

Embedded Systems

ELEC3020

Lab Assignment 1 – State Machines

Points: 10

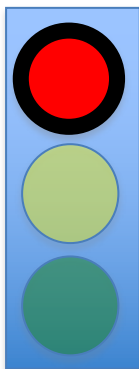
NO TEAMS: This lab is an individual assignment.

EQUIPMENT: PC/Mac with ReTrO simulation system
<https://robotics.ee.uwa.edu.au/retro/>

Traffic Lights

Build a traffic light system in Retro for an intersection of two streets
You only have to model one traffic light for each of the two streets.

The repeated light sequence for Street-1 and Street-2 is as follows:
{ 1: red; 2: red → 1: red; 2: green → 1: red; 2: yellow+green →
1: red; 2: red → 1: green; 2: red → 1: yellow+green; 2: red }



Street 1



Street 2

EXPERIMENT 1 (3 points)

Implement the given task with a pulse generator module with 6 output lines, one for each traffic light.

EXPERIMENT 2 (5 + 1 + 1 points)

Implement the given task as a state machine using only combinatorial logic elements, flip-flops, and a simple clock to generate the system pulse. Do not worry about actual timing differences between states.

For achieving full marks, minimize the number of gates used.

Get one extra point for using three or less FF and less or equal to 10 gates.

Get one extra point for completing this lab in a new creative way.