

A Multi-Robot Platform for Mobil Robots with Multi-Agent Middleware

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Technical Aspects of Multimodal Systems



Outline

Motivation

- Introduction

- Scenarios

- Hardware

Current State

- Demo

- Ideas

- Requirements

Summary

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Scenarios

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- ▶ Complex tasks require specialised hardware (stereo vision, robot arm or even hand etc.)
- ▶ Simple tasks are complex tasks (»grip that trash there«, »open that door«, »find the pink one«)
 - ▶ Few sophisticated robot vs. multiple simple robots which coordinate
- ▶ Lot of older and unused hardware in the lab
 - ▶ Use cheaper hardware for complex tasks
- ▶ Augment the action radius (of the platform)
 - ▶ Cover a larger area in less time

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Introduction

Scenarios

Hardware

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Demo

Ideas

Requirements

Summary

Scenarios

A few examples only

- ▶ Hunter and Prey (Hide and Seek)
 - ▶ Coordinated search for hiding robot
- ▶ Cleanerworld
 - ▶ Look for and take away »trash«
 - ▶ Maintain battery life
- ▶ Exploration
 - ▶ Map building from unknown territory
 - ▶ Efficient coordination of multiple »Explorers«
- ▶ Others?

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Motivation

Introduction

Scenarios

Hardware

Current State

Demo

Ideas

Requirements

Summary

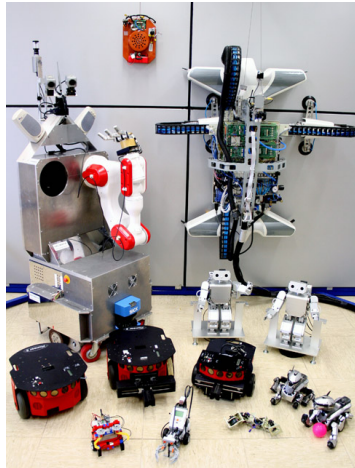
Hardware

@TAMS



Hardware (cont.)

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Outline

Motivation

Introduction

Scenarios

Hardware

Current State

Demo

Ideas

Requirements

Summary



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Demo

Outline

Motivation

Introduction

Scenarios

Hardware

Current State

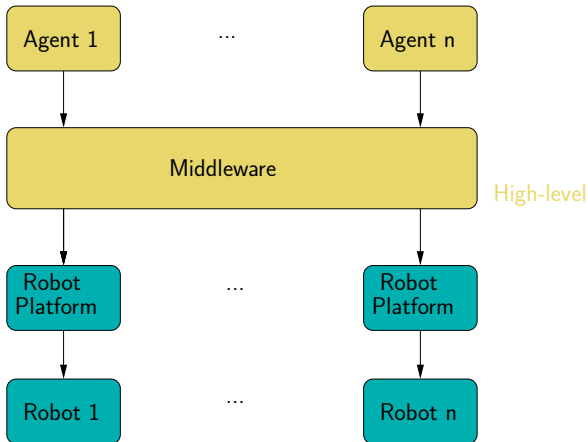
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Ideas

Requirements

Summary

Architecture



Architecture (cont.)

- ▶ Robot platform transparently provides
 - ▶ Path planning (goto)
 - ▶ Localization (whereami)
 - ▶ Collision Avoidance
 - ▶ Map?
 - ▶ Special abilities (Gripper, Arm etc.)?
- ▶ Different robot platforms shall be supported
- ▶ Different middleware modules shall be supported

Outline

Motivation

Introduction

Scenarios

Hardware

Current State

Demo

Ideas

Requirements

Summary

Requirements

High-level

- ▶ Task description and definition
- ▶ Task dividing and sharing between robots
- ▶ Communication
 - ▶ central or peer-to-peer ?
 - ▶ blackboard methodology ?

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- ▶ Task-flexibility
- ▶ Fault tolerance
- ▶ Hardware re-use
- ▶ Abstraction from »a robot« to »a network«
- ▶ Collaboration of Robotics and Multi-Agent-Systems