

ENHANCING METRO OPERATIONS: DENSITY-BASED AUTOMATIC TRAFFIC CONTROL SYSTEM

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ABSTRACT

It is important to know the road traffic density real time especially in mega cities for signal control and effective traffic management. In recent years, video monitoring and surveillance systems have been widely used in traffic management. Traffic control is a very difficult task for traffic control department, especially in metro cities. The Project is designed to check the density of traffic in particular place and the information is conveyed to traffic control station. This project is designed with AT89S52 microcontroller. The module consists of a IR emitter and TSOP receiver pair. The high precision TSOP receiver always detects a signal of fixed frequency. Due to this, errors due to false detection of ambient light are significantly reduced. This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

I. INTRODUCTION

In today's high speed life, it brings down the productivity of individual and thereby the society as lots of work hour is wasted in the signals. High life, traffic congestion becomes a serious issue in our day to day activities. volume of vehicles, the inadequate infrastructure and the irrational distribution of the signaling system are main reasons for this chaotic congestions.

It indirectly also adds to the increase in pollution level as engines remain on in most cases, a huge volume of natural resources in forms of petrol and diesel is consumed without any fruitful outcome. Therefore, in order to get rid of these problems or at least reduce them to significant level, newer schemes need to be implemented by bringing in sensor based automation technique in this field of traffic signaling system.

Vehicular traffic control at road crossings has always been a matter of concern for administrations in many modern cities around the world. Several attempts have been made to design efficient automated systems to solve this problem. Most of the present day systems use pre-determined

timing circuits to operate traffic signals which are not very efficient because they do not operate according to the current volume of traffic at the crossing. It is often seen in today's automated traffic control systems that vehicles have to wait at a road crossing even though there is little or no traffic in the other direction. There are other problems as well, like ambulances getting caught up by a red traffic signal and wasting valuable time. Congestion is often translated into lost time, missed opportunities, lost worker productivity, delivery delay and, in general, increased cost. Actually the traffic congestion is not only recurring (caused by recurring demand that exists virtually every day) but also non-recurring (caused by traffic incidents like damaged vehicles, crashes, work zones, weather and special events) in nature. To manage non-recurring congestion some sensor based systems were suggested for improvement over fixed timing controlled ones.

However the performance was not satisfactory due to the necessity of a direct line-of-sight (LOS) path between sensor and vehicles. Further, simultaneous multiple detections were difficult to handle with a sensor-based system.

It is an application specific project which is used to control the traffic, this project is implemented by placing IR transmitter and led's at the 4 way junction, the four paths are represented by R1,R2,R3,R4

Transmitter and receiver are placed at the either side of the four paths, and four led's are the corner of the junction

When there is a traffic along the paths, value of R would 000 which are the values of irsensors and if there is no traffic the value is 111

II. LITERATURE REVIEW

Presents a savvy movement control framework to pass crisis vehicles easily. Every individual vehicle is outfitted with exceptional radio recurrence ID (RFID) tag (set at a key area), which makes it difficult to expel or devastate. We utilize RFID per user, NSK EDK-125-TTL, and PIC16F877A framework on-chip to peruse the

RFID labels connected to the vehicle. It checks number of vehicles that passes on a specific way amid a predetermined length. It likewise decides the system clog, and consequently the green light term for that way. In the event that the RFID-label read has a place with the stolen vehicle, then a message is sent utilizing GSM SIM300 to the police control room. Furthermore, when an emergency vehicle is moving toward the intersection, it will impart to the movement controller in the intersection to turn ON the green light. This module utilizes ZigBee modules on CC2500 and PIC16F877A framework on-chip for remote correspondences between the emergency vehicle and activity controller. The model was tried under various mixes of contributions to our remote correspondence research center and exploratory outcomes were found obviously. we proposed an Implementing Intelligent Traffic Control for Congestion, Ambulance leeway, and Stolen Vehicle Detection. This framework was actualized in light of present criteria that following three conditions in those one is overwhelming movement control and another is making a foundation of crisis vehicle like rescue vehicle and VIP vehicle. In this paper we will actualize a sensor organizes work which is utilized to identify the movement thickness and furthermore utilize RFID peruser and labels. We utilize ARM7 framework on-chip to peruse the RFID labels connected to the vehicles. It checks number of vehicles that passes on a specific way amid a predefined span. In the event that the RFID label read has a place with the stolen vehicles. GSM SIM300 utilized for message send to the police control room. Furthermore, when an emergency vehicle moving toward the intersection, it will impart the activity controller in the intersection to turn on the green light. This module utilizes Zigbee modules on CC2500 [1]. Canny Traffic Control and Management System which utilizes savvy parts like RFID, IR sensors, microcontroller, and so forth.

III. DESIGN OF HARDWARE

This chapter briefly explains about the Hardware of Smart Traffic Control System for Emergency Vehicles.

3.1 MICROCONTROLLERS: The AT89C51 is a low-voltage, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51

is a powerful microcomputer, which provides a highly flexible and cost-effective solution to many embedded control applications.

In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

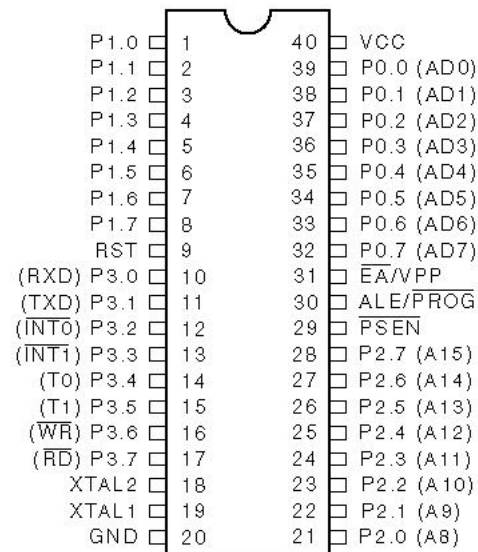


Fig: Pin diagram

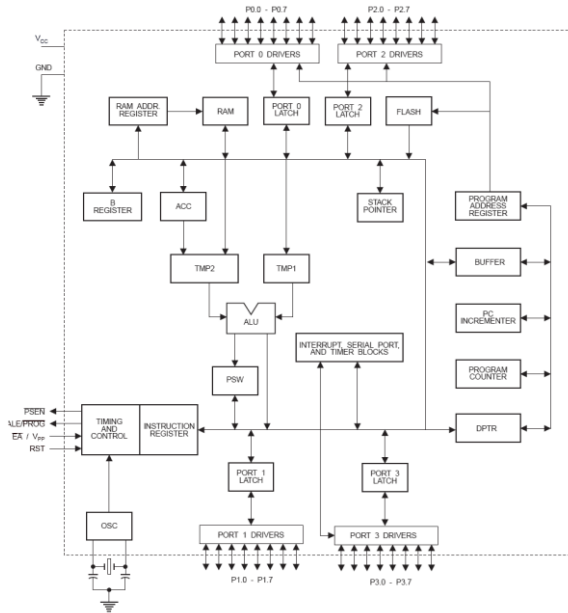


Fig: Block diagram
3.2. POWER SUPPLY

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as “Regulated D.C Power Supply”.

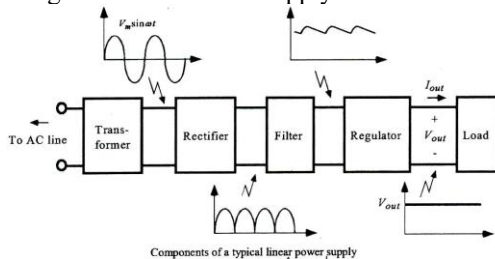
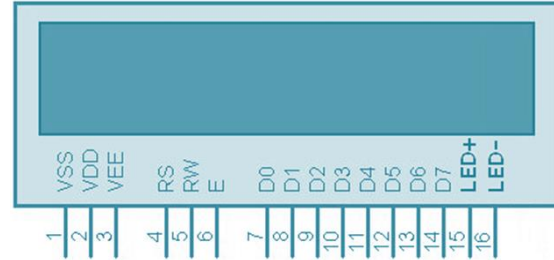


Fig: Power Supply

3.3 LCD

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers



3.4 IR SENSOR

Infrared is a energy radiation with a frequency below our eyes sensitivity, so we cannot see it Even that we can not "see" sound frequencies, we know that it exist, we can listen them.



Even that we can not see or hear infrared, we can feel it at our skin temperature sensors. When you approach your hand to fire or warm element, you will "feel" the heat, but you can't see it. You can see the fire because it emits other types of radiation, visible to your eyes, but it also emits lots of infrared that you can only feel in your skin.

3.5 LED:

LEDs are semiconductor devices. Like transistors, and other diodes, LEDs are made out of silicon. What makes an LED give off light are the small amounts of chemical impurities that are added to the silicon, such as gallium, arsenide, indium, and nitride.

When current passes through the LED, it emits photons as a byproduct. Normal light bulbs produce light by heating a metal filament until it is white hot. LEDs produce photons directly and not via heat, they are far more efficient than incandescent bulbs.



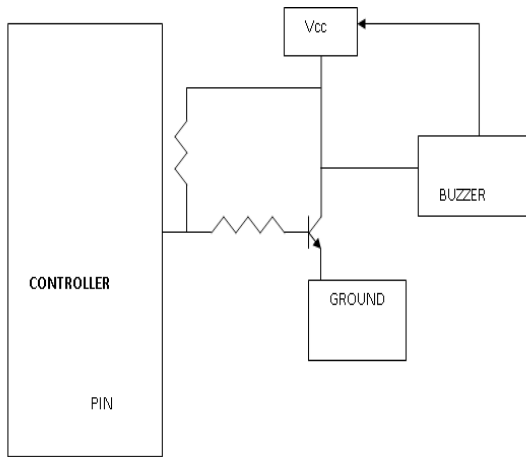
Fig : Typical LED

Not long ago LEDs were only bright enough to be used as indicators on dashboards or electronic equipment. But recent advances have made LEDs bright enough to rival traditional lighting

technologies. Modern LEDs can replace incandescent bulbs in almost any application.

3.6BUZZER DRIVER CIRCUIT:

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.



The sensors used can be of the IR / LASER type for the Through Beam type sensor or Inductive type Metal sensors. This project will also employ a remote control in the hands of the traffic policeman to override any of the signals being chosen by the PC by default. The Transmitters work on 433 MHz Carrier Frequency and our model will employ one set of Transmitter and Receivers, for the information transfer. The front End will be made in Visual Basic and using the Serial or the Parallel port will establish the communication with the Micro-Controller. For Serial Port Communication we will use RS232 Protocol.

Limitations of this Circuit:

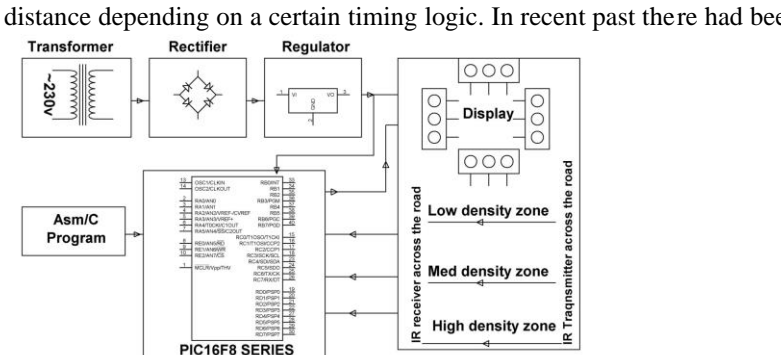
- IR sensors sometimes may absorb normal light also. As a result, traffic system works in improper way.
- IR sensors work only for fewer distances.
- We have to arrange IR sensors in accurate manner otherwise they may not detect the traffic density.

IV.PROJECT DISCRIPTION

There has been a need to automatically control things from a distance depending on a certain timing logic. In recent past there had been distribute the traffic in such way that the traffic management should be balanced. To overcome this problem we are designing a system, which can control the traffic according to the density of vehicles. A Micro-Controller and a Personal Computer in which all timing related details are fed to the PC and then the control signals are passed to a 89C51 based board which in-turn controls the various lights.

This project of ours features Bi-Directional flow of information from and to the Base Station. Sensors are connected to the Micro controller, which sends the information as to which path should be open. According to the vehicle density information corresponding signal lights should glow to pass the traffic. Thus vehicle density based traffic signal is indispensable for accurate services. Standing at the signal for long duration consumes more petrol and time. The aim of this project is to save time, save money and petrol and make the traffic management accurate.

BLOCKDIAGRAM



SYSTEM DESIGN

Designing of this system is possible when you select the specific controller to suite. For this we selected 89S52 controller. With the help of 89S52 controller traffic control system can be implemented successfully with the help IR technology. To the

controller we connected IR transmitter and receiver circuit. Instead of IR transmitter and receiver we can go with photo diode and photo transmitters also. Here we are using four IR pairs for each side.

When ever vehicles reach the junction on each side, then IR detects the vehicle by sending signal to controller and the controller will counts the count of vehicles. And calculate the maximum count from them and give the path to side which has maximum count by glowing green LED and other three sides red LED shall be glow.

V.CONCLUSION

Nowadays, traffic congestion is a main problem in major cities since the traffic signal lights are programmed for particular time intervals. However, sometimes the demand for longer green light comes in at the one side of the junction due to huge traffic density. Thus, the traffic signal lights system is enhanced to generate traffic-light signals based on the traffic on roads at that particular instant. The advanced technologies and sensors have given the capability to build smart and intelligent embedded systems to solve human problems and facilitate the life style. Our system is capable of estimating traffic density using IR sensors placed on either side of the roads. Based on it, the time delay for the green light can be increased and we can reduce unnecessary waiting time. The whole system is controlled by 8051 microcontroller. The designed system is implemented, tested to ensure its performance and other design factors.

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