Smart Traffic Signal System Using Microcontroller

Piyush Desai[1], Abhilesh Fuldeore[2], Nikhil Daivat[3], Bhushan Mali[4]

[1, 2, 3, 4] Department of Electrical Engineering, Sandip Institute of Engineering & Management

Abstract: In the present time due to increasing urbanization, traffic problems in the city are getting worse. The huge increase in the number of vehicles and the absence of discipline has made it difficult to travel faster and safer in all major cities of India. Traffic can be harassed in the city as well as emergency vehicles like fire brigade, ambulance etc., if the vehicle is trapped in the traffic, it can lead to greater survival. Therefore, it is necessary to set up a Smart Traffic Signal to reduce all troubles. So that the traffic will be smooth and convenient, and not all people will suffer from this. This system are based on microcontroller. In this system we are used mainly microcontroller, IR sensors, Bluetooth sensors for emergency vehicles. The system contain one IR transmitter and another is IR receiver which are mounted on both sides of the road.IR sensors are measure the vehicle density on road and send the signal to microcontroller then microcontroller will operate and control the signal lights.
Keywords: Microcontroller, IR sensors, Traffic signal system, LEDs, Bluetooth module

I. INTRODUCTION

This project aim is eliminate the delay on roads and reducing the traffic on traffic signal or roads automatically using microcontroller system. Using the details of vehicles density we can manage the signal time and the traffic on traffic signals or roads. We are placed the IR sensors on both sides of the road. One is the IR transmitter and another is IR receiver. IR sensors detect the density of the vehicles and give current traffic information on each road side. IR sensor send this traffic information to the microcontroller. According to this information microcontroller adjust the timing of signal and control the traffic signal system smartly. The road which have traffic is more than other road then thus road assign green signal is more time and for other have red is assign. Emergency vehicles are connected to microcontroller through Bluetooth module. If there is an emergency vehicle comes, the Bluetooth module will detect it and give the information to the microcontroller, then microcontroller will make the red signal to green and help the emergency vehicle to move quickly.

II. LIST OF COMPONENTS

Sr. no.	Name of component	Specification	Qty.
1	89S52 Micro Controller	8K Bytes, 256 bit RAM 4.0V to 5.5V Operating Range	1
2	IR sensor	Rating- 1.2V, 30mA, Range- 50meter	1
3	LED	1.2V, 20mA	12
4	LCD	16x3 , 5V	4
5	Watchdog Timer	8051 inbuilt timer , 11MHZ	1
6	Transformer	230/12V AC , 1 Amp	1
7	Bridge Rectifier	Diodes 1N4007	1
8	Filter	ELECTROLYTE CAP 470uf/25V	1
9	Regulator	2.6A, 24V DC, I/P 230V AC	1
10	IR Diode/Transmitter	1.2V, 50mA	12
11	IR Receiver	1.2V, 50mA	12
12	Crystal Oscillator	11 MHZ, 5V	1
13	PCB	-	1
14	RF Module(Sender)	5V	1
15	RF module(Receiver)	5V	1
16	Encoder	5V	1
17	Decoder	5V	1
18	7805 Regulator	5V	1

Table 1: List of Components

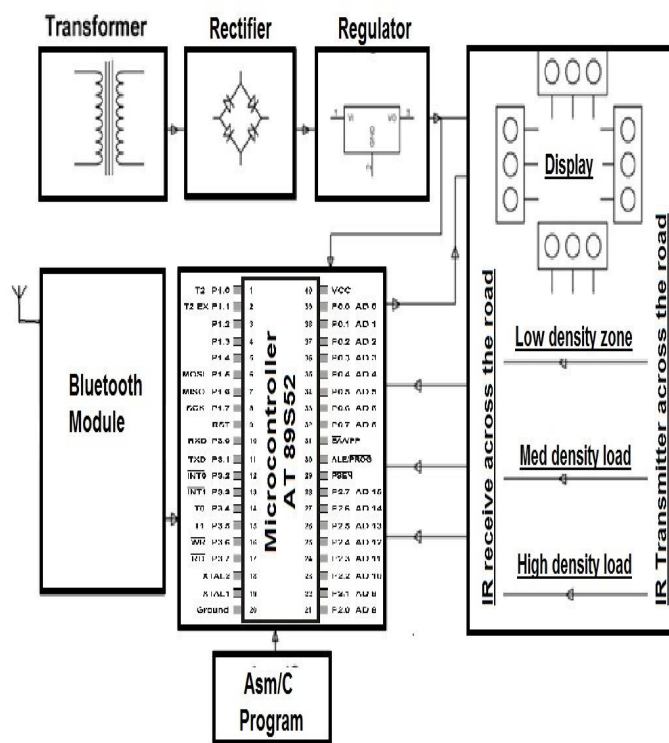## III.   SYSTEM BLOCK DIAGRAM

Figure-1: Block Diagram

IV.   DISCRIPTION

A.   89S52 Microcontroller

The main component of this system is microcontroller AT89s52. This microcontroller is fall under 8051 microcontroller family. We are selecting microcontroller 89s52 because it is easy of programming.

B.   Features of Microcontroller 89s52

1)   It is low power, High performance CMOS 8-bit microcontroller.
2)   8 KB of ISP flash memory.
3)   Operating range is 4 volt to 5.5 volt.
4)   Internal ram is 256*8 bit.
5)   32 programmable I/O pins.
6)   Endurance is 1000 write/Erase cycle.
7)   Inbuilt timer, Three 16-bit Timer/counters.
8)   Cost is cheap.

C.   Infrared Sensors

Figure-2: Infrared Sensor

Infrared sensor is an electronic device, it is used to detect vehicles and also detects emergency vehicles. IR sensors comes in pair. One is Rx (receiver) and one is Tx (transmitter). Transmitter send the infrared rays and receiver capture or receive this infrared rays. Transmitter is in transparent or in white colour and receiver is in dark colour or black colour. Transmitter is transmit IR rays, if any vehicle between transmitter and receiver then receiver not capture or sense the IR rays. That means vehicle present on road. Sensors detect the density of vehicles and send the information to microcontroller.

1) *Transformer:* Transform is an electrical device. Transformer is used in this system because we need a small voltage. Transformer is convert the 230V AC supply into 12V AC supply.

2) *Bridge Rectifier:* We required a dc supply for operating all devices, so rectifier is convert ac supply into dc supply. We can used full wave bridge rectifier. Main advantages of this rectifier is low ripple in the output dc signal. Efficiency is high and power loss is low.

3) *Voltage Regulator (78xx):* The voltage regulator 7805 is a member of 78xx series of voltage regulator. It is regulate the 12V DC power supply into 5V DC.

4) *Bluetooth Module:* Bluetooth module operate the help of smart phone and it is connect with microcontroller. Bluetooth module used for emergency vehicles. If emergency vehicle comes then the smart phone give the signal for bluetooth module and bluetooth module send this information for microcontroller. And then microcontroller will make the red signal to green and help the emergency vehicle to move quickly.

V. ADVANTAGES

A. During normal time condition signal timing changes automatically on sensing the traffic density.

B. If any emergency vehicle like ambulance, fire brigade etc., comes on signal requiring priority are built in with bluetooth module to override the timing and providing green signal in the desired direction while stop the others lanes by red signal for some time..

C. It helps to reduce the traffic jams.

D. Operation has become faster.

E. Maintenance required is less.

F. It gives more human safety.

VI. CONCLUSION

By using this system configuration we can reduce the traffic jams on traffic signals. So it will be easier to travel and save our time. It will also help to get an emergency vehicles early in crowd. This project is helpful to reduce the travelling time.

VII. ACKNOWLEDGMENT

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