International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 06 | June 2018 www.irjet.net p-ISSN: 2395-0072

# Intellectual 4way Traffic Control System Using PLC and SCADA

**Ranjith A V[1], Sree Rajendra[2], Shivashankara B S[3], Sharath H K [4]**

*[1]PG scholar Dept. of Mech. Engg., Malnad college of Engineering, Karnataka, India*
*[2,3,4]Associate professor, Dept.of Mech. Engg., Malnad college of Engineering, Karnataka, India*

---

**Abstract -** *Intellectual 4way traffic control system is a modern engineering technology, which is intended to measure traffic density by counting the number of vehicles in each lane. In this system PLC takes a data from sensors and checks the priorities. The mechatronic system which is provided for troubleshoot the problems occurring during heavy traffic. To calculate the vehicle densities in a lane at a 4-way lane cross and then give the priority automatically using a program. The lights [green, yellow, red] ON & OFF time is depend on the density of the vehicles & specific priorities which can be decided by logic program.*

***Key words****:* Intellectual 4way Traffic Control System, PLC, SCADA, etc

## 1. INTRODUCTION

Traffic light which is one of the vital public facilities plays an important role to the road users. Traffic signal light is used to control the movement of vehicles and passengers, so that traffic can flow smoothly and safely. Traffic signal lights are relatively simple and common in places, they are critical for ensuring the safety of the driving area. The growing use of traffic lights attests to their effectiveness in directing traffic flow, reducing the accidents and the most recently to their utility in controlling the flow of traffic through metropolitan areas which have been used together with computer systems. In the conventional traffic control system it may be observed that the time of signal light glowing for a particular road will be always constant. Sometimes it may happen that, one particular road may be crowded more than any other. In such cases, the conventional traffic control system will fails to give priority to the heavy traffic lanes.

In the conventional traffic control system it may be observed that the time of signal light glowing for a particular road will be always constant. Sometimes it may happen that, one particular road may be crowded more than any other. In such cases, the conventional traffic control system will fails to give priority to the heavy traffic lanes.

### 1.1 Problem Study

In metropolitan cities with huge population handling the traffic is the most complicated task. Handling traffic manually in such regions involves constant manpower with continuous monitoring with conventional hard wired controlled systems, which makes the system to be more complicated and difficult to troubleshoot so switching over to the advanced controllers like PLC which is having the ability to automatically monitor and control the traffic according to the program developed by the user makes the traffic management an easier task. In order to replace the human power supervisory systems like SCADA comes into picture which will do the constant job of monitoring the traffic 24*7 and makes it hassle free.

The SCADA will be constantly feeds inputs from the PLC through the sensors connected to it which is used to measure the traffic density at the particular region which reduces the response time.

### 1.2 Objectives

To understand the structure and operation of PLC and study the ladder logic design and their programming technique and also how to make the interfacing to the PLC

To develop a program that works together with a model of four Junction traffic light and sensors

The intention of the project is to present the initial steps in the implementation of a smart traffic light control system based on Programmable Logic Controller (PLC) technology.

### 1.3 Methodology

Traffic signals are the most convenient method of controlling traffic in a busy junction. But, we can see that these signals fail to control the traffic effectively when a particular lane has got more traffic than the other lanes. This situation makes that particular lane more crowdie than the other lanes. If the traffic signals can allot different lanes to different vehicles based on their weight, like buses, trucks etc. in one lane, cars in one lane and like this the traffic congestion can be solved by diverging the traffic accordingly. In this method, intend to measure the traffic density by counting the number of vehicles in each lane and their weight, then park in automated parking or diverge them accordingly. It is also difficult for a traffic police to monitor the whole scenario round the clock. So, this system can be implemented on highways and city traffic.

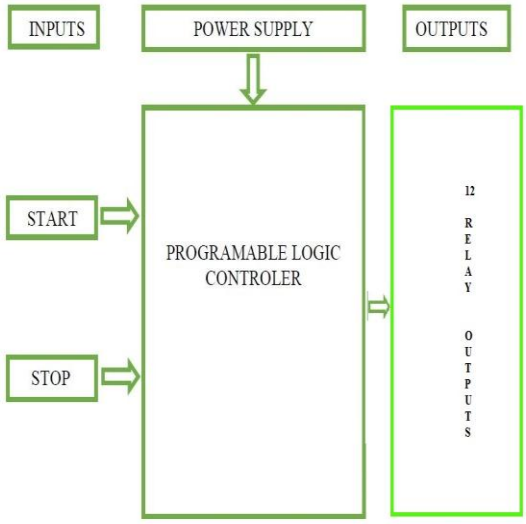


**Fig -1**: PLC Architecture

## 2. LITERATURE REVIEW

Mohit Dev Srivastava et…al; present the initial steps in the implementation of a smart traffic light control system based on Programmable Logic Controller (PLC) technology. In this method, intend to measure the traffic density by counting the number of vehicles in each lane and their weight, then park in automated parking or diverge them accordingly. It is also difficult for a traffic police to monitor the whole scenario round the clock. [1]

C Barz et…al; presents the traffic control system controlled through a PLC which takes the signals from different sensors on roads. The global system developed ensures the coordination of four intersections, setting a path that respects coordination type green light, the integration of additional sensors, the implementation of probes radar to inform traffic participants about recommended speed for accessing the green state located in the intersection that will follow to cross. [2]

Ashwini Y Dakole et…al;The new architecture and design theory of this system is integrated by lot of hardware modules such as ARM LPC 2148 microcontroller as a control unit to combine with global positioning system and CC2500 RF module by the hardware/software co-design, the new traffic control system can be design. The traffic congestion can be caused by large Red light delays in the normal traffic control system. The ARM7 based traffic control system proposes a multiple traffic light control and monitoring system that reduce the possibilities of traffic jams, caused by traffic lights. The system is based on ATmega16 and ARM7.[3]

Roxanne Hawi et…al; describes Inadequate space and funds for the construction of new roads and the steady increase in number of vehicles has prompted scholars to investigate other solutions to traffic congestion. One area gaining interest is the use of smart traffic control systems (STCS) to make traffic routing decisions. These systems use real time data and try to mimic human reasoning thus prove promising in vehicle traffic control and management. This paper is a review on the motivations behind the emergence of STCS and the different types of these systems in use today for road traffic management. [4]

Nikhil R. Chitragar et…al; Traffic signals are the most convenient method of controlling traffic in a busy junction. Present traffic signals fail to control the traffic effectively when a particular lane has got more traffic than the other lanes. The intelligent or "Smart Traffic Control" is one which would be able to calculate the vehicle density in a lane at a 4-way crossing and then decide the priority automatically using a program. [5]

Rajeshwari Sundar et… al; As a result traffic problems has increased in the last few years and the present traffic light controllers have limitations because it uses the predefined hardware that does not have the flexibility of modification on real time basis. Due to the fixed time intervals of green, orange and red signals the waiting time is more. To make this traffic light controlling more efficient a new technique is emerged called as "Smart Traffic Control System". The timings of the red and green lights will be smartly decided based on the traffic on adjacent roads. [6]

## 3. WORKING PRINCIPLE

The conventional traffic light system uses microcontroller which are troublesome in daily usage. And the microcontrollers need regular maintenance so that the future investment cost increases. So here the smart traffic light control is a sustainable way to replay the microcontrollers and also they are easy to adapt and sustain temperature conditions. Here in this project we are using traffic density control so that we will monitor the traffic density and control the delay of the traffic signals automatically. Inductive Proximity sensors are implemented to find out the traffic density.

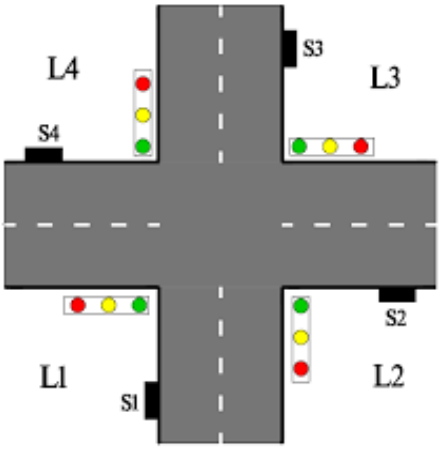


**Fig -2**: Four Lanes of the Traffic Control System

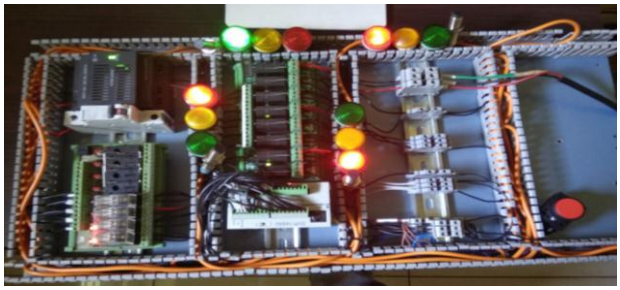

**Fig -3**: Working model of Traffic Control System

This overall progress is governed by the SCADA system. SCADA stands for Supervisory control and data acquisition. Which means it can be used for application control and monitor. So here it monitors the process happening in the PLC and sends response to the SCADA system. So if traffic intensity changes it displays the intensity of the traffic and inform the user on the other end with the time delay changed.

The main objective of this project is to control and monitor the status of Traffic light and to adjust automatically with the intensity. The proposed model consists of a relay card and PLC with digital extension module and a SMPS to step down and regulate the power supply for the PLC and the output indicators. Here there are 12 indicators to represent the real time traffic lights and proximity sensor to identify the intensity. The one more important this in the project model is the Com Cable (Communication Cable) which transfers the data to the SCADA system.

For interfacing the SCADA and the PLC we are using a 3rd party intermediate driver called KEPSERVER. So this kepserver will create a virtual server in which PLC and SCADA will be added. So that each can communicate to one other. The communication medium used for this is RS232. This means point to point communication.

### 3.1 Specification of Component

| Components | Ratings |
|---|---|
| Delta PLC | 24VDC,8-inputs,6-Outputs |
| In touch | SCADA Software by Schneider |
| Delta Digital Output Module | 24V DC |
| Indicators | 24V DC |
| SMPS | 24V, 2.1Amps |
| SENSORS | 4Nors 3wire sensor Pnp type |
| RELAY | 12Nors 24V |
| PUSH BUTTON | 2 Nors |

**Chart -1:** Components Specification

## 4. CONCLUSIONS

The designed and implementation of this technique is directly targeted for traffic management so that emergency vehicle on road get clear way to reach their destination in less time and without any human interruption. The main scope of these smart systems is to have the traffic lights mimic the human intelligence thus eliminating the need of having traffic officers control traffic on the roads. These intelligent systems provide a way for the lights to change from red to green based on current traffic conditions. The sensors are interfaced with Delta PLC Module. This interface is synchronized with the whole process of the traffic system. The method will help to reduce congestion on roads and would help in coping traffic at junctions and accidents.

### 4.1 Future Scope

- Instead of Proximity sensors Machine Vision Systems can be implemented to get accurate density of traffic
- The main advantage of PLC is we can add nearly 31 Slave devices in this particular communication medium which can be used to automate a whole city traffic
- Wireless SCADA can be implemented

## REFERENCES

[1] Azura Che Soh/Lai Guan Rhung "MATLAB Simulation of Fuzzy Traffic Controller for Multilane Isolated Intersection" Feb. 2011.

[2] Barz C, Oprea C, Erdei Z, Pop-Vadean A and Petrovan F 2014 *The control of an industrial process with PLC*, International Conference on Applied and Theoretical Electricity ( ICATE) Craiova, Romania, pp. 1-4 October 23-25.

[3] Xu Li, Wei Shu, Minglu Li, Hong-Yu Huang, Pei-En Luo, and Min-You Wu, "Performance Evaluation of Vehicle-Based Mobile Sensor Networks for Traffic Monitoring", 2009.

[4] Downs, A. (1962). "The law of peak hour expressway congestion". *Traffic Quarterly* pp.393–409.

[5] "PLC Based Intelligent Traffic Control System", Muhammad Arshad Khattak International Journal of Electrical & Computer Sciences.

[6] Rajeshwari Sundar, Santhoshs Hebbar, and Varaprasad Golla "Implementing Intelligent Traffic Control System".