INTELLIGENT TRAFFIC LIGHT CONTROL SYSTEM

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ABSTRACT: In our project we are going to design a dynamic traffic signal system where the timing of signal will change automatically bycounting the number of vehicles at any junction. Traffic congestion has done a several problem in most cities across the world and soit's a time to shift more manual mode or fixed timer mode to an automated system with decision making capabilities. Present day traffic signaling system are fixed time based which will be efficient for one lane is operational than the others. To remove this type of problem we adopted a framework for an intelligent traffic control system. Sometimes there is a higher traffic density at one lane side of the junction demands more and more green time as compared to standard time allotted therefore for this reason we propose here a mechanism. In this mechanism time period green and red time is assigned on the basis of number of vehicle counts present at that time.This can be achieved by using PIR (proximity infrared sensors). Once the numbers of vehicles are calculated, the glowing time of green light is assigned by the help of microcontroller (Arduino). The IR sensors which are placed on sides of the road at certain distance will count the number of vehicles passed and sends the information to the microcontroller where it will calculate how long a flank will be open or when to change over the signal lights. In subsequent selections, we have elaborated the procedure of this framework.

INTRODUCTION

If we see today's high speed life, traffic congestion becomes a serious and big issue in our day to day activities. These will brings down the productivity of individual and thereby the society as lots of work hour is wasted in the signals. Due to increased number of vehicle users day by day, the inadequate infrastructure and the irrational distribution of the signaling systems are main reasons for the traffic congestions. It will also indirectly adds to the increase in population level as engines will remain on in most cases, a large amount of natural resources in the forms of petrol and diesel is consumed without any fruitful outcome. Therefore, in order to reduce these problems to significant level, newer ideas need to be implemented by bringing in sensor based automation technique in this field of traffic signaling system.

PRESENT TRAFFIC SIGNALING SYSTEM

At present time, traffic control is achieved by the use of hand signs by the traffic police, traffic signals and markings. All complete traffic education program is needed,throughdriver-licensing authorities, to ensure that those who operate motor vehicles understand these rules of the road and the actions that are required or advised to take when a particular control device is present. Each of the traffic control device is governed by standards of design and usage; for example, stop signs always have a red background and are in octagonal shape. Design standards will allow the users to quickly and consistently perceive the sign in the visual field along the road. Use of standard colors and shape will helps to identify and in deciding on appropriate course of action. Under current circumstances, traffic lights are located at different directions with fixed time delay, following a repeated cycle while switching from one signal to other causing unwanted and wasteful congestion on one lane while the other lanes remain vacant. The systems we are going to propose identify the density of traffic on individual lanes and thereby allocate the timing of signals. IR transmitter and receiver will count the number of obstructions and provide information about the traffic density of a particular lane and send this information to a controller unit which will make the particular decisions as per the current traffic information.

OPERATIONAL MODEL

The model we proposed here will works on the principle of changing delay of traffic signals based on the number of vehicles are passed through an assigned section of the road. We are using four sensors which are placed at four sides of a four way road which counts the number of vehicles passed by the area which covered by the sensors.

Fig.1: Proposed Model Overview

Here we are using IR sensors for our system to design an intelligent traffic control system. IR sensor consist IR transmitter IR receiver (photodiode) in itself. This IR transmitter and IR receiver will be placed at the same side of the road and at a particular distance from the junction. As the vehiclesare passed through these IR sensors, the IR sensor will detects or identify the vehicle and it will send the information to the microcontroller. The microcontroller will count the number of vehicles, and calculate glowing time of LED according to the density of vehicles. If the density is more, LED will glow for longer time than normal average and vice versa. The traffic lights are initially running at a normal delay of 5 seconds, which willproduce a delay of 20seconds in the entire process. The entire embedded system is placed at a junction. Microcontroller is interfaced with the LEDs and IR sensors. The total four number of IR sensors required and LED's 12 hence these are connected to the any two ports of microcontroller. IR transmitter and receiver pairs, proximity of the sensor is used the output voltage according to distance from an object comparator which a reference set. The reference voltage is set by potentiometer according to required range of sensing.

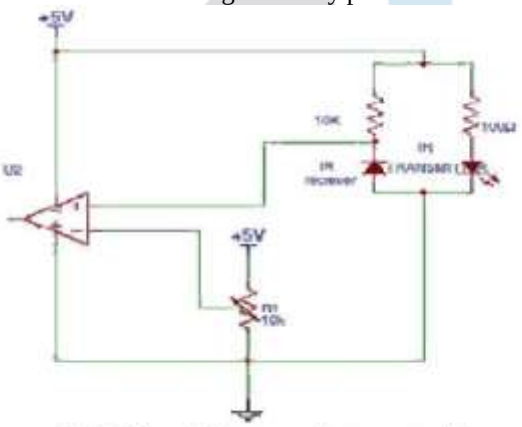

Fig.2: Circuit diagram of sensor module

When the sensor senses the any obstacles the comparator at low else it gives +5V (HIGH). The controller program will counts this change from low to HIGH indicating passing of a vehicles.

The objective of the use of IR sensor is to detect obstacles. It consists of an emitter (IR LED), detector (IR photodiode) and ancillary circuitry. The stronger the reception of IR radiation source, greater is the output voltage. We have use Op-Amp LM-324 for the comparator operation where Vin is compared against Vref with on feedback resistance and very high gain. Here +Vcc is connected to +5V and -vcc is connected to ground and the OPAMP output acts as digital HIGH or LOW for the microcontroller.

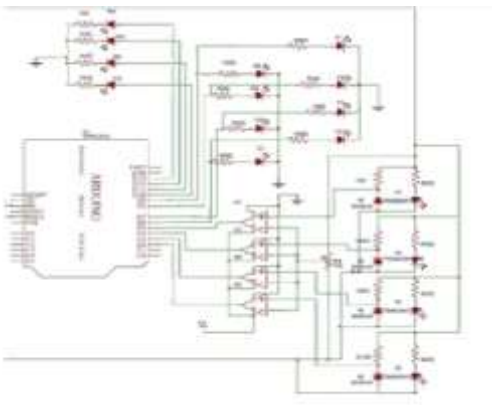

Fig.4: Circuit Schematic Diagram

When the input voltage is lesser than Vref (Vin<Vref), the output of comparator produces a LOW signal and when input voltage is greater than Vref (Vin>Vref), the comparator output produces a HIGH. The three sets of LED Green, Yellow and Red are used to indicate the GO state, WAIT state and STOP state for particular lane.
The glowing of LEDs G(green), Y(yellow), R(red) will follow these sequence

- G1-Y2-R3-R4
- G2-Y3-R4-R1
- G3-Y4-R1-R2
- G4-Y1-R2-R3

G1 and Y2 are connected to same ports similarly G2-Y3, G3-Y4, G4-Y1.

FUTURESCOPE

The proposed model worked very efficiently with great outputs, the real life situation is going to be more challenging and demanding. Some challenges that should be taken into account are listed as follows

1. Low range IR sensors may not be a good option for long range signaling system. We will either go with ultrasound or radar techniques for long range signaling systems.
2. The influence of the stray signals that will alter the reading of sensor receptors and lead to conveying wrong information to the microcontroller.
3. A periodic checking of the accuracy and precision is a must done for efficient operation of this model proposed.

As we come for future advancements, the traffic check post are may be connected by wireless transmitters by which the crossings ahead may be an anticipation of the traffic that is approaching. This will be achieved by connecting the sensor network with GPS connectivity and short waves radio transmission signals. This will act as a feed forward system making the signaling system even easier and makes the traffic congestion free.

CONCLUSION

There is a more need of efficient traffic management system in our country, as India meets with 384 road accidents every day. To reduce this traffic congestion and unwanted time delay in traffic an advanced system is designed here in this project. With on field application of this technology, the managing of traffic can be effectively channelized by distributing the time slots based on the merit of vehicle load in certain lanes of multi junction crossing. The next step forward is to implement this scheme is a real life scenario for first hand results, before implementing it on the largest scale. We believe that this may bring a revolutionary change in traffic management system on its application in actual field environment.

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