

A Review on PLC and Its Application on Smart Traffic Control

DEEPAK PATODIYA¹, ANIL PRATAP SINGH²

^{1,2} Department of Electrical Engineering, , Poornima College of Engineering, Jaipur, Rajasthan, India

Abstract -- The extent of this paper will be to introduce the beginning steps in the execution of a keen movement light control framework In light of Programmable Logical controller (PLC) engineering. The available specialized foul paper quickly recognizes those available mechanization frameworks around those provision ahead keen activity control. The advent and application of microprocessors, microcontrollers and new particular instruments for example, PLCs, Supervisory control and data acquisition (SCADA) Also distributed control systems (DCS) have expanded productivity, accuracy, precision What's more effectiveness. The keyword automation clearly describe the creation and application of technology to monitor and control the production and delivery of products and services. The previous practice leads to many problems that need additional maintenance cost and subsequent delay for a long time. The advantage of automation is that it saves labour, however it is also used to save energy, materials and to improve quality, precision and accuracy. The application of the system will greatly alleviate the traffic congestion, improve the efficiency of road, and make a contribution to energy conservation and emission reduction. In the future we will be living in the era with the smooth traffic flow, the good environment and social sustainable development.

I. INTRODUCTION

The meaning of the automation is derived from the Greek literature automation. Automation helps to improve productivity by modernizing and it is the process of having machines follows a predetermined sequence of operation sequence of operation with or without human intervention in a manufacturing process. The present investigation involves the operation of traffic lights at the central node of the intersection roads with references to the timing of barrier cut traffic during pedestrian traffic, and shows the timing of timers for passing and stopping vehicles.

Automation is a set of technologies that results in operation of machines and systems without significant human intervention and achieves performance

superior to manual operation. Modern automation is the automatic handling and continuous processing of machine, made possible with computer controls. Not main in this lifestyle is the wonder likely should make movement jams, as well as result in An waste about mankind's Furthermore material assets. Therefore, we have with search a canny activity control framework dependent upon those transform done movement flow, What's more it camwood naturally alter those period from claiming chance of the movement lights with minimize junction vehicles stagnation phenomenon[9]. In place will execute the provisions indicated, a specific level of brainpower may be needed over both those movement light and the controller. Accepted activity control frameworks are unidirectional, from controller on movement lights, without any reaction starting with the status of the movement lights. Person technique to ideal control Also movement administration may be the coordination about movement lights on make green waves currently, there exist diverse methodologies with ascertain green waves. The principle reason for existing for these systems may be to decrease those number for stops and minimize those travel times previously, excursions [4] here we proposed to utilize weight sensors Also counters on control those movement with simplicity [12].

II. PROGRAMMABLE LOGIC CONTROLLERS

A Programmable logic controller (PLC) is a digital electronics device that uses a programmable memory to store instructions and to implement specific functions such as logic, timing, counting and arithmetic operations to control machines and processes [14].

PLC is used in almost everywhere in our daily life and many industrial areas just like automotive, food,

textile, machinery manufacturing, agriculture and etc. [15].

Input devices e.g. switches, and output devices e.g. motors, being controlled are connected to the PLC and then the controller monitors the inputs and outputs according to this program stored in the PLC by the operator and so controls the machine or process [13]. PLCs were first introduced in the late 1960's. Bedford associates (Bedford, MA) proposed Modular Digital Controller (MODICON) to a major US car manufacturer. The MODICON084 is the world's first PLC commercial production by Bedford associates [1]. To determine the most suitable PLC to be used in the automation task need several basic Considerations to be made namely, number of input/outputs, digital/analog I/O, memory capacity needed, speed and required power for CPU and coding instructions, manufacturer's service Support etc. All these parameters are interdependent and choice need to be judicious. The PLC mainly consists of a central processing unit (CPU), memory and I/O modules to handle input/output data. PLCs have the basic structure as shown in Figure 4 [1].

III. LADDER LOGIC PROGRAMMING:-

The programming language used here is ladder logic. It represents a program by graphical diagram which is based on the circuit diagrams of relay logic hardware. It issued to develop software for programmable logic controllers (PLCs) in industrial control applications. The name is because of programs in this language resemble ladders, with two vertical rails and a series of horizontal rungs in between them [14].

1. PLCs are similar to computer but have certain features which are specific to their use as controllers. These are:
2. They are rugged and designed to withstand vibrations, temperature, humidity and noise.
3. The interfacing for inputs and outputs is the controller.
4. They are easily programmed and have easily understood programming language.
5. It contains programmable functions.
6. It scans memory, inputs and outputs in predetermined manner.

7. It provides error checking diagnostics.
8. A PLC can provide some form of monitoring capabilities
9. A PLC can be effectively designed for a wide variety of control tasks.

IV. TRAFFIC CONTROL SYSTEM

- Traffic signals control vehicle movements
- Traffic Control Systems are interconnected with Electronics system that controls traffic signals.
- Traffic Control Systems depend on logic which can be divided into these categories:

I .The signal phases and cycle length are depend on the traffic flow on the desired track

II .The system responds to interrupts or timing base system and open the desired signal according to the priority requirement

A. ADVANTAGES

Traffic signals help control the flow of vehicles, pedestrians and bicycles by giving "right-of-way" to the various movements in an orderly manner. Signals that are properly located, designed and maintained can:

- Provide for orderly movement of traffic. Increase capacity of the intersection.
- Reduce frequency and severity of certain types of crashes, especially right-angle collisions.
- Provide for continuous movement of traffic at a definite speed along a given route.
- Interrupt heavy traffic at intervals to permit other vehicles or pedestrians to cross.
- Effectively perform traffic management
- Overall, traffic signals help us get where we're going safely and in a timely manner. [3]

B. DISADVANTAGES

Movement signs are now and then viewed as issues in intersections. Done fact, movement signs that need aid poorly found could adversely influence the security What's more effectiveness about vehicle, bike Also walker activity. Inappropriate alternately unjustified

signs might bring about person or a greater amount of those following:-

- Significant increase in the frequency of some types of collisions
- Increased congestion, air pollution, and fuel consumption.
- Excessive delay.
- Excessive disobedience of the signal indications.
- Increased use of less adequate streets as motorists attempt to avoid the traffic signals.
- Frustration especially in hot weather [3].

V. NEW APPROACH

In this technique we would proposing to decrease those overwhelming movement Also blockage out and about by utilizing PLC built movement preoccupation framework. This might fill in on weight sensing utilizing sensors whose yield will make nourished will a PLC, which will control those movement preoccupation. This method is done two parts:-

• DIVERSION:-

Weight sensor may be put at toll corner. It faculties the weight & sends sign to PLC. PLC will generate a slip hosting those data around the vehicle in the structure for barcode. PLC will provide for the preoccupation as stated by the weight of the vehicle. Fig. 1.

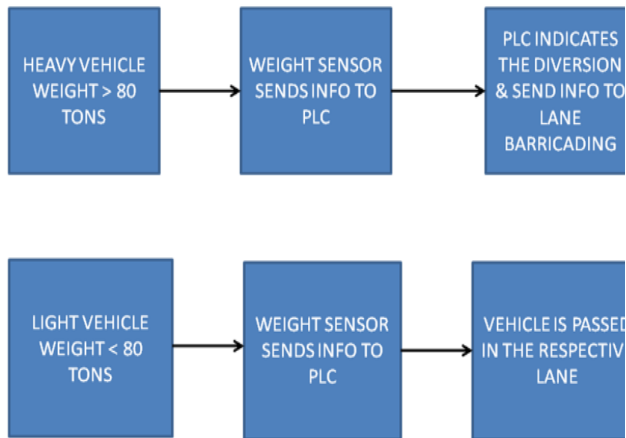


Fig. 1 Flow chart for diversion of vehicles based on weight

• CONGESTION CONTROL:-

In this there are two counters dependent up counter (at the beginning of the road) & down Counter (at the

conclusion of the road) whose max worth is 100. The point when a vehicle enters the road, up counter is situated What's more the other way around. There need aid 3 states for permitting the vehicle in the range fig.2

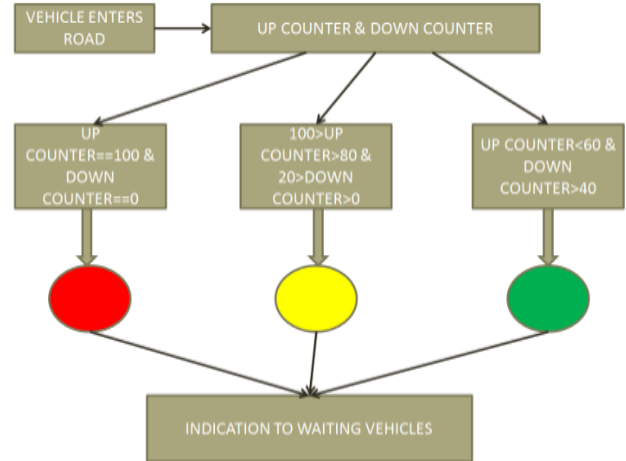


Fig. 2 Flow chart for diversion of vehicles based on traffic density

- If up Counter==100 & down Counter==0, At that point red light will make indicated i. E. No vehicle will a chance to be permitted with enter the zone.
- If 100>UP Counter>80 & 20>Down Counter>0, after that yellow light will be demonstrated i. E. Vehicles will a chance to be completely frank will a chance to be prepared to enter those territory.
- If up Counter<60 & down Counter>40, that point green light will make indicated i. E. Vehicles will be permitted should enter those range.

VI. SCADA VIEW OF PROPOSED METHOD

We utilized within Touch Software toward Wonder ware in this method. There are two SCADA views:

- Indicating blockage & preoccupation over city. Fig. 3.
- Demonstrating to movement status & preoccupation for vehicles in toll corner Fig. 4.

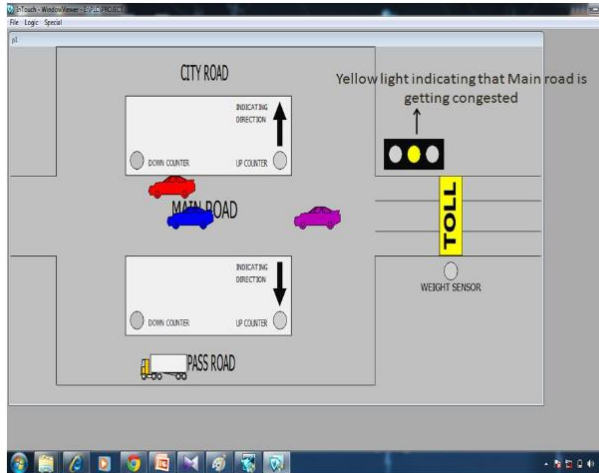


Fig. 3 Showing congestion & diversion in city

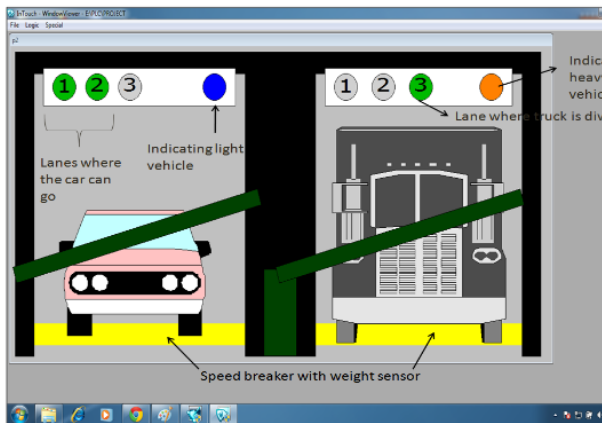


Fig. 4 Showing traffic status & diversion for vehicles at Toll Booth

VII. CONCLUSION

This technique will assistance decrease clogging once streets Also might assistance in adapting to mishaps Similarly as the overwhelming vehicles Also light vehicles will make in distinctive lanes. Resultantly, an answer to a a great part basic issue for movement blockage and deadly mishap mishaps will be could be allowed utilizing this framework. Along these lines those recommended framework might make our streets a safer spot to head out.

REFERENCES

[1] Hudedmani, Mallikarjun G., R. M. Umayal, Shiva Kumar Kabberalli, and Raghavendra Hittalamani. "Programmable Logic Controller (PLC) in Automation." *Advanced*

Journal of Graduate Research 2, no. 1 (2017): 37-45.

[2] Voinescu, Monica, Andreea Udrea, and Simona Caramihai. "On urban traffic modelling and control." *Journal of Control Engineering and Applied Informatics* 11, no. 1 (2009): 10-18

[3] Khattak, Muhammad Arshad. "PLC based intelligent traffic control system." *International Journal of Electrical & Computer Sciences IJECs-IJENS* 11, no. 06 (2011).

[4] Makdisie, Carlo Y. "Automation Development of Traffic Light Control via PLC based Simatic Manager." *International Journal of Electronics Engineering* 4, no. 1 (2012).

[5] Joshi, Jaswandi G., and D. D. Ahire. "A BRIEF SURVEY ON PROGRAMMABLE LOGIC CONTROLLER AND ITS VERSATILE APPLICATIONS USING SCADA SYSTEM."

[6] Padmavathi, G., D. Shanmugapriya, and M. Kalaivani. "A study on vehicle detection and tracking using wireless sensor networks." *Wireless Sensor Network* 2, no. 02 (2010): 173.

[7] Shankar, K. Gowri. "Control of boiler operation using PLC-SCADA." In *Proceedings of the International MultiConference of Engineers and Computer Scientists*, vol. 2, pp. 19- 21. 2008.

[8] Bindu, K. P. Jayasree. "NR, Sreenivasan E." *Control. Automation and Monitoring of Hardboard Production Process Using PLC-SCADA System* 2, no. 7 (2013): 3281-3286.

[9] Zhong, Fei, Jutao Wang, and Xudong Cheng. "Application of Intelligent Traffic Control Based on PLC." In *Proceedings of the 2nd International Conference on Computer Science and Electronics Engineering*. Atlantis Press,2013.

[10] Shingre, Nikita, Reema Nagwekar, Rupa Roy, Trupti Shendkar, and Rupinder Kaur. "REVIEW ON MOBILE PHONE BASED SCADA FOR INDUSTRIAL AUTOMATION."

[11] Nellore, Kapileswar, and Gerhard P. Hancke. "A survey on urban traffic management system using wireless sensor networks." *Sensors* 16, no. 2 (2016): 157.

[12] Srivastava, Mohit Dev, Shubhendu Sachin Prerna, Sumedha Sharma, and Utkarsh Tyagi. "Smart traffic control system using PLC and

- SCADA." International Journal of Innovative Research in Science, Engineering and Technology 1, no. 2 (2012): 169-172.
- [13] Burali, Y. N. "PLC based industrial crane automation & monitoring." International Journal of Engineering and Science 1, no. 3 (2012): 01-04.
- [14] Kelaginamane, Sudeep, and D. R. Sridhar. "PLC Based Pneumatic Punching Machine." Journal of Mechanical Engineering and Automation 5, no. 3B (2015): 76-80.
- [15] Joshi, Mehul G., Pranav B. Bhatt, and Ghanshyam D. Patel. "Industrial Automation for Roto-moulding Plant using PLC." International Journal of Engineering Trends and Technology (IJETT) 24