

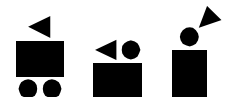
# AUTONOMOUS SYSTEMS LAB

## Robots@Home Overview

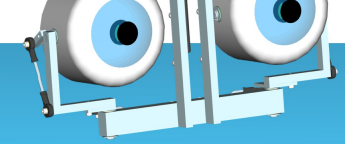
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May 31, 2007



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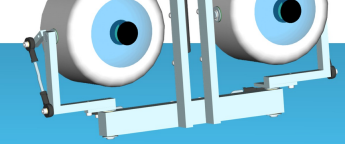


# Goal

## Robotic mobile platform for home applications

- scalable and affordable
- embedded perception for learning and mapping of room layouts
- safe and robust navigation

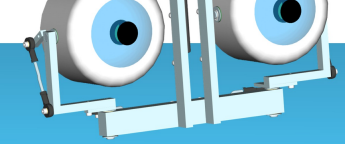




# Partners

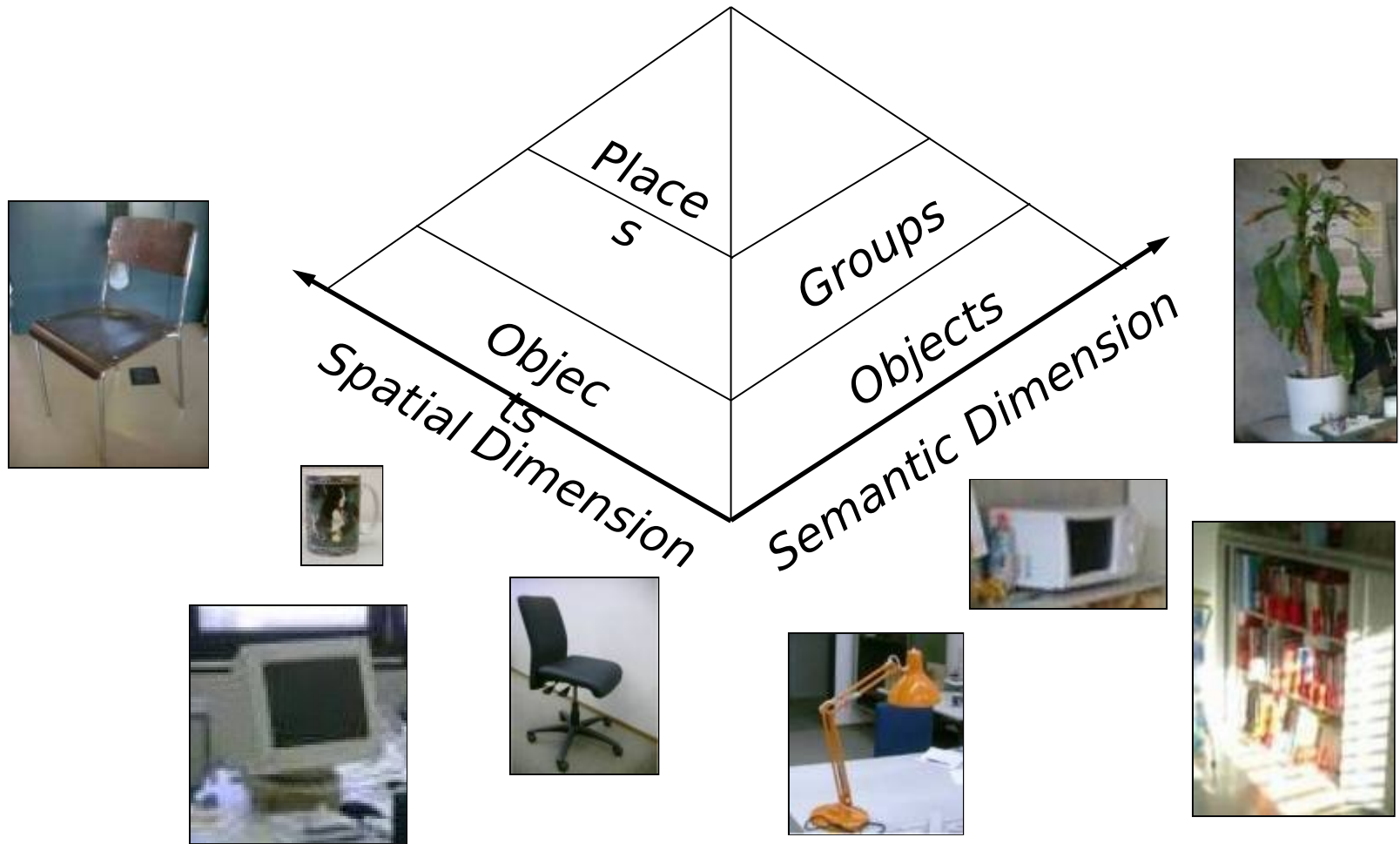
- Mapping and learning room layout **ETH**
- Object classification, recognition, and annotation
- Safe and robust navigation
- Embedded vision system
- User scenario
  - Home monitoring
  - Support **N Nespresso.com** disabled persons
  - Leisure

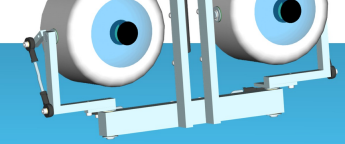




# Room Layouts

## Object and Boundary Based Representation





# Room Layouts

## Boundary and Object Detection

### Room Detection

Room dimension detection with *swissranger* / *stereo camera* (TUW)

Floor and wall detection with *vision*, *stereo* and *omni camera* (TUW and ETHZ)

### Object Detection and Classification

Object *structure* extraction from *vision* (TUW)

*Structure* base object classification with *vision* (TUW)

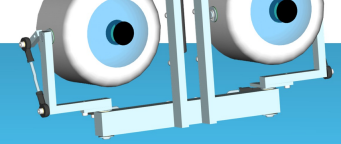
Object part detection with *swissranger* (ETHZ)

Object part extraction from *range scans* (TUW)

### Room Layout Learning

Behavior based approach (TUW)

Probabilistic hierarchical approach (ETHZ)



# Navigation Platform

## Objective

Development of a generic (robot) platform for different applications

## Applications

Brainstorming for collecting ideas

Judgment of ideas → selection of applications for robots@home

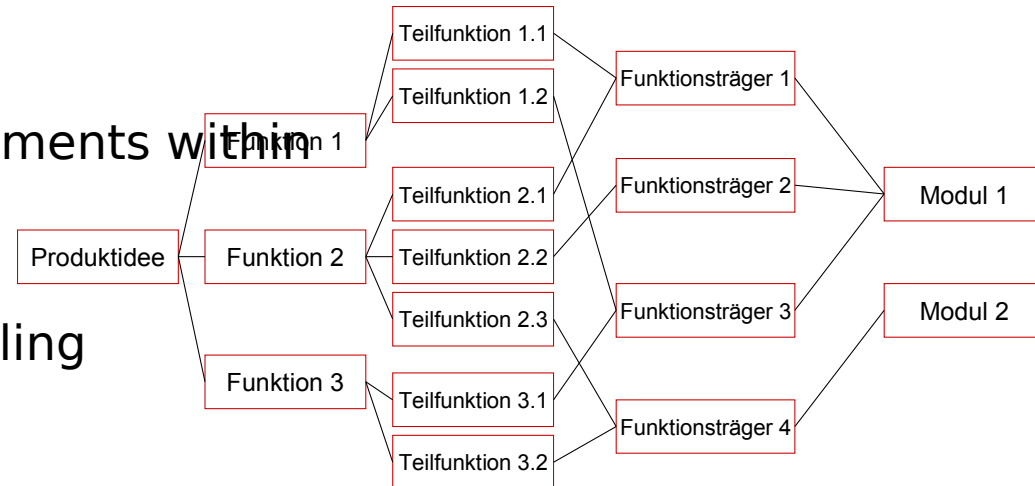
## Requirements

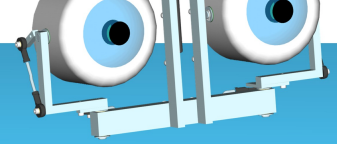
Consolidate all the requirements within a matrix

## Modules

Definition of modules fulfilling the requirements

		Power		
		100 PS	110 PS	120 PS
Motor	Motor A			
	Motor B			
	Motor C			
	Motor D			

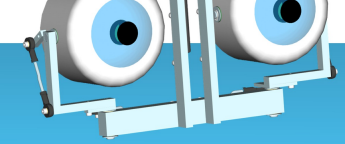




# User Scenario

## User Interface

- The goal is to develop a *simple, easy-to-use interface* for showing the robot around to obtain the room map and to annotate main items of furniture in the room.
- Other functionalities might be added once the functions of the robot will be clearly defined.
- My tasks are
  - to define the *best interface modality* (touch screen, speech, etc.)
  - to participate in the *design* and testing phase of this interface in order to make it as "user friendly" as possible



# Summary

- Current efforts are made in user scenario definition and robust robot navigation.
- Approach for room layout mapping and learning is still open.
- Object detection and classification will be structure based.
- Main sensors in use will be vision (including omnicam), stereo camera, and swissranger.