A ProvisionFor Density Based Traffic Control System

Aishwarya H.C.[#1], Ramya H[#2], Sreyas V.S.[#3] andVittall A[#4]

[#1,#2,#3,#4] *UG students, Department of ECE,Sambhram Institute Of Technology,Bangalore-97*

ABSTRACT

In a developing country like India, traffic congestion is a major problem especially in urban areas of the country. Congestion results in slow moving traffic which in turn results in increased travel time. The traffic control signals have been playing a significant role in reducing the traffic congestion to a certain extend. However, the major drawback of this system is its inability for proper time management. Hence, we propose a more efficient system which allocates time based on the density of vehicles in a particular road thereby reducing the unnecessary waiting time.This proposed system also provides provisions for the smooth passage of emergency vehicles by eliminating the waiting time for these vehicles.This system further offers vehicle to vehicle communication and traffic junction signal to another junction signal communication.

Keywords— Density Based Traffic Signal, Emergency override, Traffic Junction signal to another junction signal communication.

I.INTRODUCTION

Nowadaysoneofthemajorproblemsfacedinanymetrocityistrafficcongestion.Gettingstranded in between heavy traffic is a headache for each and every person driving the vehicle and even to the traffic police controlling the traffic. One of the oldest ways of handling traffic was having a traffic police deployed at each junction and manually controls the inflow of traffic through hand signaling. However this was quite cumbersome and then came the need for a different type of control - using Traffic Control Signals. Conventional traffic signal started playing importantrole incities,butastimepassed,withincreaseinpopulationincities,thissystembecamelessefficient intrafficmanagement.The flow of the traffic constantly changes depending on the time of the day, day of the week and time of the year. At times, road work and accidents further influence the complexity. Hence, traffic light optimizationisacomplicatedprocess.Evenforsinglejunctionstheremightbenoobvioussolution and the problem becomes even more complex for the multiple junctions, as the state of one light in one junction directly influences the flow of traffic towards many

otherlights.Thiscalledtheneedoftrafficcontrolsignalwhichworksmoreefficiently. So this proposition allocates time for each road depending on the density of traffic on it. And also the project aims to provide signal override for emergency vehicles through RF signal. It happens when there is an emergency situation like ambulance, fire brigade stuck in the traffic. This project therefore happens to be the perfect solution in high population cities. This project makes use of IR sensors to measure the density of traffic.This proposed system also provides provisions for the smooth passage of emergency vehicles by eliminating the waiting time for these vehicles.

This system further offers vehicle to vehicle communication and traffic junction signal to another junction signal communication. The aim of this traffic research is to optimize the flow of vehicular traffic and goods.

II.LITERATURE SURVEY

Geetha.E, V.Viswanadha, Kavitha.G proposed an intelligent auto traffic signal control system [1]. Traffic congestion is nowadays a prime issue to be considered. Generally Vehicular traffic intersects at the junctions of the road and are controlled by the traffic signals. In this system, a dynamic control of the traffic is made possible by traffic signal which works based on the density of the vehicles on the particular road. The proposed system tries to minimize the possibilities of traffic jams, caused by the traffic lights, to some extent by clearing the road with higher density of vehicles and also provides the clearance for the emergency vehicle if any. The system makes use of micro controller, IR sensors and Radio Frequency Identification (RFID) technology.

DAswani and C. Padma proposed a smart traffic control system for emergency vehicle clearance [2].The emergency override is done by using a set of RF transmitter and receiver. RF encoder is used to assign different RF frequency for each road. RF decoder is used to identify the RF signal frequency and determine to which road it belongs.

S. Sharma, A. Pithora, G. Gupta, M. Goel, and M. Sinha proposed Traffic light priority control for emergency vehicle using RFID [3]. When RF transmitter sends particular frequency, the signal assigned to a particular road through encoder, at the decoder end it determines to which road it belongs and sends the corresponding data to microcontroller. Then microcontroller makes green light ON for that particular road to which transmitted signal frequency belongs just after currently processing road. After the green light timed-out occurs to a road which had been override, normal system operation resumes with turning ON the green light for the road which is next to a road which had been under processing just before override signal has occurred

Jubair Mohammed Bilal and Don Jacob proposed an intelligent traffic control system [4].In metropolitan cities, traffic is one of the major concerns nowadays. This system works on the simple principle that a car will be able to move only if a space is available for it to do so and the signal will remain unchanged until all the cars in the lane have passed.With the use of sensors at every junctions it is possible to efficiently control the traffic.

S. Suganya, R. Sinduja, T. Sowmiya & S. Senthilkumar proposed a system to control street light glow based on the vehicle movement [5].The project aims to eliminate the manual operations and to design an energy efficient automatic streetlight controller using light dependent resistor and microcontroller.

III.PROPOSED SYSTEM

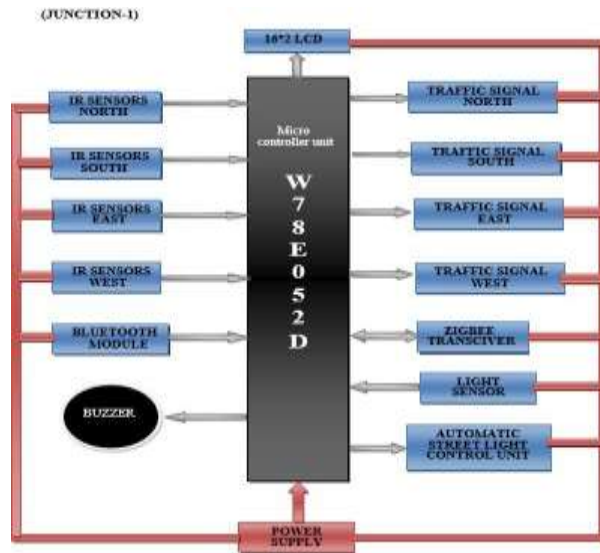The block diagram of the proposed system is given as follows:
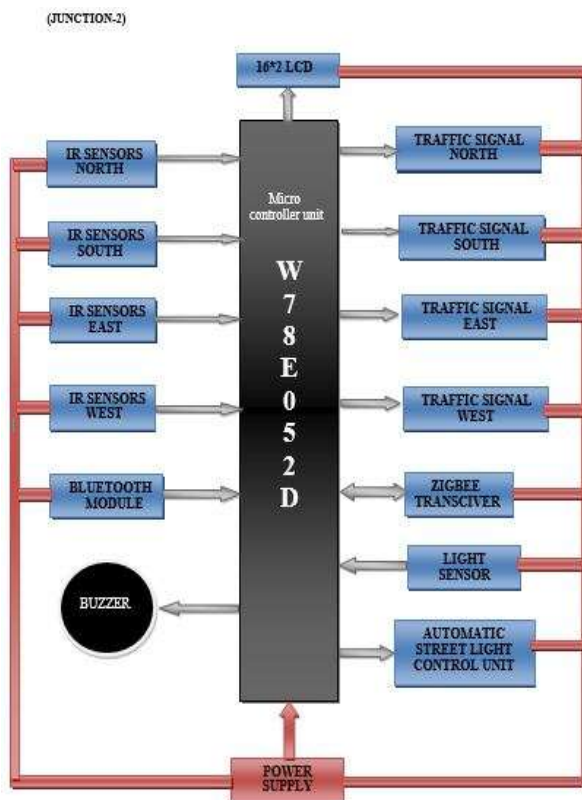

Figure 1: Block diagram of Junction 1

Figure 2: Block diagram of Junction 2

The above figures shows the block diagramof the proposed system. Each road is divided into threesectionsasLow,MediumandHightrafficdensityregions.Atthebeginningoflow,mediumandhigh density sections, sensors are mounted to show the respective traffic situation on a road and to assign appropriate green light time to each road. When density of traffic is measured by IR sensors mounted on each road, system gives pre-defined interval of time to each road in accordance with the traffic density on it to clear its traffic by making green light ON for that road. This normal operation continues until overridesignaloccurs.Whenoverridesignaloccurssystemhaltsitsnormaloperationandstartsexecuting the override signal and again comes back to the normal operation after execution. This helps the emergency vehicles like ambulance, fire-brigade etc. on any road to pass the signal without unnecessary waiting for the signal to be turn green for a road it ison.Figure 1 represents a traffic junction which communicates with another traffic junction shown in figure 2.

1.1 IR Sensors

An infrared sensor is an electronic device, which emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.

1.2 Microcontroller unit

A microcontroller is a small computer on a single integrated circuit. In modern terminology, it is similar to, but less sophisticated than, a system on a chip or SoC; an SoC may include a microcontroller as one of its components.

1.3 Bluetooth Module

Bluetooth module is used for exchanging data over short distances from a mobile device or building personnel. Here we use the Bluetooth module with RF Transceivers for emergency override process.

1.4 Zigbee Transceiver

Zigbee Transceiver Module provides bi-directional communication between two-way enabled RTI remote controls and control processors utilizing Zigbee wireless communication. Capable of being hard-wired directly to a control processor or be used as a wireless repeater device to create an ultra-reliable, self-healing Zigbee network.Here we use the Zigbee transceiver for traffic junction to junction communication.

1.5 Light Sensor

   A lightsensor is an electronic device used to detect light. There are several types of lightsensors. A photocell or photo resistor is a small sensor which changes its resistance when light shines on it.

1.6 Automatic Street Light Control Unit

The automatic street light control unit is mainly dependent on light sensor. When the vehicle passes through the LDR, the current or voltage passes through the circuit and the light will be glown. Once the distance between the light to sensor increases the light will turn off.

1.7 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. An LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

1.8 Power Supply

A powersupply is an electrical device that supplies electric power to an electrical load. The primary function of a powersupply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, powersupplies are sometimes referred to as electric power converters.

1.9 Buzzer

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

2. ADVANTAGES, DISADVANTAGES AND APPLICATIONS

2.1 Advantages

a.) This system could be used at any traffic junction for controlling the traffic automatically.

b.) By using this system the traffic vehicles could easily be controlled in normal and emergency condition.

c.) By using this system, men work power and time could be reduced.

d.) The accidental chances could be reduced.

2.2 Disadvantages

a.) As the proposed system uses RF signal for emergency override, there is a possibility that someone can bring the system down by transmitting false override signal.

2.3 Applications

a.) Traffic Intersections.

3. CONCLUSION

In this proposed system, we have studied the optimization of traffic light controller in a city using IR sensors, micro controller. This proposed system reduces the possibilities of traffic jams, caused by high red light delays and provides the clearance to the emergency vehicle, to an extent and successfully . Here we designed the system with the purpose to clear the traffic in accordance with priority .In this system, we use IR sensor to find the traffic density. When the IR cut in any one of the roads, that road is considered the higher traffic density road. So the road with the highest priority is cleared first. The proposed system also gives importance to the emergency vehicles such as ambulance. If any emergency vehicle is waiting in a signal then the particular lane is given a higher priority and the traffic in that lane iscleared.

REFERENCES

[1]Geetha.E, V.Viswanadha, Kavitha.G, "Design of an Intelligent Auto Traffic Signal Controller with Emergency Override," International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 3, Issue 4, July 2014.

[2]D Aswani and C. Padma, "A smart traffic control system for emergency vehicle clearance" International Journal and Magazine of Engineering, Technology, Management and Research Volume 3, Issue 9, September 2016.

[3]S. Sharma, A. Pithora, G. Gupta, M. Goel, and M. Sinha, "Traffic light priority control for emergency vehicle using RFID," Int. J. Innov. Eng. Technol., vol. 2, no. 2, pp. 363–366, 2013.

[4]Jubair Mohammed Bilal, Don Jacob, "Intelligent Traffic Control System", IEEE International Conference on Signal Processing and Communications, IEEE-2007.

[5]S. Suganya, R. Sinduja, T. Sowmiya & S. Senthilkumar, "Street light glow on detecting vehicle movement using sensor" International Journal for Advance Research in Engineering and Technology, ICIRET-2014.

[6]Michael R. Smith, Paul J. Davidson and Henry L. Pfister, "Emergency Vehicle Warning and Traffic Control System".

[7]Vivek, Tyagi, Senior Member IEEE, Shivakumar Kalyanaraman, Fellow, IEEE, and Raghuram Krishnapuram, Fellow, IEEE "Vehicular Traffic Density State Estimation".

[8]N. Ahmed Surobhi and Abbas Jamalipour, "M2M-Based Service Coverage for Mobile Users in Post-Emergency Environments," IEEE Transactions onVehicular Technology, VOL. 63, NO. 7, September 2014.

[9]Xue Yuan, XiaoliHao, Houjin Chen, and Xueye Wei, "Robust Traffic Sign Recognition Based on Color Global and Local Oriented Edge Magnitude Patterns," IEEE Transactions on Intelligent Transportation Systems, VOL. 15, NO. 4, August 2014.

[10]   A. K. Mittal and D. Bhandari, "A novel approach to implement green wave system and detection of stolen vehicles," in Proc. IEEE 3rd Int. Adv. Compuer., Feb. 2013, pp. 1055–1059.