

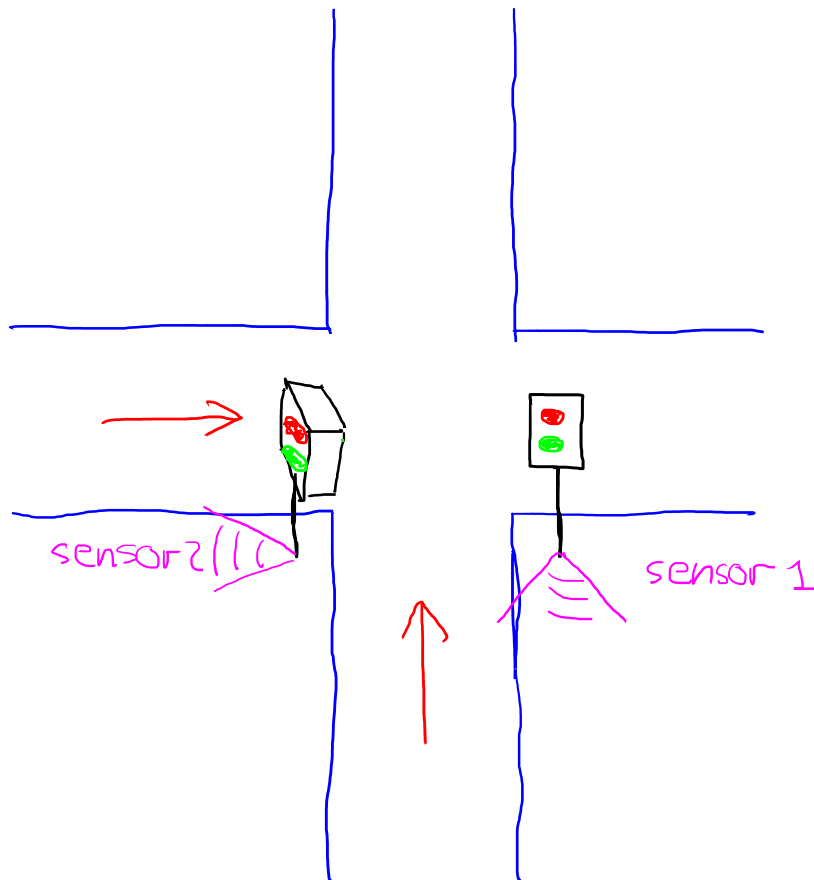
# Formal Methods

## Project I: Crossroad

Vladislav Ryzhikov

[ryzhikov@inf.unibz.it](mailto:ryzhikov@inf.unibz.it)

<http://www.inf.unibz.it/~ryzhikov>



You are required to model the traffic lights control of a crossing of two one-way roads:

- Each of the two traffic lights has a sensor that detects the presence of a car passing by it
- A car when present will cross only if the color is green, otherwise (when the color is red) it will wait
- The cars can flow continuously (one after another) on each of the roads
- The cars cross the crossing *instantly*, i.e., in one tact of time
- For simplicity assume that our controller does not have a timer and will switch from green to red for, e.g., west-east road only if there is no car passing by it and there is a car waiting on the south-north road

Write a NuSMV program modelling the control of the crossing. You can use the following (and other, if necessary) reasonable assumptions:

- The flow of cars on each of the roads interrupts

Verify if the traffic lights work correctly:

- It never happens that the colour is green on both traffic lights
- If the car is waiting by the traffic light it will eventually cross

Formulate at least one more *interesting* property (showing advantages or limitations of your modelling). Check if it holds.

*Hint:* Start modelling by identifying important states, such as “traffic light 1 is red, traffic light 2 is green, sensor 2 detects a car, sensor 1 does not detect a car”