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A LITERATURE SURVEY ON "DENSITY BASED TRAFFIC SIGNAL SYSTEM USING LOADCELLS AND IR SENSORS"

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ABSTRACT

There is an increasing demand in systematic automatic system for optimizing vehicular traffic control since the delay of the existing traffic signal system is fixed and it does not depend on traffic density. We have proposed a system that allows us to optimize the traffic flow according to traffic density. Here, we sense the density of traffic using IR and load sensors. The lanes are prioritized according to their densities. We have also included a feature to clear the way for emergency service vehicles using RFID system. The system also uses GSM to notify the authorities if any malfunctioning occurs.

KEYWORDS: Traffic signal system, Arduino, load sensors, IR sensors, RFID, emergency service vehicles.

I. INTRODUCTION

Traffic signal system is a system that has been implemented to control the flow of vehicular traffic. The existing traffic signal system has a major disadvantage that it is implemented with fixed time slots and thus it does not depend on current traffic densities. There is a necessary to upgrade this existing traffic signal system to solve various problems of traffic jam. So here we propose a simple, low-cost, and real time traffic signal system that aims to overcome many problems and thus improves the traffic system. The system is based on Arduino Mega that evaluates the traffic density using IR sensors, load sensors and dynamic timing slots with different levels. Our system will be very useful for solving most of the traffic congestion problems occurs today.

II. LITERATURE SURVEY

Surveillance systems and video monitoring [1] have been utilized for traffic control in recent years. A lot of innovations have been made for inspecting the density of the traffic based on image processing [4, 5]. But these techniques require the good images whose quality depends on various factors such as rain, fog and so.

Historically, there exist various vehicle detectors such as radar, ultrasonic [2], and microwave detector. But these sensors are expensive, with less capacity, difficult to maintain, difficult to implement and extra maintenance charges will be there. Radar sensors are affected by metal barriers near road.

Sensors like Passive acoustic detector array, Piezoelectric, Photoelectric, Inductive loop detector, magnetic detectors [11], etc are employed in the field of traffic monitoring and management systems. These sensors are less accurate [3].

Traffic congestions that occur in urban areas cannot be properly controlled by using existing fixed signal timing system. When the traffic density increases more than a limit on a particular road, it needs larger green light duration to reduce the traffic flow. The major problem of the existing traffic light system is that the transition timing slots are fixed in software and unnecessary waiting time is being wasted when no vehicles are present on opposite route.

Our system uses Arduino Mega that is interfaced with IR sensors [6, 8]. Three IR transmitters and receivers are placed on each road. When an automobile passes between the IR sensors, the photodiode is activated and the object is detected. According to this, there are three modes of lighting transition slots: the soft traffic mode, the normal mode and the traffic jam mode. The shifting between these three modes is done dynamically using software. [7].

In addition to this, our system also uses load sensor cells which detect vehicles by their weights. A load cell is a sensor that is used to measure the weight of an object. It basically contains two major components, a spring element and one or more strain gauges. Spring element serves as the reaction for the applied load and focuses the effect of the load into a strain-field. In a cantilever load cell, the spring element is a part of the cantilever itself – the beam stores elastic potential energy as the live end is deflected from the equilibrium position. [9, 10].

Our system also has a feature to clear the way for emergency service vehicles such as ambulance, fire fighting vehicles etc. An RFID tag will be mounted under each emergency service vehicle. The basic idea behind the proposed system is that the RFID tagged emergency service vehicle is detected on the way using RFID reader mounted on the road [12].

Whenever there is any malfunctioning in the system, it automatically sends the message to the operating authority of that traffic signal system through GSM [2].

III. PROBLEM IDENTIFICATION

Model Traffic congestion is increasing on the road day- by- day. As a result of which, following issues arises. One of the issues is that the vehicles need to wait at the junctions even if there is no traffic on the other side. These problems occur due to fixed control on traffic signal timing. This project will aim to control the traffic according to the density.

Emergency service vehicles like ambulance, fire fighting vehicle, police vehicle etc. might have to wait till the signal turns green which can be solved using this system. There is a possibility of blocking/malfunctioning of sensors due to various reasons. This system has a GSM module connected to the microcontroller which notifies the operator in such cases.

IV. BLOCK DIAGRAM

The system uses Arduino Mega which uses ATmega2560 microcontroller. In this system, each lane will have 3 load sensors and 3 IR sensors to detect level of density in that particular lane. IR sensors are included just to improve accuracy.

This system also includes a RFID system for emergency vehicles, GSM module to notify the authority if there is any malfunction occurs.

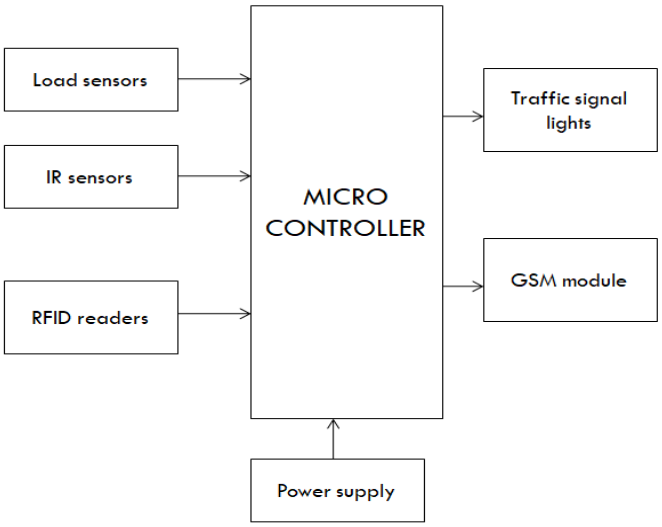

Fig-1: Block diagram of the density based traffic signal system

V. CONCLUSION

Implementation of Density based traffic signal system in urban cities allows us to control the traffic system effectively. Vehicular accidents will be reduced due to proper management of traffic. The system effectively reduces wastage of unnecessary. Emergency service vehicles like ambulances, fire fighting vehicles etc. will not have to wait or get stuck. This is one of the major advantages of this system.

VI. REFERENCES

[1] Uttara E. Prakash, Athira Thankappan, Vishnupriya K. T., Arun A. Balakrishnan (2018). Density Based Traffic Control System Using Image Processing, Proceedings of 2018 International Conference on Emerging Trends and Innovations in Engineering and Technological Research.

[2] Ashish Jain, Manisha Mittal, Harish Verma, Amrita rai (2014). Traffic Density Measurement based On-road Traffic Control using Ultrasonic Sensors and GSM Technology, Proc. of Int. Conf. on Emerging Trends in Engineering and Technology, ACEEE, Volume: 03 Issue: 03.

[3] Ashwini Basavaraju , Senhalata Doddigarla , Navitha Naidu , Shruti Malgatti. (2014). Vehicle Density Sensor System To Manage Traffic, International Journal of Research in Engineering and Technology, Volume: 03.

[4] Sarpong Kwadwo Asare, Robert A.Sowah (2012). Design and development of a Microcontroller Based Traffic Light Control System Using Image Processing Techniques, A case study prototype for Legon-Okponglo Junction,University of Ghanna, IEEE 2012.

[5] Mohammad Shahab Uddin Ayon Kumar Das, Md. Abu Taleb (2015). Real-time Area Based Traffic Density Estimation by Image Processing for Traffic Signal Control System, Bangladesh Perspective, IEEE 21-23 May 2015.

[6] M. Naveen, S. Raghavendra, D. Imran Basha, P. Kiran Kumar (2019). Density based Traffic Signals Controlling Using ARDUINO and IR Sensors, International Journal of Electronics Engineering, ISSN: 0973-7383 Volume 11 • Issue 1 pp. 348-351 Jan - June 2019.

[7] Saiba P A, Afeefa M U, Aruna T S, Clincy Jose, Radhika V M (2017). Density Based Traffic Signal System using PIC Microcontroller, International Journal of Computer Trends and Technology (IJCTT) – Volume 47 Number 1 May 2017.

[8] S.Sundara Mahalingam, S.Arockiaraj (2018). Density Based Traffic Light Control Using Arduino, IJARIIE, Vol-4 Issue-5 2018.

[9] Akindele Ayoola E, Awodeyi Afolabi I, Matthews Victor O, Alashiri Olaitan A, Idowu Oriyomi K, Olaloye Folarin J (2018). Development of an Electronic Weighing Indicator for Digital Measurement International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 09, Sep 2018.

[10] Andrew Gilman, Donald G. Bailey,Institute of Information Sciences and Technology Massey University, Palmerston North, New Zealand (2005). High-speed Weighing Using Impact on Load Cells,IEEE 2005.

[11] Vadrevu S. V. S. R. Pavan Kumar, Dr. M. Kamala kumara (2016). A Novel Application Of Adaptive Traffic Control System For India, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 5, Issue 7, July 2016.

[12] B.Janani Saradha, G.Vijayshri, T.Subha (2017). Intelligent Traffic Signal Control System For Ambulance Using RFID And Cloud, Second International Conference On Computing and Communications Technologies (ICCCT'17).