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Eight Way Traffic Light Control for High Density and Minimum Travel Time

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ABSTRACT: *Traffic issues like congestion, unpredictable travel time delays and road accidents are taking a serious shape. All countries are wrestle with this tickler not only in urban areas but also at highway intersection. In current scenario only smart concept can alleviate traffic problems. Many concepts have been implemented to flow traffic efficiently like system using sensor, cloverleaf interchange, vehicle count system etc. When we implement complex electronic concept for traffic control then it needs high maintenance and monitoring system also which makes it pricey.*

The scope of this paper is to present a novel, low-cost technique to control Eight-way/ Six-way traffic light system based on microcontroller. The system operates with traffic lights implemented with LED technology. System tries to reduce possibilities of traffic jam, caused by overcrowd, to an extent. The microcontroller used in the system belongs to MCS-51family i.e. 89C52. The system contains microcontroller-2, LED lights-48 (Green-24, Yellow-8 and Red-16) and Digital display. Both the controllers are assigned to a particular task one is coded for stand up lights and another for circle lights. Project features are: It requires low maintenance, Easy to monitor, Traffic congestion distribution scheme, Simple design using traffic rules, Safe and quick clearance of traffic.

KEYWORDS—*Microcontroller, Digital Display and LED light.*

I. INTRODUCTION

Traffic models play an imperative role in both today's traffic explore and in many traffic applications such as traffic flow prophecy, incident detection and traffic control. Every traffic application requires specific features of the traffic model. As the number of road users constantly increases, and resources provided by current infrastructures are limited, intelligent control of traffic will become a very important issue in the future. However some limitations to the usage of intelligent traffic control exist. Avoiding traffic jams for example is thought to be beneficial to both environment and economy, but improved traffic flow may also leads to an increase in demand. There are several models for traffic simulation. In this paper, we propose an approach to simulate high network traffic (Eight-way/ Six-way) by congestion distribution scheme and simple network design using traffic rules for safe and quick clearance of traffic.

II. CLASSIFICATION OF PROPOSED TRAFFIC MODEL

So to understand the traffic congestion distribution scheme and its control we should first know the traffic signs, Road markings and its corresponding system implementation. A lot of area will be requied to implement proposed concept and this will also put on attention of several government and business organization. In this study our focusing area are: to facilitate traffic in rush hour, enhanced route plan, minimizing travel time, travel and vehicle safety, resolve complex network design, use of circle area at most, parallel u-turn concept to evade road accidents. These step up are advantageous to economy and the environment.

Fig. 1. Eight way traffic network design.

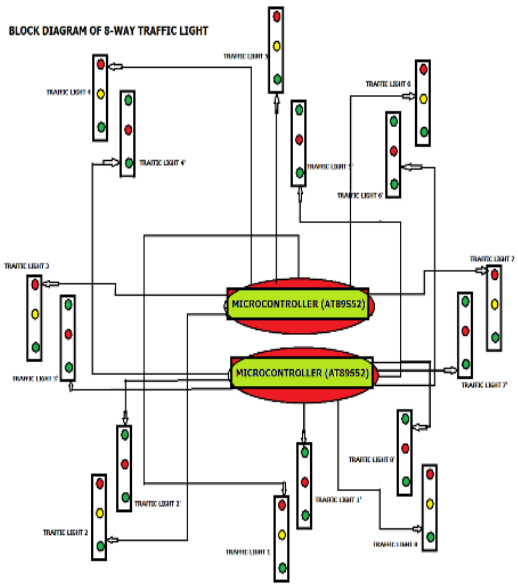

Fig. 2. Functional Block Diagram

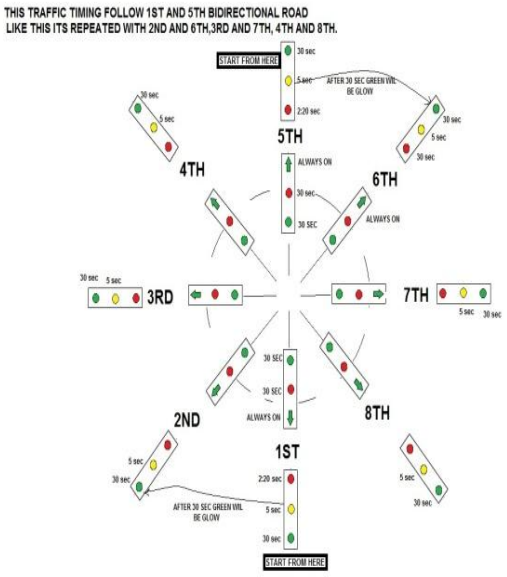

Fig. 3. Circuit implementation design

III. MICROCONTROLLER INTERFACING CIRCUIT

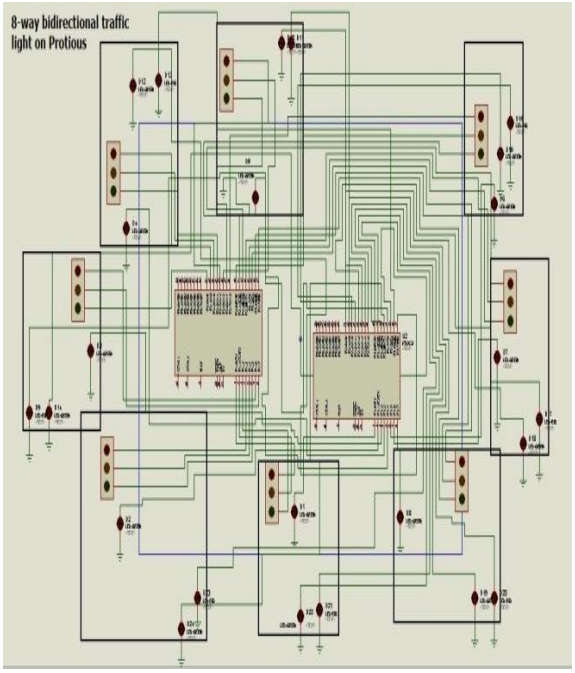

Fig. 4. Circuit diagram using PROTEUS

Complete schematic is shown in Figure 4. The circuit is designed with the help of software tool Proteus. It provides virtual environment to simulate microcontroller based circuit. To control eight way (bidirectional) traffic lights we are using two microcontrollers; three port of each named as P1, P2 and P3. All the traffic lights are connected to the respective I/O pin. Both the microcontrollers are programmed for the specific task using embedded-c. One is to control stand up traffic lights and another to control traffic lights fixed on circle. It requires +5V power supply and receives 11.0592MHz from the crystal oscillator at XTAL1 and XTAL2 pin. Reset switch connected at pin 9 of each microcontroller to provide manual reset. Digital display may also be used for travelers' convenience.

IV. CIRCUIT OPERATION

Fig. 3 shows that initially, stand up lanes (1^{st} & 5^{th}) will RUN (G1, G5, G10, G17, Y2, Y6, R9, R13-ON) and other lanes will be STOP. Vehicles from both the outgoing lane will cover semicircle but clockwise and those have to move from 1 to 6-8 and 5 to 2-4 would have to wait at circle until the red (R9, R13) and yellow (Y2, Y6) turns into green (G2, G6, G9, G18-ON). Similarly, the process will be continued for other stand up lanes at a time in clockwise direction i.e. 2^{nd} & 6^{th} -> 3^{rd} & 7^{th} -> 4^{th} & 8^{th}. Parallel u-turn facilitate travelers to avoid wait process on circle and keep journey continue, this will also reduce traffic congestion at the circle not only this but also green time can be changed for any lane accordingly.

V. EMBEDDED-C PROGRAM COMPILATION USING KEIL

A. For first microcontroller (µC1): Program for stand up traffic lights

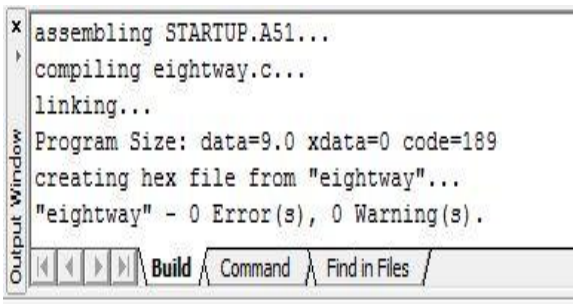

Fig. 5. Compilation message-1

B. For second microcontroller (µC2): Program for circle traffic lights

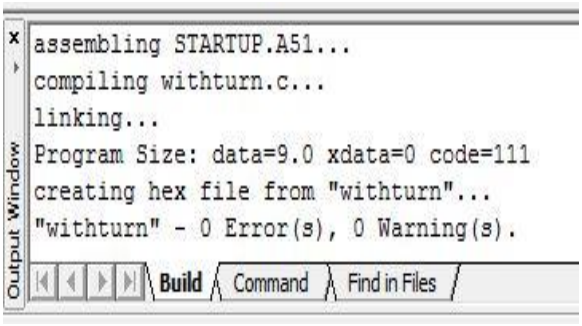

Fig. 6. Compilation message-2

VI. CIRCUIT SIMULATION RESULTS USING PROTEUS

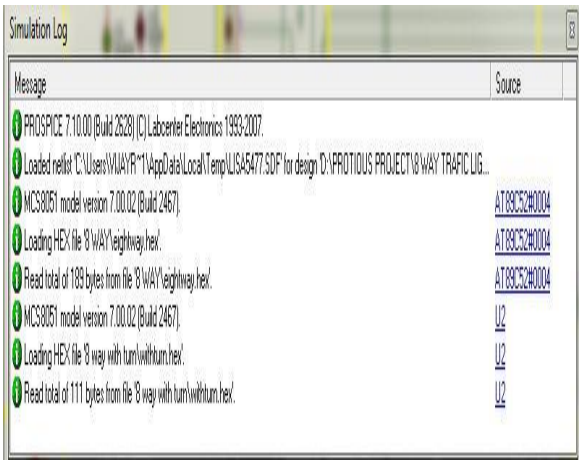

Fig. 7. Simulation message

VII. RESULTS

With the help of PROTEUS it is found that the operation is running successful in virtual environment. Traffic congestion distribution scheme and parallel u-turn theory facilitate travelers. Network design using traffic guidelines and at most use of circle area makes it exotic. And also required green time to clear all the outgoing lanes come up to what we expect.

VIII. CONCLUSION AND FUTURE ROADMAP

In this paper we have studied that how a smart network design and circuit implementation can streamline the process to control and monitor the eight way/ six way (bidirectional) traffic lights as shown in fig. 1 and fig. 3 respectively. In future this concept can be used to incorporate other traffic network designs not only in urban areas but also at highway intersection. And the system implementation can be changed according to the traffic network need with no trouble.

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