AUTOMATIC VEHICLE TRAFFIC CONTROL

AND COLLISION AVOIDANCE

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ABSTRACT

Traffic management is a major critical issues in nowadays to handle the traffic congestion. The large increase of the vehicles leads to a lot of traffic jams. Traffic light plays an important role in traffic management. But these traffic lights are changed according to the predefined time. They are not change the signals according to the number of vehicles in the lane. As the result some vehicles are wait even there is no traffic on the other side. To overcome this traffic problem and to reduce the waiting time in the traffic, We go for automation. In this system, it automatically minimize and maximize the timing in the traffic signal based on the number of vehicles in each lane. Traffic density is measured by the IR sensor depending upon the traffic in particular junction. The IR sensor is used to counts the number of vehicles, those information are transferred to controller to control the signals through wireless communication. At the same time, this system helps the emergency vehicles like ambulance, fire engine, etc., to reach the destination in correct time.

INTRODUCTION

OVERVIEW

India is the second most populous Country in the World and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. In order to avoid this excess time consumption an intelligent traffic control system is used which turns the signal in the path of the ambulance to green. Zigbee is used to communicate between the traffic signals and emergency vehicles. Zigbee uses three frequency bands for transmission- 868 MHz band with a single channel has a raw data rate of 20 kb/s. The IR sensor transmits IR light and measure the light reflected from an object. An IR sensor can measure the heat of an object as well as detects the motion here the IR sensors are used to detect the vehicle moment and microcontroller counts the density of vehicles and the traffic signals are controlled based on the density of vehicles in four ways. Due to growing in number of vehicles on roadways causes heavy traffic congestion on the road. Traffic congestion on roads may cause delay for emergency services (i.e. Ambulance, Fire fighter, Police, etc.).A traffic light plays an essential role in traffic management.Under the normal state traffic light duration for path is almost fixed and same for the entire path and emergency vehicle are not considered.

A survey on various traffic management schemes for traffic clearance, and clearance of emergency vehicle. Traffic congestion has been causing various critical problems and Encounters in the major and most populated cities. To travel to different places within the city is becoming more difficult for the travellers in traffic. Owing to these congestion problems, people lose time, miss Opportunities, and get frustrated application in traffic management provides dynamic interaction between the components of a transport system, allows inter and intra vehicular communication, smart traffic control, smart parking, electronic toll collection system, logistics and fleet management, vehicle control and safety , road assistance. With the growing number of vehicles, traffic congestion and transportation delay on urban arterials are increasing worldwide. Therefore it is practically important to develop, verify and validate simple yet powerful models that help in designing and improving the safety and efficiency of transportation. It is a significant issue to control traffic lights in road–vehicle systems.

PROPOSED SYSTEM

Due to growing in number of vehicles on roadways causes heavy traffic congestion on the road. From the present difficult segment, it can be seen that, existing

technologies are inadequate to handle the difficulties such as congestion control, emergency vehicle clearance. The signal timing changes automatically on sensing the traffic density at the junction. Traffic congestion is a severe problem in many major cities across the world. Traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Junction timings allotted are fixed. Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time.

SYSTEM IMPLEMENTATION

Traffic Control System

From the current problem section, it can be seen that, existing technologies are insufficient to handle the problems of congestion control, emergency vehicle clearance, stolen vehicle detection. To solve these problems, we propose to implement our Intelligent Traffic Control System. In our proposed system the numbers of vehicles entering are detected by using IR sensors the IR sensors is connected to the microcontroller.

The microcontroller counts the vehicle density and controls the traffic signal automatically .The microcontroller is used to control the traffic signals in four road junction by automatically controlling the traffic lights.

Due to the massive growth in urbanization and traffic congestion, intelligent vision based traffic light controller is needed to reduce the traffic delay and travel time especially in developing countries as the current automatic time based control is not realistic while sensor based traffic light controller is not reliable in developing countries.

How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed. Even though today's methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day. Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic.

Traffic Congestion

The IR sensor will track how many vehicles have passed through for a specific period and determine the congestion volume. Accordingly, it sets to green light duration for that path

Emergency Vehicle Clearance System

In this module, there are 2 parts, first part which is ZigBee transmitter is placed in the emergency vehicle. When the switch is pressed, it will transmit the signal. The signal contains unique id and security code. The transmitter contains atmel162 .A microcontroller and ZigBee module. The microcontroller sends the commands and data to the ZigBee via serial communication. Second part is the receiver, which is placed at traffic pole. It also contains microcontroller and ZigBee module. Emergency vehicle carrying ZigBee transmitter into the range of ZigBee receiver, and then the traffic light will change to green till the receiver receives the ZigBee signal. In the default condition, red and green light will set for 10 seconds. The time period will be varied according to the traffic conditions and emergency vehicle. In Emergency vehicle clearance system each emergency vehicle contains ZigBee transmitter module and the ZigBee receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle is used for emergency purpose. This will send the signal through the ZigBee transmitter to the ZigBee receiver. It will make the traffic light to change to green.

Ambulance Clearance

SYSTEM DESCRIPTION

OBJECTIVE

The traffic congestions controlled based on the density in the road. The emergency vehicles are detected and the signal is send to the receiver. With the approaching of emergency vehicles at the traffic, turn on the green light to reduce the time delay of the emergency vehicles to reach their destination.

SYSTEM ARCHITECTURE
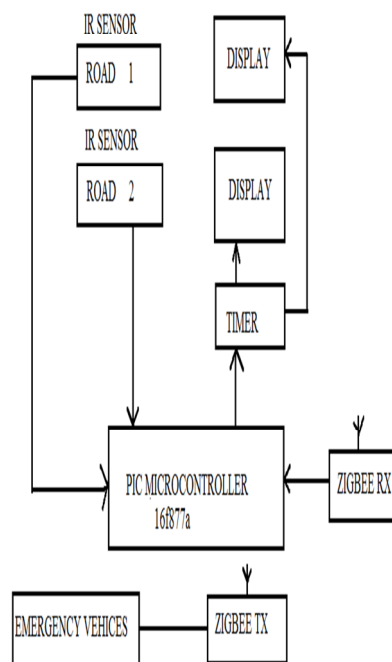
LCD

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs

LCD Display

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the PIC16F877A microcontroller and display messages in two lines with 16 characters each. It displays all the alphabets. Green letters, punctuation marks, mathematical symbols etc. in addition, it is possible to display symbols that user makes up on its own.

IR SENSOR

An infrared sensor is an electronic device, that 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. Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. The infrared region is divided into three regions: near infrared region, mid infrared region, and far infrared region.

The wavelengths of these regions and their applications are shown below.

- Near infrared region-700nm to 1400nm-IR sensors
- Mid infrared region-1400nm to 3000nm-Heat sensing
- Far infrared region-3000nm to 1mm-Thermal sensing

The frequency range of infrared is higher than microwave and lesser than visible light. The basic concept of an infrared sensor which is used as obstacle detector is to transmit an infrared signal, this infrared region bounces from the surface of an object and the signal is received at the infrared receiver.

IR Sensors

Principle Of Working

The principle of an IR sensor working as an Object Detection Sensor can be explained using the following figure. An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo-Couple or Opto –Couple.When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor is defined. It consists of an IR LED, a photodiode, a potentiometer, an IC operational amplifier and an LED .IR LED emits infrared light.

The photodiode detects the infrared light .An IC Op-Amp is used as a voltage comparator. The potentiometer is used to calibrate the output of the sensor according to the requirement

ZIGBEE

ZigBee is the most popular industry wireless mesh networking standard for connecting sensors, instrumentation and control systems. ZigBee, a specification for communication in a wireless personal area network (WPAN).

Zigbee

Working

ZigBee basically uses digital radios to allow devices to communicate with one another. A typical ZigBee network consists of several types of devices. A network coordinator is a device that sets up the network, is aware of all the nodes within its network, and manages both the information about each node as well as the information that is being transmitted/received within the network. Every ZigBee network must contain a network coordinator. Other Full Function Devices (FFD's) may be found in the network, and these devices support all of the 802.15.4 functions.

They can serve as network coordinators, network routers, or as devices that interact with the physical world. The final device found in these networks is the Reduced Function Device (RFD), which usually only serve as devices that interact with the physical world. As mentioned above several topologies are supported by ZigBee, including star, mesh, and cluster tree. As can be seen in above figure 3, star topology is most useful when several end devices are located close together so that they can communicate with a single router node. That node can then be a part of a larger mesh network that ultimately communicates with the network coordinator. Mesh networking allows for redundancy in node links, so that if one node goes down, devices can find an alternative path to communicate with one another.

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