Case Study on Alternating-time Temporal Logic

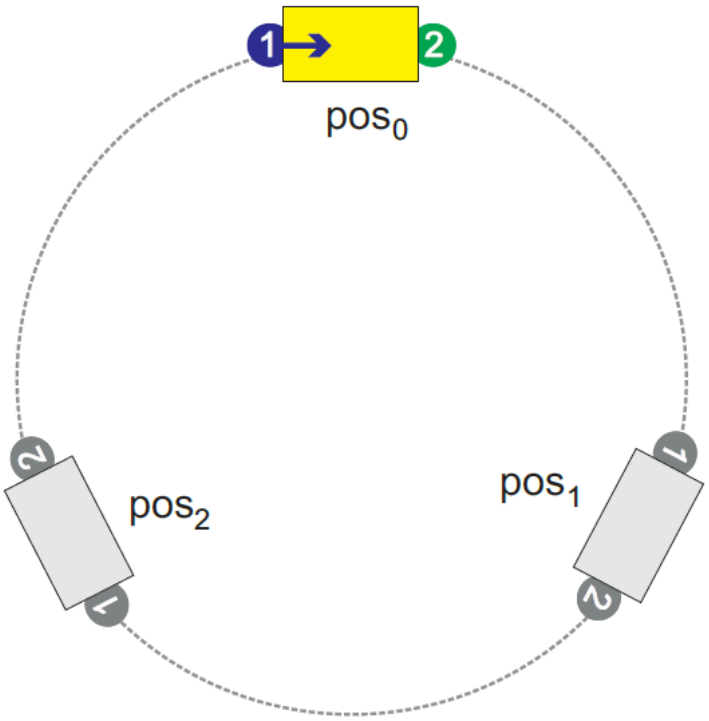
1. Modelling

Two robots push a carriage from opposite sides. As a result, the carriage can move clockwise or anticlockwise, or it can remain in the same place. We assume that each robot can either push or refrain from pushing. If they push simultaneously or wait simultaneously, the carriage does not move.
When only one of the robots is pushing, the carriage moves accordingly:

- clockwise if pushed by robot 1, and
- anticlockwise when robot 2 is pushing.

To make the domain discrete, we identify three different positions of the carriage: pos0, pos1, pos2.

Define a CGS that describes these features.



2. Specification

Specify the following properties in ATL formulas:

1. Robot 1 has a strategy to stay forever in position 0.
2. Robots 1 and 2 have a strategy to stay forever in position 0.
3. If the system is in position 0 then Robots 1 and 2 have a strategy to stay forever in position 0.

3. Verification

Which of the formulas hold in every state of the model?