

SMART TRAFFIC MONITORING SYSTEM USING IR SENSORS BASED ON MICROCONTROLLER & GSM, GPS TECHNOLOGY

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Abstract—The project is aimed at designing a density based dynamic traffic signal system where the timing of signal will change automatically on sensing the traffic density at any junction. Traffic congestion is a severe problem in most cities across the world and therefore it is time to shift more manual mode or fixed timer mode to an automated system with decision making capabilities. Present day traffic signaling system is fixed time based which may render inefficient if one lane is operational than the others. To optimize this problem we have made a framework for an intelligent traffic control system. Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time. We, therefore propose here a mechanism 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 is achieved by using Infrared 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 sides of the road will detect the presence of the vehicles and sends the information to the microcontroller where it will decide how long a flank will be open or when to change over the signal lights. In subsequent sections, we have elaborated the procedure of this framework.

Keywords—*IR sensor, Microcontroller, LCD display, gsm, gps*

I .INTRODUCTION

Traffic congestion is a condition on transport networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. When traffic demand is great enough that the interaction between vehicles slows the speed of the traffic stream, this results in some congestion. While congestion is a possibility for any mode of transportation, this article will focus on automobile congestion on public roads. As demand approaches the capacity of a road (or of the intersections along the road), extreme traffic congestion sets in. When vehicles are fully stopped for periods of time, this is colloquially known as a traffic jam or traffic snarl-up. Traffic congestion can lead to drivers becoming frustrated and engaging in rage. Mathematically, congestion is usually looked at as the number of vehicles that pass through a point in a window of time, or a flow. Congestion flow lends itself to principles of fluid dynamics.

Relevance

Density Based Traffic Light Timing Control System. At the present time, the traffic control system becomes the main issue because of the fast increase in automobiles and also due to large time delays between traffic lights. ... Based on the sensors, microcontroller detects the traffic and controls the traffic system

Motivation

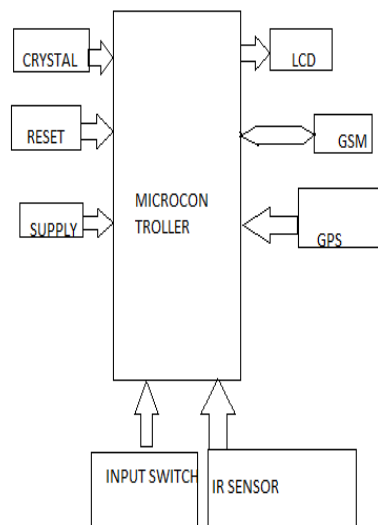
The traffic lights that are in widespread use today do not do much intricate reasoning when deciding when to change the lights for the various road users waiting in different lanes. How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed.

Problem Definition

Traffic congestion is a main problem with foremost cities. In India the traffic lights are founded on timing system i.e. whether the vehicles are present or not the timing will remain constant which makes people to wait unnecessarily for longer time. The key characteristic of the traffic in cities particularly for developing the geographies is that even if the geographies are explicitly mentioned/marked on the roads it doesn't move through the lanes

Technical Approach

BLOCK DIAGRAM



LCD



LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2LCD means it can display 16 characters per line and there are 2 such lines.LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology.

IR Sensor-

To detect the real time of traffic condition. A IR sensor in this project are used because this sensor sense the that the rode is High density, low density or medium density are sense. And data will be transfer in over mobile. This IR sensor detects vehicle and also detect the emergency vehicle. Thermal radiation is emitted by all the objects in the infrared spectrum. The infrared sensor detects this type of radiation which is not visible to human eye

HOW DO IR SENSOR WORKS?

An IR (Infrared) sensor is an electronic device which can be used to sense certain parameters of its surroundings by either emitting or detecting radiations. It can also measure heat of an object and detect motion. It uses the infrared light to sense objects in front of them and map or guess their distance. This system consist of 4 IR sensors as a detector of 4 junctions. IR transmitter looks like an LED. This IR transmitter always emits IR rays from it. The operating voltage of this IR transmitter is 2 to 3v. These IR (infra-red) rays are invisible to the human eye. But we can see these IR radiations through camera. IR transmitter transmits IR rays that are received by IR receiver. Generally IR receiver has high resistance in the order of mega ohms but when it is receiving IR rays the resistance is very low. The operating voltage of IR receiver also 2 to 3V. We have to place these IR pair in such a way that when we place an obstacle in front of this IR pair, IR receiver should be able to receive the IR rays. When power is supplied, the transmitted IR rays hit the object and reflect back to the IR receiver.

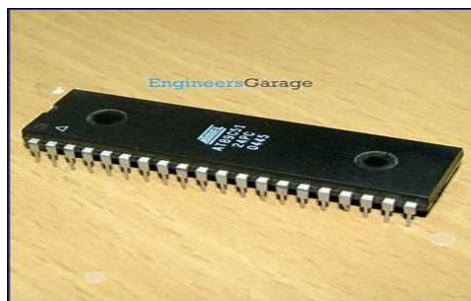
Distance = 10cm

Electrical Parameters:-

- 5VDC Operating voltage
- I/O pins are 5V and 3.3V compliant
- Range: Up to 20cm
- Adjustable Sensing range
- Built-in Ambient Light Sensor



MICROCONTROLLER 89c51:



In 40 pin AT89C51, there are four ports designated as P₁, P₂, P₃ and P₀. All these ports are 8-bit bi-directional ports, *i.e.*, they can be used as both input and output ports. Except P₀ which needs external pull-ups, rest of the ports have internal pull-ups. When 1s are written to these port pins, they are pulled high by the internal pull-ups and can be used as inputs. These ports are also bit addressable and so their bits can also be accessed individually.

Port P₀ and P₂ are also used to provide low byte and high byte addresses, respectively, when connected to an external memory. Port 3 has multiplexed pins for special functions like serial communication, hardware interrupts, timer inputs and read/write operation from external memory. AT89C51 has an inbuilt UART for serial communication. It can be programmed to operate at different baud rates. Including two timers & hardware interrupts, it has a total of six interrupts.

GPS & GSM MODEM:

In Vehicle tracking project, you can track the location of your Vehicle. This project gives Minute-by-minute updates about vehicle location by sending sms through GSM modem. This SMS contains longitude and latitude of the location of vehicle. Microcontroller is the central processing unit CPU of our project. Microcontroller gets the coordinates from GPS modem and then it sends this information to the user in Text SMS. GSM modem is used to send this information via SMS. SMS will be sent to the owner of the vehicle.

GPS based Vehicle tracking system is required in many situations, like in case of car theft detection. This project will be useful when our car is stolen. Also if somebody wants to track school bus of their children, at that time it will be helpful to find out the location of kids. One more situation is when some company wants to track the location of the cab or transport bus of employee then in this case this vehicle tracking system will be very useful.

In **GPS tracking system** the location of vehicle is sent to remote place and it is done by GSM modem. Global Positioning System (GPS) modem requires minimum 3 satellites to calculate the exact location. This modem communicates only in single way with microcontroller. This means that it can only transmit data to microcontroller. GPS Modem does not receive any data from microcontroller. At the same time GPS modem does not send data to Satellite, it only receives signal from satellites.



HARDWARE IMPLEMENTATION

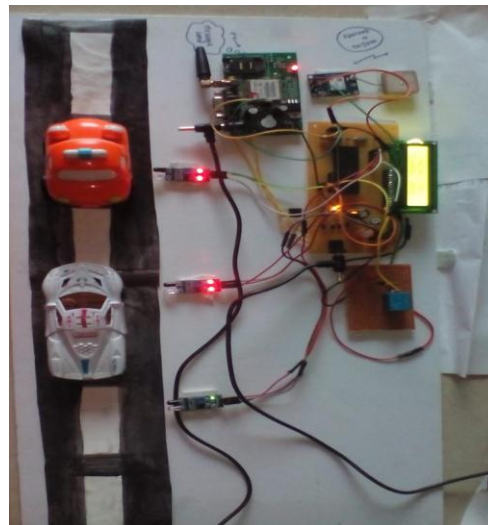
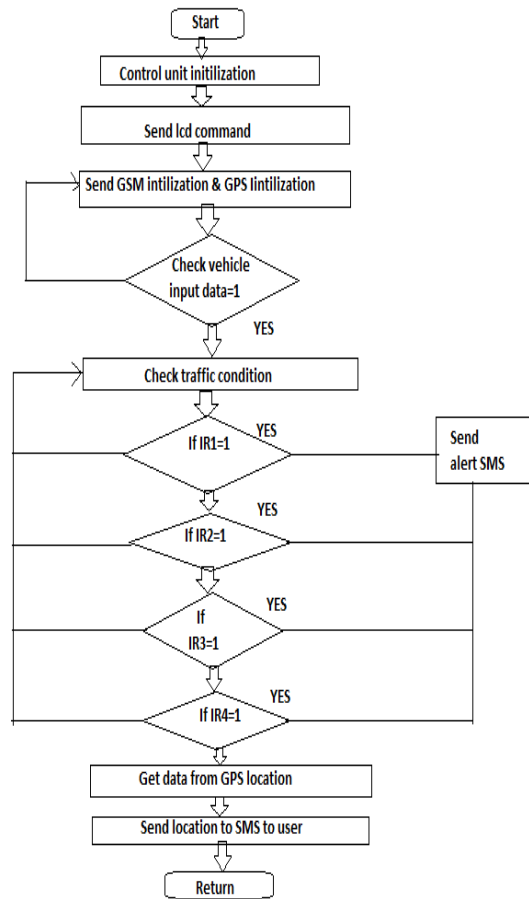


Fig- Hardware Implementation

SOFTWARE



DESIGN

CONCLUSION

By using this system configuration we can reduce the possibilities of traffic jam caused by traffic light to an extent. The no of passing vehicles on the road decides the density range of traffic and on the basis of vehicle count of microcontroller decides the traffic light delay.

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