Research Paper

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Density Based Intelligent Traffic Control System Using IR Sensors

Engineering

KEYWORDS : IR(Infrared)sensors, Traffic congestion, Microcontroller.

Er. Pramod Sharma	Faculty,PG department of Electronics & Communication, Raja Balwant Singh Engineering & Technical Campus, Bichpuri Agra.
Akanksha Mishra	Final year students (EC), Raja Balwant Singh Engineering & Technical Campus, Bichpuri Agra.
Kaumudi Singh	Final year students (EC), Raja Balwant Singh Engineering & Technical Campus, Bichpuri Agra.

ABSTRACT

The aim of our study is to reduce the problem of traffic congestion which is becoming a very severe problem now-a-days. As we all know that the present traffic light system consists of a predefined hardware which has a fixed time for green light and red light. To optimize this problem we have made a framework for an intelligent traffic control system. Generally we have seen that the conventional traffic light system is not depends upon the density of the traffic. So we proposed a scheme in which the time period of green light and red light is assigned on the basis of the density of the traffic present at that time. This can be done by using IR sensors. Once the density is calculated, the glowing time of green light is assigned by the help of the microcontroller. The sensors which are present on either sides of the road will detect the presence of the vehicles and sends the information to the microcontroller. On the basis of those informations, micro-controller will make a decision and then assign the glowing time of green light and red light. It means that the timing of the traffic lights is set according to the density of the vehicles. This is going to be very helpful in the reduction of the traffic congestion and it has a scope for further expansion in future.

1. INTRODUCTION

Human is the most intelligent creation of god. For ease and making life more comfortable, human being is inventing new technologies every day.

With new wings of hopes, people are coming out from their houses for developing the standard of living. This is why traffic congestion is increasing on the road day- by- day. As a result of which, two main problems are arises

No traffic, but still need to wait.

Heavy traffic jams

These problems occur due to Fixed Control On Traffic. The meaning of Fixed Control On Traffic is that we are not controlling the traffic according to the density, but in manner of programming which is already fixed in the system.

To solve this problem of a fixed traffic light control system, we are introducing a traffic control system which is based on the density, for keeping control on the traffic. It is named as 'Intelligent traffic control system based on density'. Intelligent traffic control system based on density means, a system which can modulates itself according to the number of vehicles or can say density.

Here we are using IR sensors for making a conventional traffic control system, an intelligent traffic control system. IR sensor contains IR transmitter IR receiver in itself. These IR transmitter and IR receiver will be mounted on either sides of the road at a particular distance. As the vehicle passes through these IR sensors, the IR sensor will detect the vehicle & will send the information to the microcontroller. The microcontroller will count the number of vehicles, and provide the glowing time to LED according to the density of vehicles. If the density is higher, LED will glow for higher time than average or vice versa.

The main advantage of this system is that it reduces the waiting time for vehicles. As we know that time is the most valuable thing now-a-days , so many of people break the traffic rules just to reach at time to their destination. The reason behind breaking the traffic rules is to wait for more time whether the traffic is present or not.

So, the proposed system is able to reduce this problem of people and also to minimize the number of accidents happening on the road every day.

2. LITERATURE SURVEY

In the past,the researchers had gone through different types of technologies. A brief survey of various solutions to the traffic congestion problems are presented.

Embedded system

Intelligent Traffic Signal Control System by Dinesh Rotake & Prof. Swapnili Karmore[1] (2012). In this system AVR 32 microcontroller with programmable flash memory, built-in 8 channel analog to digital converter and IR sensors are used. The IR sensors are used to detect the presence of emergency vehicle and the microcontroller is designed to give a red signal to all the sides but one with the emergency vehicle.

Active RFID and GSM Technology

This technique is mentioned in the Road Traffic Congestion Monitoring and Measurement using Active RFID and GSM Technology by Koushik Mandal, Arindam Sen, Abhijnan Chakraborty and Siuli Roy[3] (2011). In this system active RFID tag, wireless coordinator,wireless router, GSM modems and monitoring station software are used. Here the wireless devices are mounted on either sides of the road and they collect the data from the active RFID tags. Through GSM, monitoring station will collect all the data and respond to the corresponding traffic signal.

Wireless Sensor Networks

This was presented in the Priority Based Traffic Lights Controller Using Wireless Sensor Networks by Shruthi K R and Vinodha K[2] (2012). In this a wireless sensor network is being used. To define the direction of any emergency vehicle, system uses a fuzzy logic and by collecting all the information the central monitoring system gives the corresponding appropriate response.

Image Processing

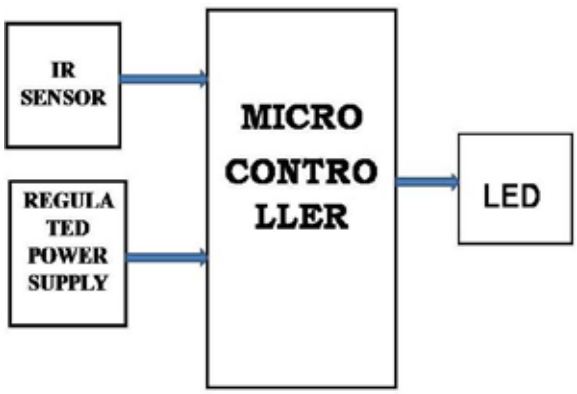
Traffic congestion problem can also be reduced to greater extent through the process of image processing. This is mentioned in

Image Processing Based Intelligent Traffic Controller by Vikramaditya Dangi, Amol Parab, Kshitij Pawar and S.S Rathod[4] (2012). In this technique a camera is used which is fixed on either poles or some other tall structure in such a way that they can cover the whole traffic scene. Images extracted from the video is then analysed and used to detect the vehicle and for counting them and thus depend upon the density, the time is allotted for each side.

3. PROPOSED SYSTEM

To solve the congestion related problems, we proposed a system that uses simple electronic component like LED as traffic light indicator, IR sensors to detect the number of vehicles and a microcontroller for defining the time period of the traffic light signal based on the density.

4. BLOCK DIAGRAM



Power supply:

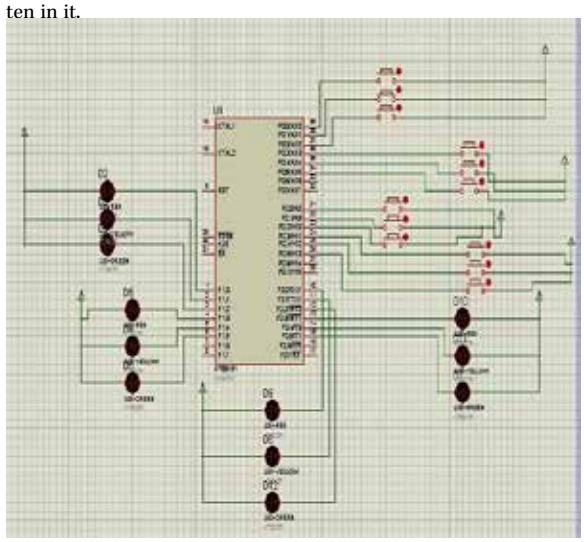
As per the power requirement of the hardware of the intelligent traffic light control system, supply of +5V with respect to GND is developed. The complete circuitry is operated with TTL logic level of 0V to 5V. It comprise of 0V to 9V transformer to step down the 220V AC supply to 9V AC. Further a bridge rectifier converts the 9V into 9V√2 DC. It is further filtered through a 1000uF capacitor and then regulated using 7805 to get +5V. To isolate the output voltage of +5V from noise further filtering 220uF capacitor is used [5].

IR Sensors:

In this system we will use IR sensors to measure the traffic density. They are arranged on each side of the road and are interfaced to the microcontroller. Based on these sensors, controller detects the traffic and control the traffic system. IR sensors are connected to the microcontroller. If there is a traffic on road then that particular sensor output becomes logic one otherwise logic zero. Based on logic 0 and logic 1 output, the microcontroller changes the glow time of the green LED of the corresponding junction to a higher value. Thus as a number of vehicle increases, the green light glows for more time.

Microcontroller:

Micro-controller unit is constructed with ATMEL 89C51 Microcontroller chip. The ATMEL AT89C51 is a low power, higher performance CMOS 8-bit microcomputer with 4K bytes of flash programmable and erasable read only memory (PEROM). Its high-density non-volatile memory compatible with standard MCS-51 instruction set makes it a powerful controller that provides highly flexible and cost effective solution to control applications. Micro-controller works according to the program written in it.



Circuit diagram

On the basis of vehicle count, microcontroller decide the traffic light delays for each side. Traffic light delays are classified as LOW, MEDIUM, HIGH range. Three ranges are predefined by varying vehicle count.

LEDs:

Three LEDs i.e. Red, yellow and green are used as a traffic light indicator.

5. METHODOLOGY

The system is based on microcontroller.

The system contains IR transmitters and IR receivers which are mounted on the either sides of roads.

This IR system gets activated when any vehicle passes on road between IR transmitter and IR receiver.

The microcontroller controls the IR system and counts the number of vehicles which are passing in between the sensors.

Based on different densities of vehicles, the microcontroller decides the glowing time of the traffic lights.

6. CONCLUSION

A traffic light system had been designed and developed with proper integration of both the hardware and the software. The infra-red sensors were interfaced with the microcontroller. This interface is synchronized with the whole process of the traffic system. For this project, the knowledge of sequential systems, electrical and electronics applications had been proven. Automatically, this project could be programmed in any way to control the traffic light model and will be useful for planning road system.

REFERENCE

[1] Intelligent Traffic Signal Control System Using Embedded System by Dinesh Rotake and Prof.SwapniliKarmore, Innovative Systems Design And Engineering, ISSN 2222-1727 (paper) ISSN 2222-2871 (online), Vol. 3, No. 5, 2012 | [2] Priority Based Traffic Lights Controller Using Wireless Sensor Networks by Shruthi K R and Vinodha K, International Journal Of Electronics Signals And Systems (IJESS) ISSN: 2231- 5969, Vol-1 Iss-4, 2012 | [3] Road Traffic Congestion Monitoring and Measurement using Active RFID and GSM Technology by Koushik Mandal, Arindam Sen, Abhijnan Chakraborty and Siuli Roy, IEEE | Annual Conference on Intelligent Transportation Systems, 2011. | [4] Image Processing Based Intelligent Traffic Controller by VikramadityaDangi, AmolParab, KshitijPawar and S.S Rathod. Undergraduate Academic Research Journal (UARJ), ISSN : 2278 – 1129, Vol-1, Iss-1, 2012. | [5] B. Prashanth Kumar, B. Karthik " Micro controller based traffic light controller", Department of Electrical & Electronics Engineering Gokaraju Rangaraju Institute of Engineering & Technology, 2011 | |