

Sophia Antipolis, French Riviera  
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# **SYMBOLIC WHITE BOX MODEL-BASED TESTING**

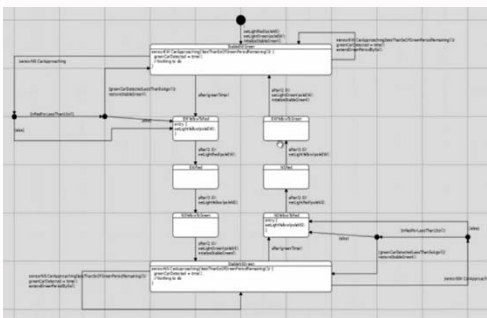
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# SYMBOLIC WHITE-BOX MODEL-BASED TESTING

**Traffic Lights Functional Requirements**

- A traffic light can be in one of the following 4 states at any point in time:
  - 'red'
  - 'yellow'
  - 'green'
  - 'blinking yellow'
- Initially both lights must be in the state 'blinking yellow'.
- A control command 'start' from the control interface must:
  - transition NS into the state 'red'
  - transition EW into the state 'green'
- A control command 'stop' will transition both lights to 'blinking yellow' regardless of the state that the lights are in.
- When NS is in state 'green', EW must be in state 'red'. This is a "stable state" of the system.
- When EW is in state 'green', NS must be in state 'red'. This is a "stable state" of the system.
- A traffic light stays 'green' (green period) for 15s, then turns 'yellow' for 2s, and transitions to 'red'. After 2s the other light turns 'yellow' for 2s, and then transitions to 'green'.
- Both lights have a sensor that detects approaching traffic from either north or east. Sensors only have an effect in the two "stable states" of the system. The sensor effect the light transitions as follows:
  - if the light in state 'green' detects approaching traffic:
    - if less than 5s of the normal 15s "green period" is remaining, the "green period" must be extended by 5s.
    - if more than 5s of the normal 15s "green period" is remaining, nothing happens.
  - if the light in state 'red' detects approaching traffic:
    - if we have been in 'red' for less than 15s:
      - if the light in 'green' has detected a car less than 5s ago, do nothing
      - if the light in 'green' has detected a car more than 5s ago, a 'green to red' transition as defined by step 7 above must be started.
    - if we have been in 'red' for more than 15s, a 'green to red' transition as defined by step 7 above must be started.

REQUIREMENTS



DESIGN MODEL

FORMALIZATION

Formal Model

BACKWARD TESTING  
(CHECKING FOR CONFORMANCE WITH MODEL)

Test Verdict

SYSTEM UNDER TESTING

SYMBOLIC EXECUTION OF SUT WITH TRACES (SCENARIOS) GENERATION

Traces (Scenarios of System Behavior)

