

Exercise 3: Traffic Signal Controller

Functional Requirements

1. The traffic controller is for 4-way driveways
 - a. There are two traffic signal boards, one is for North-South direction, the other is for East-West direction
2. A signal board provides three-color traffic lights, green, yellow, and red
 - a. There can be additional light for left turn (green '←' sign)
3. The initial color of signal is red
4. When the controller is turned on, both signal board illuminate red light for 3 seconds
5. After 3 seconds from initial state, the North-South board stays in red while the East-West board illuminates green light
6. The change of colors shall follow the order
 - a. Green -> yellow -> red -> green -> ...
 - b. Red -> green -> yellow -> red -> ...
7. Except for the initial 3 seconds in red, the time to be spent for each color is as follows
 - a. Green: 10 seconds
 - b. Yellow: 2 seconds
 - c. Red: 12 seconds
8. When 'off' signal is received, both signal board illuminates red light for 3 seconds and turned off
9. (Optional) Left turn signal is included
 - a. After 5 seconds of green light, both green and left-turn sign shall be illuminated for 5 seconds

To do

1. Model the requirements in Finite State Machine
2. Write a NuSMV model from the FSM
3. Check the followings
 - a. Both signals can never be 'green' at the same time
 - b. If it is in 'red' it eventually becomes 'green'
4. Generate test cases from the NuSMV using state coverage criteria