P.R. China junzhang@ieee.org*

[3] *"Real-Time Traffic Signal Control for Roundabouts by Using a PSO-Based Fuzzy Controller" WCCI 2012 IEEE World Congress on Computational Intelligence June, 10-15, 2012 - Brisbane, Australia*

[4] *Sheng-Tzong Cheng · Jian-Pan Li · Gwo-Jiun Horng · Kuo-Chuan Wang © Springer Science+Business Media New York 2013 "The Adaptive Road Routing Recommendation for Traffic Congestion Avoidance in Smart City"*

[5] *Z. Wen and T. Li (eds.), Foundations of Intelligent Systems, Advances in Intelligent Systems and Computing 277, DOI: 10.1007/978-3-642-54924-3_90, Springer-Verlag Berlin Heidelberg 2014"The Design and Simulation of Intelligent Traffic Signal Control System Based on Fuzzy Logic"*