

# Intelligent Traffic Management for Ambulance and VIP Vehicles

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**ABSTRACT** - Now a days considering the fast moving world scenario especially in large cities many service get delay due to traffic jams. Ambulance service is one of the crucial services that get delay very often. It is possible to propose dynamic time-based coordination schemes where the green signal time of the traffic lights is assigned based on the present conditions of traffic. This is achieved by using 3 pair of IR sensors (Transmitter and Receiver) across the road to monitor a particular length / zone while vehicles on the same zone block the IR light falling on the IR receiver to assume low traffic density. This system will implementing based on present criteria that tracking three conditions in those one is heavy traffic control and another one is making root of emergency vehicle like ambulance and VIP vehicles.

**Key Words:** IR sensors, Traffic control system, Traffic light controller (microcontroller AT89S52), RF transmitter and receiver.

## 1. INTRODUCTION

### 1.1 OVERVIEW

Traffic congestion is a severe problem in many major cities across the world. The traffic congestion can also be caused by large Red light delays, etc. The delay of respective light is hard coded in the traffic light and it is not dependent on traffic. Therefore for simulating and optimizing traffic control to better accommodate this increasing demand is arises .One of the major problems faced by heavy traffic is by Ambulances. As we all know that Ambulances are the most important medical means of transport in any country as they carry patients to the nearby hospitals. But due to heavy traffic, one can often see the Ambulances stuck in traffic for long durations thus causing danger to patient's life.

### 1.2 AIM

Our project aims to solve this problem of Ambulances and VIP vehicles. When an Ambulance and VIP vehicles arrives, its corresponding lane traffic light becomes green and all the others become red, thus paving traffic less way for the Ambulance and thus helping it to reach the hospital swiftly. This is possible by the use of RF transmitters and Receivers.

## 2. HARDWARE DETAILS:

### 2.1. MICROCONTROLLER:

#### Features of microcontroller 89c51:

There are some important features of microcontroller which are given below,

- The 89c51 is compatible with MCS 51 family.
- It has 8 bit data bus and 8 bit (arithmetic logic unit).
- It has 4k bytes of on chip reprogrammable flash memory.
- It supported three level program memory lock.
- It has 16 bit of address bus and 64 kb of RAM (random access memory) and ROM (read only memory).
- It has on chip RAM 128 bytes data memory.
- It has four 8 bit bidirectional input or output ports that is 32 programmable input or output lines.

- It can execute 1 million one cycle instructions per second with a clock frequency of 12MHz.
- It has one UART programmable serial ports.
- It has six interrupts source.
- It has two multimode 16 bit timers.
- It has two level interrupts priority.
- It has power saving mode.

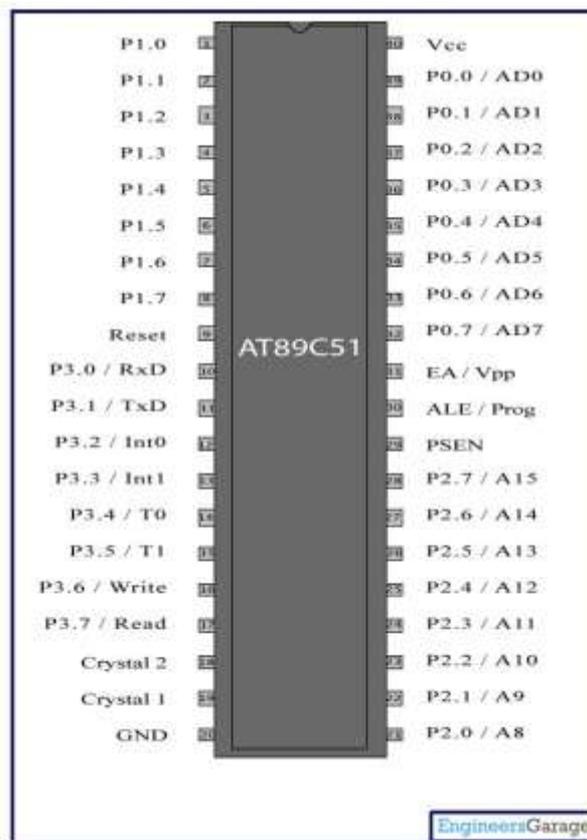


Fig.2.1 Microcontroller AT89C51

## 2.2 IR LED

Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion 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.

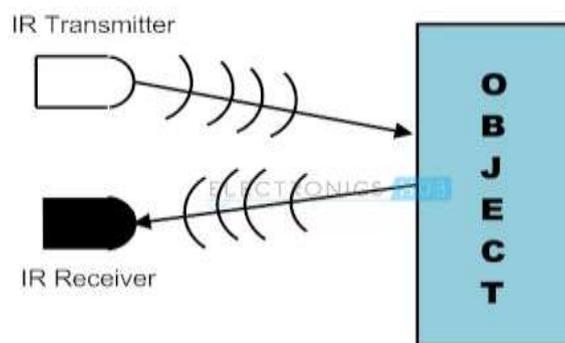
- Near infrared region — 700 nm to 1400 nm — IR sensors, fiber optic
- Mid infrared region — 1400 nm to 3000 nm — Heat sensing
- Far infrared region — 3000 nm to 1 mm — Thermal imaging

The frequency range of infrared is higher than microwave and lesser than visible light.

For optical sensing and optical communication, photo optics technologies are used in the near infrared region as the light is less complex than RF when implemented as a source of signal. Optical wireless communication is done with IR data transmission for short range applications. An infrared sensor emits and/or detects infrared radiation to sense its surroundings. The working of any Infrared sensor is governed by three laws: Planck's Radiation law, Stephen – Boltzmann law and Wien's Displacement law. The basic concept of an Infrared Sensor which is used as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.



**Fig.2.2.1 IR LED**



**Fig 2.2.2 concept of IR**

**2.3 PHOTODIODE:**

A photodiode is a type of photo detector capable of converting light into either current or voltage, depending upon the mode of operation.

Infrared receivers are also called as infrared sensors as they detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photo diodes as they detect only infrared radiation. The picture of a typical IR receiver or a photodiode is shown below.

**Distinguishing Between Black and White Colors:**

It is universal that black color absorbs the entire radiation incident on it and white color reflects the entire radiation incident on it. Based on this principle, the second positioning of the sensor couple can be made. The IR LED and the photodiode are placed side by side. When the IR transmitter emits infrared radiation, since there is no direct line of contact between the transmitter and receiver, the emitted radiation must reflect back to the photodiode after hitting any object. The surface of the object can be divided into two types: reflective surface and non-reflective surface. If the surface of the object is reflective in nature i.e. it is white or other light color, most of the radiation incident on it will get reflected back and reaches the photodiode. Depending on the intensity of the radiation reflected back, current flows in the photodiode.

If the surface of the object is non-reflective in nature i.e. it is black or other dark color, it absorbs almost all the radiation incident on it. As there is no reflected radiation, there is no radiation incident on the photodiode and the resistance of the photodiode remains higher allowing no current to flow. This situation is similar to there being no object at all.



**Fig2.3 Photodiode**

## **2.4 RF TRANSMITTER & RECEIVER:**



**Fig 2.4 RF transmitter and receiver**

Basically the RF modules are 433 MHz RF transmitter and receiver modules. The transmitter draws no power when transmitting logic zero while fully suppressing the carrier frequency thus consume significantly low power in battery operation. When logic one is sent carrier is fully on to about 4.5mA with a 3volts power supply. The data is sent serially from the transmitter which is received by the tuned receiver. Transmitter and the receiver are duly interfaced to two microcontrollers for data transfer.

## **3. SOFTWARE DETAILS:**

Here is some software which is used in proposed system.

### **3.1. KEIL MICROVISION :**

Installation using the web download 1. Download the product from [www.keil.com/demo](http://www.keil.com/demo) 2. Run the downloaded executable 3. Follow the instructions displayed by the SETUP program Installation from CD-ROM 1. Insert the CD-ROM into your CD-ROM drive. The CD-ROM browser should start automatically. If it does not, you can run SETUP.EXE from the CD-ROM. 2. Select Install Products & Updates from the CD Browser menu 3. Follow the instructions displayed by the SETUP program Product Folder Structure The SETUP program copies the development tools into subfolders. The base folder defaults to C:\KEIL\. The following table lists the default folders for each microcontroller architecture installation. Adjust the examples used in this manual to your preferred installation directory accordingly.

Requesting Assistance At Keil, we are committed to providing you with the best embedded development tools, documentation, and support. If you have suggestions and comments regarding any of our products, or you have discovered a problem with the software, please report them to us, and where applicable make sure to: 1. Read the section in this manual that pertains to the task you are attempting 2. Check the update section of the Keil web site to make sure you have the latest software and utility version 3. Isolate software problems by reducing your code to as few lines as possible If you are still having difficulties, please report them to our technical support group. Make sure to include your license code and product version number. See the Help – About Menu. In addition, we offer the following support and information channels, all accessible at

www.keil.com/support1 . 1. The Support Knowledgebase is updated daily and includes the latest questions and answers from the support department 2. The Application Notes can help you in mastering complex issues, like interrupts and memory utilization 3. Check the on-line Discussion Forum 4. Request assistance through Contact Technical Support (web-based E-Mail) 5. Finally, you can reach the support department directly via support.intl@keil.com or support.us@keil.com

8051 Development Tool Support The Keil C51 Compiler and the Keil Linker/Locator provide optimum 8051 architecture support with the following features and C language extensions. Interrupt functions with register bank support are written directly in C Bit and bit-addressable variables for optimal Boolean data type support Compile-time stack with data overlaying uses direct memory access and gives high-speed code with little overhead compared to assembly programming Reentrant functions for usage by multiple interrupt or task threats Generic and memory-specific pointers provide flexible memory access Linker Code Packing gives utmost code density by reusing identical program sequences Code and Variable Banking expand the physical memory address space Absolute Variable Locating enables peripheral access and memory sharing.

## 2.2. PROTEUS:

Proteus is software for microprocessor simulation ,schematic capture ,and printed circuit board (PCB)design. It is developed by lab center electronics. Proteus 8 is a best simulation software foe various designs with microcontroller.It is mainly popular because of availability of almost all microcontrollers in it. So it is handy tool to test programs .You cn simulate your programming of microcontroller in proteus 8 simulation software. After simulating your circuit in proteus 8 software you can directly make PCB design with it so it could be a all in one package for students and hobbyists. So I think now you have a little bit idea about what is proteus software.

## 2.3. EXPRESS PCB :

It starts by downloading our New free CAD software Express PCB Plus. It includes ExpressSCH Classic for drawing schematics and ExpressPCB Plus for circuit board layout. Both programs are completely free,fully functional and easily installed with a single Install Shield setup program. Learning to use this software is fast because of its standardized windows user interface. It is recommended to begin our project by drawing a schematic. While not required,it will save our time when designing our PCB. Drawing a schematic with the ExpressSCH program is as easy as placing the components on the page and wiring the pins together. Designing two or four layer boardsusing the ExpressPCB Plus program is very simple. It starts by inserting the component foot prints,then drag them into position. Next, connect the pins by drawing the traces.

## 4. SYSTEM DESIGN:

### 4.1 POWER SUPPLY:

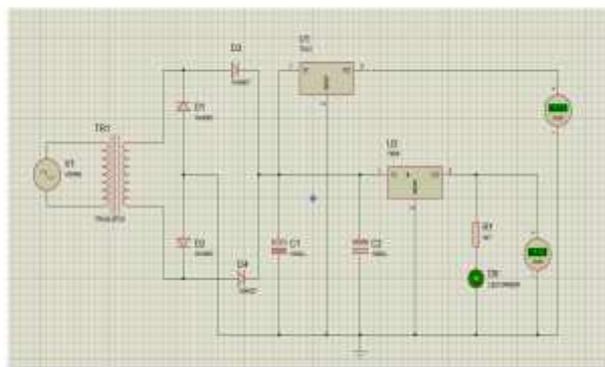
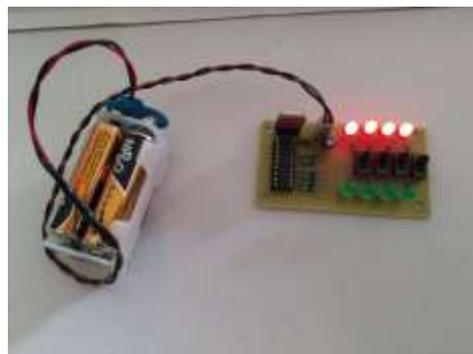


Fig.4.1.1 power supply section

#### 4.2 MODEL:



Receiver section



Transmitter section

#### 5. BLOCK DIAGRAM:

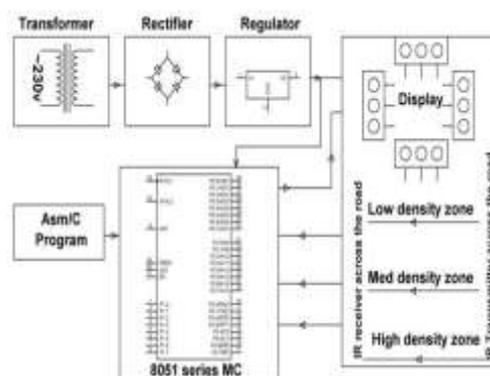


Fig.5.1 Block diagram

#### Block diagram description:

The output of power supply which is 5v connected to the 40th pin of MC & Gnd is connected to the 20th pin. The input is given to port 2 of MC and the output of MC i.e., port 0 and port 1 is given to LED's.

Pin 0.0 of port 0 of MC is connected to D4 i.e., Red LED,

Pin 0.1 of port 0 of MC is connected to D5 i.e., Yellow LED,

Pin 0.2 of port 0 of MC is connected to D6 i.e., Green LED,

Pin 0.3 of port 0 of MC is connected to D3 i.e., Green LED,

Pin 0.4 of port 0 of MC is connected to D5 i.e., Yellow LED,

Pin 0.5 of port 0 of MC is connected to D1 i.e., Red LED,

Pin 2.0 of port 0 of MC is connected to Q3 i.e., photodiode

Pin 2.1 of port 0 of MC is connected to Q4 i.e., photodiode

Pin 2.2 of port 0 of MC is connected to Q10 i.e., photodiode

And Q5 also connected to Q5 i.e., photodiode

Pin 2.3 of port 2 of MC is connected Q2 i.e., photodiode.

Pin 2.4 of port 2 of MC is connected to Q1 i.e., photodiode pin 1.0 of MC is connected to D8 i.e., Red LED pin 1.1 of port 1 of MC is shorted to Q5 and also connected to D10 i.e., yellow LED. Pin 1.2 of port 1 of MC is connected to D12 i.e., Green LED pin 1.3 of port 1 of

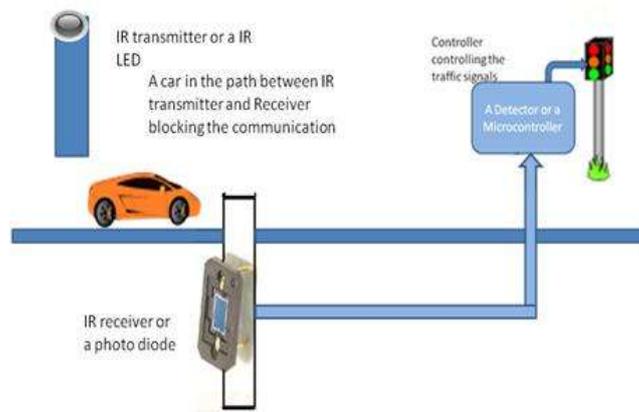
MC is connected to D11 i.e., Green LED pin 1.4 of port 1 of MC is connected to D9 i.e., yellow LED pin 1.5 of port 1 of MC is connected to D7 i.e., Red LED.

IR diode is connected through a resistance to the dc supply. A photo diode is connected in reverse biased condition through a potential divider of a 10k variable resistance and 1k in series to the base of the transistor. While the IR rays fall on the reverse biased photo diode it conducts that causes a voltage at the base of the transistor. The transistor then works like a switch forcing the collector going to ground. Once the IR rays are obstructed the driving voltage is not available to the transistor thus its collector goes high. This low to high logic can be used for the microcontroller input for any action as per the program.

The project uses the IR interruption concept for providing logic state change to the input of the MC as explained above. The project uses a number of IR diodes facing photodiodes. Thus the transistors Q1, Q2, Q3, Q4, Q5 are in conducting state. As the collector of those transistors are connected to corresponding port pins form as an input for the program to the executed based on change of logic state.

Twelve number of LEDs representing as signal lights are connected to the output of the MC in sink mode to port '0', port 1 & port 2. While all the input coming from Q1 to Q5 are in logic low state, the output LEDs i.e., 3 per junction that is Red, Amber & Green of each side way of a four traffic junction follow switch ON green timing in fixed intervals in a sequential clockwise direction. Thus during low traffic density in one of the way, fixed green timing for each way in a junction are provided. While any one of the way is blocked with more no. of vehicles, the IR blocking happens. There are three zones with three set of IR sensing arrangement. In this project the transistors Q1 to Q5 go high because of IR interruption while the vehicle comes in between the photodiode & the IR diode.

This logic high sensed at the MC input changes the green ON time to a higher value for allowing more vehicles to pass through. After sometime similarly any other way gets more traffic, the sequential timing gets automatically increased for that way. Each way is divided into 3 active zones, each zone representing some specific length. Based on the IR interruption the green ON time increases, thus more the vehicle longer will be the green signal time. Thus dynamic time control is achieved based on the traffic density. Full circuit is produced below.



### Sensors mounted on the Poles:

It can be a simple IRLED-Photodiode arrangement or a video detection unit which can detect the presence of vehicles. This works on the principle that when a car passes between the IR transmitter and IR receiver, the IR light is blocked and as the result the resistance of the photodiode increases. This change in resistance can be converted to electrical pulses, used to control the traffic lights.

### 6. FLOW CHART:

Fig shows the system flow chart of proposed system which will indicates the actual flow of proposed system to gain the appropriate result

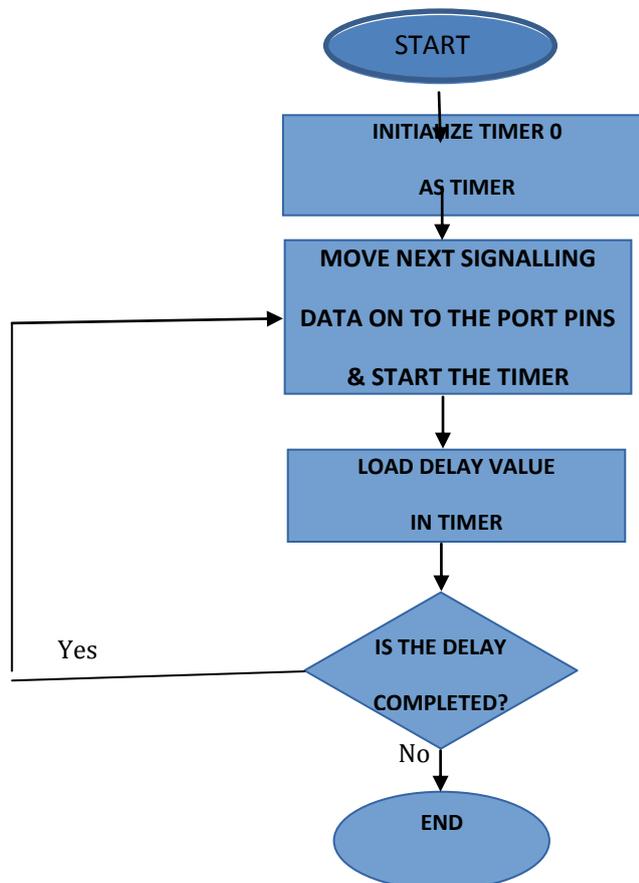


Fig.6.1 Flow Chart

## 7. CONCLUSION & FUTURE SCOPE

The proposed work considers not only the priority of the vehicles but also the density of the vehicles on the road and controls the traffic light sequence efficiently. Also as a future scope the condition of patient can be monitored this information is send to the respective doctor. So that doctor can prepare for the next process before the patient reach to the hospital. Traffic lights can be increased to n number and traffic light control can be done for whole city by sitting on a single place.

## 8. ACKNOWLEDGEMENT

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## 9. REFERENCES

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