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# Traffic Signal Controlling By Barrier Using PIC 18F4550

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**ABSTRACT**: Traffic congestion is one of the major problems all over the world especially in densely populated metro cities like Mumbai and Delhi where number of vehicles running on the road are more than the capacity of road itself. Due to severe amount of traffic a lot of productive time of people working is spent on the streets which directly affect the economy of that region. Since the number of people owning a vehicle is increasing day by day there is a need to adopt a smart solution for handling traffics, avoiding breakage of traffic rules and thereby decreasing road accidents and mishaps. This paper gives an idea about how traffic can be managed in big metro cities having many lanes by barrier system using PIC 18F4550 as well as prevents the people from breaking the traffic regulation rules and making them face with more stringent action. This system can be applied in areas having cross road junction which are very busy and experience tremendous amount of traffic load. This traffic signal controlling system is different than system already existing in some of major cities in world because the people driving are bound to maintain the traffic rules and there is negligible margin for error in the system.

**KEYWORDS:** Traffic Congestion, Cross Road Junction, Barrier System, PIC 18F4550.

## I. INTRODUCTION

Traffic signals are used to control the flow of vehicles. In the recent years, the need of transportation has gain immense importance for logistics as well as for common human. This has given rise to the number of vehicles on the road. Due to this reason, traffic jams and road accidents are a common sight in any busy city. Nowadays people don't follow the traffic rules sometimes. Stopping at red signal isn't mandatory for them. People keep moving even though red signal is visible to them and this causes accidents. To overcome this problem we thought of the new system for traffic management. In this we introduced the idea of blocking the road by using wood panel barrier when red signal comes up. There are different ways of controlling road intersections. The simplest case is the right-hand rule or if the traffic is higher, a roundabout or the signal of a policeman can help steer the traffic. However, especially in big cities, in complicated cases when the roads in the intersection have several lanes, the use of traffic lights cannot be avoided. An additional issue arises when there is intersection not only between roads but also between railroad tracks and roads, what often occurs in suburban traffic situations. The most common way to handle this type of intersection is the conventional cyclic lights control. More enhanced way of controlling the traffic in different directions is monitored by sensors and the signals. Thus we can obtain control of traffic lights. Traffic control barricades are on the other hand sign & signal device used to guide and control traffic includes pedestrians, motor & car drivers. Usually placed adjacent or over or along the cross road junction, highways & other public areas. Mainly used to warn drivers and pedestrians for guiding in a work zone and to redirect traffic on high speed roads. In case of four way road it is really very much important to control traffic in a manageable way [1]. This research addresses the traffic control problem and hence proposes an intelligent traffic control system by using PIC 18F4550 based barricade. The whole system is also kept under surveillance by the traffic board authority to prevent corruptions occurring within the region.

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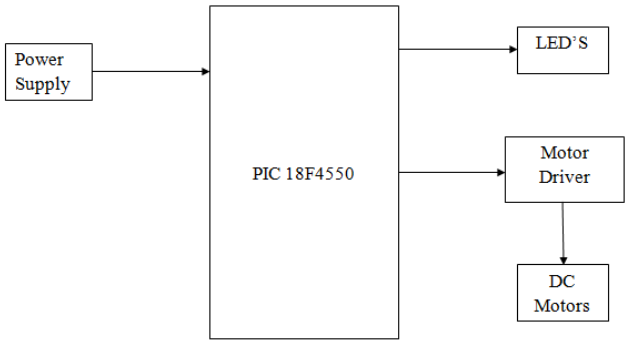


Fig.1.Block diagram of the system

The above figure shows the complete block diagram of the system to be implemented. An external power supply is applied to PIC18F4550 which is used to drive the motor at different times. There are three led's(traffic signals) in the system that indicate the system to be controlled by motor and it depends on which led is glowing and their respective action is performed accordingly. The traffic signals are controlled using PIC18F4550 microcontroller. The DC motors are connected to the controller. When the traffic signal becomes red the DC motor starts rotating and the panel comes up and blocks the roads and prohibits vehicles on moving further. When the signal becomes yellow the DC motor starts rotating in opposite direction and this brings the panel down. When the signal becomes green the roads are finally free and vehicles start moving. This cycle repeats on all roads thus preventing the accidents.

## II.RELATED WORK

This system takes ideas from other systems which have already been implemented earlier. It is an extension of already existing traffic control system. But here the system is making use of a low cost microcontroller PIC 18F4550 which makes the programming easy and cuts down the cost per device. The system accuracy is also very high due to immediate response time of PIC 18F4550. This accuracy is very crucial for the system since half a second up or down can cause damage which can lead to road collisions. This process is highly efficient as well as reliable for working out the traffic congestions and preventing the breakage of traffic rules.

## III.SYSTEM DESIGN AND DESCRIPTION

The system consists of various hardware components. Some of the main components are described below:-

*1)* PIC 18F4550 (Microcontroller):

PIC 18F4550 is s 40 pin, high performance, enhanced flash usb microcontroller with nanoWatt technology. It's USB features are USB V2.0 Compliant SIE, Low-speed (1.5 Mb/s) and full-speed (12 Mb/s), Supports control, interrupt, isochronous and bulk transfers, Supports up to 32 endpoints (16 bidirectional), 1-Kbyte dual access RAM for USB, On-board USB transceiver with on-chip voltage regulator, Interface for off-chip USB transceiver, Streaming Parallel Port (SPP) for USB streaming transfers, Five Crystal modes, including High-Precision PLL for USB, Two External RC modes, up to 4 MHz , Two External Clock modes, up to 40 MHz. PIC 18F4550 Microcontroller has High current sink/source: 25 mA/25 mA, Three external interrupts, Four Timer modules (Timer0 to Timer3), Master Synchronous Serial Port (MSSP) module supporting 3-wire SPI (all 4 modes) and I2C Master and Slave modes, 10-bit, up to 13-channels Analog-to-Digital Converter module (A/D) with programmable acquisition time. Some of the special features C compiler optimized architecture with optional extended instruction set, 100,000 erase/write cycle Enhanced Flash program memory typical, 1,000,000 erase/write cycle data EEPROM memory typical, Programmable Code Protection [2].

2) LM 293D (Motor Driver):

The L293D is a quadruple high-current half-H driver designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. It is designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. When an enable input is high,

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the associated drivers are enabled, and their outputs are active and in phase with their inputs. External high-speed output clamp diodes should be used for inductive transient suppression. When the enable input is low, those drivers are disabled, and their outputs are off and in a high-impedance state. The L293D is designed for operation from 0°C to 70°C [3].

3) LM 7805 (Voltage Regulator):
LM 7805 Series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators [4].
.
The system also requires a dc motor of 100rpm, led's for indication purpose, resistors of 47ohm, 1k ohm, 10k ohm as well as capacitors of 22uF, 470uF, 1000uF.

The circuit diagram of traffic control system is given in the figure below:-

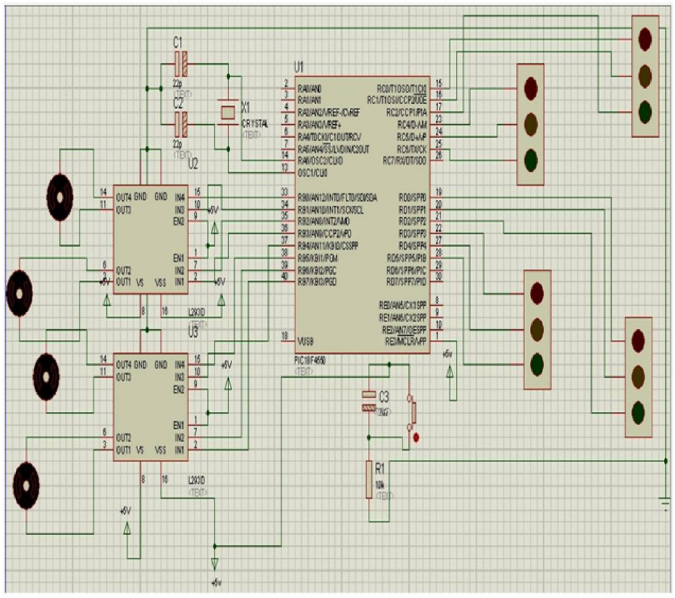


Fig.2.Circuit Diagram

In the above circuit we use PIC 18F4550 microcontroller, motor driver ic's, dc motors and LEDs. We also use 12v dc adapter and this 12v dc is converted into 5v dc using LM7805 ic and it is provided to the whole circuitory.PIC 18F4550 is used for further operation. Port B of PIC 18F4550 is used for motor driver ic (L293D).Port C&D are used for indicating the led's.

## IV.IMPLEMENTATION

In all there are four signals which consist of red, green& yellow led's at each of the lane of cross road. Out of four signals, first signal green led is lit up and rest all other are red and at that time first barrier is lifted down and all other are lifted up and vehicle of first lane are allowed to move. After a predefined interval of time, second signal green led is lit up and rest all other are red and at that time second barrier is lifted down and all other are lifted up and vehicle of second lane are allowed to move. Again after a predefined interval of time, third signal green led is lit up and rest all

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other are red and at that time third barrier is lifted down and all other are lifted up and vehicle of third lane are allowed to move. Lastly for a predefined interval of time, fourth signal green led is lit up and rest all other are red and at that time fourth barrier is lifted down and all other are lifted up and vehicle of fourth lane are allowed to move. This is a continuous process which goes on with a predefined time delay for each lane in clockwise direction.

Fig.3.Implementation Circuitry of Complete System

The traffic signal system using barrier is initially simulated on Proteus Software. The PIC 18F4550 Microcontroller programming has been firstly implemented in MPLABV2.0. After the required debugging the hex codes have been transferred to PIC Loader V2.0 which assigns the assembly language program into the PIC 18F4550 used in the physical device. The program to be implemented in MPLABV2.0 is given in appendix 1 below.

## V. RESULTS

The final fabricated circuitry of traffic signal controlling using both PIC 18F4550 and motor driven circuit is as shown in figure:-

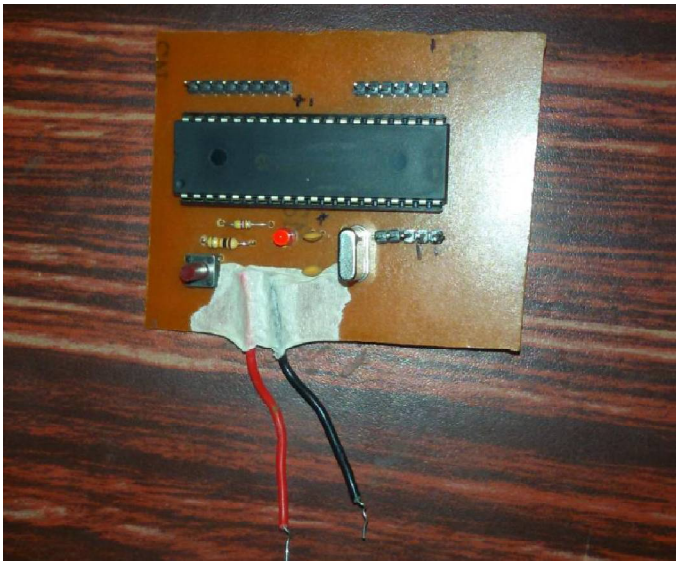

Fig.4.Final fabricated circuit (PCB Board)

The above figure shows the final fabricated circuit of PIC18F4550 with components attached to it.

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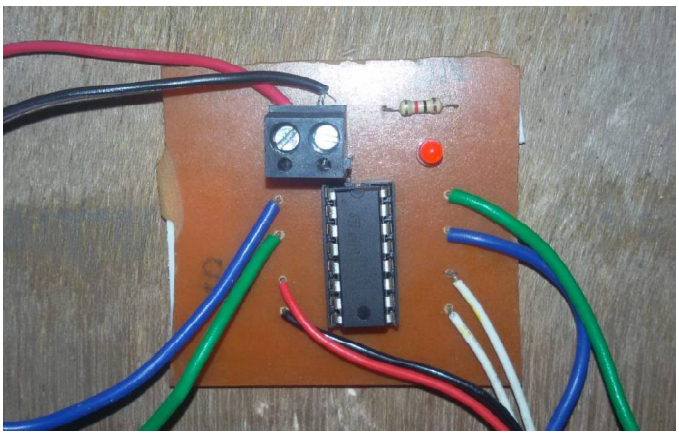

Fig.5.Final fabricated circuit (PCB Motor Driven)

Both Fig.4 and Fig.5 which are results of the traffic signal controlling system are implemented in the model of Implementation circuitry as shown in Fig.3.

## VI.LIMITATIONS

In today's world speed is the ultimate word. Everyone is running a rat race and people definitely prefer to spend more time and utilize their energy in doing their respective professional and personal work rather than wasting both their valuable time and energy in commuting on road [5].The traffic signalling control system using barrier has certain limitations. In case of emergency and vip vehicles same system cannot be implemented since barrier won't detect vehicles with importance. To overcome this limitation the method used for emergency vehicle over-ride is using RFID tags which are attached to the front side of vehicle as well as providing the barricades with RFID tag reader so that the emergency and vip vehicle can pass easily through it. This can lead to advancement in existing system and will be beneficial to both the government as well as public. This will in turn increase the efficiency as well as the reliability of developed system.

## VII.CONCLUSION

The Traffic Signal Control System using barricades is developed by keeping in mind that it is for use of general public so it is user friendly and efficient. It is very effective way of optimizing the traffic and can be used for real time applications. This system is most suitable to control traffic congestion and reducing accidents for four way roads. It also provides orderly movement of traffic, safety assurance and provides drivers confidence by assigning him the right way. This proposed system will be help a developed country to manage traffic jams more appropriately and systematically.

## Appendix 1

```
#include<p18f4550.h>
#include<stdio.h>
void MSdelay(unsigned int itime);
void main()
{
TRISD=0x00;
TRISB=0x00;
while(1)
{
LATD=0x56;
MSdelay(3000);
LATD=0x59;
```

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```
MSdelay(3000);
LATD=0x65;
LATB=0x01;
MSdelay(1000);
LATB=0x00;
MSdelay(3000);
LATB=0x02;
MSdelay(1000);
LATB=0x00;
LATD=0x95;
LATB=0x08;
MSdelay(1000);
LATB=0x00;
MSdelay(3000);
LATB=0x04;
MSdelay(1000);
LATB=0x00;
}
}
void MSdelay(unsigned int itime)
{
unsigned int i,j;
for(i=0;i<itime;i++)
for(j=0;j<1200;j++)
}
```

## ACKNOWLEDGEMENT

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