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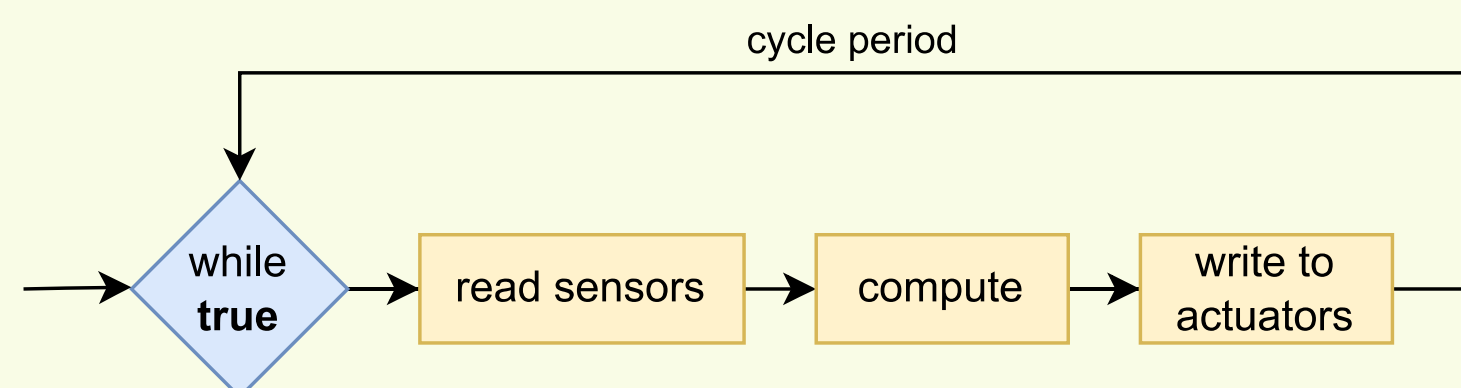
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# RoboSim : software models for sound simulation

RoboSim is a domain-specific language for modelling the simulation software of a robotic system.

## Cyclic execution flow

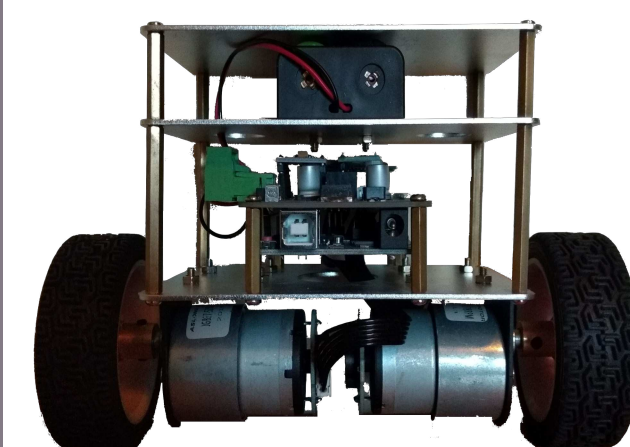
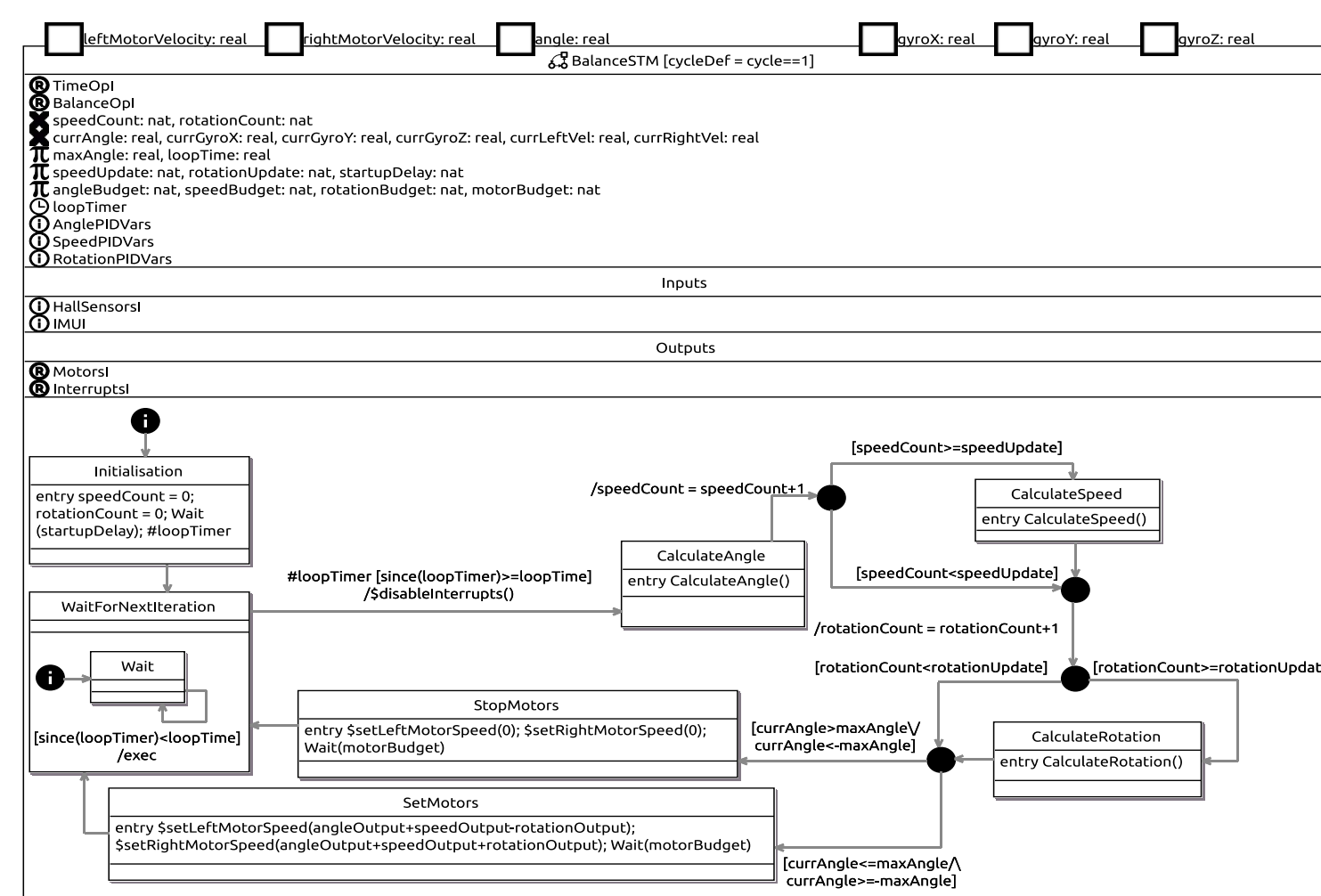


## Main features

- **Portability:** tool-independent.
- **Architectural:** clear separation between simulation of **environment** and software.
- **Cyclic:** execution flow reflects the idealised sense-compute-act cycle.
- **Soundness:** tackles the gap between models and implementations.

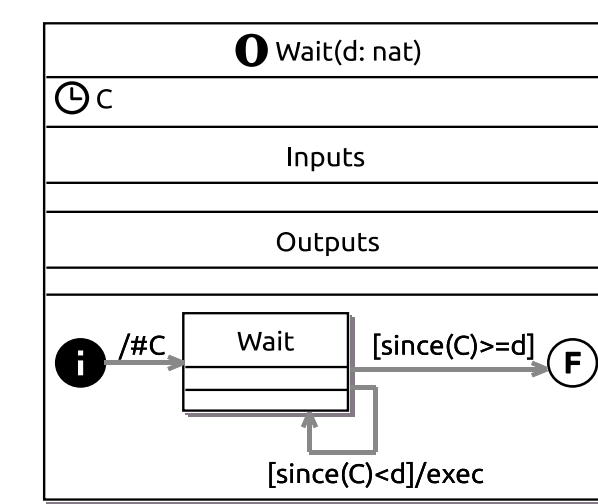
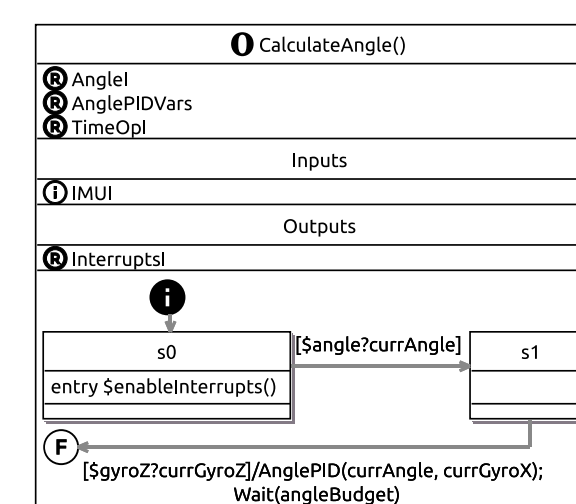
## Simulation software modelling in RoboTool

- Same component model as **RoboChart**: modules, controllers and state machines.
- Time modelling: budgets, deadlines and timeouts.
- Platform independent and parallel software.
- Communications are asynchronous and reflected at sample times.



Segway whose simulation software is modelled in RoboSim

RoboSim state machine of the Segway example



RoboSim software operation

Budget explicitly modelled in RoboSim using exec

## Sound transformation



## Formal semantics

## Formal semantics

## Formal model

## Simulation assumptions

## Conforms?

## Formal model

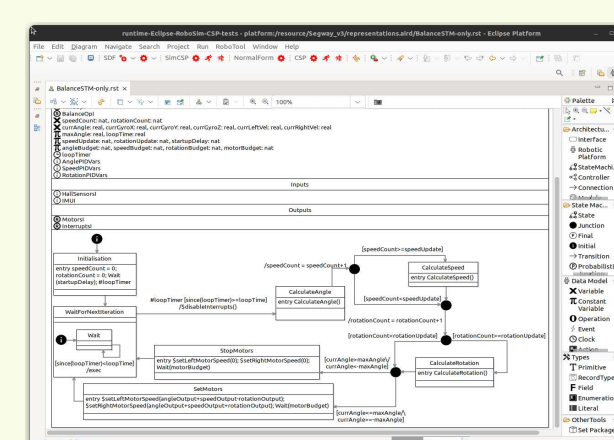
## Model checking

## Theorem proving

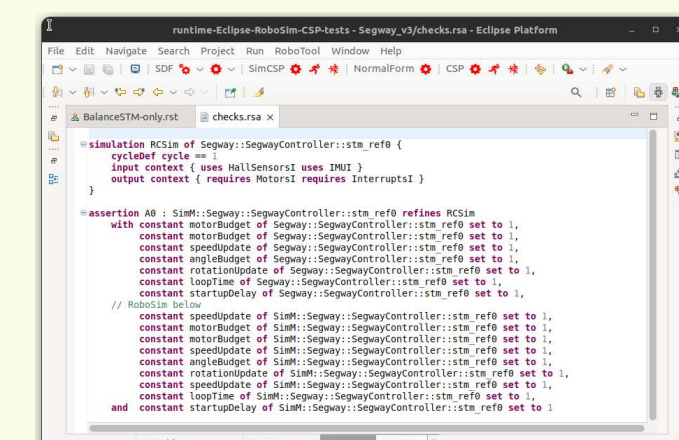
## Process algebraic discrete-timed semantics

Makes it possible to check for:

- **Schedulability:** given the timing constraints of the simulation paradigm, can a RoboChart model be simulated at all?
- **Conformance:** are all the behaviours of a RoboSim model permitted by a RoboChart specification?
- Application-specific **properties**



Modelling



Assertion verification analysis

## RoboTool

