NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

BACHELOR OF ENGINEERING IN ELECTRICAL AND ELECTRONIC ENGINEERING

"MINI PROJECT REPORT" TITLE: "DYNAMIC SIGNAL LIGHT TIMINGS ON TRAFFIC DENSITY"

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CERTIFICATE

Certified that the mini project work entitled "DYNAMIC SIGNAL LIGHT TIMINGS ON TRAFFIC DENSITY" Carried out by Ramesharaja Ursu K R –1NH19EE407, Ananda M A – 1NH18EE702, MOHAMMED SUFIYAN – 1NH18EE730, are bonafide students of New Horizon College of Engineering submitted the report in completion of project at department of Electrical and electronics engineering, New Horizon College of engineering during the academic year 2019-2020. It is certified that all the correction/suggestions indicated for internal assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfied the academic requirements' in respect of project work prescribed for said degree.

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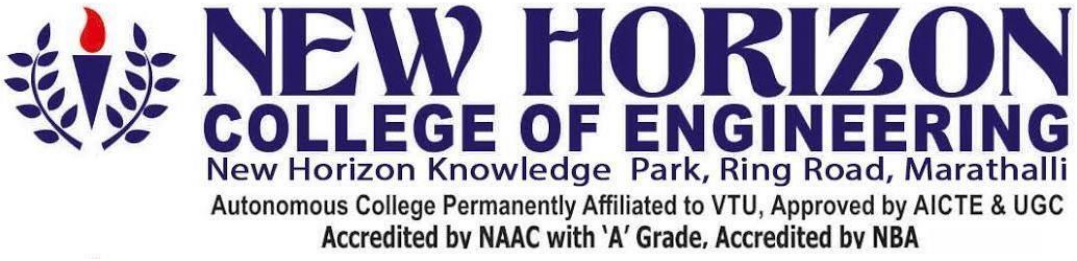

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We are highly indebted to our project guide Mr. Mohan for their guidance and constant supervision as well as for providing necessary information regarding the project and also for their support in completing the project.

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Finally, we would like to thank God for giving us an opportunity to study in this institution

CHAPTER 1:-INTRODUCTION.

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. So, in order to overcome this problem, we will go for density based traffic light timing control system. This article discusses how to control the traffic based on density. The proposed system uses IR sensors to calculate the traffic density. We have to place one IR sensor on every road; where the sensor always senses the traffic on that specific road. All these sensors are interfaced to the microcontroller Based on the sensors, microcontroller detects the traffic and controls the traffic system.

The traffic control system project is to solve traffic congestion, To solve the problem, we have designed a framework for a dynamic and automatic traffic light control system and developed a simulation model with codes to help to build the system on hardware.

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 pairs 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.

As there are 3 zones only, it is immaterial if vehicles are parked side by side. As it crosses the zone, the green time automatically changes as programmed.

CHAPTER 2:-COMPONENTS AND DESCRIPTION.

Hardware specifications: 1)

8051 microcontroller.

2) Resistor.

3) IR Transmitter Receiver.

4) Transformer.

5)Capacitors.

6) IR LED.

7) Transistors.

8)Diodes.

9) Crystal oscillator.

10) Cable and connectors.

11)Push button.

12)IC

13)IC Soc

Software specifications.

1)keil µ vison IDE.

2) MC programming language:-Embedded C.

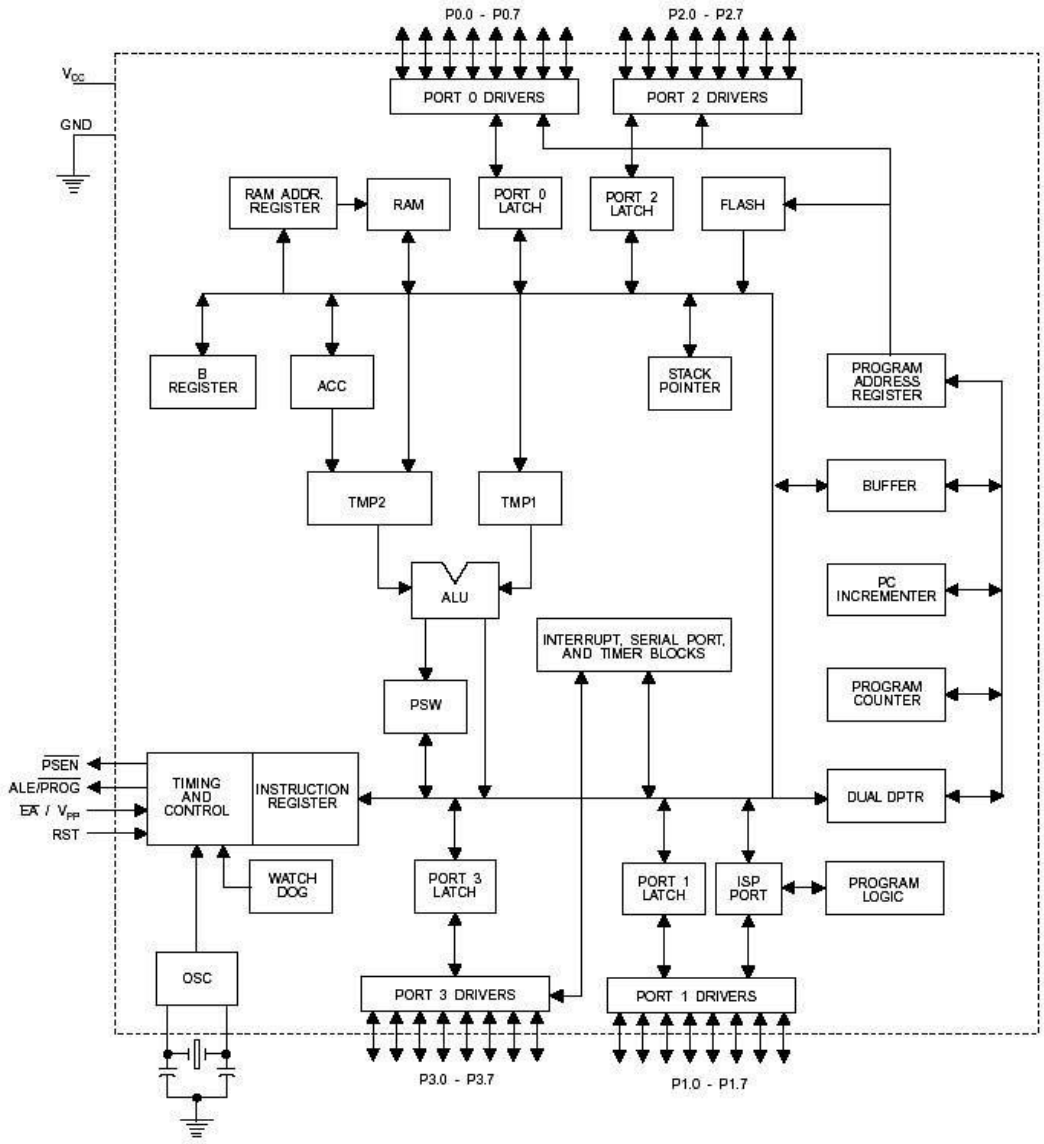
2.1 AT89S52 MICROCONTROLLER .

The AT89S52 is a low-power,high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable flash memory.The device is manufactured using Atmels highdensity non-volatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out.The on-chip flash allows the program memory to be reprogrammed in-system or by a conventiona lnonvolatile memory programmer.By combining a versatile 8 bit CPU with in system programmable flash on a monolithic chip,the Atmel AT89S52 is a powerful microcontroller which provides a highlyflexible and costeffective solution to many embedded control applications.

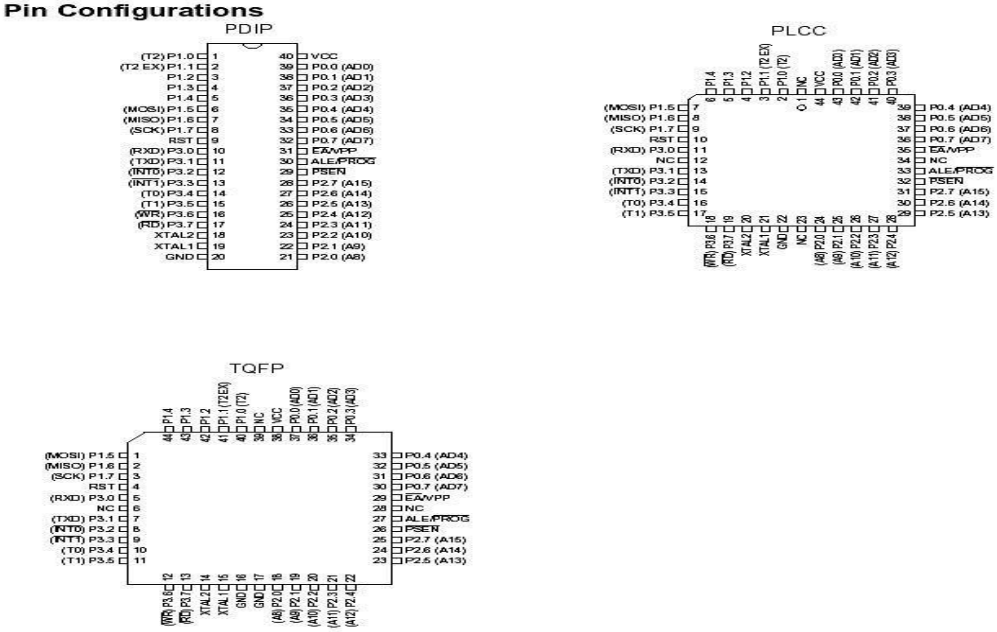
The AT89S52 provides the following standard features:8K bytes of flash,256 bytes of RAM,32 I/O lines ,Watch dog timer,two data pointers,three 16-bit timer/counters,a six-vector twolevel interrupt architecture,a full duplex serial port,on-chip oscillator,and clock circuitery.In addition, the AT89S52 is

designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.The idle modeI 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 interrupt or hardware reset.

Block Diagram



Pin Configurations



Pin description:-

Pin 40 provides supply voltage to the chip.The voltage source is + 5V.GND: Pin 20 provides ground. Port 0:Port 0 is an 8-bit open drain bidirectional I/O port.As an output port,each pin can sink eight TTL inputs.When 1s are written to port 0 pins,the pins can be used as high impedance inputs.Port 0 can also be configured to be the multiplexed low order address/data bus during accesses to external program and data memory.In this mode,P0 has internal pull up port 0 all receives the code bytes during flash programming and outputs the code bytes during program verification.External pull ups are required during program verification.

Port 1: Port 1 is an 8-bit bidirectional I/O port with internal pull ups.The port 1 output buffers can sink/source four TTL inputs.When 1s are written to port 1 pins,they are pulled high by the internal pull ups and can be used as inputs,port 1 pins that are externally being pulled low will source current (IIL)because of the internal pull ups.In addition,P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2EX),respectively ,as shown in the following table.

Port 1 also receives the low-order address bytes during flash programming verification.

Port Pin	Alternate Functions
P1.0	T2 (external count input to Timer/Counter 2), clock-out
P1.1	T2EX (Timer/Counter 2 capture/reload trigger and direction control)
P1.5	MOSI (used for In-System Programming)
P1.6	MISO (used for In-System Programming)
P1.7	SCK (used for In-System Programming)

Port 2:-Port 2 is an 8 bit bidirectional I/O p0rtbwith internal pull ups .The port 2 output buffers can sink/source four TTL inputs.When 1s are written to port 2 pins,they are pulled high by the internal pull-ups and can be use as inputs.As inputs, Port 2pins that are externally being pulled low will source current (IIL)because of the internal pull-ups.

Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external memory that uses 16-bit addresses(MOVX@DPTR). In this application,Port uses strong internal pull upswhen emitting1s.During accesses to external data memory that uses 8-bit addresses(MOVX@RI),Port 2 emits the contents of the P2 Special Function Register.Port 2 also receives the high order address bits and some control signals during flash programming and verification.

Port 3:-Port 3 is an 8-bit bidirectional I/O port with internal pull-ups.The Port 3 output buffers can sink/source four TTL inputs.When 1s are written to port 3 pins, they are pulled high bythe internal pullups and can be used as inputs.As inputs,Port 3 pins that are externally being pulled low willsource current (IIL)because of the pull-ups. Port 3 also service the functions of various special feauters of the AT89S52,as shown in the following table.

Port 3 also receivessome control signals for Flash programming and verification.

Port Pin	Alternate Functions
P3.0	RXD (serial input port)
P3.1	TXD (serial output port)
P3.2	$\overline{INT0}$ (external interrupt 0)
P3.3	$\overline{INT1}$ (external interrupt 1)
P3.4	T0 (timer 0 external input)
P3.5	T1 (timer 1 external input)
P3.6	$\overline{WR}$ (external data memory write strobe)
P3.7	$\overline{RD}$ (external data memory read strobe)

RST:- Reset input.A high on this pin for two machine cycles while the oscillator is running resets the device.This pin drives High for 96 oscillator periods after the Watchdog times out.The DISRTO bit in SFR AUXR (address 8EH) can be used to disable this feature.In the default state of bit DISRTO,the RESET HIGH out feature is enabled.

ALE/PROG:-Adress Latch Enable(ALE)is an output pulse for latching the low byte of the address during accesses to external memory.This pin is also the program pulse input (PROG) during flash programming.

In normal operation,ALE is emitted at aconstant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes.Note,however,that one ALE pulse is skipped during each access to external data memory.

If desired ,ALE operation can be disabled by setting birt 0 of SFR location 8EH.With the bit set,ALE is active only during a MOVX or MOVC instruction.Otherwise, the pin is weakly pulled high.Setting the ALE-disable bit has no effect if the microcontroller is in execute mode.

PSEN:-Program Store Enable (PSEN) is the read strobe to external program memory.When the AT89S52 is executing code from external program memory,PSEN is activated twice each machine cycle,except that two PSEN activations are skipped during each access to external data memory.

EA/VPP:-External access enable.EA must be strapped to GND in order to enable the device to fetch code from external pogram memory locations starting at 0000H up to FFFFH.

Note,however, that if lock bit 1 is programmed,EA will be internally latched on reset.EA should be strapped to VCC for internal program executions.This pin also receives the 12-volt programmingenable voltage(VPP) during flash programming.

XTAL1:-Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2:-Output from the invering oscillator amplifier.

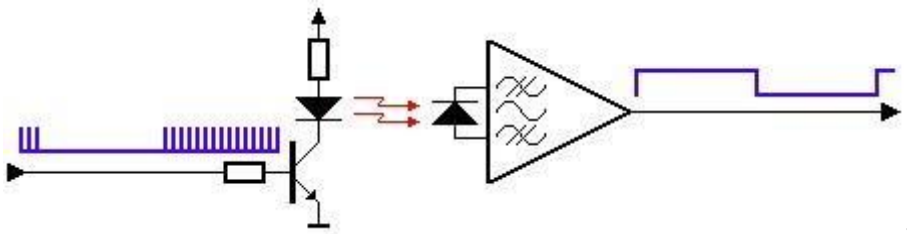
2.2 RESISTOR:

RESISTOR

Resistor offers a resistance to the flow of current and act as voltage dividers. We mostly use resistance in this range even though more power rating high value resistors are available. Resistors are “passive devices”, that is they contain n source of power or amplification but only attenuates or reduce the voltage signal passing through them. Resistance is the opposition that a substance offers to the flow of electric current. The standard unit of resistance is “ohm”.

2.3 TRANSMITTER

In the picture below we can see a modulated signal driving the IR LED of the transmitter on the left side. The detected signal is coming out of the receiver at the other side.In the picture below we can see amodulated signal driving the IR LED of the transmitter on the left side.The detected signal is coming out of the receiver at the other side.



:

IR TRANSMITTER

The transmitter usually is a battery power handset.It should consume as little power as possible,and the IR signal should also be as strong as possible to achieve an acceptable control distance.Preferably it should be shock proof as well.

Many chips are designed to be used as IR transmitters.The older chips were dedicated toonly one of the many protocols that were invited.Now days very low power microcontrollers are used in IR transmitters for the simple reason that they are more flexible in their use.

2.4 TRANSFORMER:

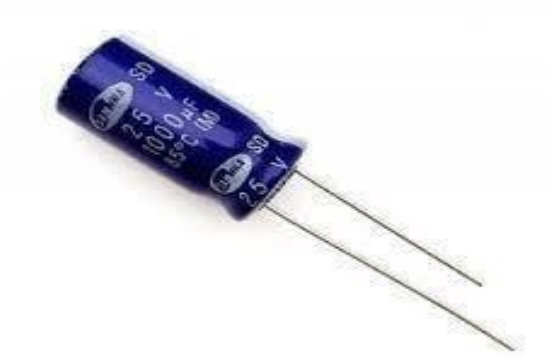
TRANSFORMER

A transformer is a passive electrical device that transfers electrical energy between two or more circuits. A varying current in the coil of the transformer produces a varying magnetic flux, which in turn induces a varying electromotive force across a second coil wound around the same core. Electrical energy can be transferred between the two coils, without a metallic connection between the two circuit.

2.5 CAPACITOR:

Capacitors are used in timing circuits or Oscillatory AC circuits. They can also be used as filters. In case of filters what are needed are the input supply frequency as well as the capacitance of capacitor in order to get the capacitive resistance. A capacitor with rating

2.2uf is that the maximum voltage that the capacitor can sustain is 25V and 2.2uf s its capacitance rating.



CAPACITOR

2.6 IR LED

IR LED

- An IR LED,also known as IR transmitter, is a special purpose LED that transmits infrared rays in the range of 760nm wavelength.
- Such LEDs are usually made of gallium arsenide or aluminium gallium arsenide.
- They,along with IR receivers,are commonly used as sensors.The appearance is same as a common LED.
- Since the human eye cannot see the infrared radiations.It is not possible for a person to identify whether the IR LED is working or not,unlike a common LED.
- To overcome this problem,the camera on a cell phone can be used.The camera can show us the IR rays being emanated from the IR LED in a circuit.

2.7 TRANSISTOR:

TRANSISTOR

A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals controls the

current through another pair of terminals because the controlled output power can be higher than the controlling input power.

You have made when you create your project target. Refer to page 58 for more Information about selecting a device. You may select and display the on-chip peripheral components using the Debug menu. You can also change the aspects of each peripheral using the controls in the dialog boxes.

2.8 **PHOTODIODES:**

PhotoDiode

- A photodiode is atype of photodetector capablebof converting light into either current or voltage,depending upon the mode of operation.
- Photodiodes are similar to regular semiconductor diodes except that they may be either exposed(to detect vaccum UV and X rays) or packaged with a window or optical fiber connection to allow light to reach the sensitive part of the device.

CHAPTER 3:- PROJECT DESCRIPTION.

3.1CONSTRUTION OF THE PROJECT.

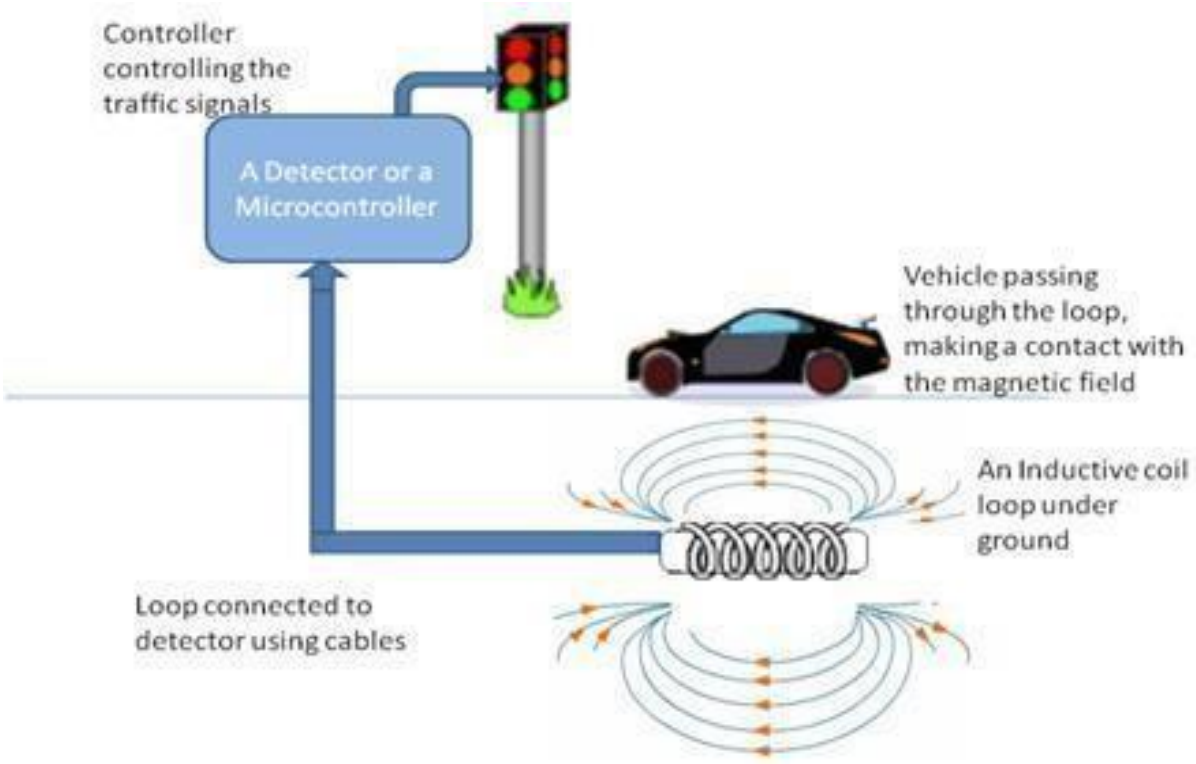
A Display:- It is the basic traffic signal display which the vehicle driver or the commuter can see.It can be a conventional incandescent discharge lamps or an arrangement of LED.

A Traffic Signal display

A Detector unit:- It is the unit which detects the presence of vehicles and sends this information to the controller to be processed.

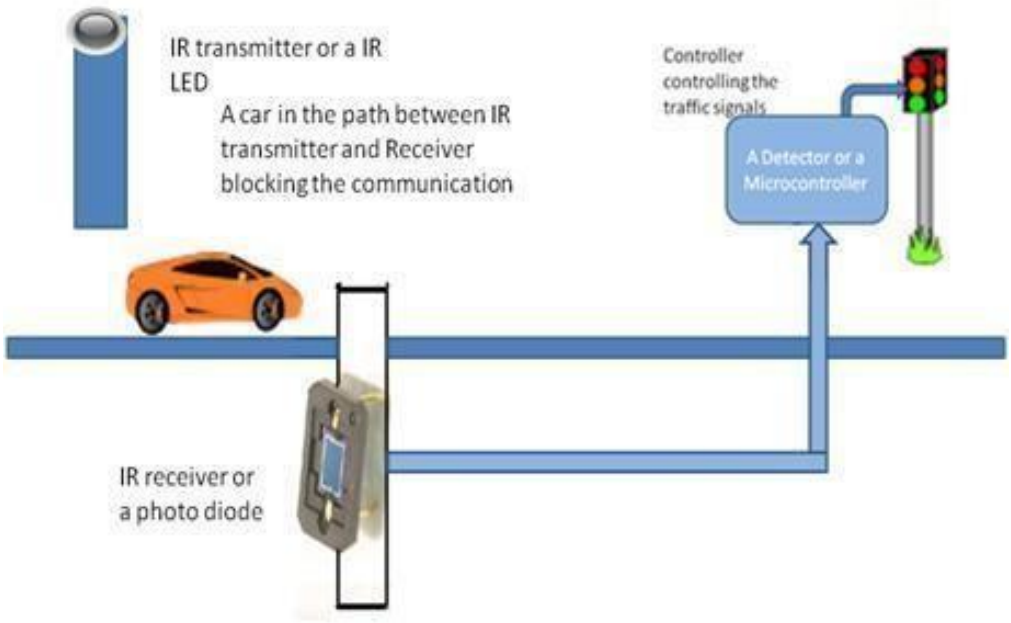
Practically there are two types of Detectors:

1)Inductive Loop Detector:-It consists of a coil of wire embedded into a groove on the road surface which is sealed with a rubber.It detects change in frequency.The inductor coil is and accordingly controls the triggering of the relay which is used to trigger the traffic signals. Basically it works on the principle that when a car moves over the inductor coil,the inductance of the coil decreases.This decreased inductance causes the resonant or oscillation frequency to increase and the electronics unit accordingly sends electric pulses to the control unit to control the switching of traffic lights.However a disadvantage of such system is the inductor loops are prone to electromagnetic interference,i.e. electromagnetic radiation from other devices can also affect the magnetic field and hence the inductance of the coil.They are also more prone to failure and require high installation cost and also cause disruption of traffic.



Traffic signal control using inductive loop detector.

2)Sensors mounted on the poles :- It can be a simple IR LED-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 be converted to electrical pulses,used to control the traffic lights.



Traffic Signal Control using Sensors Mounted on Poles.

A Controller unit:-It is the unit which receives the detector output which gives an indication of the presense of vehicles and there by makes a calculation of the traffic density and accordingly controls the display unit.It can be amicroprocessorbased computer or a simple microcontroller.

A control unit

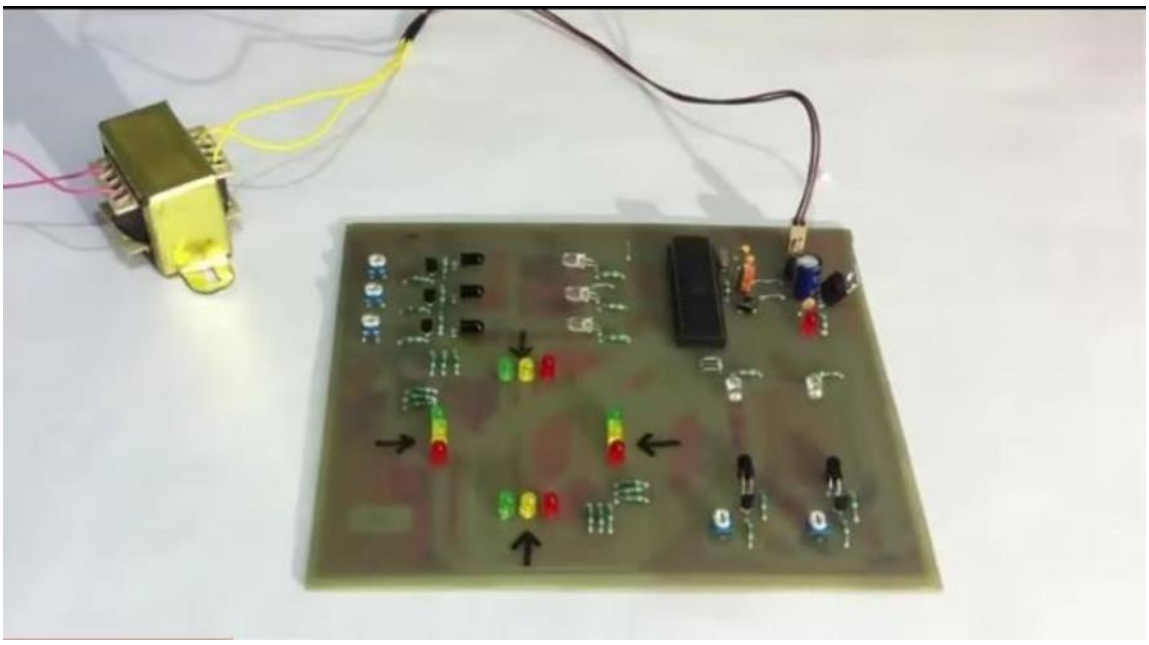
The three main traffic controllers are

1)Display unit:-It consists of 3 LEDs-Green,Red and Amber in each of side of the junction with an all total of LEDs.

2)Detecor Unit:-Itconsists of an arrangement of photodiode and IR LED combination at each junction which detects presense of vehicles by detecting change in resistance.

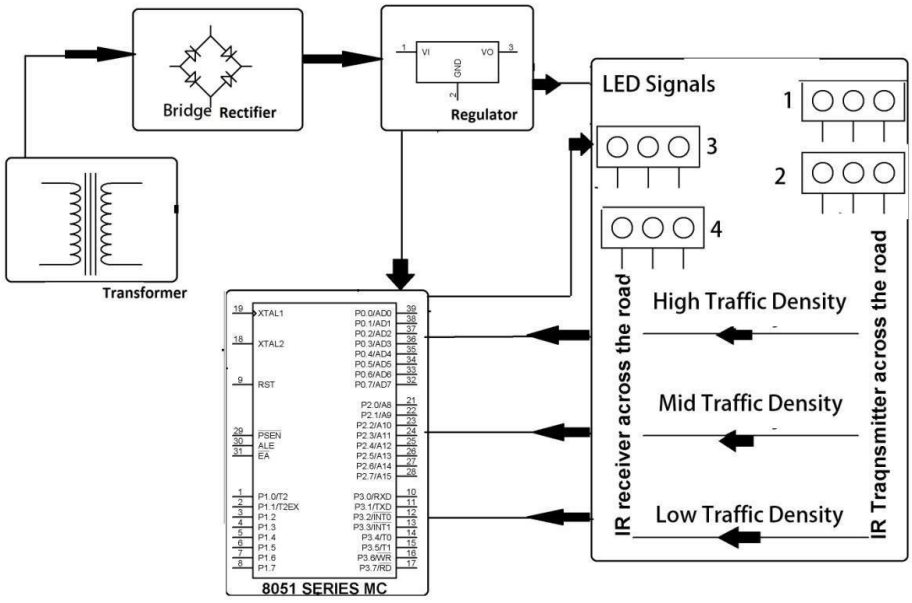
3)Controller Unit:-It consists of a microcontroller which receives the IR sensor output and accordingly controls the glowing of LED.

3.2 CIRCUIT DIAGRM OF THE PROJECT.



Circuit diagram of dynamic signal light timings on traffic density.

3.3 BLOCK DIAGRAM OF THE PROJECT.



Block diagram of dynamic signal light timings on traffic density.

In normal conditions ,i.e. when there is no vehicle on the road, the IR transmitter or the IR LED transmits IR light which is received by the ohotodiod,which starts conducting.As the photodiode conducts,the corresponding transistor also conducts giving an output of logic signal to the microcontroller.The same principle works for all other IR sensor-transistor arrangement.The microcontroller makes each LED glow for a fixed amount of time.Now if there is presense of vehicles,the communication between the IR transmitter and the receiver is interrupted,i.e. the photodiode receives less or no amount of light from the IR diode and accordingly the base current to the transistor reduces,eventually making the conductor go to off condition.This causes an output of high logic signal from the transistor,to the microcontroller.The microcontroller accordingly changes the glow time of the green LED of the corresponding junction to higher value.Thus as number of vehicles increases,the green light glows more time,allowing a quick flow of traffic from the junction.

3.4 **WORKING OF THE PROJECT.**

The traffic control system project is intended to design a density based dynamic traffic signal system.The timing of the signal changes rountinely on detecting the density of traffic at the junction.Traffic jamming is a strict problem in several major cities across the world and it has become terrible for the commuters in these cities.

Conventional traffic light system is based on set time idea selected to each side of the junction which cannot be changed as per changeable traffic density.Junction timings selected are fixed.Sometimes high traffic density at one side of the junction demands longer green time as evaluated in typical allotted time.The proposed system using an 8051 family microcontroller is interfaced duly with sensors changes the timing of junction routinely to accommodate movement of vehicles smoothly avoiding unnecessary waiting time at the junction.

He sensors used in this project are IR and photodiodes are in a line of sight configuration across the loads to detect the density of the traffic signal.The density of the vehicles is measured in three zones (low,medium and high)based on which timings are selectd accordingly.

Further this traffic control system can be enhanced by synchronizing all traffic junctions in the city by founding an n/w can be wired(or) wireless. This synchronization will very much helpful in reducing traffic congestion.

Therfore,from the above theory finally,we can conclude that using this project we can save a significant amount of time and also we can stop unnecessary traffic jams.Presently in India,we are following timebased control of traffic signals.

CHAPTER 4- PROGRAMMING.

PROGRAM CODE:- #

```
include<reg51.h>

#define density_level P1  //void

green_delay(); //Lights

declaration

sbit ar=P0^0;

sbit ag=P0^1;

sbit br=P0^2;

sbit bg=P0^3;

sbit cr=P0^4;

sbit cg=P0^5;

sbit dr=P0^6;

sbit dg=P0^7; //sensors

declaration

sbit IRaa=P1^0;

sbit IRab=P1^1;

sbit IRba=P1^2;

sbit IRbb=P1^3;

sbit IRca=P1^4;

sbit IRcb=P1^5;
```

```
sbit IRda=P1^6;

sbit IRdb=P1^7;

int a[]={

void main()

{

P1=0XFF;

P3=0X00;  P0=0X00;

P2=0X00

ar=1;

br=1;

cr=1;

dr=1;

while(1)

{

Int check_high;

bit

a=0,b=0,c=0,d=0,hi

gh=0;

int  lane_a,lane_b,lane_

c,lane_d;

for
```

```
(check_high=0;chec K_high<3;check_hig

h++)

{

Swith

(density_level)

{

Case 0XFC:

If(a==0) {

ar=0;

    a=1;

for(lane_a=0;lane_a++)

{

ag=1;

}

ag=0

}

break;

case 0XF3

if(b==0)

{

br=0;
```

```
b=1;
}
}
bg=0;
break;
case 0XCF: if(c==0)
{
cr=0;
c=1;
for(lane_c=0;lane_c++)
{
cg=0;
break;
case 0X3F: if(d==0)
{
dr =0;
d=1;
for(lane_d=0;lane_d<9;lane_d++)
{
dg=1;
} }
```

```
dg=0;

break;

}

P0=P0&0XFF;

}

} }

/*{

While(high==1)

{

Int check2;

For (check2=0;check2<2;check2++)
```

```
{


{

 If(IRaa==0)

//check

lane a

{

If(IRab==0)

{

ar=0;

ag=1;

green_delay();

ag=0;

}

Else{

ag=0

//ay=1;

//yellow_delay();

//ay=0;

ar=1

}}}

If(IRba==0)  //check lane b
```

```
{


{

If(IRbb==0)

{

br=0;

bg=1;

}

else

{

bg=0;

//by=1;

//yellow_delay();

//by=0;

br=1;

}}}

{

If(IRca==0)

//check lane c
If(IRcb==0)

{

cr=0;
```

```
{


cg=1;

}

else

{

cg=0;

//cy=1;

//yellow_delay();

//cy=0;

cr=1;

}}}

{

If(IRda==0)

//check lane d

{

If(IRdb==0)

{
```

```
dr=0;

dg=1;

}

else

{

dg=0;

//dy=1;

//yellow_delay(); //dy=0;

dr=1;

}}}}}}

}*/

/*void green_delay()

{

Int y;

For(y=0;y<1000;y++0);

}      */
```

CHAPTER 5:-RESULTS AND APPLICATIONS.

5.1 RESULTS:-

- Fuel is saved to about 70% compared to normal timer based traffic control.
- Traffic can be cleared without any irregularities.
- Time can be shared evenly for all instructions.
- Effective time management.

5.2 APPLICATIONS:-

- A simple traffic light controller is implemented in this project with a eal chance of expansion.
- An external memory can be interface with the main controller so that the timings are not fixed during its programming but rather can be programming during operation.
- An efficient traffic light controller system will include a pedestrian signalling system.

CHAPTER 6:- CONCLUSION.

The optimization of city traffic scenario is an important issue tobe considered.Hence modern techquies of traffic management contribute to optimazation of traffic problem.The dynamic traffic signal controller is introduced in this project having specific function along with hardware interface.The first part of designing of program which consists of data collection,sorting,calculation of percentage and their automatic evaluation of signal time.After that the second part is web application which is designed to provide traffic alerts for road users and take measures to avoid congestion.So problems wastage fuel, emergency case could be overcome through this proposed system.This system aims at saving a large amount of waiting hours caused by traffic deadlocks,where control can save and properly.