

Density & Sound Based Vehicular Traffic Controller

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Abstract – Traffic congestion could be a severe problem in many major cities across the planet and it's become a nightmare for the commuters in these cities. Traffic are often controlled in several main junctions by incorporating either automatic traffic signal control or traffic police. But conventional traffic signal system is predicted on fixed time concept allotted to every side of the junction which can't be varied as per varying traffic density. At some times, a priority of traffic light needs to be changed based on more number of vehicles waiting in same road, VIPs vehicles and Ambulance vehicles etc. We propose to style and develop a density based traffic light system. The signal changes and sensing the traffic density. The algorithm design and encoded on Arduino based system, due to its simplicity and economy. IR sensors are used to measure the traffic density on a particular road. IR sensor have limitations that it has light intensity issues. In future, it with the improvement in IR sensor technology light issue can be resolved. IR sensors are arranged on all junction point on square to detect traffic density properly, these sensors always sense the traffic on that particular road. All these sensors are interfaced to the Arduino. By these sensors, Arduino detects the traffic and controls the traffic system. The controls of traffic light depend on number of vehicles available on the road. This method also focuses on providing a free pathway for emergency services like ambulances and fire brigade vehicle that are arriving towards the signal by sensing the siren frequency in range 700Hz-900H.

Keywords– IR Sensor,Ultrasonic Sensor,Arduino,Timer.

I. INTRODUCTION

In modern life, we've to face with many problems once among is traffic jam becoming more serious day after day. It is said that the high volume of vehicles, the inadequate infrastructure and therefore the irrational distribution of the event are main reasons for increasing holdup. The major cause resulting in traffic jam is that the high number of auto which was caused by the population and therefore the development of economy. Due to the massive growth in urbanization and traffic congestion, automatic based traffic light controller is needed to reduce the traffic delay and travel time especially in developing countries.

Traffic congestion is now considered to be one among the most important problems within the urban environments. Traffic problems are going to be also far more widely increasing as an expected results of the growing number of transportation means and current low-quality infrastructure of the roads. In addition, many studies and statistics were generated in developing countries that proved that most of the road accidents are because of the very narrow roads and because of the destructive increase in the transportation means. This idea of controlling the traffic signal efficiently in real-time has attracted many researchers to figure during this field.

II. LITERATURE REVIEW

S. .M Sundara et al.[1] proposed IR sensor and sound sensor interfaced to Arduino based system suggested that if the sound sensor added to the system and then priority of sound sensor more than IR sensor, emergency service vehicle can provide priority based free pathway by sensing siren sound of ambulance and fire brigade vehicle.

Nang Homkham et al.[2]A modern traffic light of six road and four junction is implemented by using the programming in the PIC16F877A microcontroller. The sequences of this traffic light also have been developed by using the programming in the C language. The prototype of this system is using the frequency of 20MHz.The system works efficiently over the present traffic controlling system in respect of less waiting time, efficient operation during emergency mode and suggesting alternate route.

Ovidiutomescu et al.[3] According to our approach, it is clear that in this case traffic flow will be improved by reducing stop number and each car's delay. To calculate the offset adjustment constant, we have used a fuzzy logic simulator, while the remaining results are simply mathematical calculations.Simulations have shown that using fuzzy systems, we can have satisfactory results even with a small quantity of information.

Er. Faruk Bin Poyen et al.[4] There is exigent need of efficient traffic management System in our country ,as india meats with 384 accidents every day.to reduce this congestion and anvanted time delay in traffic and advance system is designed here in this project .

Shipachavan et al.[5] It is observed that the proposed Intelligent Traffic signal Controller is more efficient than the traditional controller in respect of less waiting time, an efficient operation in emergency mode. Moreover, the system has simple architecture, fast reaction time, user friendliness and scope for further expansion

Sercan Vanc, In And Ebubekir Erdem Et Al[6]Wireless network sensors and their use in traffic monitoring, traffic density determination or vehicle speed detection and classification have recently been the focus of interest for researchers. This article describes how a replacement sensor circuit was designed to deliver instantaneous, real-time and novel solutions as a vehicle detection system.

Syed Bilal Hussain Shah et al [7] this research we have worked on Congestion problem for such special areas which have dense traffic density. The system works on traffic related problems like traffic jam; un reasonable latency time of stoppage of auto,emergency vehicles or forcibly passing, etc are often solved. By using this technique we attempt to reduce the chances of traffic jams, caused by traffic lights. Number of passing vehicle within the fixed slot on the road decide the density range of traffics and on the idea of auto density calculation, microcontroller decide the traffic light delays.

Umakant1 et al.[8]The system uses SST (Silicon Storage Technology) microcontroller that controls the various operations, monitors the traffic volume and density flow through infrared sensors (IR Sensors), and changes the lighting transition slots. The Ambulance section is also included in the system. The RF Tx (Transmitter) is fixed in the ambulance, the ambulance will give the signal to the transmitter and will send information wirelessly to the receiver in the traffic junction for the lights to travel GREEN from RED Through the RF Technology in order that the ambulance way gets cleared.

K.Vidhya, A.Bazila Banuet al[9] We can calculate the density of the vehicle by using mat lab tool by comparing the four side of the image which is given as an input. we can simulate the results of the four given input image but this can't be utilized in real time applications because it is extremely slow and therefore the software is not freed from cost like open cv to beat this disadvantage of mat lab, open cv software is employed which is extremely easy to put in and is open source software and may be utilized in real time application during a quick manner.

Er. Pramod Sharma, Akanksha Mishra, Kaumudi Singh et al [10] The aim of our study is to reduce the problem of traffic congestion which is becoming a very severe problem nowa-days. It has hardware which has a fixed time for green light and red light. To optimize this problem we've made a framework for an intelligent control system. Generally we have seen that the conventional traffic light system is not depends upon the density of the traffic. The scheme in which green 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. when the density is calculated, the green light glow which is assigned by the help of the arduino .

Objective/hypothesis formulation

Our project aims and reducing traffic jam and unwanted while delay during the traffic signal switch overs especially when the traffic is extremely low.it is the planning to be implemented in places nearing the junction where the traffic signal are placed in order to reduce congestion in this junction.its keeps the track of vehicles in each road and accordingly adjust the time for each traffic light signals.the higher number of vehicles on the road the longer will be the time delay allotted for that corresponding traffic light signal. The prototype model was developed using IR sensor and also we implementing sound sensor based traffic control for ambulance and fire brigade. we use arduino to write programming according to our requirement due to its simplicity and economy and IR sensor is use to measure traffic density in a particular road.

III. RESEARCH METHODOLOGY

Arduino



Fig.1 Arduino UNO.

Arduino 2560 is a type of controller project that created microcontroller based kits for building digital devices and interactive objects which can sense and control physical devices. The project is predicated on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins which will interface to varied expansion boards (termed shields) and other

circuits. These boards feature serial communication including Universal Serial Bus (USB) on models, for loading programs from computer. Arduino supports a programming language which also supports the languages C and C++. Arduino make devices that interact with their environment using sensors and actuators. Common samples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors. Arduino had been commercially produced in 2013 that 700,000 official boards were in users hands.

LED



Fig.2: LED

A LED may be a two-lead semiconductor light source as shown in figure2. It is a p-n junction diode, which emits light when activated. voltage is applied to the leads, electrons recombine with electron & holes within the device, releasing energy within the types of photons. This effect is named electroluminescence, and therefore the color of the luminescence (corresponding to the energy of the photon) is decided by the energy band gap of the semiconductor. An LED is usually small in area (less than 1 mm²) and integrated optical components could also be used to shape its radiation diagram.

LEDs emitted low-intensity infrared earlier in 1962. Infrared LEDs are used as transmitting elements in remote-control circuits, like those in remote controls. The first light LEDs were also of low intensity, and limited to red. Modern LEDs are visible, ultraviolet, and infrared wavelengths, with high brightness. Early LEDs were used as indicator lamps for electronic devices, replacing bulbs. They were soon packaged into numeric readouts within the sort of seven segment displays, and were commonly seen in digital clocks. Recent developments in LEDs permit them to be utilized in environmental and task lighting. LEDs have lower energy consumption, longer life, improved physical appearance, small size, and fast switching. Light emitting diodes have many applications automotive headlamps, advertising, general lighting, traffic signals, camera flashes and lighted wallpaper.

IR Sensor



Fig.3: IR Sensor

IR transmitter looks like an LED. IR transmitter emits IR rays. The operating voltage is 2 or 3V. These rays are invisible to the human eye. But we will view these IR rays through camera. It is an invisible energy, (frequency 430 THz) to 1000000 nm (300 GHz) (although people can see infrared up to a minimum of 1050 nm in experiments). Most of the thermal radiation emitted by objects near temperature is infrared. Infrared radiation is employed in industrial, scientific, and medical applications.

using active near infrared illumination allow peoples or animals to be observed without the observer being detected. Infrared apply to detect heat loss in insulated systems, to see changing blood flow inside the skin, and to detect overheating of electrical apparatuses. IR Receiver (Photodiode): A photodiode may be a semiconductor unit that converts light into current. The current is generated when photons are absorbed within the photodiode. A small amount of current is additionally produced when no light is present. Photodiodes may contain optical filters, built-in lenses, and should have large or small surface areas.

Photodiodes usually have a slower reaction time as their area increases. The common, traditional photovoltaic cell wont to generate electric solar energy may be a large area photodiode. Photodiodes will be either exposed (to detect vacuum UV or X-rays) or packaged with a window or glass fiber connection to allow light to succeed in the sensitive a part of the device. Many diodes used as a photodiode use a PIN junction for the fast speed of response. A photodiode is work in reverse bias.

Sound Sensor



Fig.4: Sound Sensor

Sound sensor may be a small board that mixes a microphone and a few processing circuitry. It provides audio output, but also a binary indication of the presence of sound, and an analog representation of its amplitude. This method uses three sound sensors to detect the frequency of the ambulance heading towards the traffic signal. The main component of the module is a simple microphone, which is based on the LM386 amplifier and microphone.

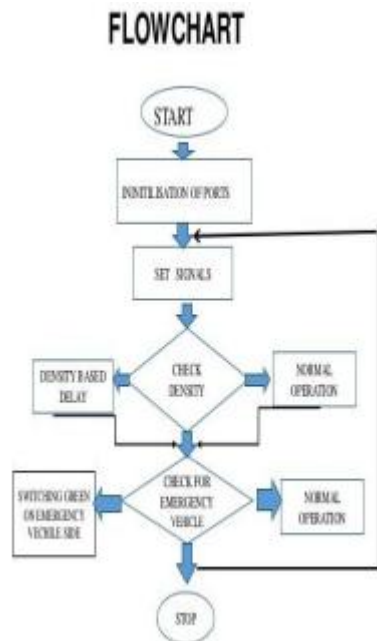


Fig.5: Flowchart

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