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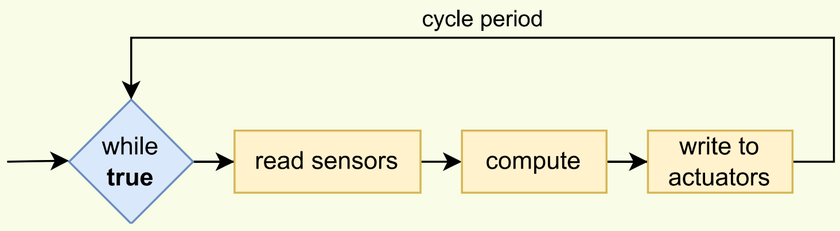
RoboSim : software models for sound simulation

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

Cyclic execution flow

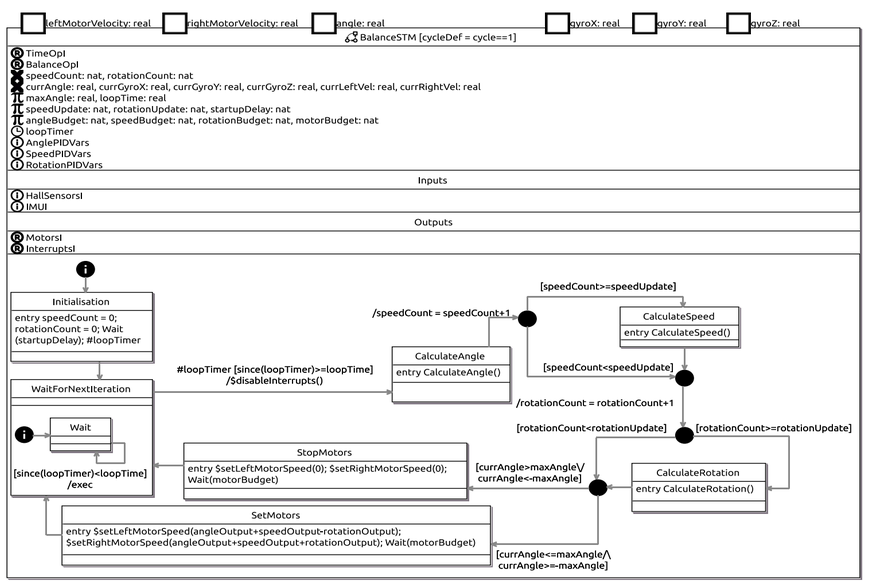


Main features

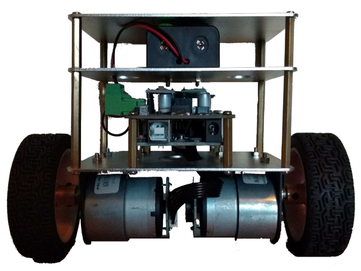
- **Portability**: tool-independent.
- **Architectural**: clear separation between simulation of **environment** and **software**.
- **Cyclic**: execution flow reflects the idealised sense-compute-act cycle.
- **Soundness**: tackles the gap between models and implementations.

Simulation software modelling in RoboTool

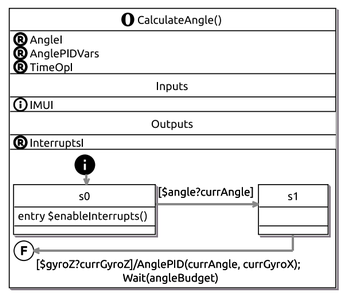
- Same component model as **RoboChart**: modules, controllers and state machines.
- Time modelling: budgets, deadlines and timeouts.
- Platform independent and parallel software.
- Communications are asynchronous and reflected at sample times.



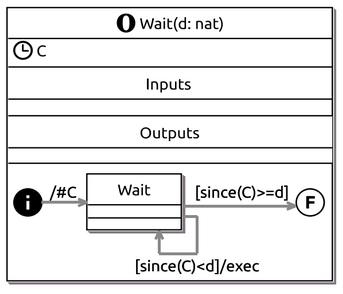
RoboSim state machine of the Segway example



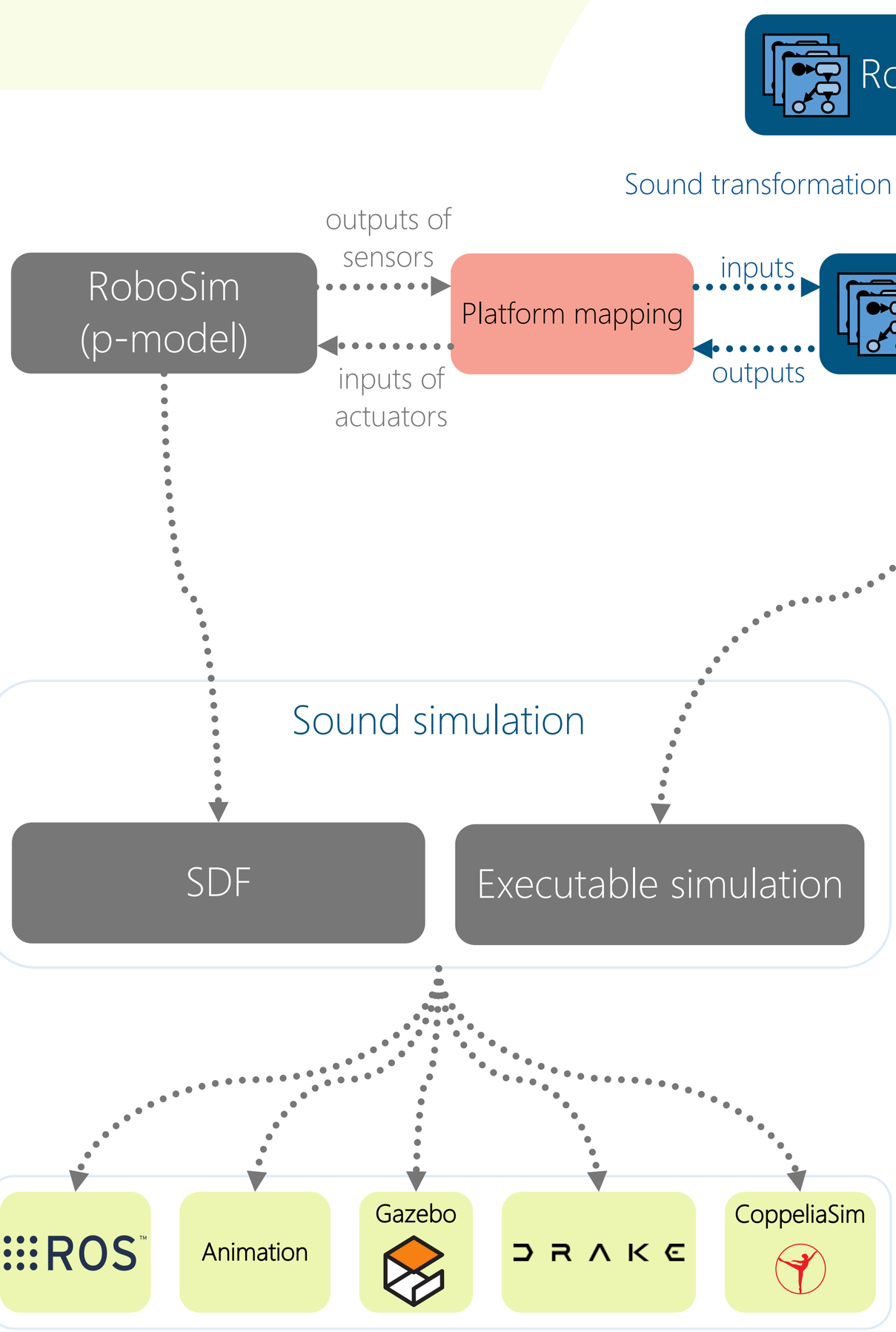
Segway whose simulation software is modelled in RoboSim



RoboSim software operation



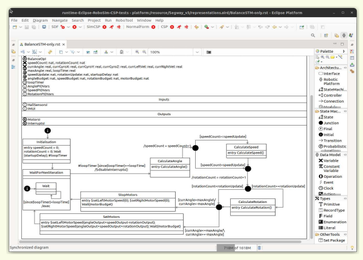
Budget explicitly modelled in RoboSim using **exec**



Process algebraic discrete-timed semantics

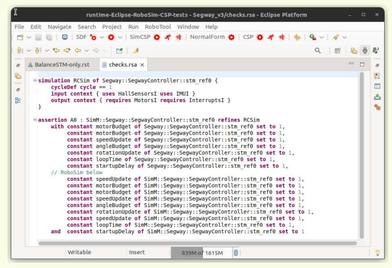
Makes it possible to check for:

- **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

RoboTool



Assertion verification analysis

robostar.cs.york.ac.uk

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