

Problem/Project Based Learning (PBL)

9

Traffic Light Controller Using 8051 Microcontroller

Date Performed:	Nov 22, 2021
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9.1 AIM

Implement the solution for PBL Traffic Light Controller Using 8051 Microcontroller .

9.2 OBJECTIVES

- To provide smooth control and co-ordination to confirm that traffic moves as smoothly and safely as possible.
- Traffic light control is a challenging problem in modern societies. This is due to the huge number of vehicles and the high dynamics of the traffic system.
- The proposal aims at reducing the traffic jams in order to reduce traffic congestion, optimize traffic flow and help pro actively manage traffic conditions.

9.3 REFERENCES

- https://www.researchgate.net/publication/338919777_AutomaticTrafficLightControlSystem
- www.watelectronics.com/how-traffic-light-control-system
(Kindly include library resource references for TY B.Tech ETC -refer following link for references
<http://103.97.164.116:8072/W27/Result/w27AcptRslt.aspx?AID=93642xD=0>)

9.4 SOFTWARE REQUIRED

- Keil Software
- Proteus Software

9.5 HARDWARE MATERIAL REQUIRED

- 8051 Microcontroller IC
- LED'S RED GREEN YELLOW
- 7 Segment Display
- wires
- PCB
- RESISTORS
- CRYSTAL

9.6 PRE-REQUISITE MCA EXPERIMENTS

Students are expected to write the name or modules of minimum four experiments used for implementation of PBL

- Experiment No. 1:LED INTERFACING WITH 8051
- Experiment No. :7 SEGMENT INTERFACING WITH 8051

9.7 DESIGN (BLOCK DIAGRAM)

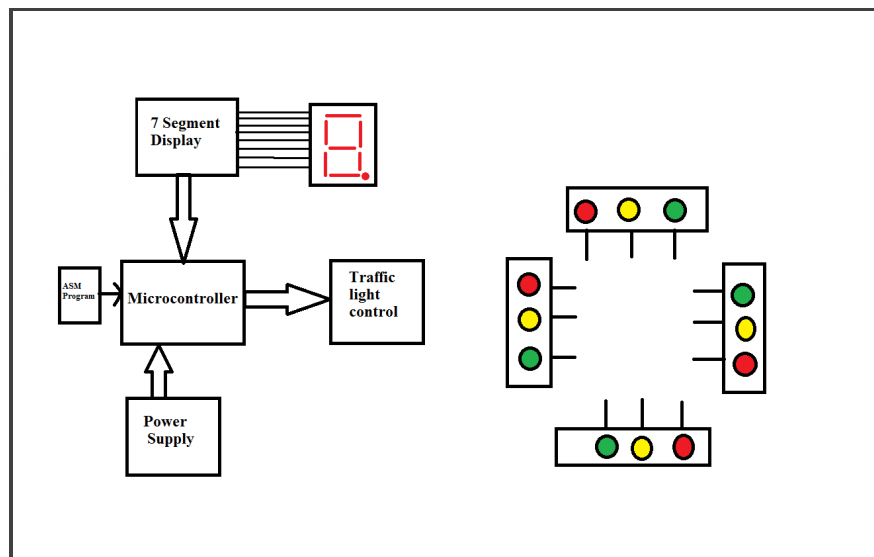


Figure shows the Block diagram of Microcontroller based Traffic Light Control system. The pins of the various input output ports of the microcontroller are connected directly to the given LED's. The 8051 is programmed in a manner that the respective LED's glow by setting the required bit using assembly language and a certain amount of delay is provided depending on the user.

9.8 Justification of selection of microcontroller for respective PBL

The name itself specifies its meaning by splitting the word micro-controller into two MICRO is derived from a Greek word Micros which means small (in size, quantity, number and dignity) and Controller is the logic circuitry that does the control action based on the program written.

An 8051 Microcontroller is the brain of this whole project and is used to initiate the traffic signal at the inter-sections on road. This circuit diagram makes use of a crystal oscillator for generating frequency clock pulses

Very popular general purpose microcontroller Widely used for small scale embedded systems.

Many vendors such as Atmel, Philips, and Texas Instruments produce MCS-51 family microcontroller chips.

4 kB of ROM memory for storing the program code

128 bytes of internal RAM for variables

Programmable serial communication 16 bit timers

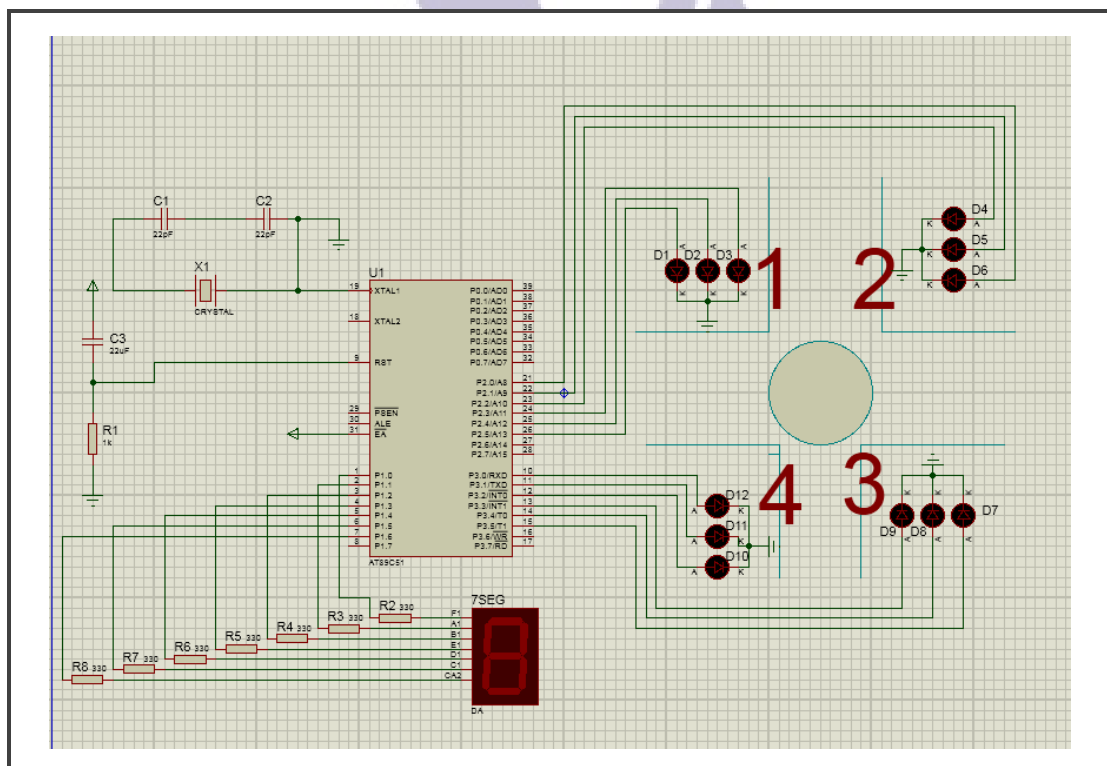
32 I/O lines

6 interrupt sources

Display Unit: It consists of 3 LED's: Green, Red and Orange on each side of the junction– a total of 12 LED's of three colors are placed at the junction.

Counter Unit : In the Counter Unit we initialize the 7 segment display, it use as timer/counter it gives delay to traffic control.

9.9 INTERFACING DIAGRAM



9.10 WORKING

In the above circuit diagram of traffic light controller, a seven-segment display is used as a counter display, and three LEDs are used for the

purpose of traffic light control. An 8051 Microcontroller is the brain of this whole project and is used to initiate the traffic signal at the intersections on road. This circuit diagram makes use of a crystal oscillator for generating frequency clock pulses. The LEDs are interfaced to the Port two and three of the microcontroller and are powered with 5v power supply. Seven-segment display is connected to the port1 pins of the 8051 microcontroller with a common anode configuration.

The LEDs get automatically switched on and off by making the corresponding port pins of the microcontroller high, based on the 8051 microcontroller and its programming done by using KEIL software. At a particular period of time, only the green light holds ON and the other lights remains OFF, and after sometime, the changeover traffic light control from green to red takes place by making the succeeding change for glowing of yellow LED. This process continues as a cycle and the timing for changing the LEDs can be displayed with the use of a seven-segment LED display in this project.

This traffic light control system can be further enhanced in such a way to control the traffic signals automatically based on the traffic density on roads with the help of IR sensor modules with automatic turnoff if there are no vehicles on either side of the road which leads to power consumption.

9.11 ALGORITHM

1. Start
2. Initially ports are zero. (P2, P3) In the main we are sending the data to traffic line 2 4 1 3
3. Turn on GREEN LED TF line 2. (P2.2)
4. Turn on GREEN LED TF line 4. (P3.2)
5. Turn on RED LED TF line 1. (P2.3)
6. Turn on 3 RED LED TF line (P3.3)

7. Send 7segment hex value to count 9 to 0 to port 1(6FH 7FH 07H 7DH 6DH 66H 4FH 5BH 06H 3FH) It will count from 9 to 0 Duration of 10sec (delay counter). .
8. Turn on YELLOW LED TF line 1(P2.4)
9. Turn on YELLOW LED TF line 3(P3.4).
10. Turn OFF RED LED TF line 1(P2.3).
11. Turn OFF RED LED TF line 3(P3.3).
12. CALL DELAY (3SECS).
13. Clear the ports. . (P2,P3).
14. Short Jump to main2 program. In the main2 we are sending the data to traffic line 1 3 2 4
15. Turn on TF line 1 GREEN LED (P2.5).
16. Turn on TF line 3 GREEN LED (P3.5).
17. Turn on TF line 2 RED LED (P2.0).
18. Turn on TF line 4 RED LED (P3.0).
19. Send 7segment hex value to count 9 to 0 to port 1(6FH 7FH 07H 7DH 6DH 66H 4FH 5BH 06H 3FH) It will count from 9 to 0 Duration of 10sec (delay counter).
20. Turn on TF line 2 YELLOW LED (P2.1).
21. Turn on TF line 4 YELLOW LED (P3.1).
22. Turn OFF TF line 1 RED LED (P2.0).
23. Turn OFF TF line 4 RED LED(P3.0).
24. CALL DELAY (3SECS).
25. Clear the ports. . (P2 ,P3).
26. Long Jump to main program (infinity loop)
27. Stop

9.12 IMPLEMENTATION

Procedure Of Proteus

Open Proteus ISIS Schematic Capture.

Select the Component Mode from the left Toolbar.

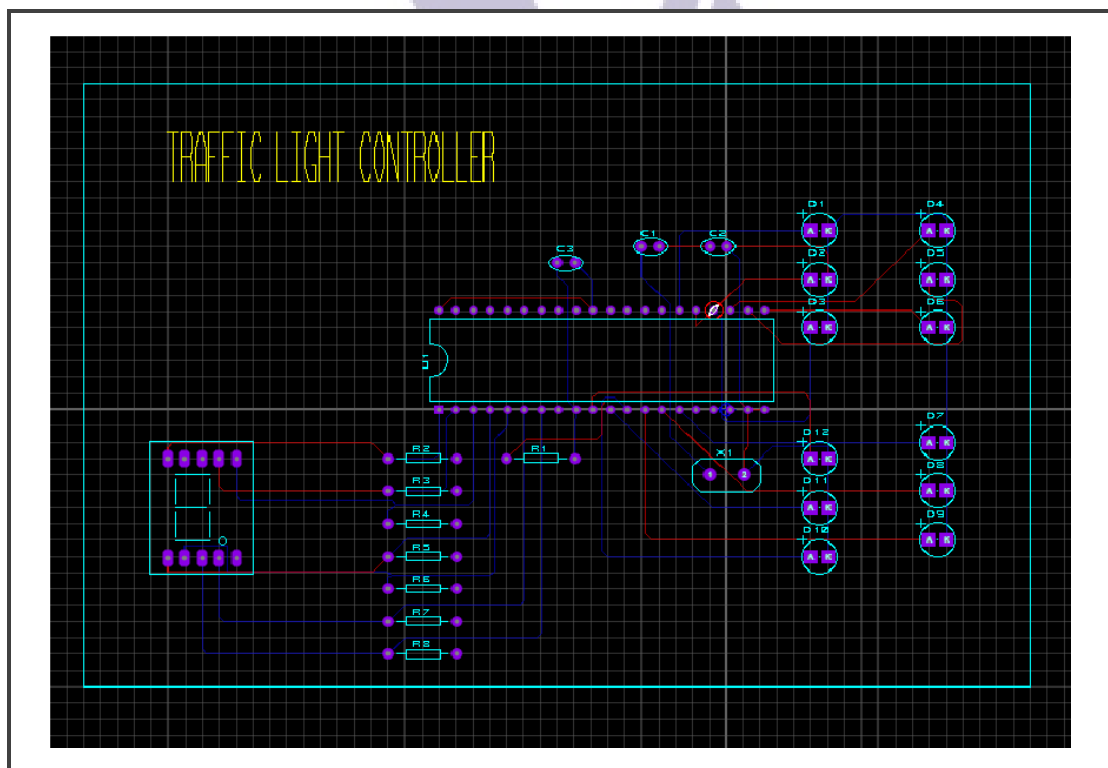
Click On P (Pick From Libraries) Add all the required components.

Place the components on the workspace.

Wire up the circuit.

Click on Play Button on the bottom left to start simulation.

9.13 PCB Design



9.14 RESULTS/OBSERVATION

The system will only work for an isolated four-way junction with traffic coming from the four cardinal directions.

Traffic only moves from the North to the South and vice versa at the same time; and at this time, the traffic from the East and West is stopped. In this case, the controller considers the combination of all the waiting densities for the North and south as that of one side and those of the east and west combined as another side.

9.15 APPLICATIONS

There is no need of traffic inspector at the junctions for supervising the traffic to run smoothly.

The intelligent work which is done by traffic inspector will be perfectly done by the microcontroller in the circuit with the help of sensors and the program which is coded to the microcontroller.

9.16 CONCLUSION/UNDERSTANDING

Thus from above theory we can conclude that using 8051 Microcontroller based control of traffic lights we can save a considerable amount of time and also we can prevent excessive traffic jams thus leading to smooth traffic flow, In practice presently in India we are following time based control of traffic signals and we are experiencing a heavy traffic jams all over which in turn consumes lot of time and fuel. We hope these methods will be adopted as soon as possible so that the limitations we are experiencing with present method can be overcome

Note: Kindly upload the following files on google classroom after completing PBL

- 1. Upload document with proper information**
- 2. Upload embedded C or ALP Program pdf file**
- 3. Upload video demonstrating working of PBL, requested to turn on front camera while recording demonstration**

References

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Certificate

This is to certify that **Gatkawar Prashant Subhasharao** , (GR. No. 22020223) (Roll No. 314071) of **Third Year Bachelor Of Technology** has performed the mentioned Experiments and PBL titled **Traffic Light Controller using 8051 Microcontroller** in the “**MICRO-CONTROLLER AND APPLICATIONS**” in Department of Electronics and Telecommunication Engineering, laboratories of Vishwakarma Institute Of Information Technology, Pune 411048.

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Date: Dec 2021

Place: Pune