



4 -Way Traffic Control System Using PLC and SCADA

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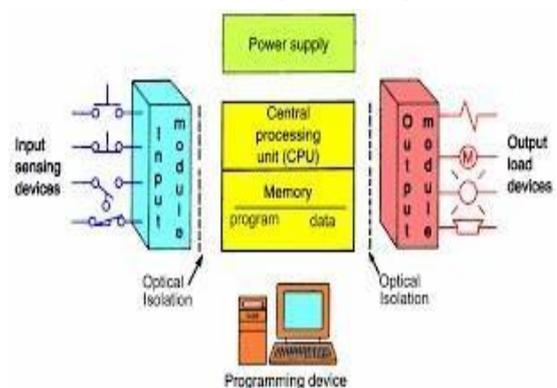
As it is also difficult for a traffic police to keep eye on the whole scenario around the clock. So, this system can be used on highways, city traffic and intersection roads like 4-way 6 lanes etc.

Abstract

The scope of this project is to give a proposal in the implementation of a traffic light control system based on Programmable Logic Controller (PLC) technology. In this method, the traffic density will be monitored by counting the number of vehicles in each lane and which lane first detects the presents of a vehicle. In practical world sensors are used to monitor presence of vehicles in a lane and evaluate the density and sends an interrupt signal to the control unit. In PLC the status of the sensors is checked and logical operations are performed to decide which lane is to be serviced first. Under low density condition it would operate as a normal sequence. A Ladder diagram will be developing for the implementation of this in the PLC.

1. INTRODUCTION

Traffic light which is one of the important public facilities plays a vital role for the road users. It will help traffic to avoid accidents and gridlocks. This research exposed the operation

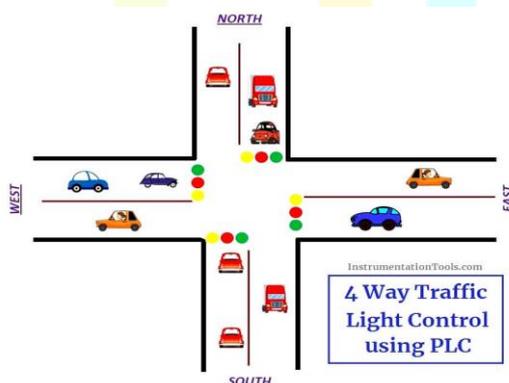


of traffic light. such as understanding the flow of the traffic system and programing itself. Traffic signal light is used to regulate the movement of vehicles and passengers, so that traffic can flow smoothly and safely. Traffic signal lights have been around of us for years and are used to efficiently and Optimizely control traffic through intersections. Although traffic signal lights are simple and common place, they are also critical for ensuring the safety of the driving area. The growing use of traffic lights attests to their effectiveness in directing traffic flow, avoiding the number of accidents, and the most important utility in controlling the flow of traffic through metropolitan areas where have been used together with computer systems.

Traffic light signal will enhance the road safety and avoid congestion by implementing the signals orderly through junctions. Traffic control lights are provided for traffic control on streets and highways, especially at junctions. The traffic signals are sequentially displayed through a suitable timing and control mechanism

A traffic light has three colors aspects which are red, yellow, and green. Every color has a certain meaning. The red light means the road user must stop driving and not crossing or pursuing the ride while the yellow light show that the road user has to ready to stop their ride. However, if the user is too close to the line that is not safe for a stop, they have to continue the ride. The green light shows the road user can continue their journey only with the absence of any hindrance. Driving through a red light without justification may be a punishable traffic offense.

2.BLOCK DIAGRAM



3.OBJECTIVE:

To understand the operation and structure of PLC and understand the ladder logic design and their programming technique and also know how to make the interfacing to the PLC to develop a program that works together with a model of four Junction traffic light . The objective 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

4.Problem Study

In metropolitan cities with huge population handling the traffic is the most complicated job. Handling traffic manually and physically in such regions involves constant manpower with continuous monitoring with conventional complicated hard wired controlled systems, which makes the system to be more messy 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 and a handy 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 less physical and an easy job. 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.

5. Methodology

Traffic signals are the most effective solution when it comes to control traffic in a particular junction specially when there is too much traffic density. But many a times it is seen that this signal fails when a particular lane has more traffic than adjusting lane. This will result into more amount of traffic in a lane than the other. If a traffic signal can be able to allow different vehicles according to their weight like trucks, buses, cars, etc. This will be the easiest solution to resolve traffic in a highly dense area. In this method we are counting the number of vehicles in a particular lane and accordingly diverge them or park in automated parking. If we consider monitoring the traffic-by-traffic police then it will be very difficult to be present 24 X 7, therefore this method can be installed in highways and city areas. The main objective of this project is to resolve the above-mentioned problems through the actuated signal control through PLC and SCADA. The actuated signal control is obtained through analysis done between the various types of traffic signal control.

6. WORKING PRINCIPLE

The conventional traffic light system is employed with microcontroller-based control system which may cause trouble in daily usage, and it requires regular maintenance which will also increase the investment cost. Therefore, the smart traffic light control can be the alternative to this type of traffic light control system, this system comes with the fact that they are easy to adopt, and they can sustain the temperature conditions. This project is employed with the traffic density system so that traffic density can be monitored and controlled, which will delay a particular lane accordingly. The sensors which are used are inductive and proximity.

The overall process of control is governed with SCADA system which stands for Supervisory Control and Data Acquisition System. Which can be used for monitoring and controlling any applications. In this project it monitors the activity in the PLC and sends data to the user on control end. So as traffic intensity changes it will sense it and accordingly give user the information about the intensity and time delay changed. The main objective of this project is to sense the intensity of traffic in a particular lane and monitor and control the traffic signal automatically. The total circuitry of the project consists of relay board and plc with digital extension module, SMPS to regulate the power flow to the relay board. There are 12 indicators used in this case 3 on each lane being green, Yellow, Red. The traffic intensity is sensed by the proximity sensors. The communication cables transfer data to the SCADA system.

7. CONCLUSION

This method will help in reducing the congestion of traffic on roads and also to prevent the accidents. This method can become the solution for the critical problem like congestion and fatal accidents. Resulting into much safer and time saving on road.

An intelligent way of traffic light control had been designed and developed successfully. The various sensors which are employed are interfaced with the plc module. The interface is then synchronized with the process. The accuracy of this system can be increased by increasing the number of sensors used to detect the vehicles present. Also future improvement can be using the IR sensors and cameras this will result in more accurate results and wide range of detection can be possible.

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

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