ISSN: 2319 – 8753

International Journal of Innovative Research in Science, Engineering and Technology
Vol. 1, Issue 2, December 2012

SMART TRAFFIC CONTROL SYSTEM USING PLC and SCADA

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Abstract: The scope of this paper is to present the initial steps in the implementation of a smart traffic light control system based on Programmable Logic Controller (PLC) technology. We, 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.

Keywords: Programmable Logic Controllers (PLC), Weight sensor, Counters, LEDs, SCADA

I. INTRODUCTION

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.

The main aim of designing AI traffic controllers is that the traffic controllers have the ability to adapt to the real time data from detectors to perform constant optimizations on the signal timing plan for intersections in a network in order to reduce traffic congestions, which is the main concern in traffic flows control nowadays, at traffic intersections [1]. A traffic light group is defined as a set of traffic lights which are controlled by the same regulator, which acts as a master or coordinator. The regulator operates under a intelligent system that allows for controlling the lights status depending on time, traffic conditions, etc. Urban traffic control strategies are based on lights controllers. An intersection is managed by a controller in charge of several red lights. The management is based on phases, cycles, split vectors and coordination between the controllers of the different intersections on the road network [2].

In order to implement the applications indicated, a certain level of intelligence is required in both the traffic light and the regulator. Traditional traffic control systems are unidirectional, from regulator to traffic lights, without any response from the status of the traffic lights [3].

One strategy for optimum control and traffic management is the coordination of traffic lights to create green waves. Currently, there exist different strategies to calculate green waves. The main purpose of these techniques is to reduce the number of stops and minimize the travel times in trips [4].

Here we intend to use weight sensors and counters to control the traffic with ease.

II. NEW APPROACH

In this method we are proposing to reduce the heavy traffic and congestion on the road by using PLC based traffic diversion system. This would work on weight sensing using sensors whose output will be fed to a PLC, which will control the traffic diversion. This method is in two parts:

A. *Diversion*

ISSN: 2319 – 8753

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Weight sensor is placed at toll booth. It senses the weight & sends signal to PLC. PLC will generate a slip having the info about the vehicle in the form of barcode. PLC will give the diversion according to the weight of the vehicle. *Fig. 1*

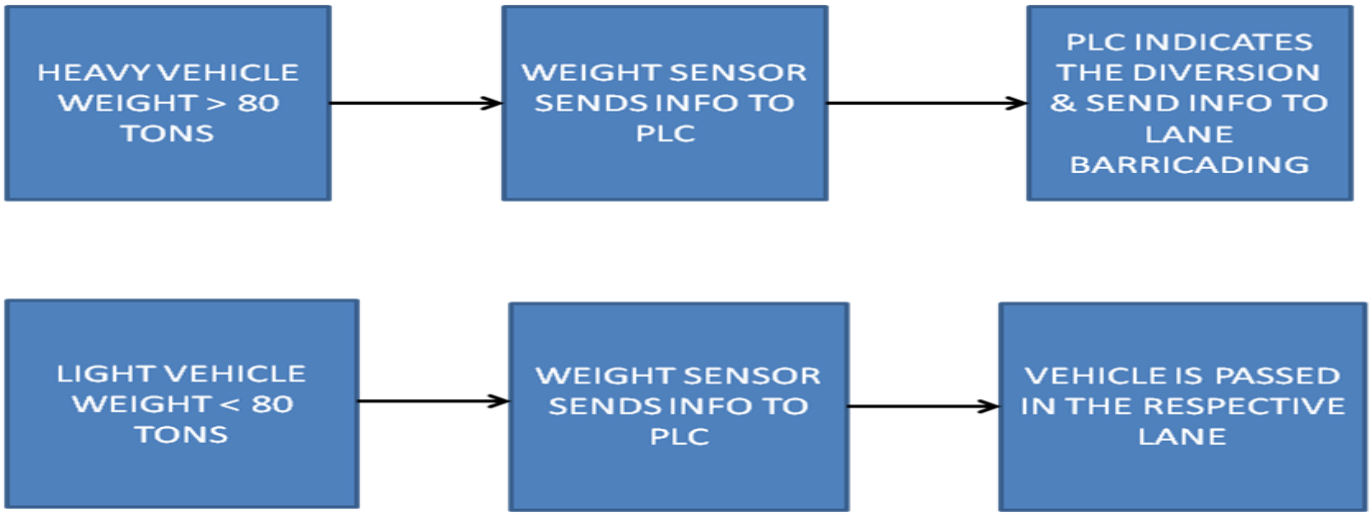

Fig. 1 Flow chart for diversion of vehicles based on weight

B. *Congestion Control*

In this there are two counters– UP Counter (at the starting of the road) & DOWN Counter (at the end of the road) whose max value is 100. When a vehicle enters the road, UP Counter is set and vice versa. There are 3 conditions for allowing the vehicle in the area Fig. 2

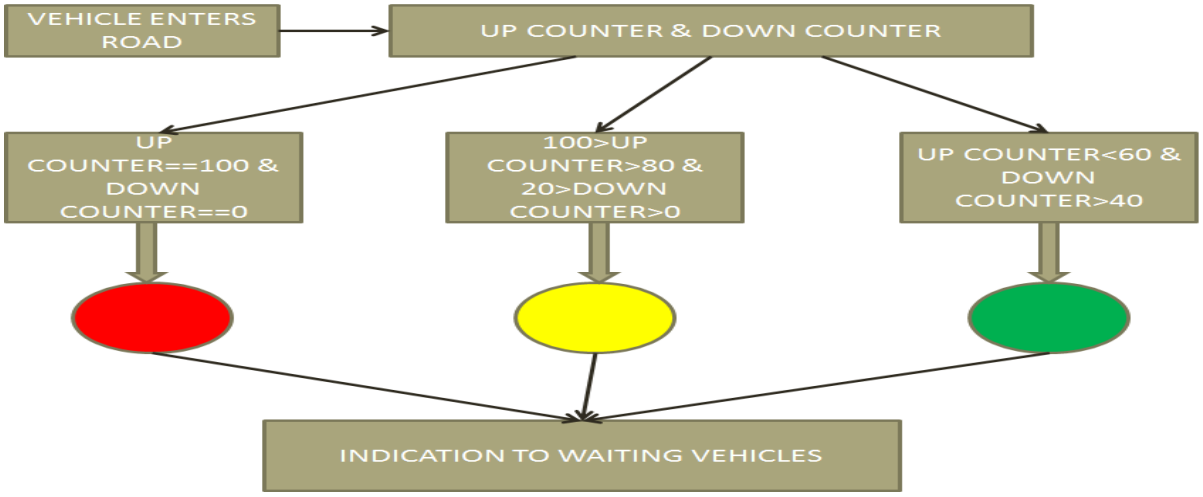

Fig. 2 Flow chart for diversion of vehicles based on traffic density

- If UP Counter==100 & DOWN Counter==0, then red light will be shown i.e. no vehicle will be allowed to enter the area.
- If 100>UP Counter>80 & 20>Down Counter>0, then yellow light will be shown i.e. vehicles will be told to be ready to enter the area.
- If UP Counter<60 & DOWN Counter>40, then green light will be shown i.e. vehicles will be allowed to enter the area.

ISSN: 2319 – 8753

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C. *SCADA view of proposed method*

We used In Touch Software by Wonder ware in this method. There are two SCADA views:

1. Showing congestion & diversion in city. *Fig. 3*
2. Showing traffic status & diversion for vehicles at Toll Booth. *Fig. 4*

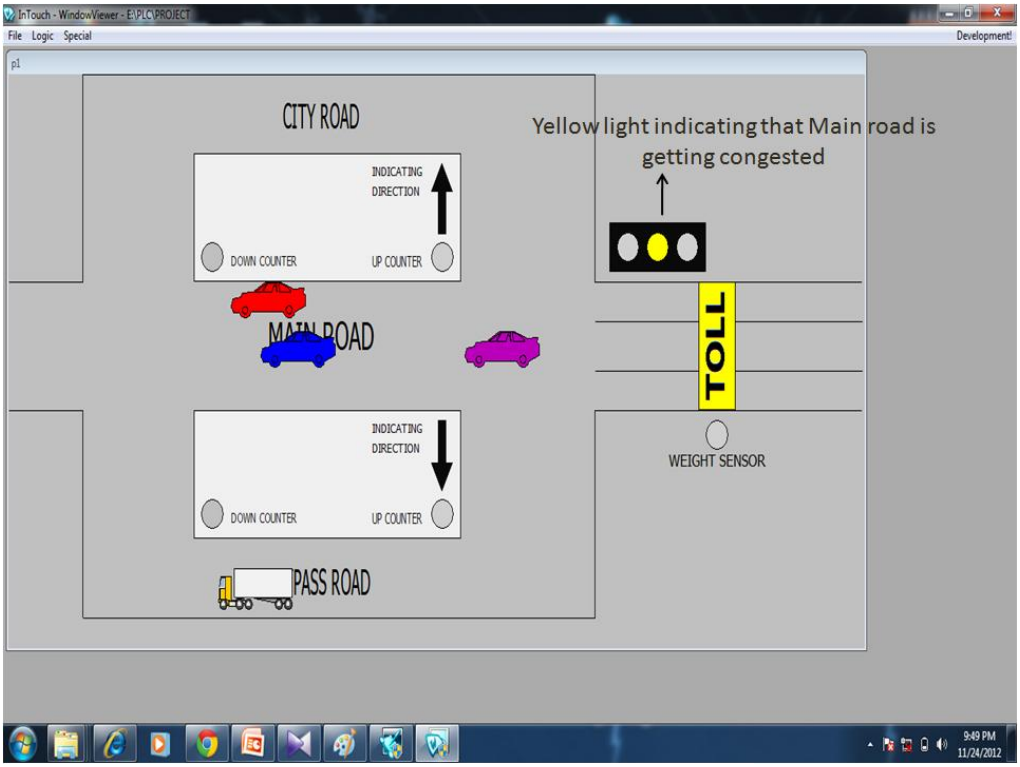

Fig. 3 Showing congestion & diversion in city

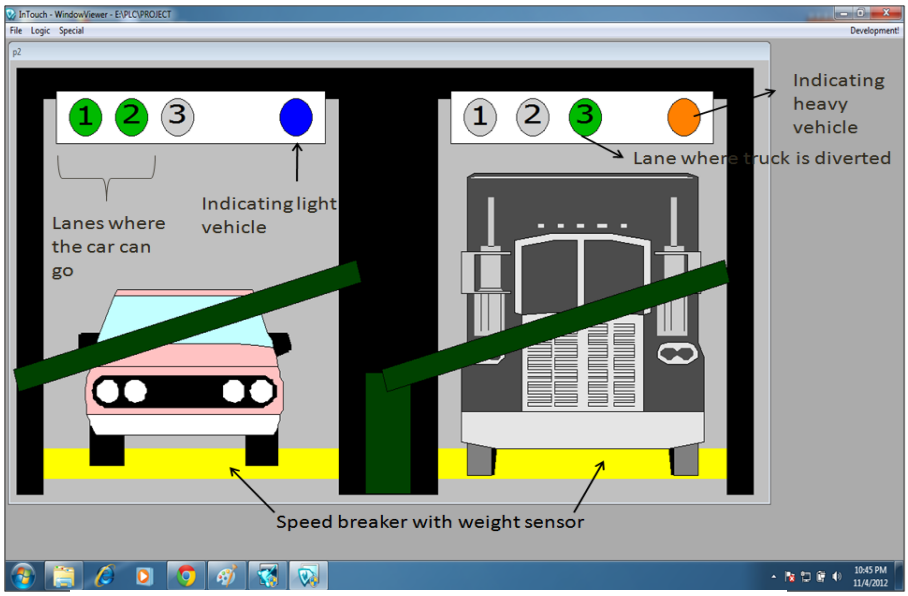

Fig. 4 Showing traffic status & diversion for vehicles at Toll Booth

III. CONCLUSION

This method will help reduce congestion on roads and would help in coping with accidents as the heavy vehicles and light vehicles will be in different lanes. Resultantly, a solution to a much critical problem of traffic congestion and fatal accidents is possible using this system. Thus the proposed system would make our roads a safer place to travel.

ACKNOWLEDGEMENT

Mohit Dev Srivastava, Prerna, Sumedha Sharma, Shubhendu Sachin and Utkarsh Tyagi are thankful to their family. They inspired them during their research work. They are also thankful to Dr. Monika Jain (HOD- Electrical & Electronics Deptt.) other faculty and staff of the EEE department for their co-ordination and devoting their precious time to them.
At last, constructive criticism and valuable suggestions from readers are welcome.

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