

# LOVELY PROFESSIONAL UNIVERSITY

Phagwara, Punjab

## Report on PLC Program to Control Traffic Lights and Pedestrian Lights

CA-2

### SUBMITTED BY:

**Name:** Paladi Sri Lakshmi Narayana Venkata Abhishek

**Registration Number:** 11908645

**Section:** 1814

**Roll no:** B23

### SUBMITTED TO:

**Name:** Harpreet Singh Bedi

**id:**17377

School of Electronics & Electrical Engineering  
Electronics and Communication Engineering  
Lovely Professional University, Phagwara

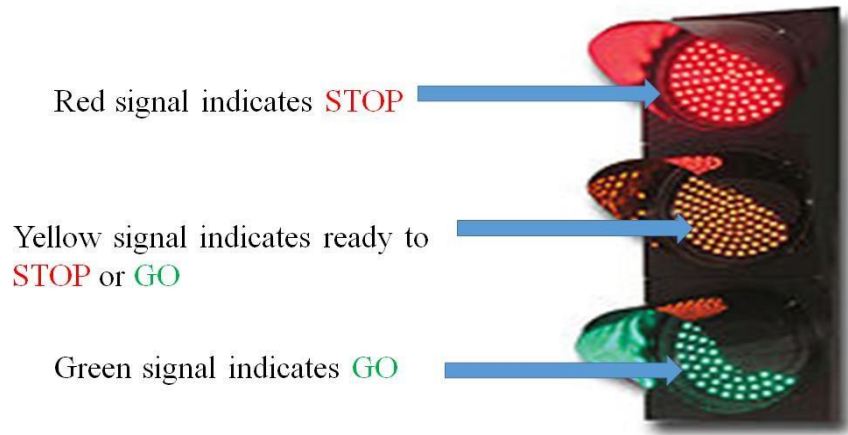
# **INTRODUCTION TO TRAFFIC SIGNAL CONTROL:**

Traffic light which is one of the vital public facilities plays an important role to the road users. It will help to curb from accidents and gridlocks. This research exposed the operational of traffic light such as understanding the flow of the traffic system and the program itself. Traffic signal light is used to control the movement of vehicles and passengers, so that traffic can flow smoothly and safely. Traffic signal lights have been around for years and are used to efficiently control traffic through intersections. Although traffic signal lights are relatively simple and commonplace, 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 number of accidents, and the most recently to their utility in controlling the flow of traffic through metropolitan areas when have been used together with computer systems.

Traffic signal lights will improve the road safety and reduce congestion by providing the signals orderly through junctions. Traffic control lights are provided for traffic control on streets and highways, especially at junctions. The traffic signals are cyclically displayed through a suitable timing and control mechanism.

A traffic light has three colours which are red, yellow and green. Every colour carries a certain sign. The red light means the road user has to 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 citation able traffic offense



The transition of the light is controlled by PLC to help the traffic movement run smooth from one direction to the other. PLC reduces traffic congestion especially in the morning and evening. Besides, it also helps to reduce the accident rate especially in town.

## INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLERS (PLC)

- **Introduction and a brief history of PLC:**

In 1968 the automatic transmission division of General Motors sought to replace hard wired relay systems and control panels with a software based control system. GM was using thousands of relays, cam timers, drum sequencers and dedicated closed loop controllers. Whenever engineers wanted to update the manufacturing process, usually once a year, they had to rewire

the relays and components consuming a lot of time and money. GM sought a system that could change the logic rather than rewiring relays. Dick Morley of Bedford Associates, Bedford, Massachusetts, now known as the “father of the PLC”, designed the Modular Digital Controller or “Modicon” which used “ladder logic” and replaced relay logic with schematic diagrams, in the process reducing wiring by 80 percent.

As they were originally designed as a replacement for hard-wired relay and timer logic control systems. PLCs have the great advantage that it is possible to modify a control system without having to rewrite the connections to the input and output devices, the only requirement being that an operator has key in a different set of instruction. The result is a flexible system which can be used to control systems which vary quite widely in their nature and complexity.

- **Definition of PLC:**

A digitally operating electronic apparatus which uses a programming memory for the internal storage of instructions for implementing specific functions such as logic, sequencing, timing, counting and arithmetic to control through digital or analogue modules, various types of machines or process.

- **PLC Software System:**

Types of programming languages.

- Statement list

- Ladder diagram
- Functional Block diagram
- Function flow chart

**Ladder diagram:** The ladder diagram has and continues to be the traditional way of representing electrical sequences of operations. These diagrams represent the interconnection of field devices in such a way that the activation, or turning ON, of one device will turn ON another device according to a predetermined sequence of events.

## **PROJECT DESCRIPTION:**

- The project is to Control the Traffic Lights and Pedestrian Lights on PLC Using Ladder Logic.
- **Equipment Required:** Logix Pro Software Personal Computer
- **Theory:** PLC operates by continually scanning the program and acting upon the instructions, one at a time, to switch on or off the various outputs. In order to do this PLC first scans all, the inputs and stores their states in memory. Then it carries out program scan and decides which outputs should be high according to the program logic.

Ladder Logic is a graphical programming language, initially programmed with simple contacts that simulates the opening and closing of relays. Ladder Logic programming has been expanded

to include functions such as Counters, Timers, shift Registers and math operations.

Ladder logic is a method of drawing electrical logic schematics. It is now a graphical language very popular for programming Programmable Logic Controllers (PLCs). It was originally invented to describe logic made from relays. The name is based on the observation that programs in this language resemble ladders, with two vertical "rails" and a series of horizontal "rungs" between them.

**Pedestrian Lights:** Many street crossings have pedestrian signals that show the words WALK and DON'T WALK or show a WALKING PERSON in white and a RAISED HAND in orange.

Pedestrian signals direct pedestrians while crossing the street. The WALK or WALKING PERSON appears when it is legal to start crossing. Here Walk in red colour indicates don't cross the road. While green colour walk indicates to cross the road. At many traffic signals, you need to push the pedestrian push button to receive the WALK or WALKING PERSON signal. At a crossing where there are no pedestrian signals, pedestrians must obey the red, yellow, or green signal lights.

- **Procedure:**

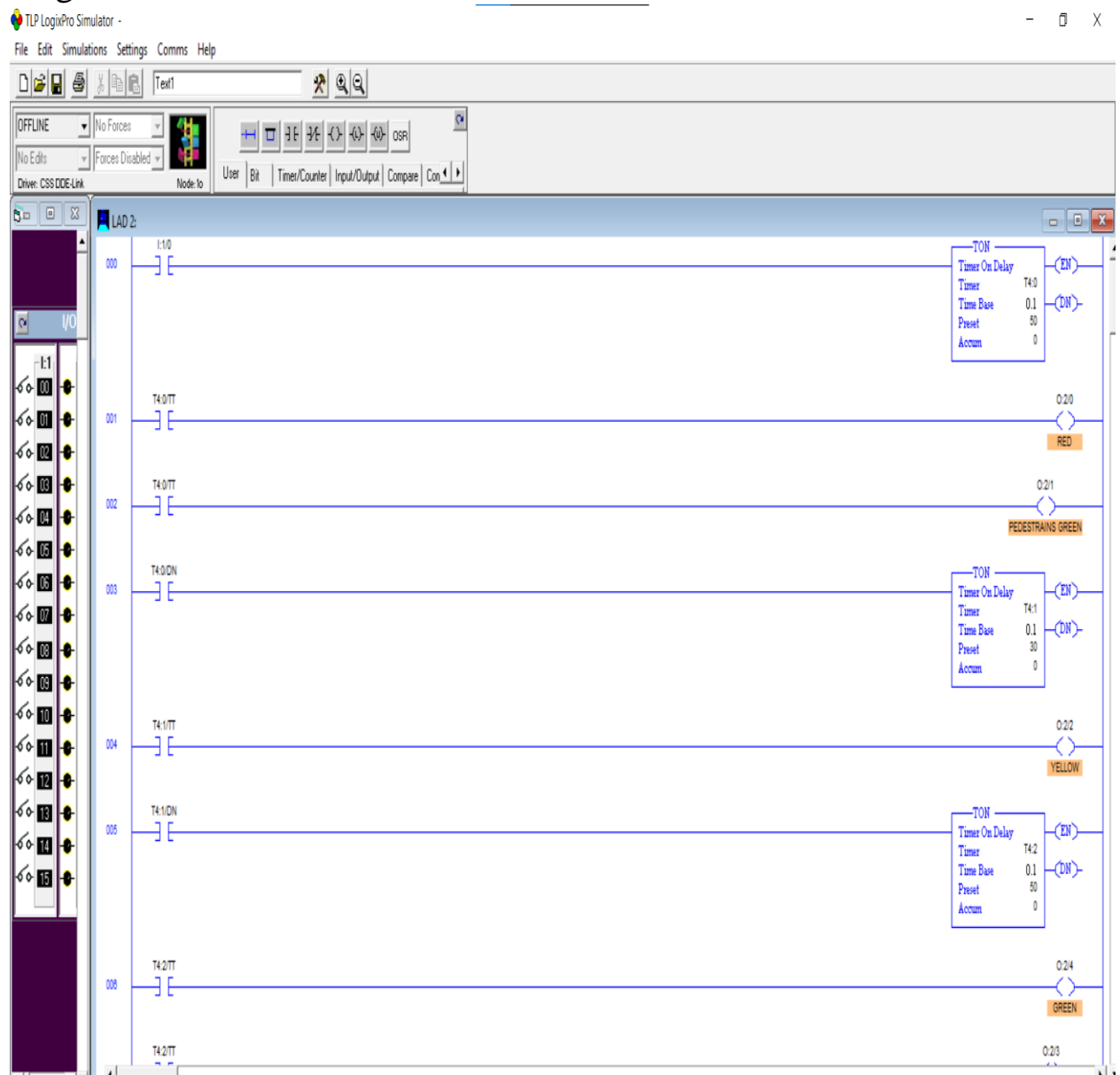
- 1) Make a Ladder Logic of working of Traffic Light
- 2) Save the program on Logix Pro Software.
- 3) Simulate the program and check for errors

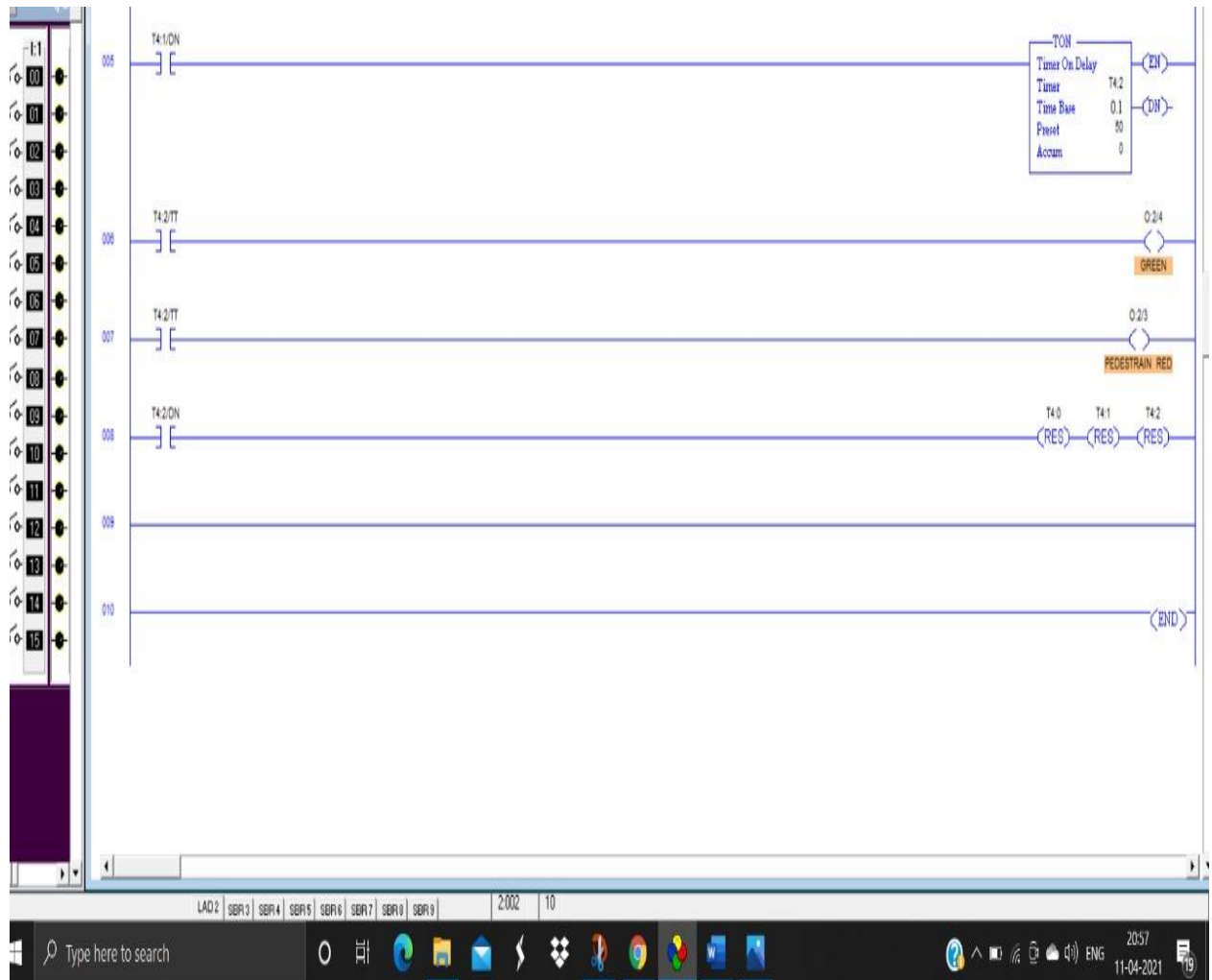
4) Run the program using run option.

5) Program is complete.

- **The Implementation of the ladder diagram for the Controlling of Traffic Lights and Pedestrian Lights:**

The below diagram is the implemented Ladder diagram





## **Working of the Ladder Diagram:**

- The circuit starts working from the RUNG 000 “NO Switch” , By turning the Switch to the ON state results the enabling of the timer.
- The timer in the Rung000 has given by a preset value of 50, The calculation of the preset value was done by using a formula as given below

$$\text{Required time} = \text{Timebase} * \text{preset value}$$



- The desired time in the case is 5 seconds and the time base value is of 0.1 so the preset value should be 50 in this case , We can change this value based on the need and application
- The timer in the RUNG 000 results the enable bit and done bit. Enable bit remains HIGH when the timer is ON and after reaching the 50 cycles of the accumulator the Timer stops working and the enable bit changes to LOW
- The Done bit of the timer became HIGH after the timer stops in the RUNG 000
- During the Time period of the enable bit from the Timer 1 Results the switch in RUNG001 and RUNG002 closed and the given Red light in RUNG 001 and the Pedistrian Green light in RUNG002 glows for the 5 seconds of time
- The DONE bit from the RUNG 000 is given to the RUNG003 and it was connected to the another TIMER which has the different values of the preset and the time duration
- The TIMER in the RUNG 003 results the Enable and done bit and the output from that
- In order to run the Timer for the 3 seconds the preset value is set to 30 and time base is set to the 0.1, By using the formula mentioned above

- The HIGH in the Enable bit of the timer in the RUNG003 Results to the Glowing of the YELLOW light in the4 RUNG004 for the duration of the 3 seconds.
- The done bit from the RUNG003 is applied to the RUNG005 “NO Switch “ and it results to the turning ON the TIMER in the RUNG005
- In order to run the Timer for the 5 seconds the preset value is set to 50 and time base is set to the 0.1, By using the formula mentioned above
- The HIGH from the enable bit of the timer in the RUNG 005 results the Glowing of the GREEN light in the RUNG006 and the pedisrtrain light in the RUNG 007
- After the duration of 5 seconds the DONE bit from the timer of RUNG005 makes the RESET of the Three timers T4:0 T4:1 and T4:2
- The simulation ends at RUNG010

## **CONCLUSION**

- Programmable Logic Circuits like an Arduino that is mainly used for industrial automation. The PLC has a better processor power & memory, can handle more current in the I/O ports, the ports are optocoupled, it is more robust, it is closed architecture, . The Logic made in this project is mainly used for controlling the traffic. Hence the simulation was done sucessfully

