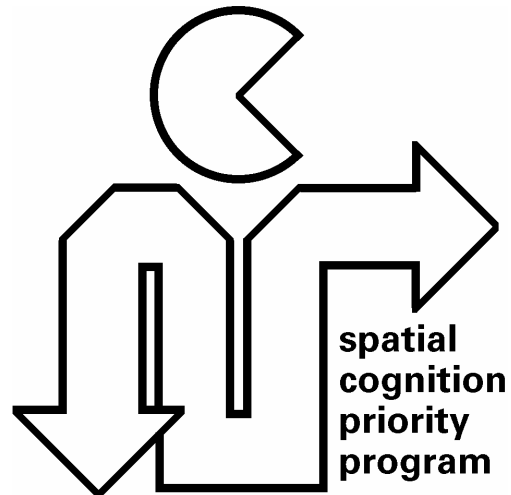


Strategies for Using a Simulation in the Development of the Bremen Autonomous Wheelchair

Thomas Röfer



Bremen Institute for Safe and Secure Systems
Center for Computing Technology

University of Bremen

Contents

SimRobot

- Platforms
- Simulated Objects
- Sensors
- Creating a Simulation

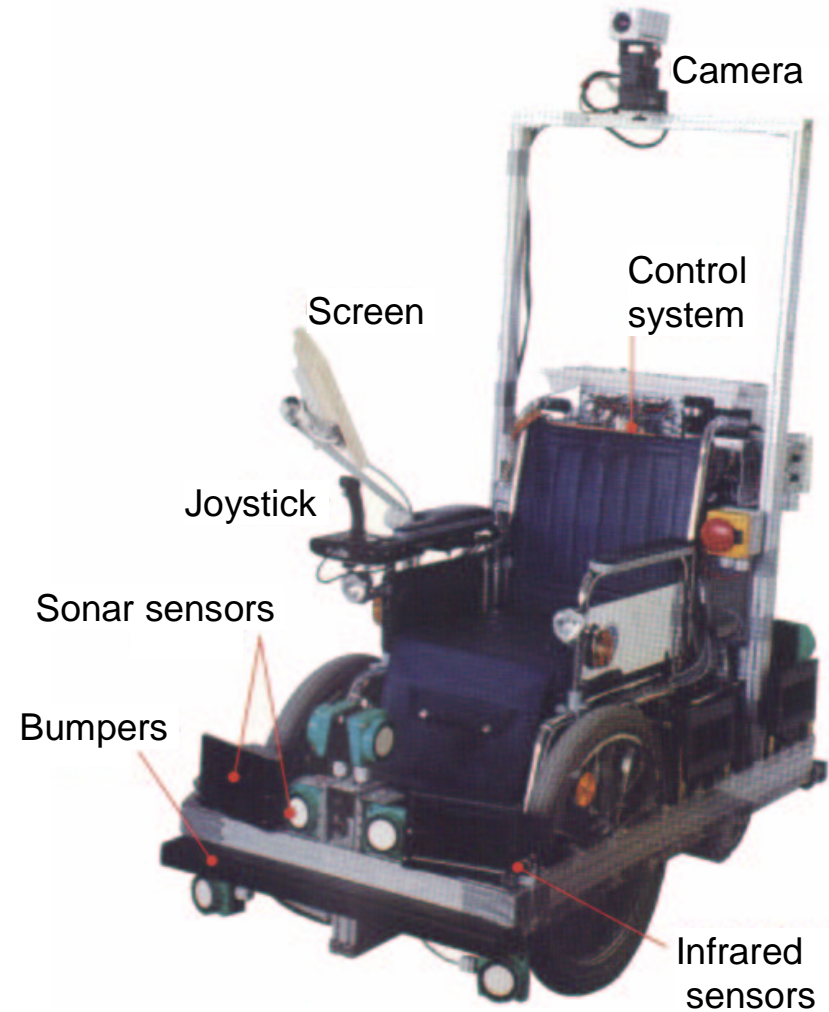
Architecture

- Synchronous / Asynchronous
- C++ Derivation Hierarchy
- Flow of Information

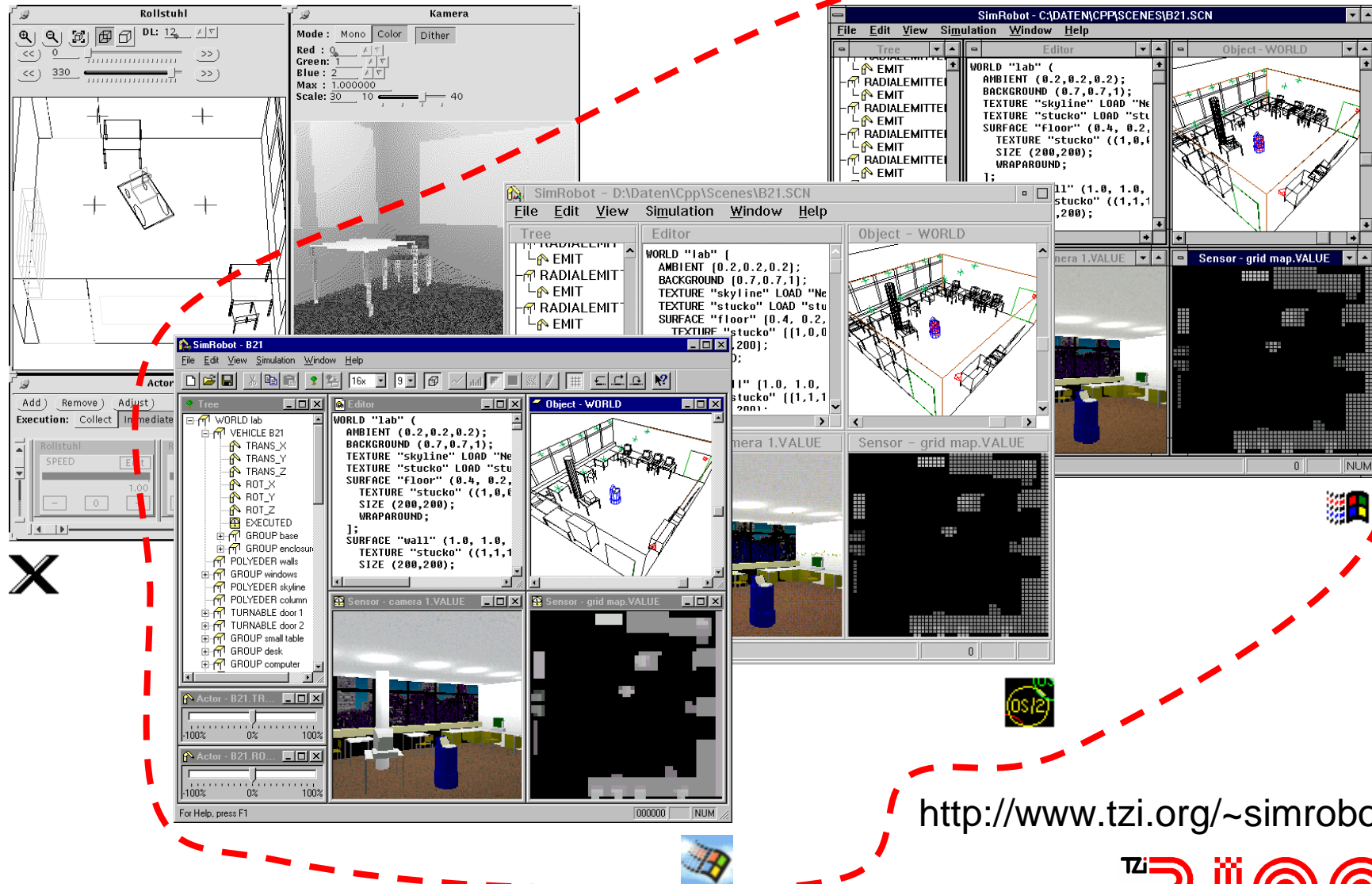
Methodology

- Evolution of Simulation
- Example

Outlook



SimRobot - Platforms



<http://www.tzi.org/~simrobot>

SimRobot - Simulated Objects

Bodies

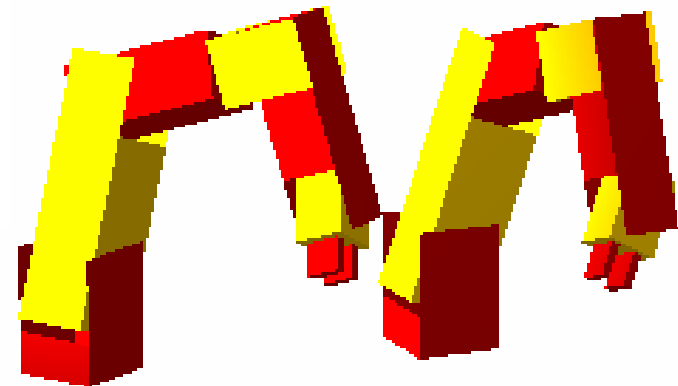
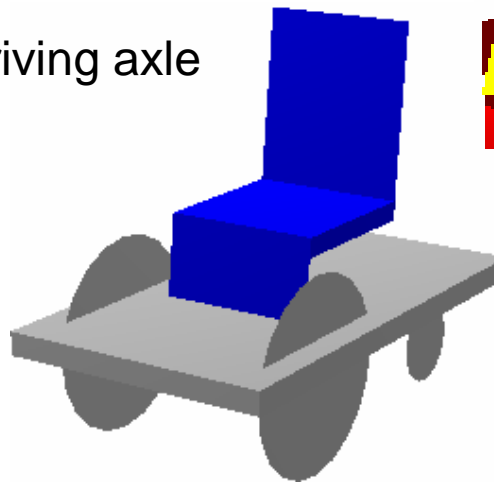
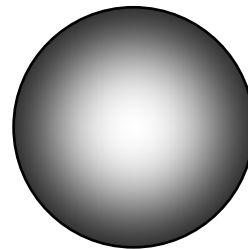
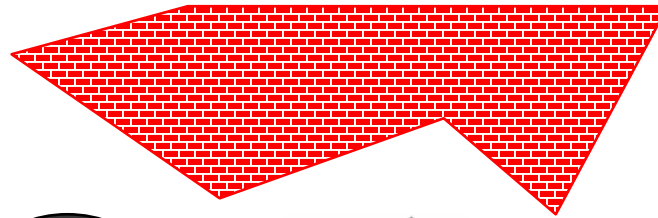
- polygons

Emitters

- radial
- spot

Actuators

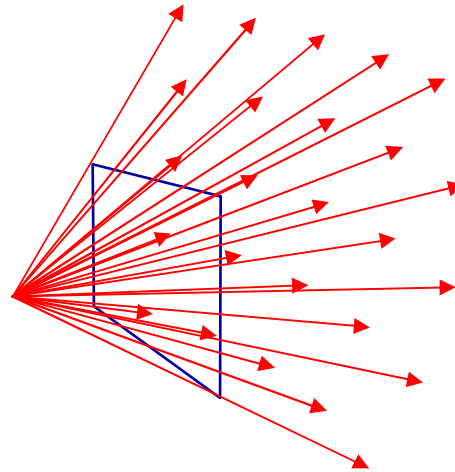
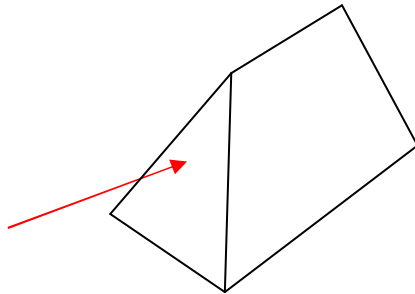
- rotational joints
- translational joints
- objects w. 6 DOF
- vehicles w. steering+driving axle



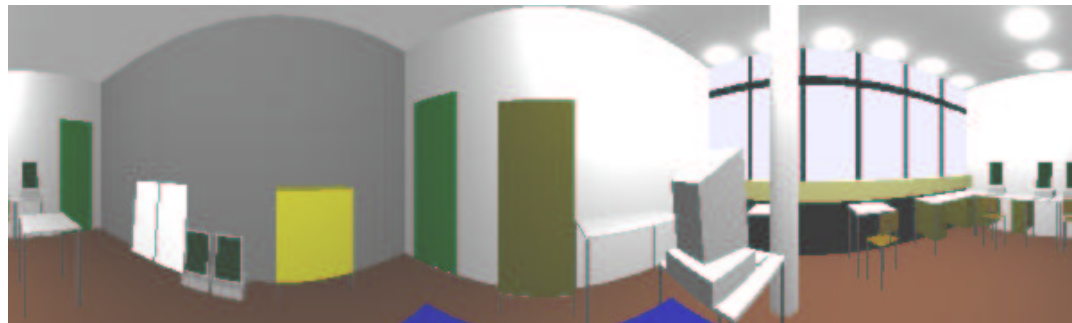
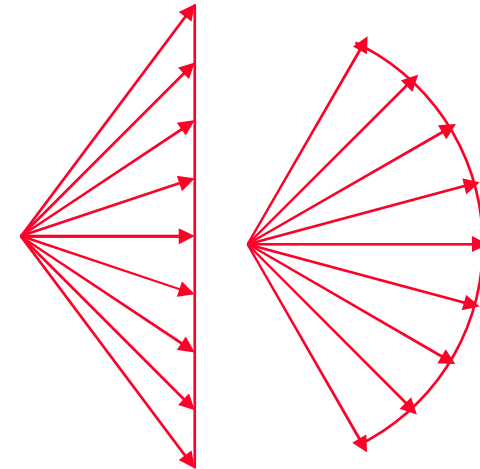
SimRobot - Sensors

Intensities of Radiation

- Tactile
- Camera
- Facette



Camera ↔ Facette



SimRobot - Sensors

Intensities of Radiation

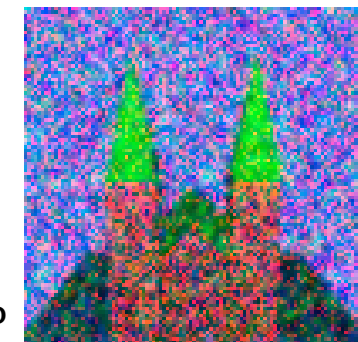
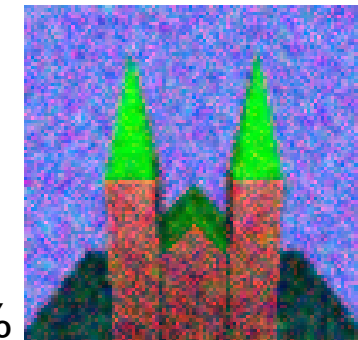
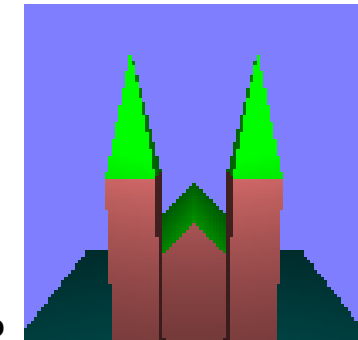
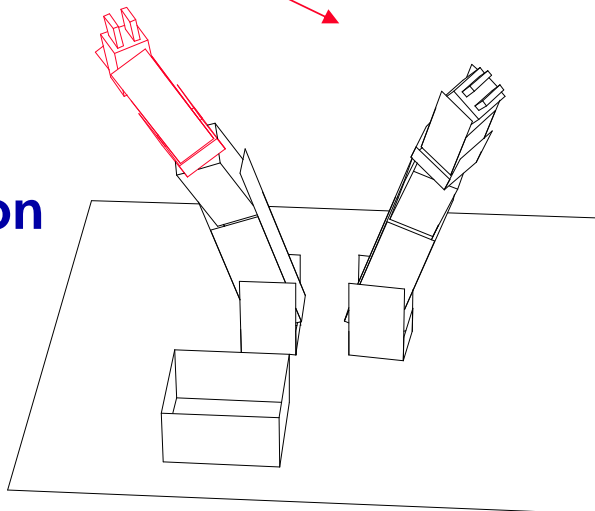
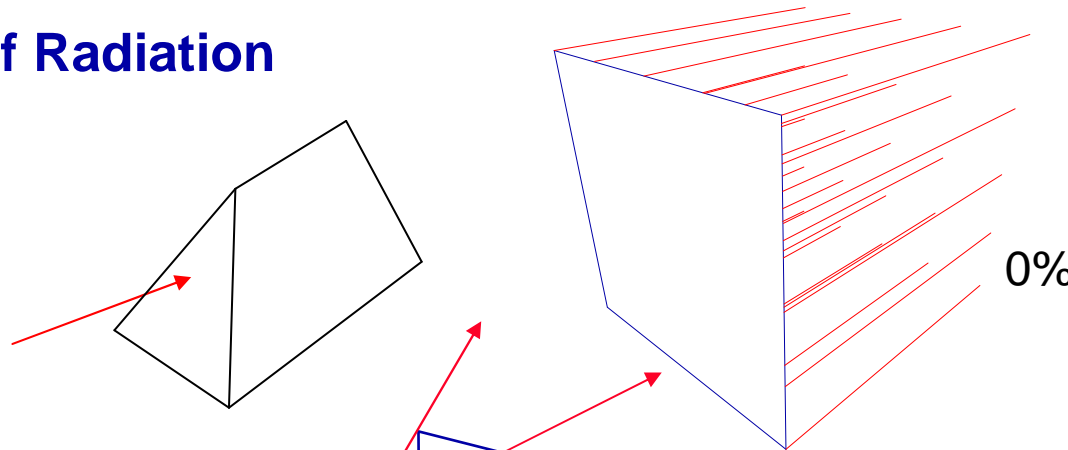
- Tactile
- Camera
- Facette

Distances

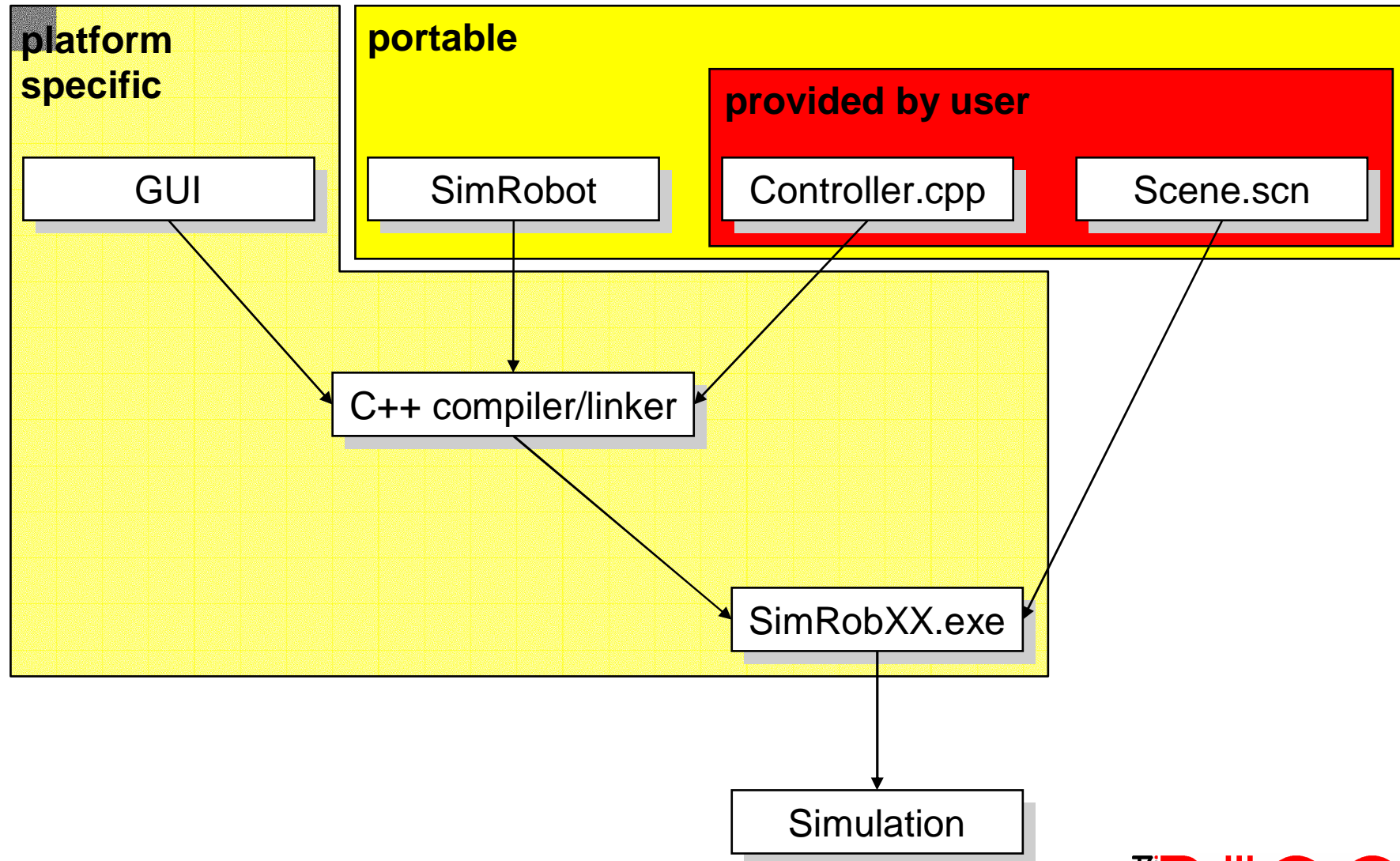
- Whisker
- Whiskerfield
- Camera
- Facette
- Ultrasonic

Noise

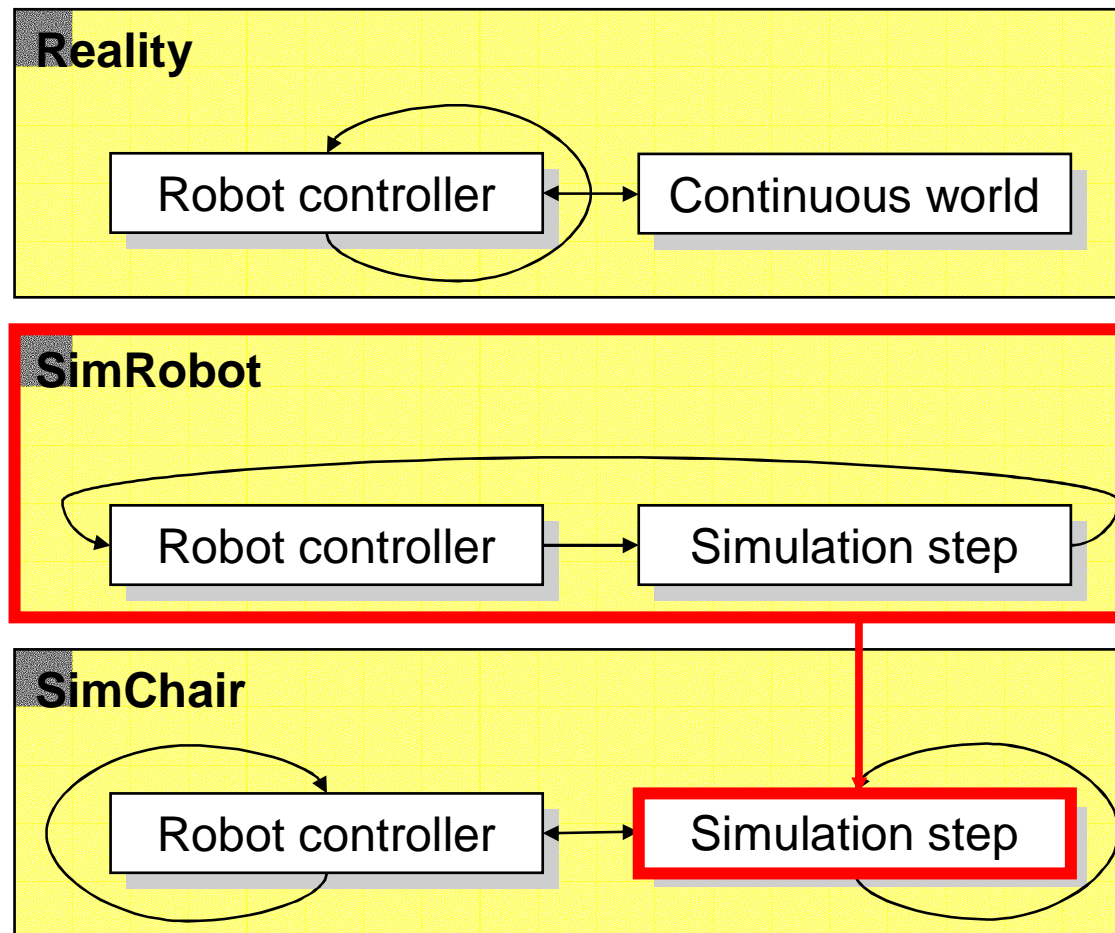
Collision-Free Execution



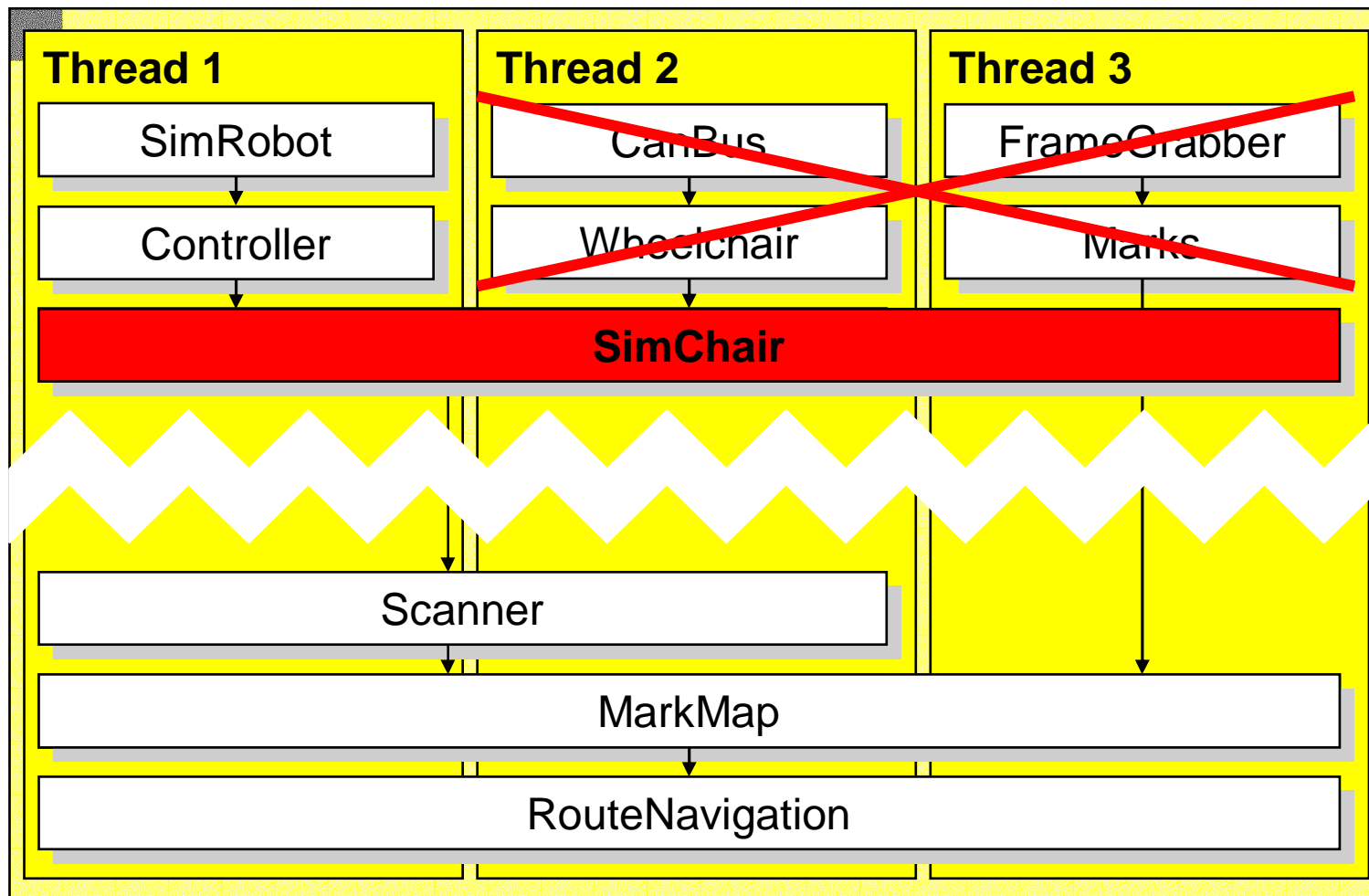
SimRobot - Creating a Simulation



Architecture - Synchronous / Asynchronous

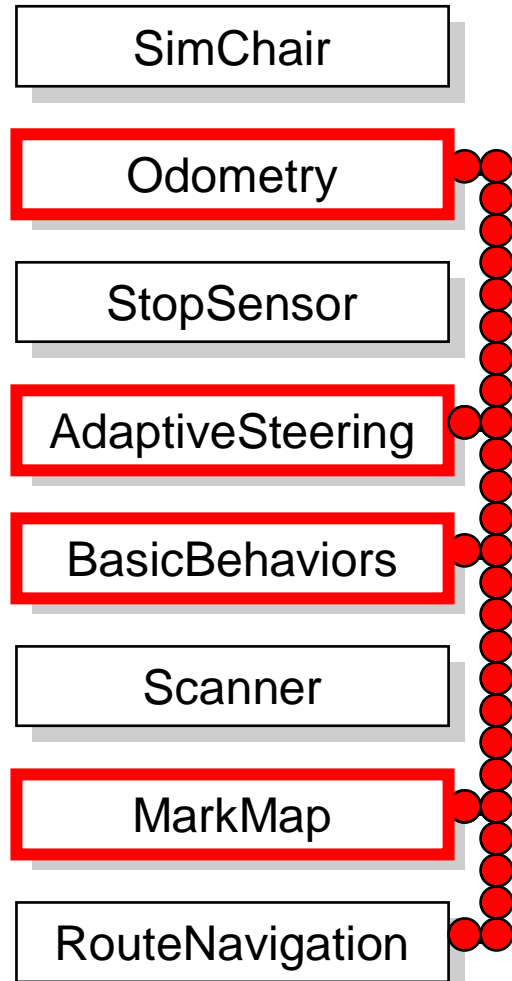


Architecture - C++ Derivation Hierarchy



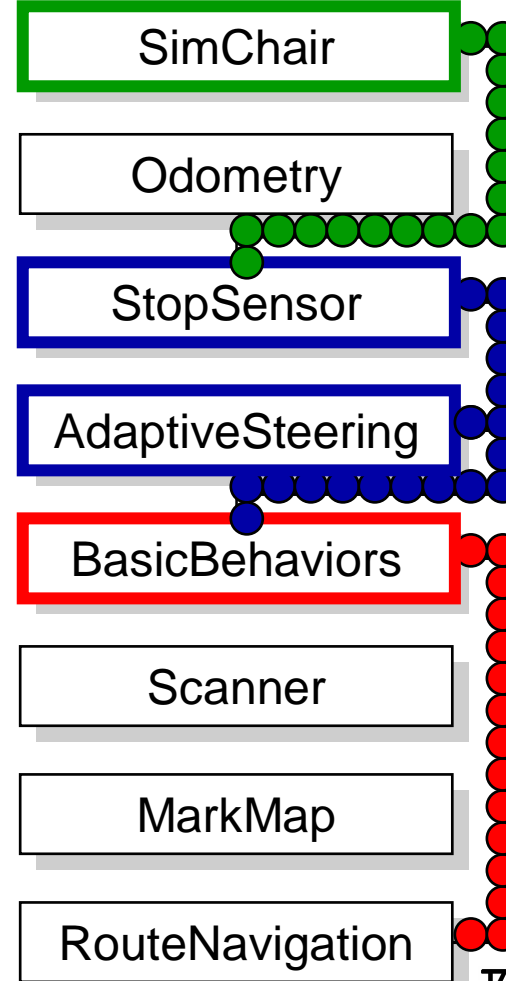
Architecture - Flow of Information

Notification



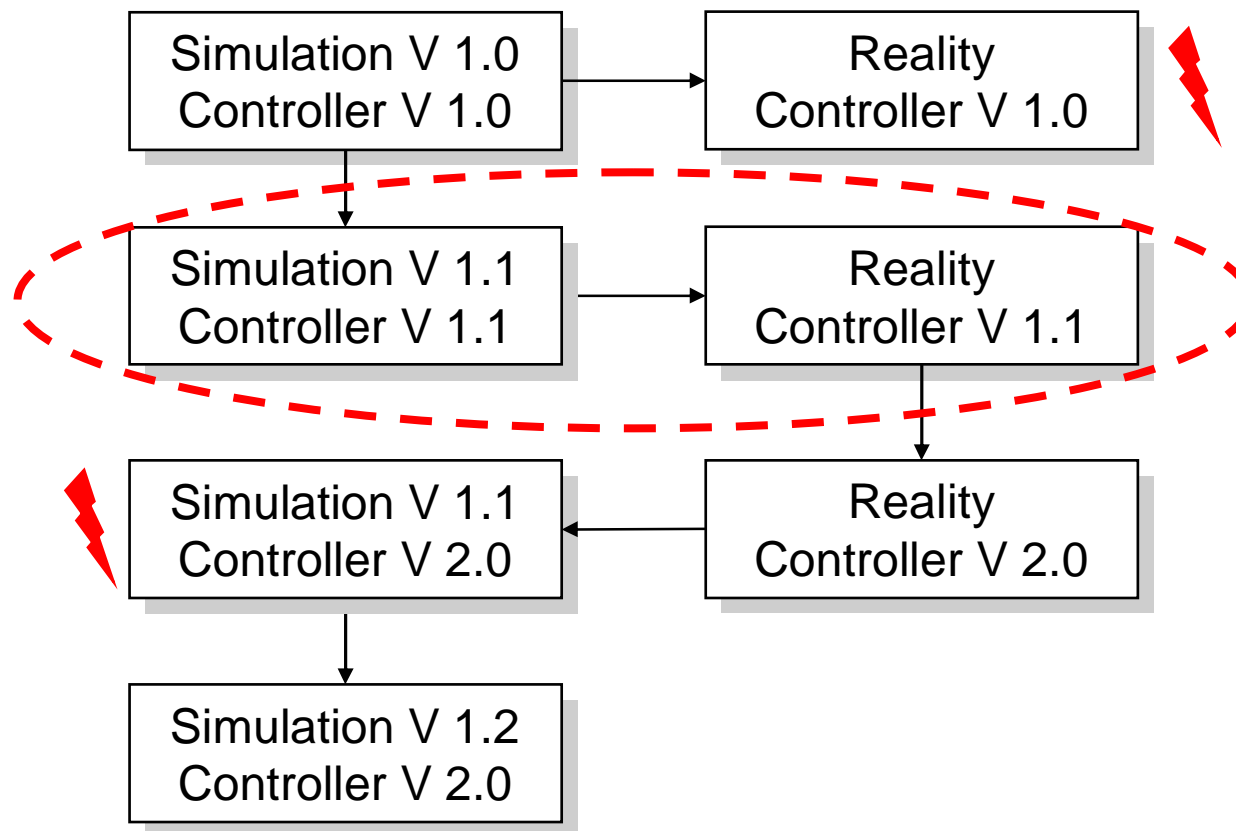
setPosition

Modification

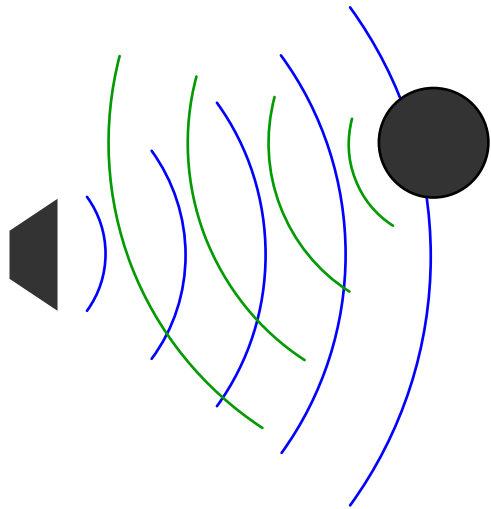


setSpeed

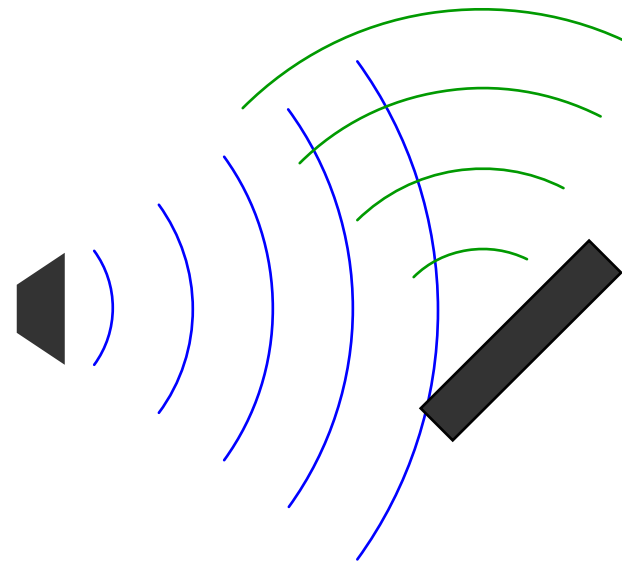
Evolution of the Simulation



Driving through a Door - Simulation



— 1.42 m —



— ∞ m —

Outlook

New Wheelchair „Rolland“

- Synchronous simulation of 32 ms steps

Rolland

