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Cavalcanti, Ana Lucia Caneca orcid.org/0000-0002-0831-1976, Filho, Madiel Conserva, De Oliveira Salazar Ribeiro, Pedro Fernando orcid.org/0000-0003-4319-4872 et al. (1 more author) *RoboSim: software models for sound simulation*. In: YorRobots and RoboStar Industry Exhibition, 11-12 Oct 2022, University of York. (Unpublished)

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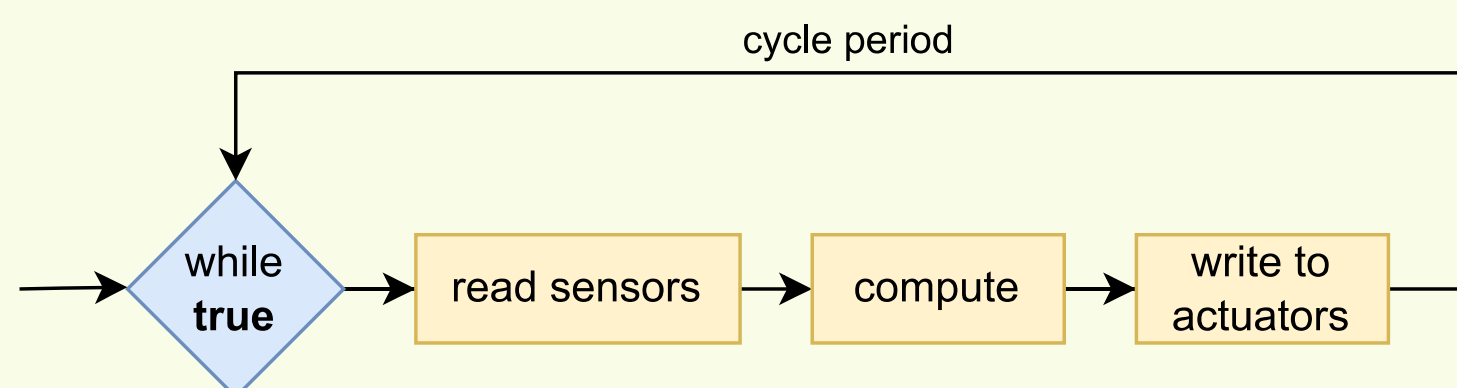
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# RoboSim : software models for sound simulation

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

## Cyclic execution flow

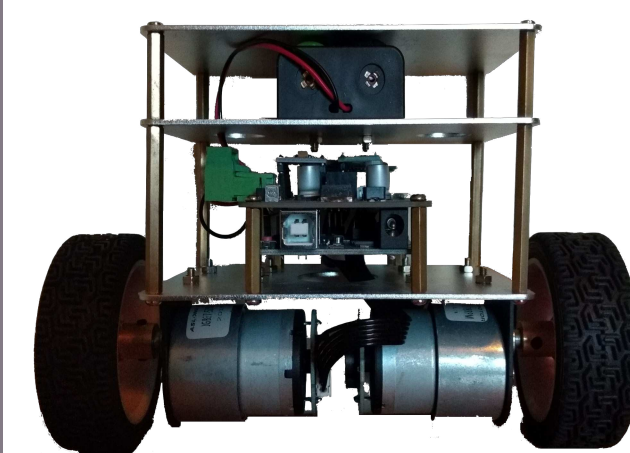
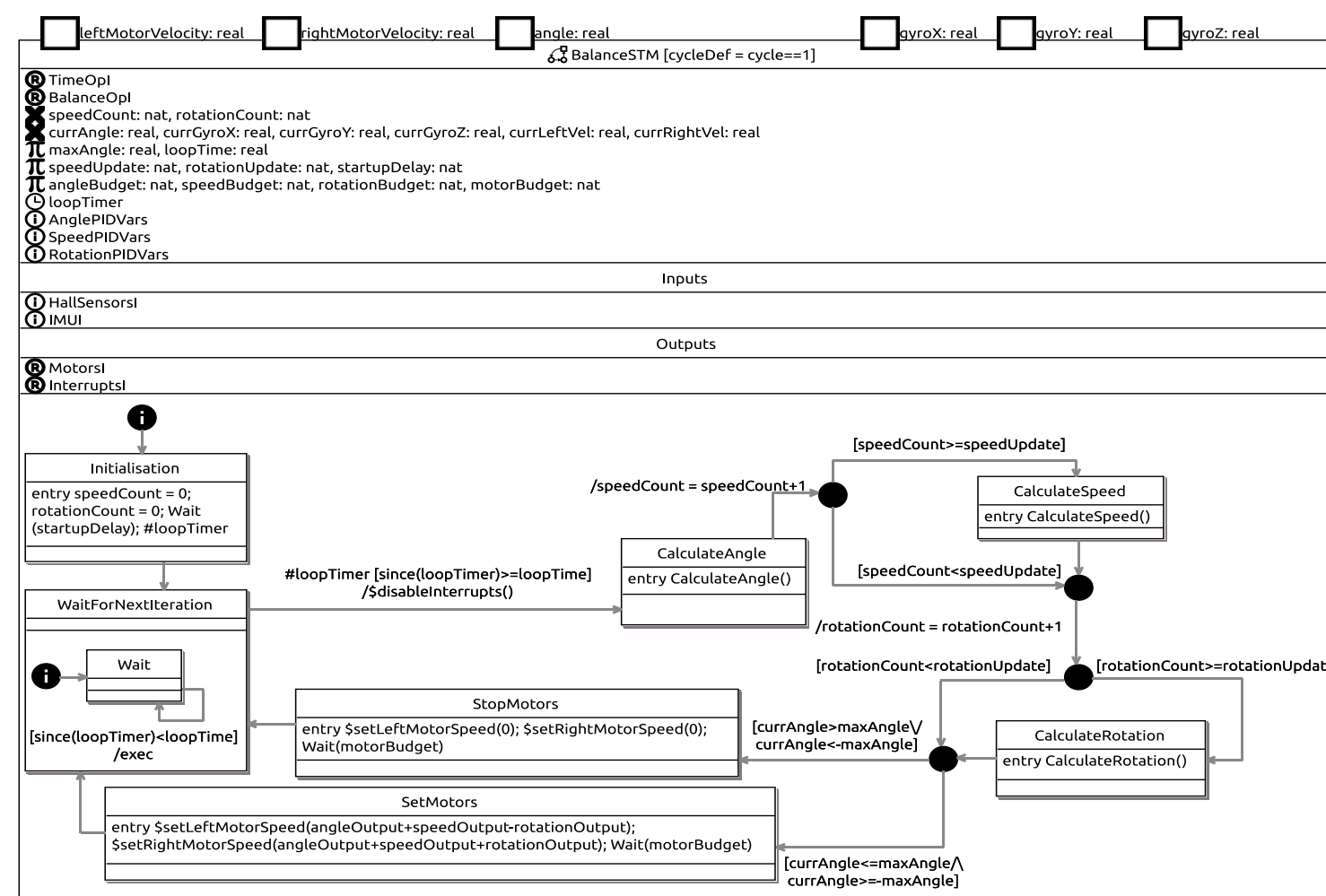


## Main features

- 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.

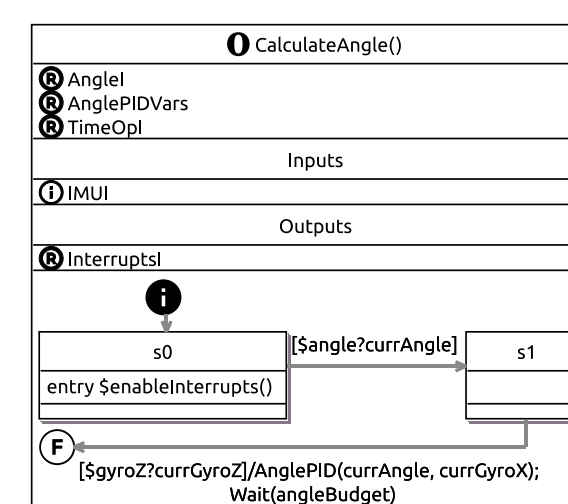
## Simulation software modelling in RoboTool

- 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.

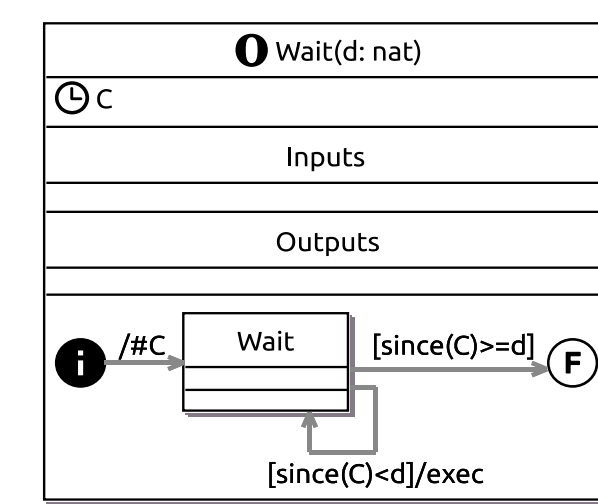


Segway whose simulation software is modelled in RoboSim

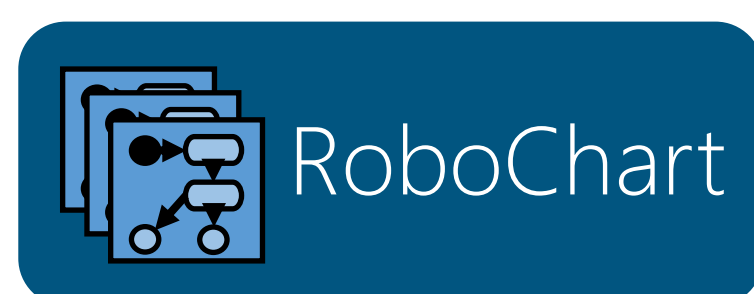
RoboSim state machine of the Segway example



RoboSim software operation



Budget explicitly modelled in RoboSim using exec



Sound transformation

Formal semantics



Formal 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

