

Technical University of Denmark

31342 Introduction to Programmable Logic Controllers

Exercise 11

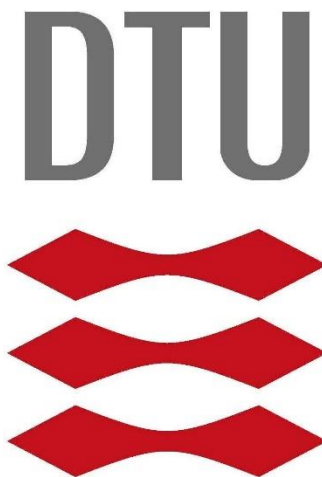
Traffic Monitoring

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Visualization of the Traffic Lights Model from 6th

Exercise:

The visualization of the traffic light model from the 6th exercise is implemented by indicating the car's lights as bigger circles with red, yellow, and green colors; and the pedestrian's lights as smaller circles with red and green colors. The implementation is shown in the Figure 1.

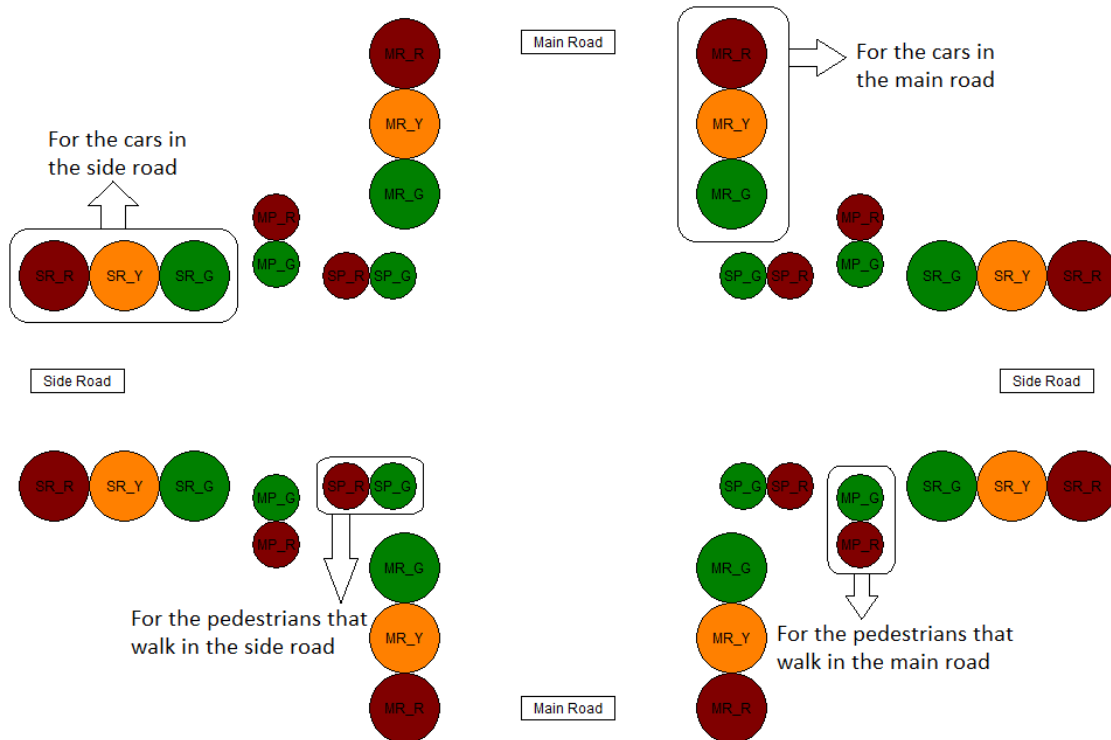


Figure 1: The visualization model of the traffic model

In the 6th exercise, there are 2 modes of the cycles of the traffic lights. The first one is the mode which the lights for both cars and pedestrians run continuously. The other one is the mode which the lights for the cars and pedestrians in the side road are triggered by the sensors for the cars and by the buttons for the pedestrians. These modes can be switched by using a button in the visualization model.

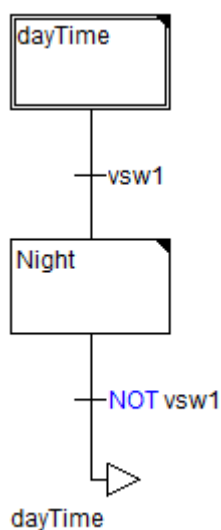


Figure 2: The SFC of the implementation

The implementation of this mode switching is done by using sequential function chart. There are two states which are called the *dayTime* for the mode that runs the cycles continuously and the *Night* for the mode that runs the cycles according to the outputs of the sensors and buttons. The state transition is controlled by the virtual button in the visualization model. The sequential function chart (SFC) of the implementation is given in the Figure 2.

It should be noted that since both states use the same timers and variables in their ladder diagrams, the first cycle of the traffic lights doesn't run correctly.

The data that track the number of pedestrians activating the pedestrian buttons can be added to the visualization model as a trend element. An example of the plot in the trend element is shown in the Figure 3.

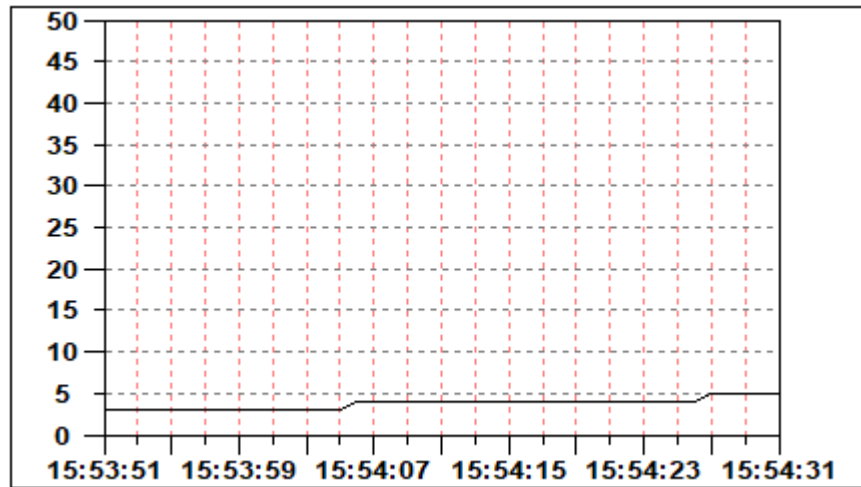


Figure 3: An example of the plot in the trending element

Also, the information on the plot is logged in a file which is named as *pedestrianNumberLog*.

Alarm functionality to the sensors and buttons are added in the visualization model. An alarm will be triggered if a button or a sensor are high for an abnormal amount of time, in this case it is 60 seconds, which indicates that there could be a short circuit in the button or sensor.

For each sensor/button, there is a variable that keeps the information whether the sensor/button is high for 60 seconds or not. If it exceeds 60 seconds, then the variable becomes *TRUE*. The implementation is shown in the Figure 4.

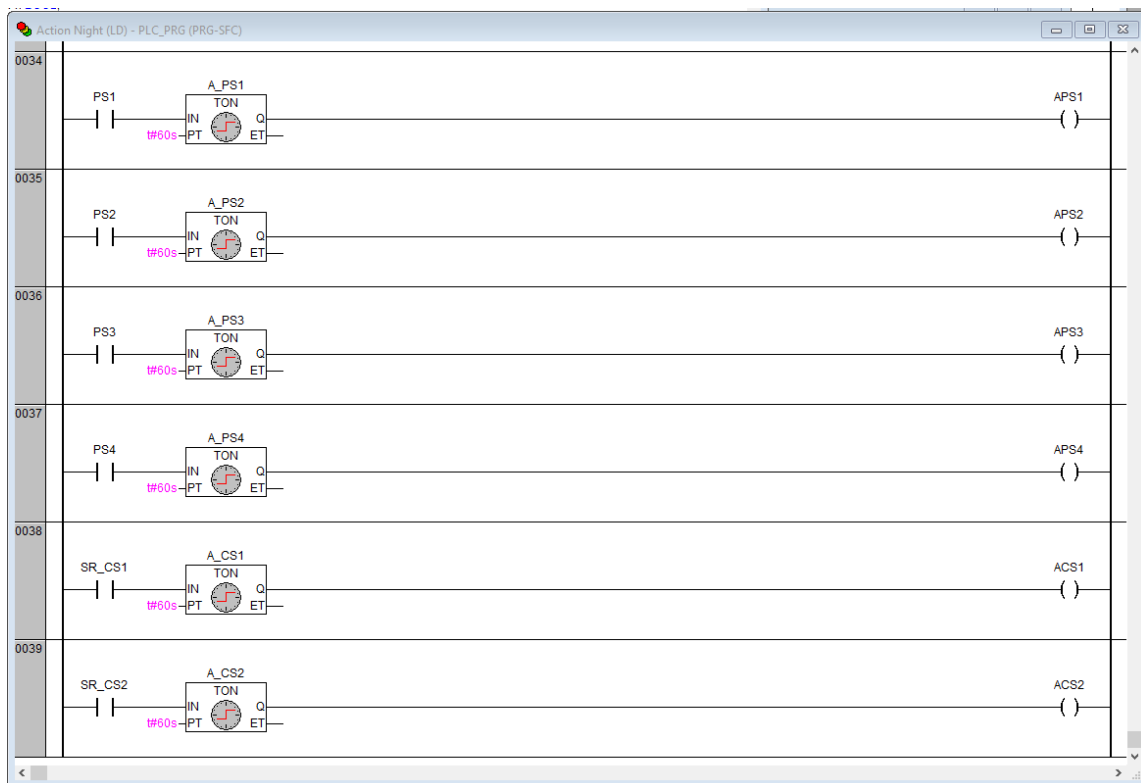


Figure 4: The implementation of keeping the info about exceeding 60 seconds for each sensor/button

The pedestrian buttons are *PS1*, *PS2*, *PS3* and *PS4*; and the car sensors are *SR_CS1*, and *SR_CS2*. The alarm data in the visualization model are logged in a file that is named as *sensorsAlarmLog*.

The overall implementation of the visualization model for the traffic light model is shown in the Figure 5.

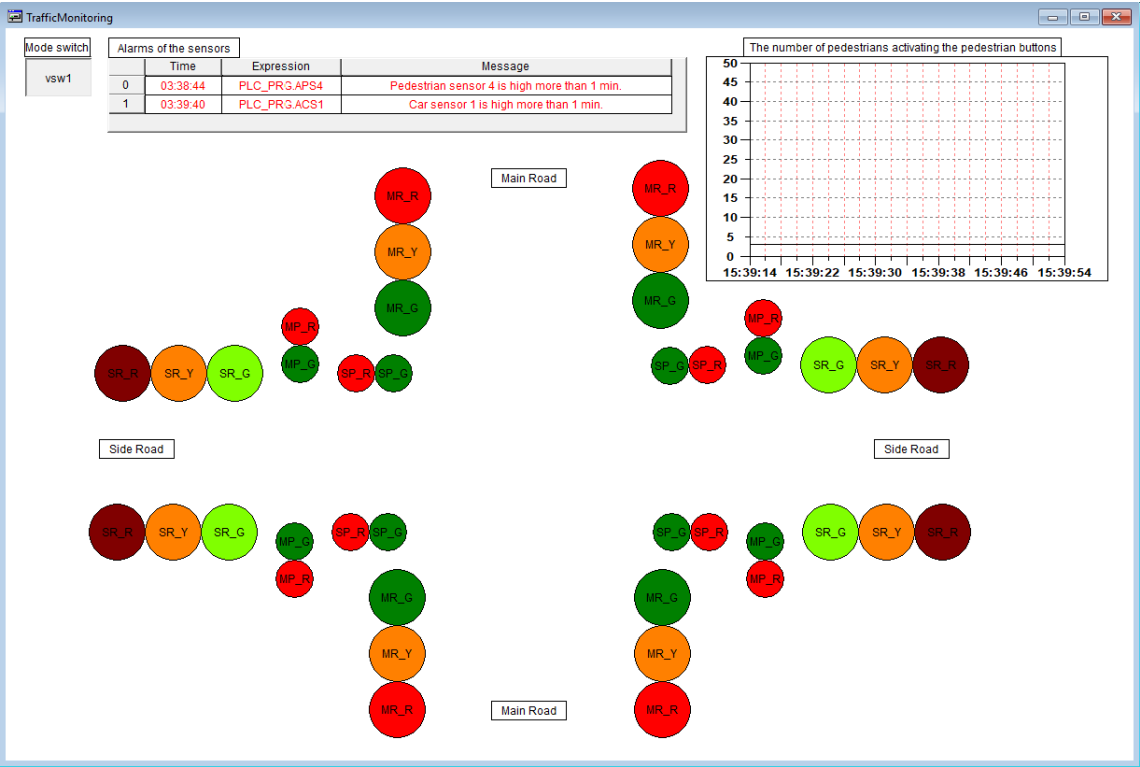


Figure 5: The overall implementation of the visualization model – Traffic monitoring