TRAFFIC FlOW MANAGEMENT SYSTEM USING WIRELESS SENSOR NETWORK

Chaithanya R, B T Namitha Urs, Chandan B, Chandrashekar K,
School of C&IT , REVA University , Bengaluru , Karnataka , India

Manjunath P C
Assistant Professor , School of C&IT, REVA University,
Bengaluru, Karnataka , India

Abstract **— Traffic flow management system using wireless sensor network is designed for efficiently using the traffic lights. Vehicle traffic is continuously increasing round the world especially in urban areas. So as to resolve we present an adaptive traffic flow management system using wireless sensor network (WSN). Existing methods for traffic management aren't adequately efficient in terms of performance, cost, and maintenance. During this system design it mainly focuses on multiple intersections. The system design mainly consists of four prototypes. The Wireless sensor network, The Intersection control agents, The Actuators-Traffic lights, The Environment-Vehicles. Here wireless sensors collect the vehicle information and these sensors sends the information to the ICA, ICA sends a control signals to the traffic lights. We test our model by sumo simulator. Sumo simulator is one of the best network protocol simulation software. This paper concludes with future highlights and useful remarks.**

Keywords—WSN (wireless sensor network), sumo simulator, ICA(Intersection Control Agent)

I. INTRODUCTION

Nowadays, vehicles have increasing throughout the world especially in large urban areas. The necessity arises for recreate and best system for the traffic controllers so as to decrease the vehicle congestion in urban areas. Traffic lights are wont to determine carriageway intersection traffic. Many techniques are used like aboveground sensors like video image processing, ultrasonic and microwave radar for traffic management but these techniques aren't so adequate in terms of maintenance, cost and performance. And few non-intrusive sensors with inductive loop detectors, micro-loops probes which is of high installation and maintenance cost. So as to beat these problems many studies suggested the utilization of WSN technology. WSN which is of more efficient in comparison to existing methods in terms of cost, performance and also environment pollution. This design is capable of counting the entire number of vehicles getting into a junction on real time basis. Based on counting, the programmable logic controller will trigger traffic lights.

MOTIVATION

Traffic management has since quite a while ago existed in some frame, from the start of railroad flagging or movement lights on city lanes, yet the development and execution of recent coordinated applications in light of Intelligent Transport Systems (ITS) has developed apace lately, due to effective research and technological advances. This has been pushed by acknowledgment of the need to oversee transport organizes all the more adequately keeping in mind the top goal to spice up the use existing framework, provides a solid support of the top client and increment security, while lessening negative natural impacts. To manage the traffic within the road, we do excellent job manually meaning one or more traffic police are appointed there to serve the people from the congestion in road. But, it is difficult to watch and manage. That's why, the new concept traffic control management system using wireless sensor network is adopted.

II. LITERATURE SURVEYS

The continuous increase within the congestion level on roads and is becoming a serious problem for transportation especially during rush hours in urban areas. This becoming a priority to transportation specialists and decision makers. The prevailing methods for traffic management, surveillance and control aren't adequately efficient in terms of the value and performance also maintenance and support. Many techniques have been used including inductive loop, RFID (Radio frequency identification), Microwave radar, Magnetic, and Ultrasonic. However, these systems have a high equipment cost and their accuracy depends on the environment condition. Some intrusive sensors may cause disruption of traffic upon installation and repair, and should end in a high installation and maintenance cost.[1] The self-algorithm traffic light system is designed to attenuate the waiting time at a particular traffic light junction for road users. By using the sensor based controlling method, 2 different timing are preprogrammed in the controller and as changes is detected the controller will response accordingly.[7] A WSN is employed as a tool to instrument and control traffic signals roadways. The controller embodies traffic system communication algorithm (TSCA) and therefore the traffic signals time manipulation algorithm

(TSTMA). Both algorithms are ready to provide the system with adaptive and efficient traffic estimation represented by the dynamic change in the traffic signals' flow sequence and traffic variation.[9] Proposed approach was Dynamic traffic light control system based on WSNs and FUZZI logic controllers which reduces the vehicles waiting time but didn't give more importance on emergency vehicles.[3] Here during this paper they need used ZigBee based wireless system to assists traffic flow on arterial urban roads. Real-time simulation in laboratory environment is conducted to work out the traffic throughput to avoid possible congestions. Random numbers are generated to mimic approaching traffic, and this information is shared by a ZigBee based real-time wirelessly network.[4] .

III.   DETAILED DESCRIPTION

A. WSN(wireless sensor network)

A wireless sensor network may be a promising technology that gives an answer for the planning and development an honest deal of traffic control system applications. The network consists of sensors and nodes. The work of sensor node is to watch traffic in an allocated different area, utilizing devices which will measure several traffic parameters like flow, density, volume, waiting time as well as pollution. The nodes collect the information from all nodes and directs an equivalent to the bottom Station.
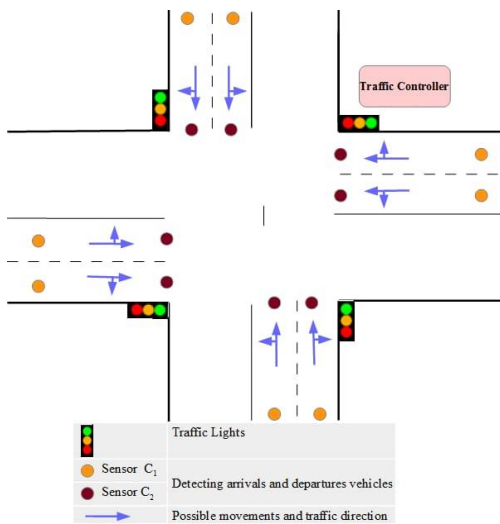

Fig:1

B. SUMO simulator

In order to check our design, we've used one among the simplest Simulator called "Simulation of Urban Mobility" is an open source, highly portable, microscopic and continuous road traffic simulation package designed to handle large road networks.
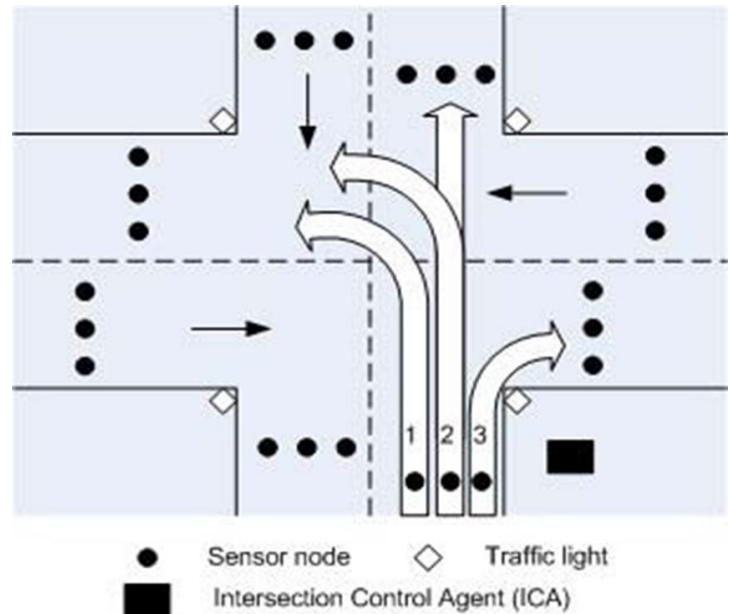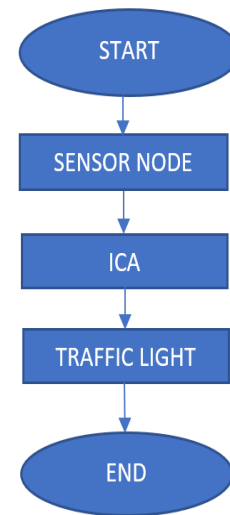
IV.   SYSTEM DESIGN

Fig:2

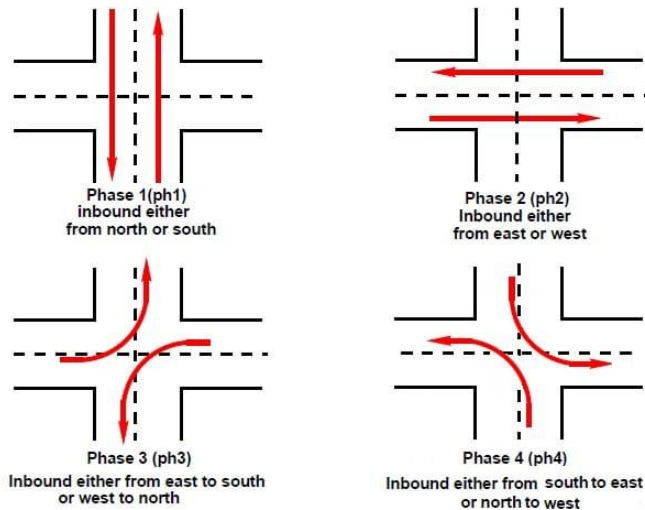Fig:3 Flow Chart of Traffic flow management control.

PROTOCOLS

Fig:4

A. *SENSOR NODES TO ICA*

Sensor nodes count number of vehicles approaching intersection. Every node monitor one lane. The message sent from sensor nodes to the intersection control agent includes number of vehicles, time duration of the collected data and lane number.

B. *ICA TO SENSOR NODES*

After receiving information from all the nodes monitoring a specific intersection agent decides the simplest flow model(policy)for the vehicle flow.

C. *ICA TO ICA WITH COORDINATION*

This is same because the previous one, except that the agents coordinate among themselves to realize even better flow. The Intersection control depends not only on the analysis one agent but on the coordination of multiple agents.

V. APPLICATIONS

Adopting this particular system would help in solving many problems that are faced on the lanes in day to day life

➢ Minimizing waiting time of the vehicles intern reducing travel time period.

➢ Less fuel consumption which reduces the Environmental Pollution.

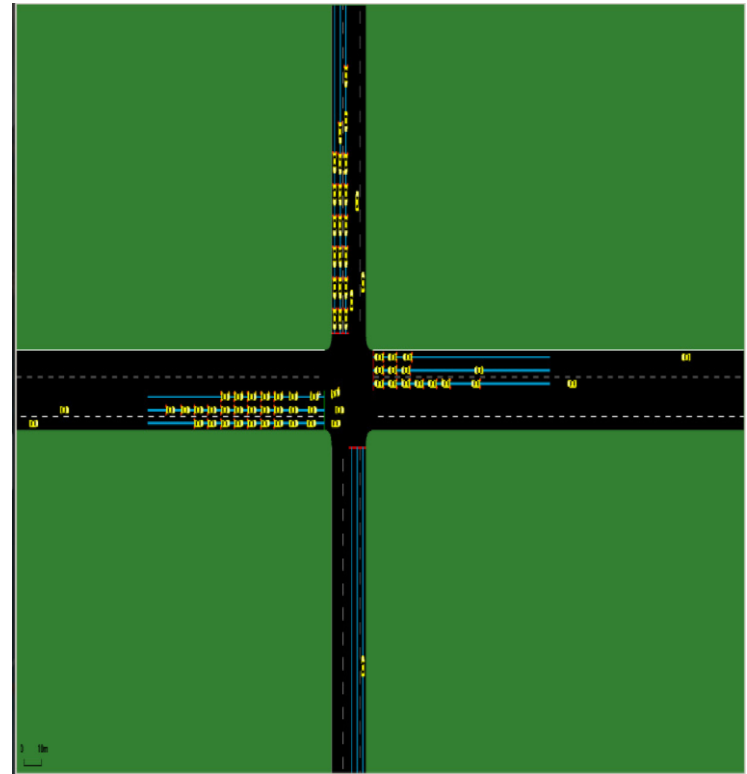➢ Saves the human life by avoiding accidents at intersection points.

VI. RESULTS AND DISCUSSION

Fig:5

VII. CONCLUSION

Our design Traffic flow management system using wireless sensor is made so as to attenuate the waiting time of the road users using traffic light signal system at certain intersection. Here wireless sensor plays a serious role during this design. By using the wireless sensor based controlling method, traffic light system will response to the important time demands as changes are detected. Enhance the smoothness and increases the efficiency of the traffic flow especially during the peak hours in urban areas. Furthermore, the possibility of traffic congestion are going to be reduced.

VIII. FUTURE ENHANCEMENT

Our proposed system fulfils all the standards for measuring, controlling and avoiding the traffic. The procedure is gainful than this system. Here the survey shows about the matter which arises at metropolitan location throughout the world caused by congestions along side the linked sources. Mostly, metropolitan location is most horrible with this example. Congestions comprise a harmful effect on the monetary condition of a nation, on the environment and so in generally quality of life. The proposed method are often improved by using powerful communication network but SUMO. This

proposed model is employed intelligent and plan for the longer time using transport scheduling tool which may best meet objectives like, eliminating road accidents, minimizing emissions, improved accessibility and growing the economy everywhere over the world.

IX. ACKNOWLEDGMENT

X. REFERENCES

[1] Kapileswar Nellore and Gerhard P. Hancke (2016), Advanced Sensor Networks Research Group, Department of Electrical, Electronic and Computer Engineering, University of Pretoria, Pretoria 0002, South Africa; Academic Editor: Leonhard M. Reindl Received: 3 August 2015; Accepted: 16 November 2015; Published: 27 January 2016J.

[2] M. Aljohani and T. Alam, (2015), "An algorithm for accessing traffic database using wireless technologies," IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), Madurai, 2015, pp. 1-4.

[3] Collotta, M.; Bello, L.L.; Pau, G.(2015), A novel approach for dynamic traffic light management based on wireless sensor networks and multiple fuzzy logic controllers. Expert Syst. Appl., 42, 5403–5415.

[4] H. Eren, H. M. Pakka, A. S. AlGhamdi and Y. Yue,(2013), "Instrumentation for safe vehicular flow in intelligent traffic control systems using wireless networks," *2013 IEEE International Instrumentation and Measurement Technology Conference (I2MTC)*, Minneapolis, MN, , pp. 1301-1305.

[5] Bharadwaj, R.; Deepak, J.; Baranitharam, M.; Vaidehi, V.(2013), Efficient dynamic traffic control system usingwireless sensor networks. In Proceedings of the IEEE International Conference on Recent Trends in Information Technology (ICRTIT), Chrompet, Chennai, India, 25–27 ; pp. 668–673.

[6] Hussian, R.; Sandhy, S.; Vinita, S.; Sandhya, S.(2013), WSN applications: Automated intelligent traffic control system using sensors. Int. J. Soft Comput. Eng. , 3, 77–81.

[7] S.K. SUBRAMANIAM 1, M.ESRO 2 and F.L.AW 3 (2012), Self-Algorithm Traffic Light Controllers for Heavily Congested Urban Route 1 Lecturer, Department of Industrial Electronics Engineering Faculty of Electronics and Computer Engineering 2 Senior lecturer, Department of Industrial Electronics Engineering Faculty of Electronics and Computer Engineering 3Grduate student, Department of Telecommunication Engineering Faculty of Electronics and Computer Engineering Universiti Teknikal Malaysia Melaka MALAYSIA.

[8] Bhuvaneswari, V.T.P.; Arunraj, V.G.; Balaji, R.; Kanagasabai, S.(2012), Adaptive traffic signal flow control using wireless sensor networks. In Proceedings of the IEEE Fourth International Conference on Computational Intelligence and Communication Networks (CICN), Mathura, Uttar Pradesh, India; pp. 85–89.

[9] KHALIL M.YOUSEF, JAMAL N.AL-KARAKI1 AND ALI M SHATNAWI (2010), Intelligent Traffic Light Flow Control System Using Wireless Sensors Networks Department of Computer Engineering Jordan University of Science and Technology Irbid 22110, Jordan Department of Computer Engineering The Hashemite University Zarka 13115, Jordan .

[10] Zhou, B.; Cao, J.; Zeng, X.; Wu, H.(2010), Adaptive traffic light control in wireless sensor networks-based intelligenttransportation system. In Proceedings of the IEEE 72nd Vehicular Technology Conference (VTC 2010-Fall), Ottawa, ON, Canada; pp. 1–5.

[11] Xiao, L.; Peng, X.; Wang, Z.; Xu, B.; Hong, B.(2009), Research on traffic monitoring network and its traffic flow forecast and congestion control model based on wireless sensor networks. In Proceedings of the IEEE International conference on Measuring Technology and Mechatronics Automation (ICMTMA), Zhangjiajie, China; pp. 142–147.

[12] Wenjie Chen, Lifeng Chen, Zhanglong Chen, and ShiliangTu,(2006), "WITS: A Wireless Sensor Network for Intelligent Transportation System", IEEE, IMSCCS'06