Optimal Strategy for Extraction of Traffic Based On PLC

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Abstract - *Traffic signals are the most suitable method of controlling traffic in busy junction. Whenever a particular lane has got more traffic than other lanes generalise traffic signals fails to control high traffic. The main objective of this paper is to introduce the system of traffic control which can be implemented on high traffic using PLC. PLC is used to control overall system using some specific functions and decides the priorities of the lane automatically. Sensors are checked vehicle density in a lane at a 4-way crossing and certain logical operations are performed to decide which lane should be serviced first also provides output signals to traffic light poles for ON or OFF the yellow, green or red lights and the timing of ON period is depend on the specific priorities.*

***Key Words*: PLC, Sensors, 485 converter, LED's, seven segment display's**

1. INTRODUCTION

The traffic system is mostly based on sequential logic. Each light operates for a given time one after another. In generalise traffic control system it may be observed that period of signals for a particular road will be always constant. These days it is necessary to introduce the system of traffic control which can be implemented in the city on high traffic. Hence need for traffic control system which would work on certain conditions and take decision automatically. Optimal system stands for minimizing traffic problems by monitoring and sensing traffic conditions and also adjusting the timer of traffic lights. The idea behind this project is to make optimal strategy for traffic control system to collect information from busy lanes by sensors and using control unit to shift service as per priority. The system consists of three main parts. The first part is PLC controller. The second part is hardware usually comprises red, yellow, green lights and display and third part is sensors. Sensors check the presence of vehicles.

1.1 Objective

To demonstrate a way to develop an optimal system using PLC to get rid of traffic in optimized manner which handles the operation of signals automatically as per the situations.

2. BLOCK DIAGRAM

In this idea of project, programming logic controller platform with DVP-SA2 series is used. It offers bigger programming capacity and executing efficiency, also offers high speed output.

Basic blocks of system are shown in FIG.1. The functions are given bellow:

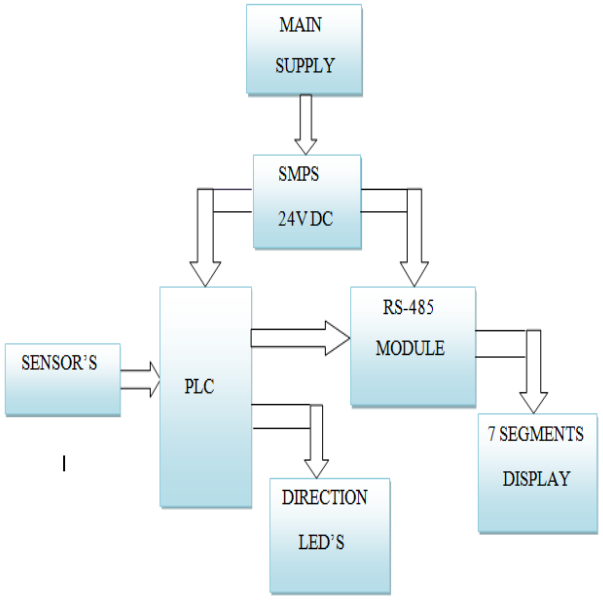

Fig-1: Block Diagram

2.1 programmable logic controllers

PLC is used to check and control a system using digital input which can be programmed for automation. It can be able to take decision automatically by using logical operations and has computational abilities.

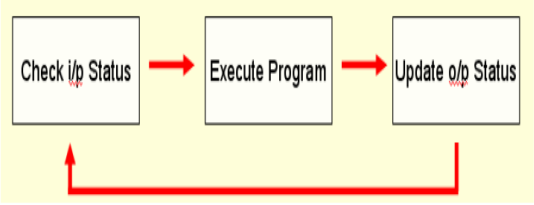

Fig 2: Operation of PLC

It checks each input status to determine whether it is on or off condition. PLC also works as modulator i.e. it can mix and match the types of input and output devices to best suit for the conditions.

2.2 Ladder programming

Ladder logic has evolved into a programming language that represents a program by a graphical diagram. It is used to develop software for programmable logic controllers. PLC works by continually scanning and look up on instructions to switch on or off various outputs. Programming has been expanded to contain the functions like counters, timers, match operations and shift registers. It is initially programmed with simple contacts and opening or closing of relays.

2.3 Proximity Sensor

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. Proximity sensor emits an electromagnetic field or beam of electromagnetic radiation and looks for changes in field. Inductive proximity sensor always defines a metal target. Proximity sensors can have high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and sensed object. The maximum distance that this sensor can detect is normal range.

Fig-2: Proximity sensor

2.3 RS-485 Converters

RS-485 is simply an electrical interface. It supports local networks and multidrop communication links. EIA-485 is a standard defining the electrical characterized of driver and receivers for use in serial communication system. It is generally accepted that RS-485 can be used with data rates up to 10Mbit/s and distance up to 1200m. PLC and controller are interfaces by modbus communication.

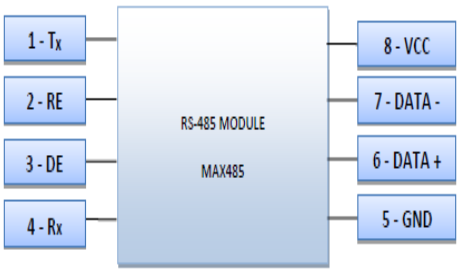

Fig-3: RS-485 Converter

3. PROCESS DESCRIPTION

Main block of the system is PLC. From power supply we get 230v AC power supply which is converting into the 24v DC by using SMPS i.e. switch mode power supply to turn on the PLC. The sensors are placed at a distance away from the junction. Sensors are the device that converts a physical condition into an electrical signal and give vehicles information to the PLC. The densities are counting by using proximity sensors. Then PLC compares each density with other densities of three lanes. PLC has abilities to change and replicate operation while collecting and communicating vital information. Ladder logic is widely used to program PLC, where continues control of process. Ladder program are transferred from PC to PLC. It takes decision and increase the green time of busy lane. Here RS-485 module for long distance communication and match the baud rate of PLC and displays for communication. Then according to the signals and sensors, seven segment display shows time as per the conditions.

4. ALGORITHM

Step 1:

i) Start the system

ii) Match the baud rate of PLC & DISPLAY'S for communication.

Step 2:

i) Switch on all displays

ii) Move the signal data onto the respective registers

Step 3:

i) Set the clock pulse of 1 sec for decrement the counter

ii) Follow normal process of the traffic signals

Step 4:

i) After one cycle is complete of traffic light now the sensor's working will be start.

ii) If X_0 (sensor 1)is on then subtract data by 20 sec from remaining 3 signal

iii) If X_0 (sensor 1) & X_1 (sensor 2) are on then subtracts data by 10 sec from remaining 3 signal

iv) If all sensors that is X_0(sensor 1), X_1(sensor 2), X_2(sensor 3) are set then follow the step 3-(1).

5. RESULT:

The following tabulation gives the reading for a particular example. When lane A is having first sensor ON then Red time prefer to remaining three signals are shown in below table. Similarly time prefers for remaining three signals whenever second & third sensors are ON.

Signal		30	30	60	90
		A	B	C	D
A	Sensors				
	1st sensor	10	10	40	70
	2nd sensor	20	20	50	80
	3rd sensor	30	30	60	90

When lane B is having first sensor ON then Red time prefer to remaining three signals are shown in below table. Similarly time prefers for remaining three signals whenever second & third sensors are ON.

Signal		90	30	30	60
		A	B	C	D
B	Sensors				
	1st sensor	70	10	10	40
	2nd sensor	80	20	20	50
	3rd sensor	90	30	30	60

When lane C is having first sensor ON then Red time prefer to remaining three signals are shown in below table. Similarly time prefers for remaining three signals whenever second & third sensors are ON.

signal		60	90	30	30
		A	B	C	D
C	Sensors				
	1st sensor	40	70	10	10
	2nd sensor	50	80	20	20
	3rd sensor	60	90	30	30

When lane D is having first sensor ON then Red time prefer to remaining three signals are shown in below table. Similarly time prefers for remaining three signals whenever second & third sensors are ON.

signal		30	60	90	30
		A	B	C	D
D	Sensors				
	1st sensor	10	40	70	10
	2nd sensor	20	50	80	20
	3rd sensor	30	60	90	30

6. CONCLUSION

In this project, we analyze the limitations of the existing traffic system and provide a new traffic control system for application of the traffic system .This project can help to reduce problem of congestion of traffic as well as reduce fuel consumption sound pollution caused by the sound of the horn nowadays.

This system is hereby implementing for reducing congestion of traffic system at the intersections of lanes by allotting variable time according to how much congestion is present on the respective area. The use of PLC makes the system more reliable than the ordinary system. by communicate the PLC with the converter we can reduce the output pins .

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