

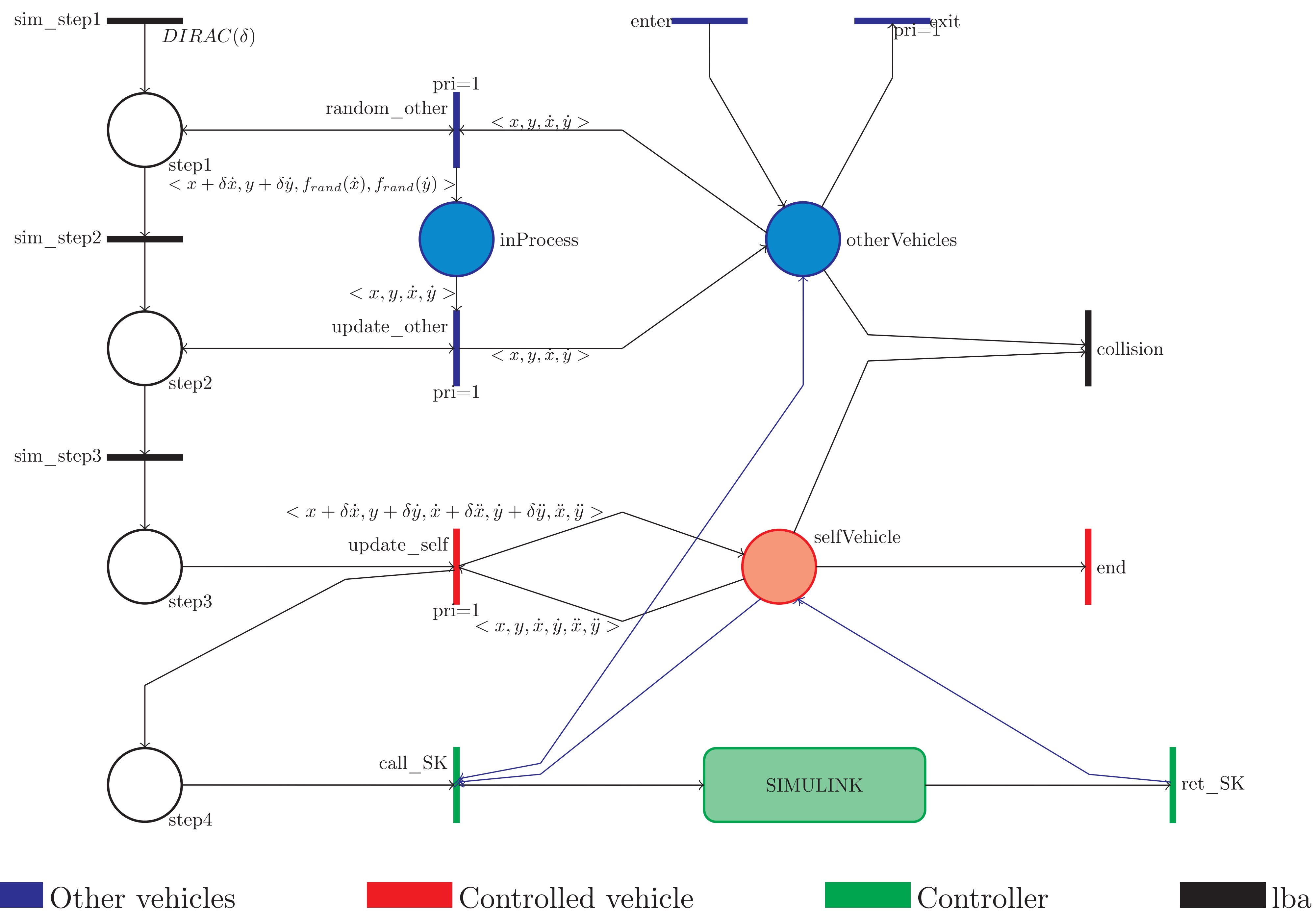
CONTEXT AND GOALS

Context. The Intelligent Transport Systems community deals with several challenges appearing while conceiving safe software dedicated to autonomous transport systems. Many recent ITS projects focus on driver assistance and on partially automated roads. First, researchers studied fully automated infrastructures (as with the project *PATH*). These approaches have been progressively replaced by new visions more centered on strategies to guarantee properties like collision avoiding, or compliance with safety distance. This view settles on cooperative systems where «*road operators, infrastructures, vehicles, drivers and other users cooperate for most efficient, safe and comfortable trips*». Implementing such systems require peer-to-peer organisation where each vehicle must cooperate in a critical and real-time environment.

Goal. Contribution to the verification of such systems, focusing mainly on the conception and implementation of verification algorithms for realistic case studies.

COSIMULATION

Cosmos simulates the environment of a road with multiple vehicles, whose behavior is calculated by transitions. One of these vehicles is controlled by a Simulink model which is interfaced with Cosmos through fictitious Petri net transitions.



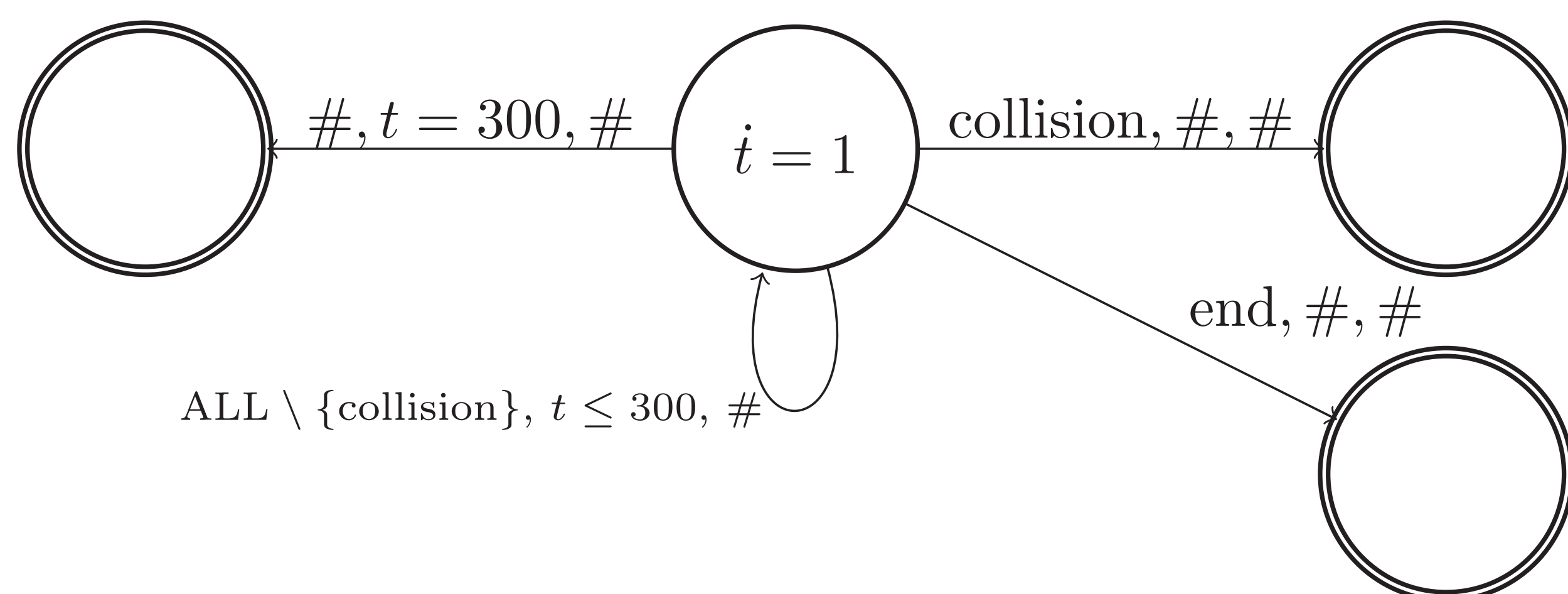
COSMOS

COSMOS is a statistical *model-checker*. It takes as input :

- a discrete-event stochastic process (DESP)
- a linear hybrid automaton (LHA) and an expression Z

It outputs an estimate (with confidence interval) of Z .

More information on COSMOS can be found on its website
<http://www.lsv.ens-cachan.fr/Software/cosmos/>



Estimated collision probability

SIMULINK

SIMULINK, an add-on to MATLAB, provides an interactive, graphical environment for modeling, simulating, and analyzing dynamic systems.

This software is used in numerous industry projects, among them autonomous vehicles design.

My PhD is part of an industrial project where we study variants of a Simulink model for an automated traffic jam controller.

