New Robotics Developments in Japan

Masa KIDODE

NAIST-IS AI Laboratory

http://ai-www.aist.nara.ac.jp/people/prof/kidode.html

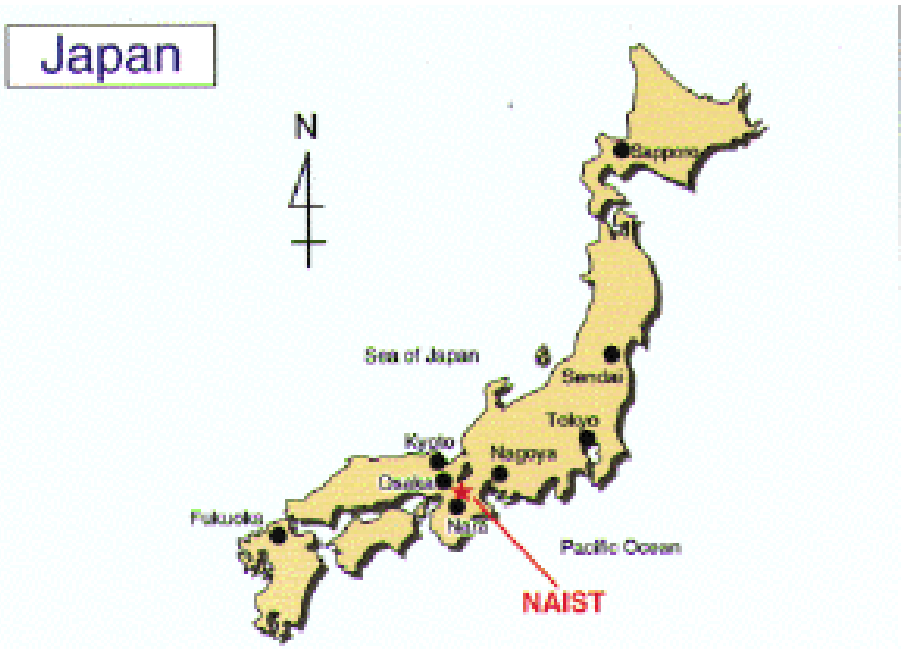
Masa(tsugu) KIDODE
（ 正継、 木戸出 ）

- 2000-present NAIST-IS AI Laboratory
- 1997-1999 TOSHIBA America Inc.
- 1996-1997 Multi-Media Business Div.
- 1992-1996 Kansai Research Lab.
- 1987-1992 Corporate Planning Div.

  (1975-1977 Purdue Univ.)
- 1970-1987 TOSHIBA R&D Center

NAIST (Nara Institute of Science and Technology)
奈良先端科学技術大学院大学

- A national university comprised solely of 3 graduate schools
- Located in Keihanna Science & Culture Town
  - Near Nara, Kyoto, Osaka, Kobe
  - Nara is the oldest capital of Japan (710-793).



Recent Topics on Robotics Developments in Japan

- EXPO 2005 Aichi
- Robocup 2005 Osaka
- Network Robot Project
- Next Generation Robot Project in Kansai
- **Recent Activities in NAIST-IS-AI**

- **Summary - Industrial & Academic Approaches**
- **Discussions**

Robots in EXPO 2005 Aichi

- Robot Showcase

  Working, Prototype & Station Robots

  supported by METI(Ministry of Economy, Trade and Industry)

  and Toyota, Mitsubishi & Brother Robots

http://www-1.expo2005.or.jp/en/robot/index.html

Various Robots

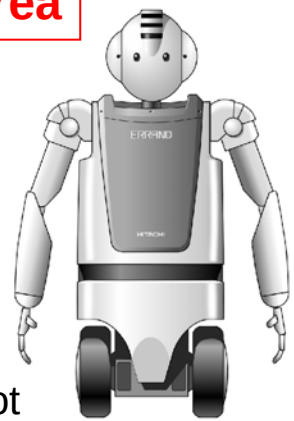
Residential Area

Mobile Robot
“Eco-Vihecle”

On Stage

Humanoid Robot
“HRP-2”

Town Area

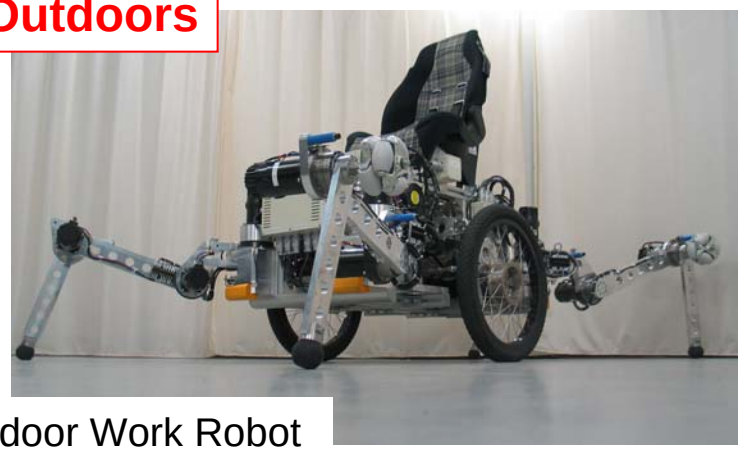


Service Robot
“Emue”

Park Area

Woody Work Robot
“WOODY-1”

Outdoors



Outdoor Work Robot
“Shorie”

Robocup 2005 Osaka

- Soccer Contest Leagues : Small Size, Middle Size, 4-Legged, Humanoid, Simulation
- Rescue Contest Leagues : Real, Simulation
- Junior Contest League

- from Theory (Epigenetic Robotics, Development & Learning)
  to Implementations

http://www.robocup2005.org

Network Robot Project

- Virtual, Unconscious, & Visible Robots

  supported by MIC(Ministry of Internal Affairs and Communications)

  about Platform, Applications, and Services

- Project Promotion
  in Keihanna Open Laboratories

http://www.scat.or.jp/nrf/English/index.html

What is Network Robots?

Ubiquitous Network & Sensor Network

Network Robots

"Visible" type



"Virtual" type


"Unconscious" type


Next Generation Robot Project in Kansai

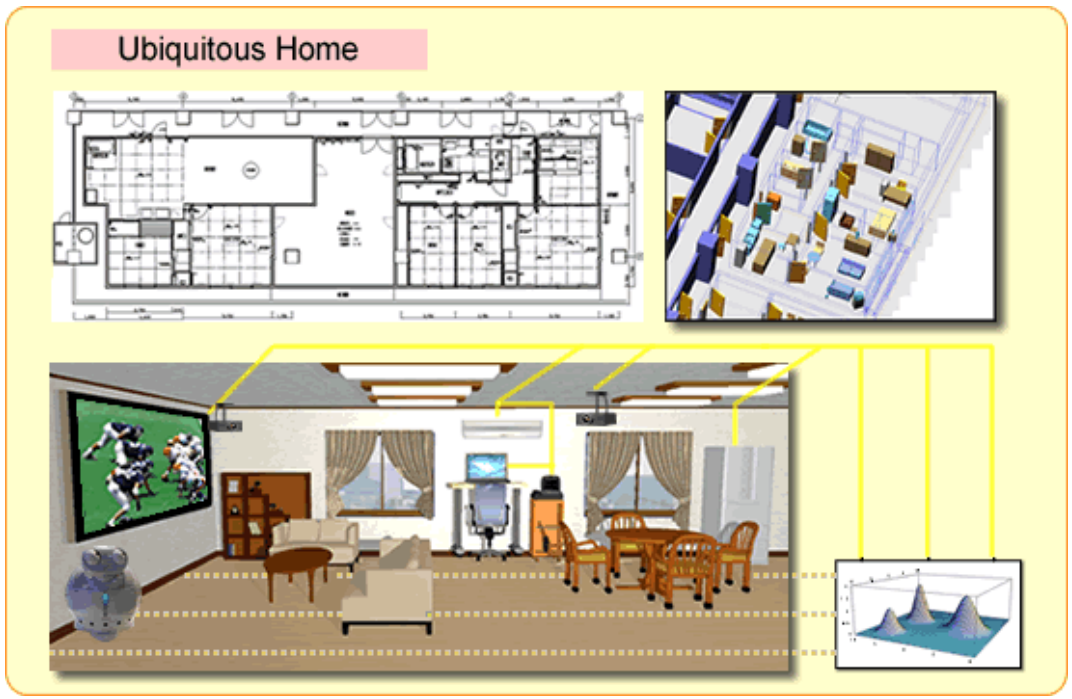
- Regional Promotion Program by Industries-Academia-Governments Collaboration

- Keihanna Open Laboratories Project
  - Platform Architectures
  - Practical Applications
  - Service

http://www2.nict.go.jp/jt/a130/khn-openlab/f_research_en.htmle Business

Open Laboratory Project - Ubiquitous Home

The ubiquitous home is used to conduct tests for proving the interconnectivity of appliances; robotize the entire home mainly based on the function distributed collaborative infrastructure; obtain a clear understanding of human behavior in the robotized home and realize new services based on such an understanding; and prove the concept of home robots that adapt themselves to the residents.



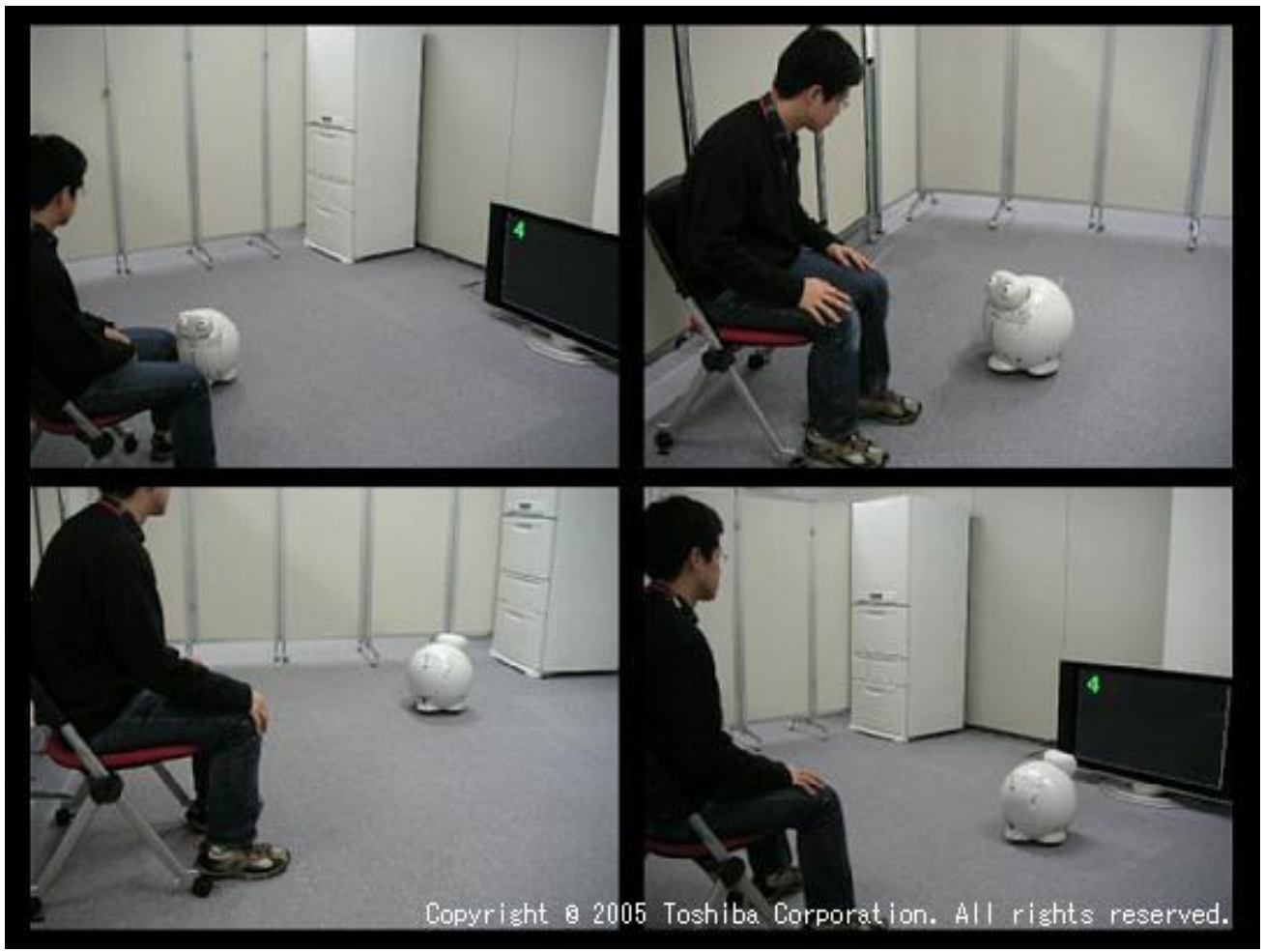
Interface Robot “Fino”

- Speech I/O
- Like Infant
- **Word Association**
- Context Aware IF
- Ubiquitous Home

(Network Appliances and their Context DB)

Robot Experiments by Toshiba Corp.

Practicality and Familiarity Fusion of a Robotic Interface



Recent Activities in AI Laboratory

- Robot Partners in NAIST-IS

  21COE Project on Robot, Media & Network

- Collaborations with Robots & Partners

  Robot Ontology, Free-Talking

- Goldfish Scooping Robot

  dynamic analysis, visual feedback

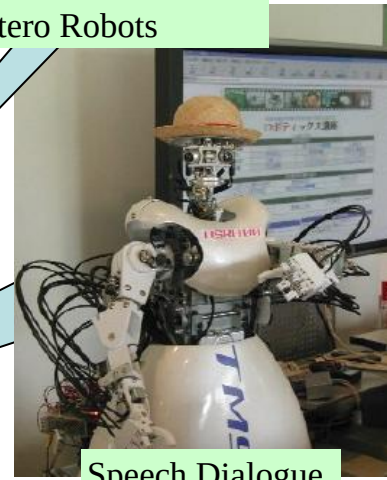
http://ai-www.aist-nara.ac.jp/index.html

Robots World @NAIST-IS

Gaze Instruction

Collaboration with Hetero Robots

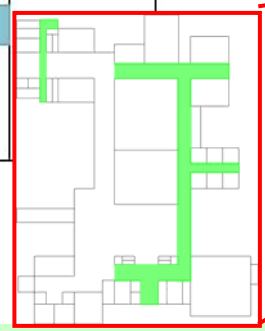
Collaboration with Homo Robots



Speech Dialogue

Hand Gesture Instruction

Accompany Guidance



Navigation by Rough Sketch Map

Mediation

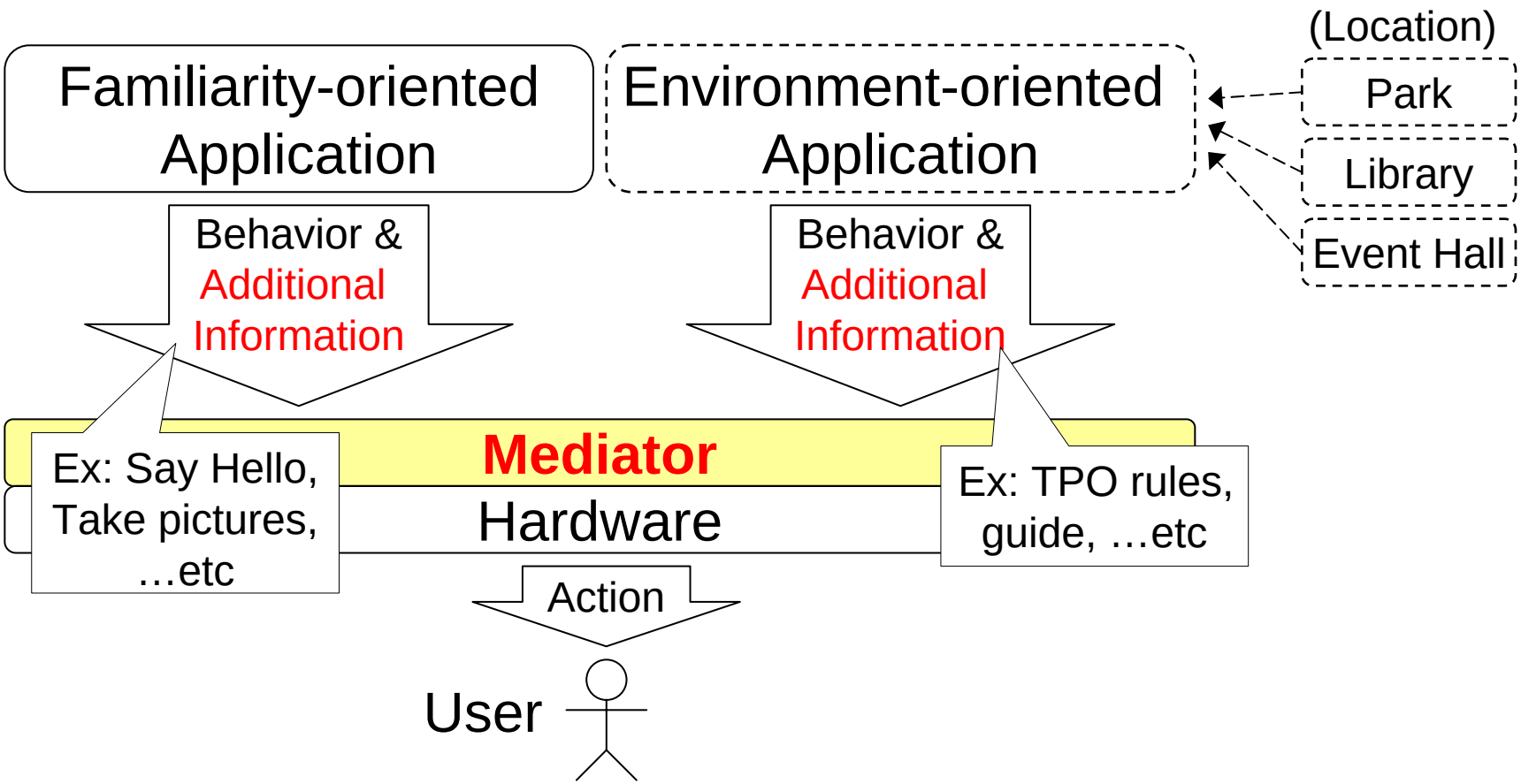
Visual Feedback Robot

Scooping Goldfish by “Poi”

Ex. Moving Objects

Middleware Architecture for Robot Collaboration

Personal Robots' Intermediating Mediator Adaption to environment



Summary on Recent Activities in Industries

- Humanoid & Two-Legged Robots
- Communications, Pet, & Home Robots
- DFS Framework & Service Business

Ex. Robovie Series

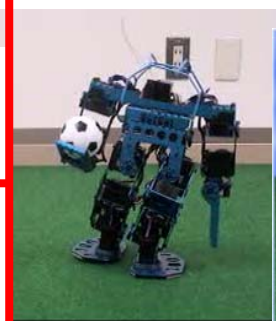
1999.9 2000.6 2000.11 2002.3 2003.4 2003.10 2004.7






Robovie 0 I II III IIS R height > 100cm

On market



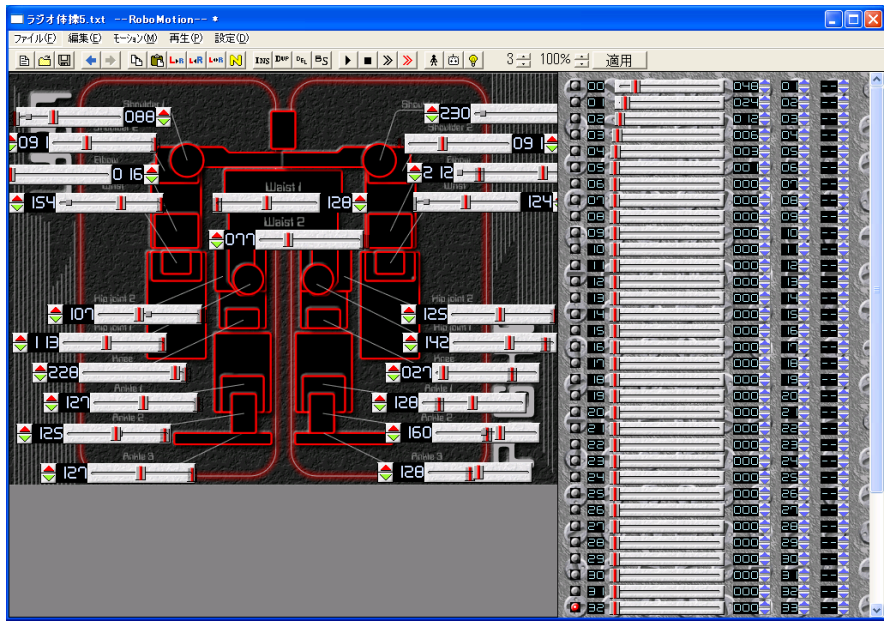

40cm > height

M V

Software Editing Behaviors: Robovie Maker ®

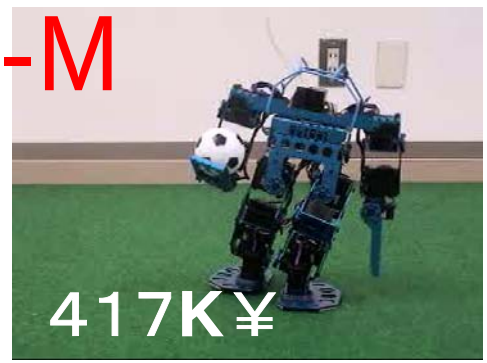
Robovie-R

Height 110cm
Weight 50kg



Robovie-M

Height 29cm
Weight 1,9kg



Summary on Recent Activities in Academia

- Intelligent Interfaces

  Multimedia, Multimodal

  1:1 ---- 1:n ---- n:n

- Learning, Self-Organization

  Robot Age: from Adults to Infants

- Mechanisms, Materials, & Applications

  Flexible, Warm-Hearted, Soft, Intelligent, Autonomous

Discussions

- Platform Architecture

  Hardware, Software & Application

  Add-on, Plug-in, API, DFS

- Robot Ontology

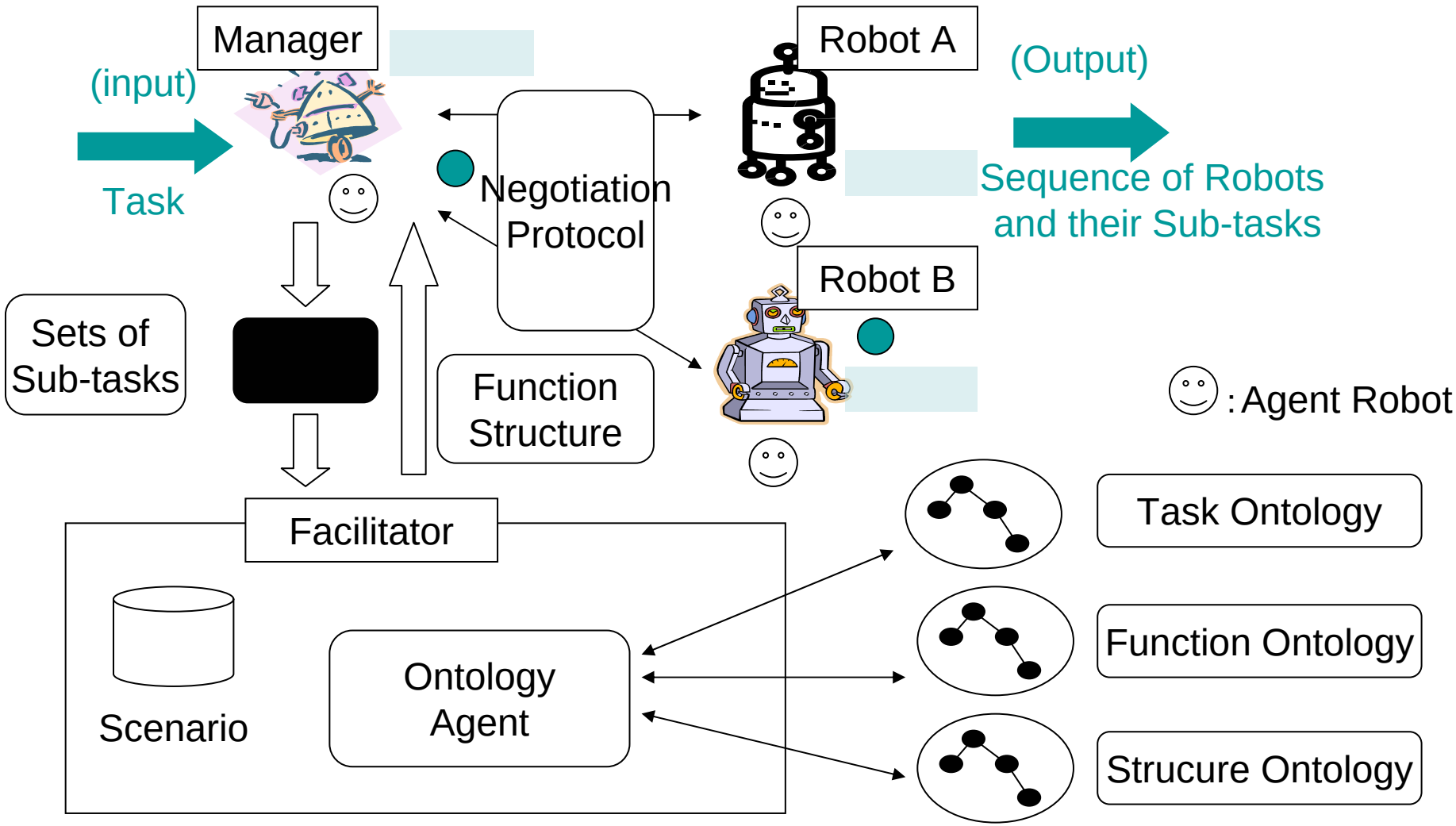
  Collaborations with Robots and Partners

  Live Tests and Evaluations

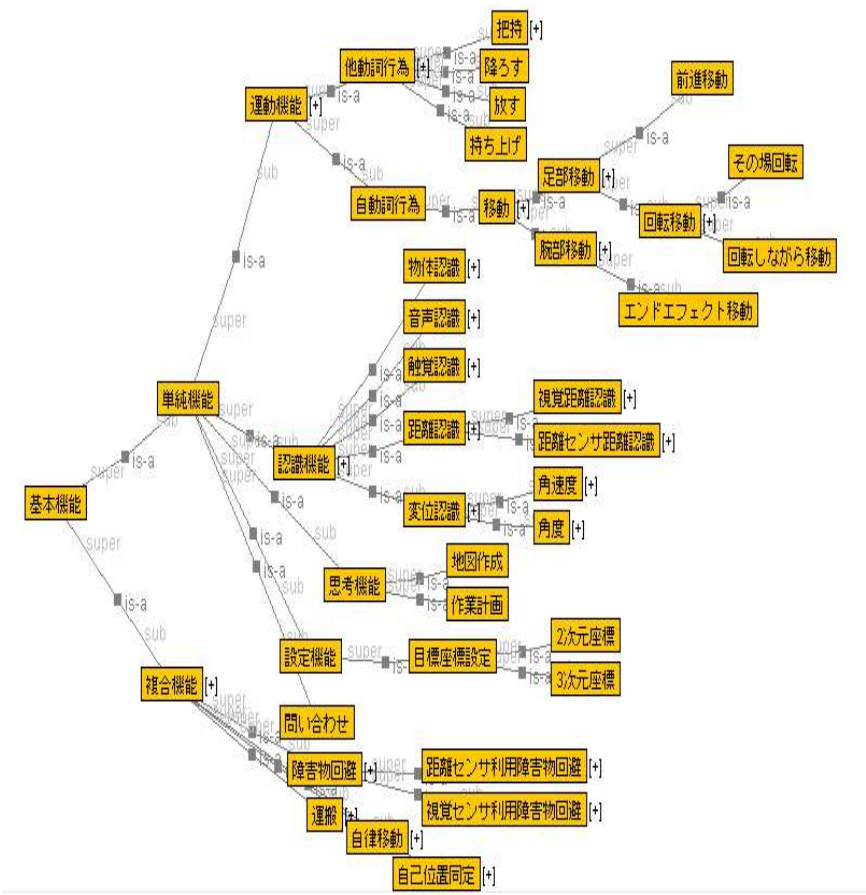
- Embodied Media Concepts

  New Human Communications Model

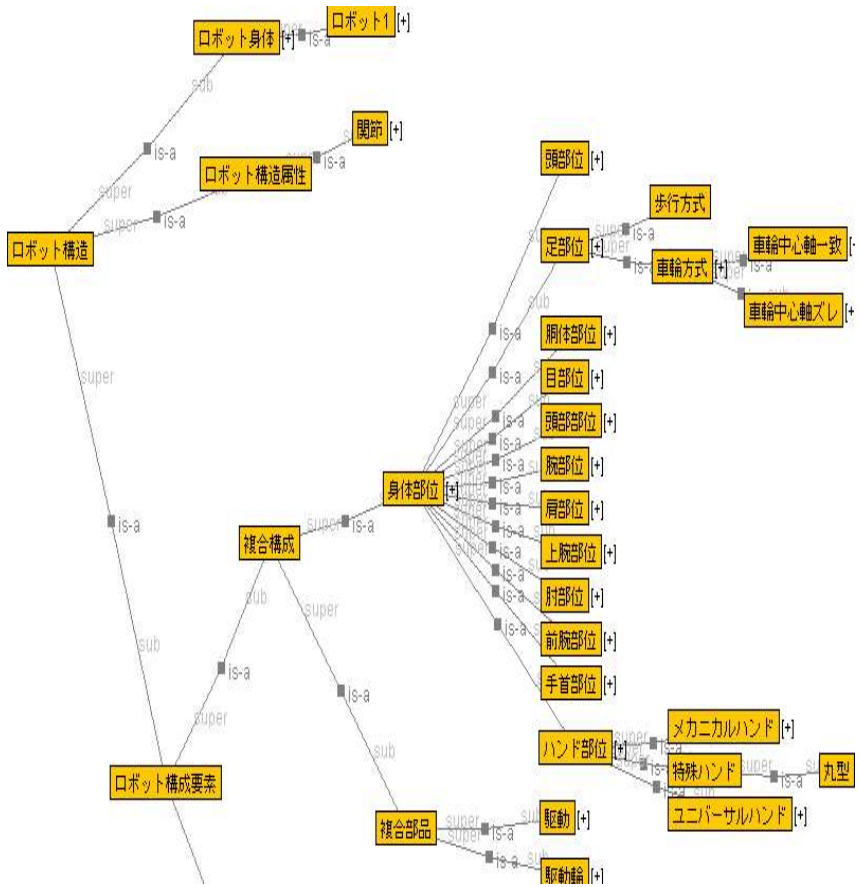
Collaboration Framework



Robot Ontology



Function Ontology



Structure Ontology