Super Distributed Object DSIG Final Agenda ver.1.01 sdo/04-11-01

OMG TC Meeting - Washington D.C. -- 1-5 November 2004

Schedules:

		TF/SIG				
		Host	**Joint (Invited**	**Agenda Item**	**Purpose**	**Room**
Monday						
12:00	13:00	**LUNCH**				
13:00	18:00			Architecture Board Plenary		
Tuesday						
9:20	9:30	SDO		Welcome and Review SDO Agenda	SDO Meeting Kick-off	Jefferson, Lobby Lv1
9:30	10:15	SDO		< Invited Talk > "Research on Task Intelligence and Robot Middleware" Takashi SUEHIRO (AIST, Japan)	Informative	Jefferson, Lobby Lv1
				Break		
10:30	11:00	SDO	(MARS, RTSS, ManTIS)	Robotics Activity Charter Discussion	Discussion for the future robotics related activity and its authorization	Jefferson, Lobby Lv1
11:00	12:00	SDO	(MARS, RTSS, ManTIS)	Robotics Activity Roadmap Discussion	Discussion for the future robotics related activity and its authorization	Jefferson, Lobby Lv1
12:00	13:00	**LUNCH**				
13:00	14:00	SDO	(MARS, RTSS, ManTIS)	SDO for Robotics Domain Discussion	Discussion on potential RFP for standardizing SDO for Robotics Domain	Jefferson, Lobby Lv1
14:00	14:30	SDO		Next Meeting Agenda Discussion, etc	SDO Closing session	Jefferson, Lobby Lv1
14:30		SDO		Adjourn		
Wednesday						
12:00	14:00	**LUNCH and OMG Plenary**				
18:00	20:00	**OMG Reception**				
Thursday						
12:00	13:00	**LUNCH**				
16:00	16:30	MARS	RTESS, SBC, ManTIS, Telecom, SDO	SDO Activity Report in Washington Meeting		GB Salon E, 1st FL
13:00	18:00			Architecture Board Plenary		
17:00	19:00	MARS	all	Agenda Coordination	cooperative activity	
Friday						
8:30	12:00			AB, DTC, PTC		
12:00	13:00	**LUNCH**				

Other Meetings of Interest to SDO

Monday						
8:00	8:45	OMG		New Attendee Orientation		
9:00	12:00			Tutorial - Software Radio Components Specification		
8:30	17:30	C4I		C4I Coalition Day		
13:00	17:00	OMG		Tutorial - Introduction to UML 2.0		
18:00	19:00	OMG		New Attendee Reception (by invitation only)		
Tuesday						
13:00	17:00	OMG		Tutorial - Survey of OMG Specifications		
Wednesday						
10:00	11:00	OMG		Meeting for Robotics Showcase (Nicole and		
13:00	17:00	RTESS	Telecom, MARS	RT CCM Vanderbilt presentations		
Thursday						

Preceding Activities

- **Presentation** (by Prof. Makoto Mizukawa)
  April 26, 2004 (St. Louis TM)
  mars/2004-04-10

- **Robotics Information Forum** **Kick-off**
  August 24, 2005 (Montreal TM)
  http://www.is.aist.go.jp/rt/events/20040824OMG.html
  mantis/2004-08-06 .. -10

Mailing List:
robotics@omg.org

Research on Task Intelligence and Robot Middleware

Takashi Suehiro
Task Intelligence Research Group
Intelligent Systems Research Institute
AIST

AIST OMG 2004.11.02

Robot Technology Middleware Project

- Supported by NEDO(New Energy and Industrial Technology Development Organization)
- about 100 million yen/year
- from 2002 to 2005

- RT means Robot Technology

RT middleware
NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

Our Research Area
(Task Intelligence)

- Intelligent Manipulator Control
- Manipulation Skill
- Dexterous Hand and Gripper
- Man-Robot Interface
- Vision
- Task Modeling
- System Integration

Research Activities

- Projects
  - Digital Maintenance Field Archiving Technology(1999-2004)
  - Skill Based Nuclear Power Plant Maintenance Robot (1998 - 2003, 2003-2008)
  - RT(Robot Technology) Middleware Project (2002-2005)
- Basic Researches
  - Fabric Handling Robot
  - Personal Manipulation Robot
  - Robot arm with tactile sensors
  - etc.

Manipulator Control

- Base of our research,
- not directly related with Robot Middleware.

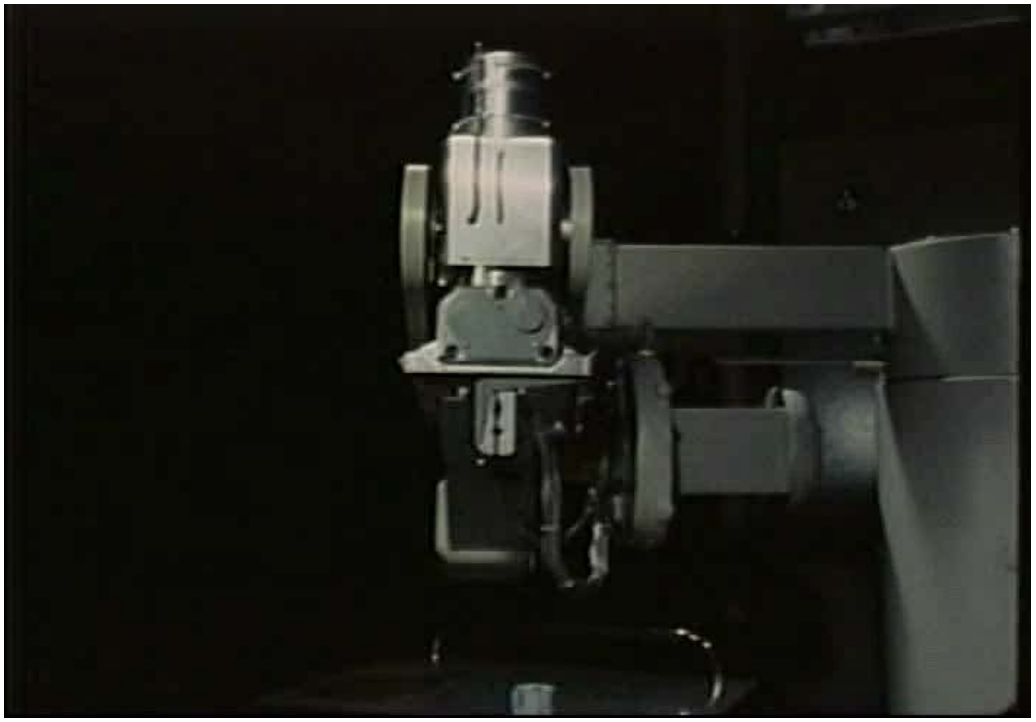
- We found a limitation of system, which led us to Robot Middleware.

Servo Control of Direct Drive Manipulators

- We have developed sophisticated DD manipulator servo,
- position/force hybrid control in task space,
- implemented on MIPRCOC 16, 16bit high performance micro computer(4 mips).
- ETA2(1983),ETA3(1985)

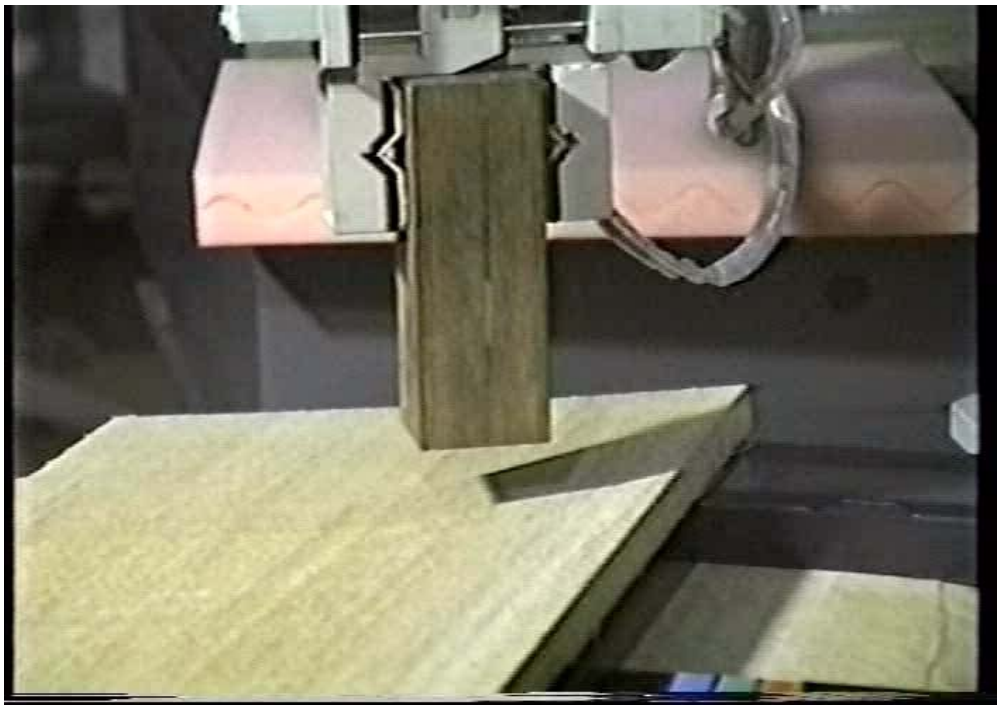
ETA2

- 1983



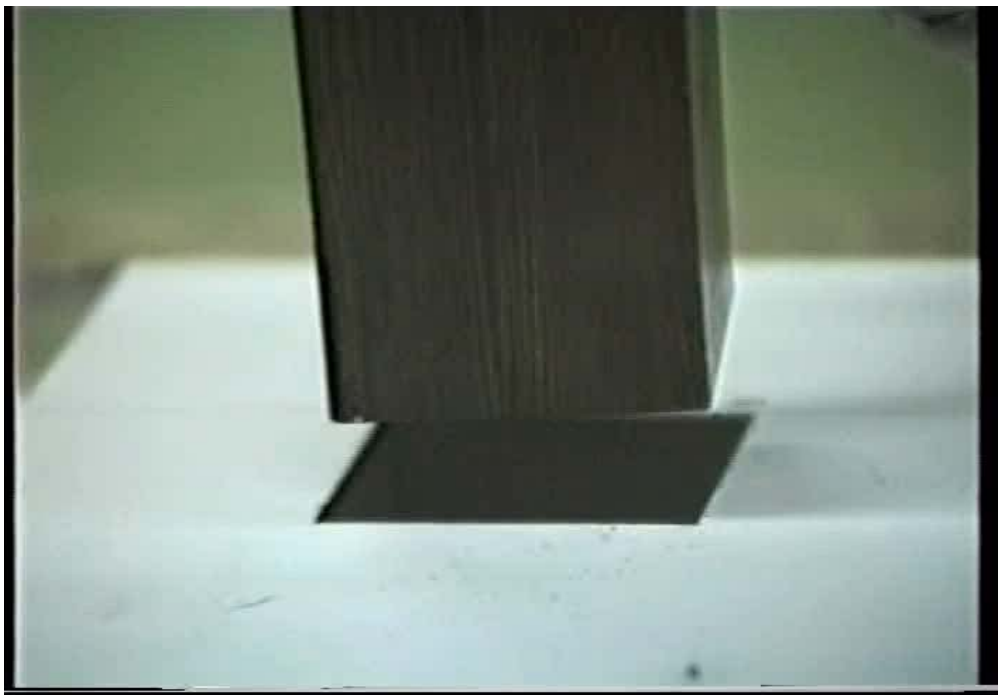
Face Fitting Skill by ETA3

- 1988



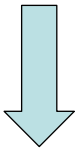
Insertion by ETA3

- 1990



Limitation of the Control System

- We wanted to apply more sophisticated control method. But, there were limitations of the control system.
  - CPU power
  - program structure



- We developed new control system on transputer network.

Multi-Agent Control System

- Distributed robot control system,
- We developed CORBA like system by ourselves, routing system, definition of typical agent structures and data structure, automatic generation of stubs and skeletons, and data marshalling library.
- This is conceptual base of our Robot Middleware.

Takumi: Intelligent Manipulator Control System

- Start from 1993

Stamping skill

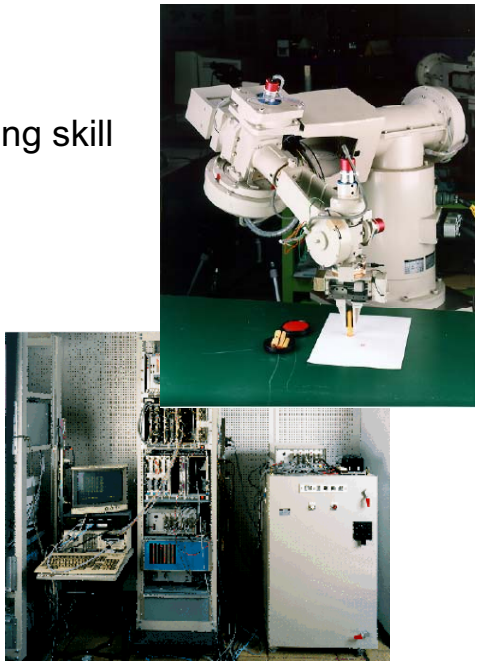


図　TAKUMIシステム外観

more than 50 transputers

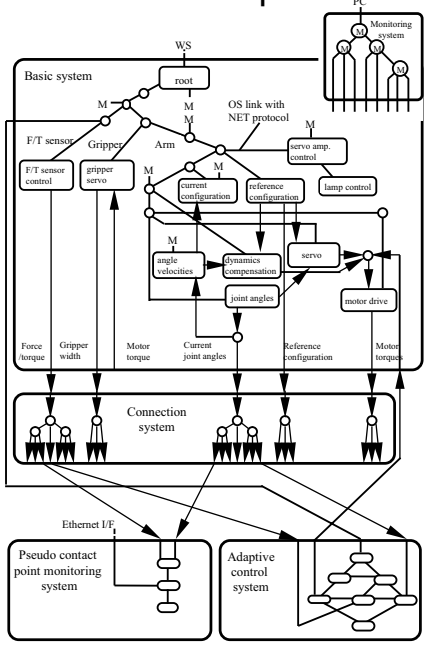
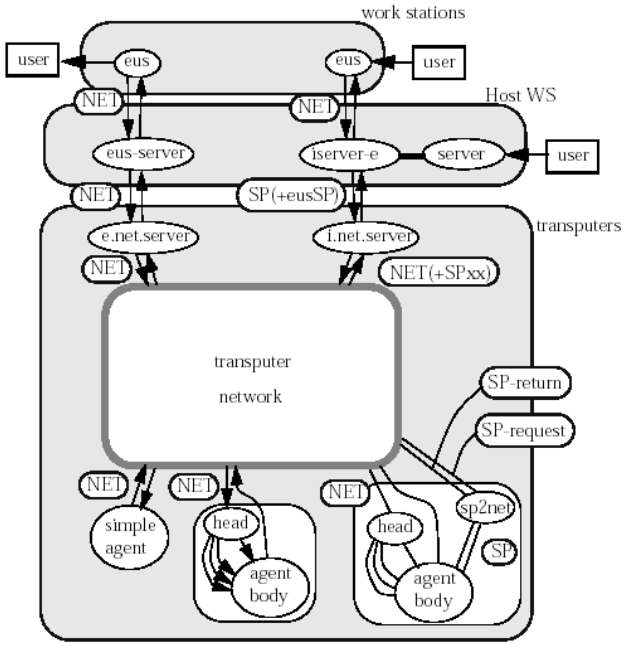


図　TAKUMIのエージェント構成図
（図中の四角枠はエージェントを表す）

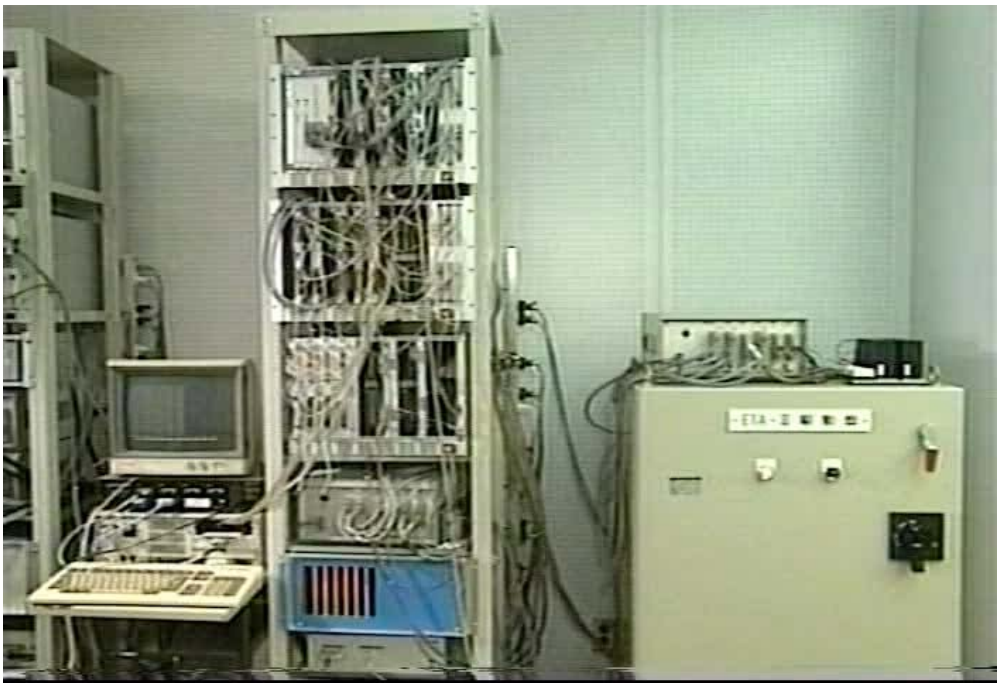
Multi-Agent Control System on Transputer Network

- 1994



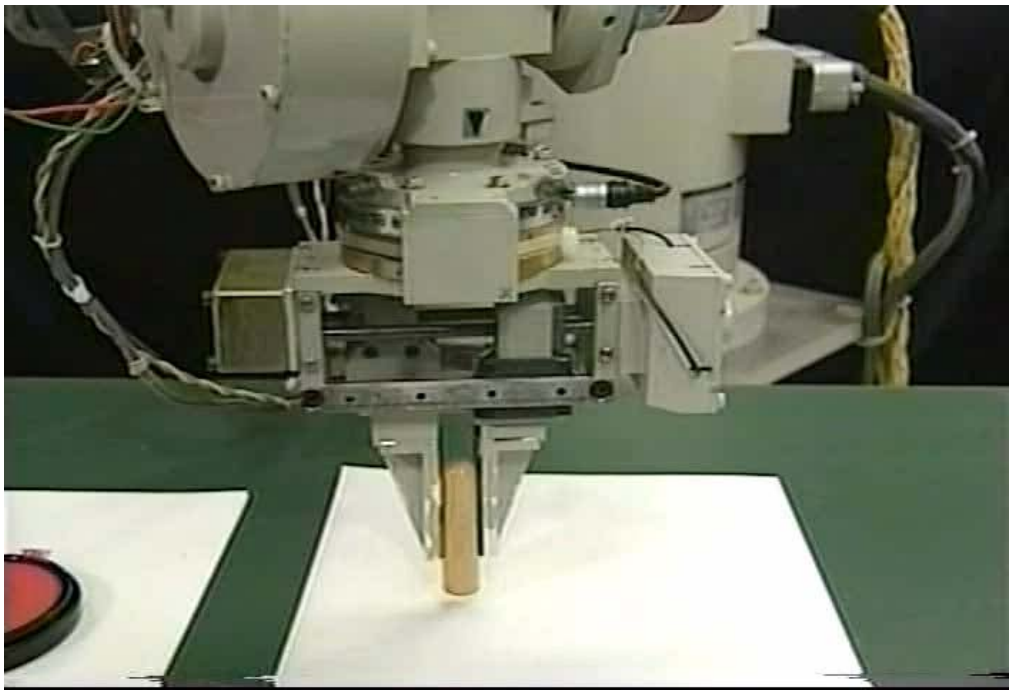
View of Takumi Control System

- 1995



Seal Stamping

- 1995



Skill on Multi-Agent System

- 1996

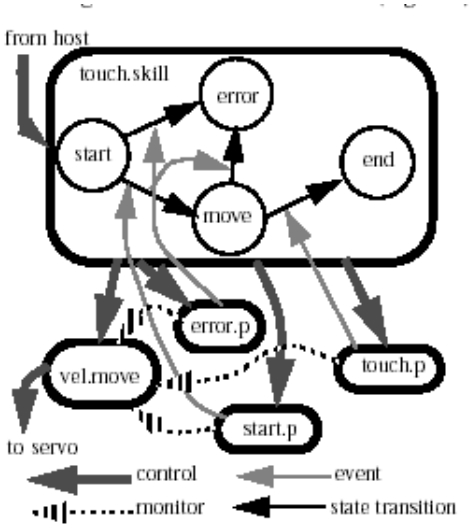


Figure 6 Behavior of agents of move-to-touch

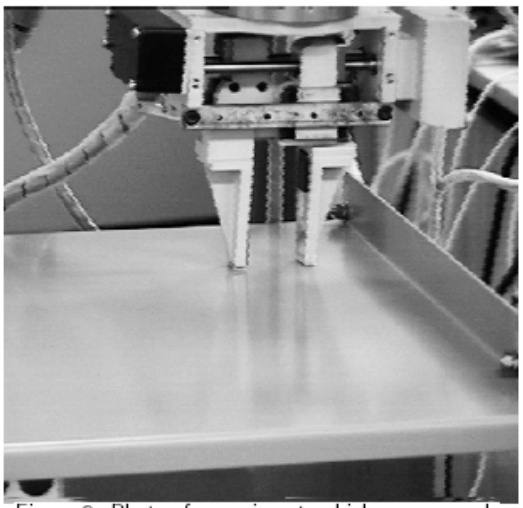


Figure 9 Photo of experiment, which corresponds to (b) of Figure 7

Parallel Execution of Touch Skills

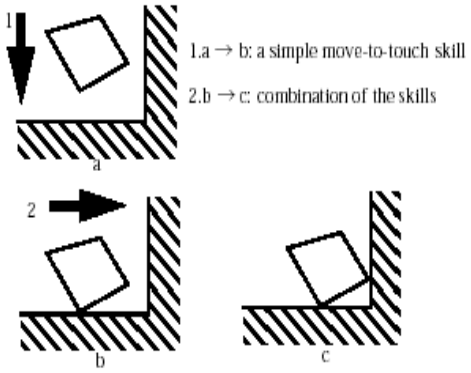


Figure 3 Move-to-touch

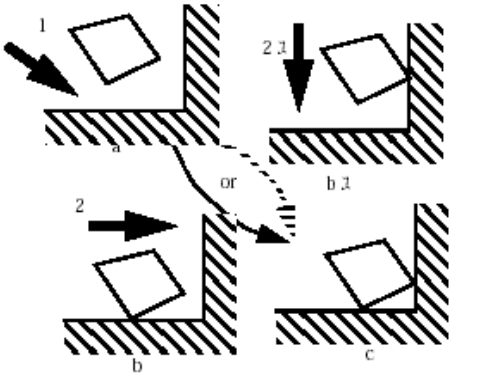


Figure 7 Parallel execution of two move-to-touch

Sequential execution

Parallel execution

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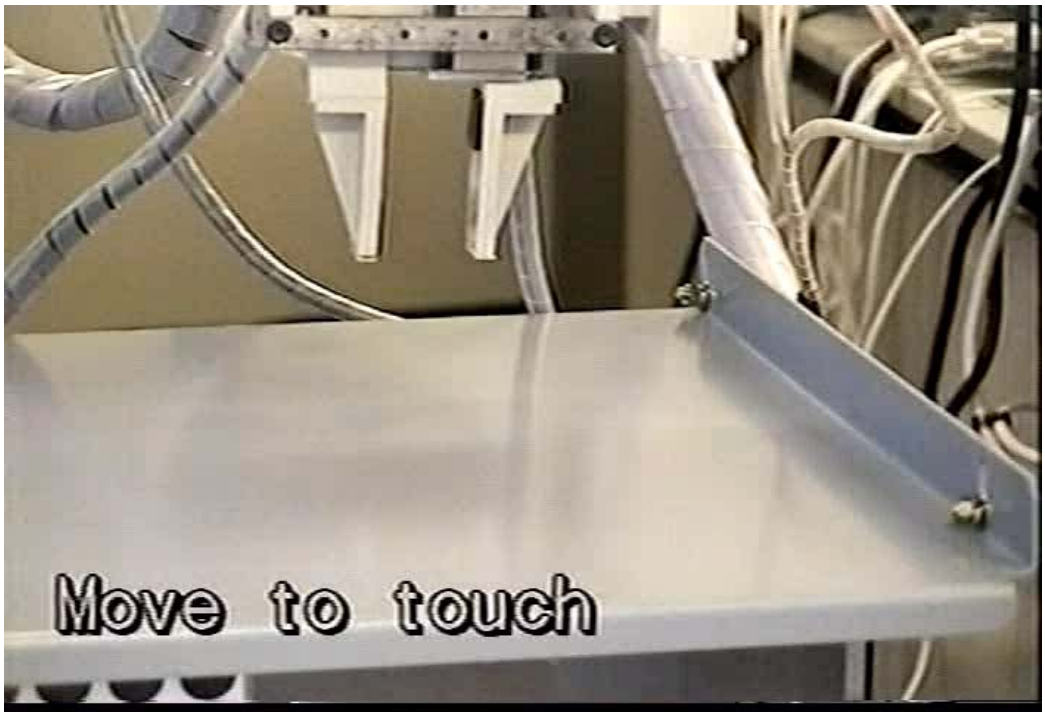
Parallel Execution of Touch Skills



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Spreading Multi-Agent Concept

- We would like to develop all of our robot system as multi-agent system.
- But ...

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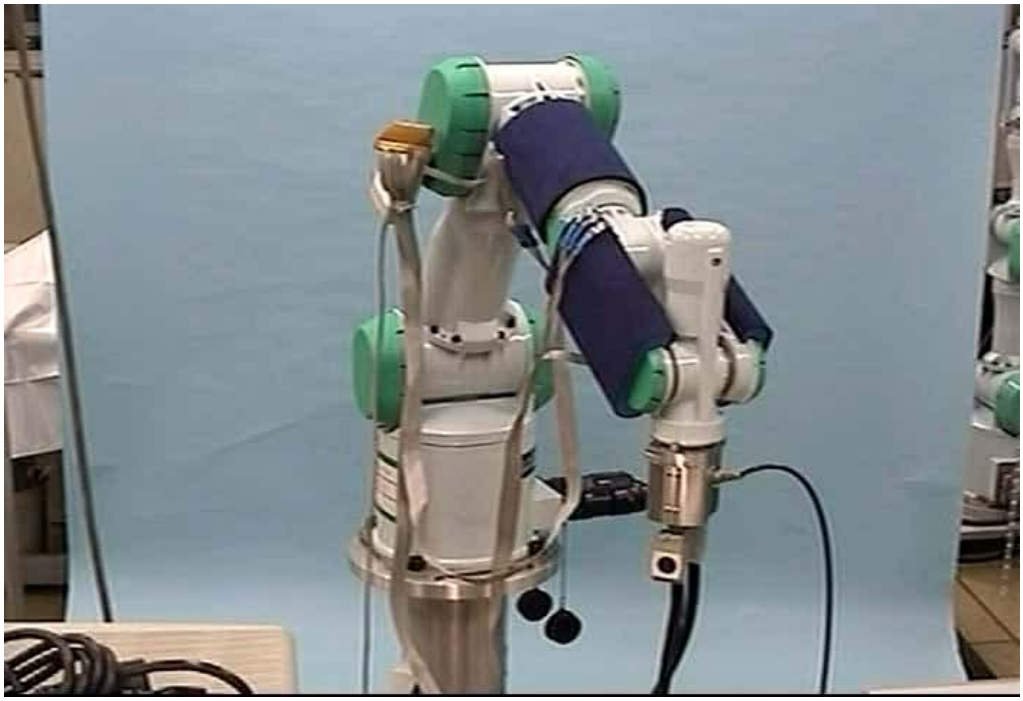
Sensor Based Control System



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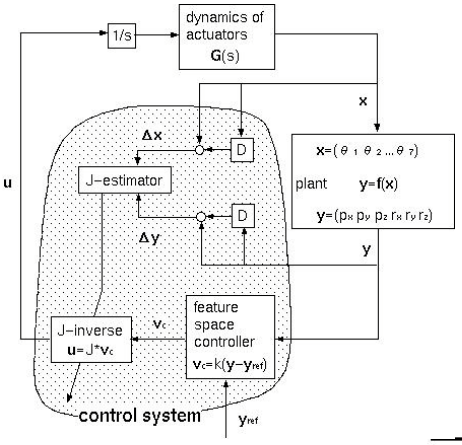
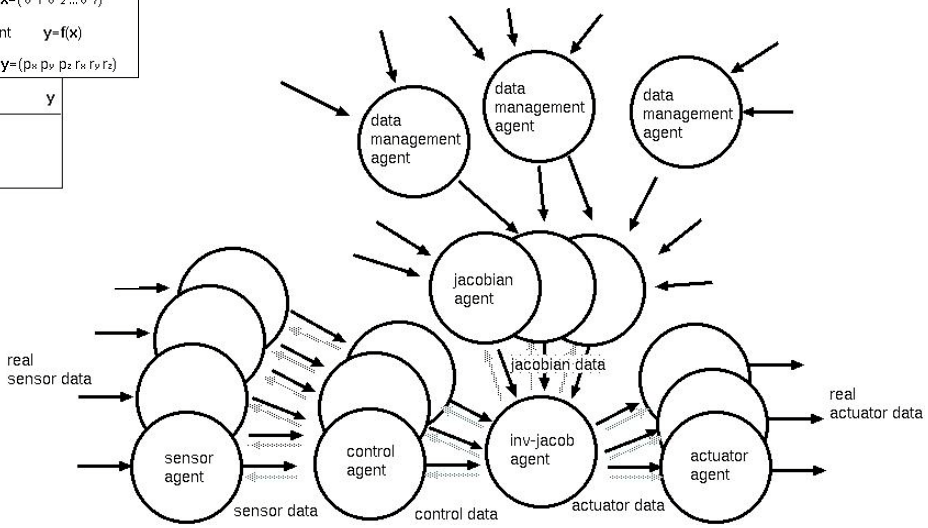
Sensor Based Control System

- 2000





Robot Middleware

- Multi-agent system is conceptually good,
- but it is difficult to spread without specification of architecture and software support.

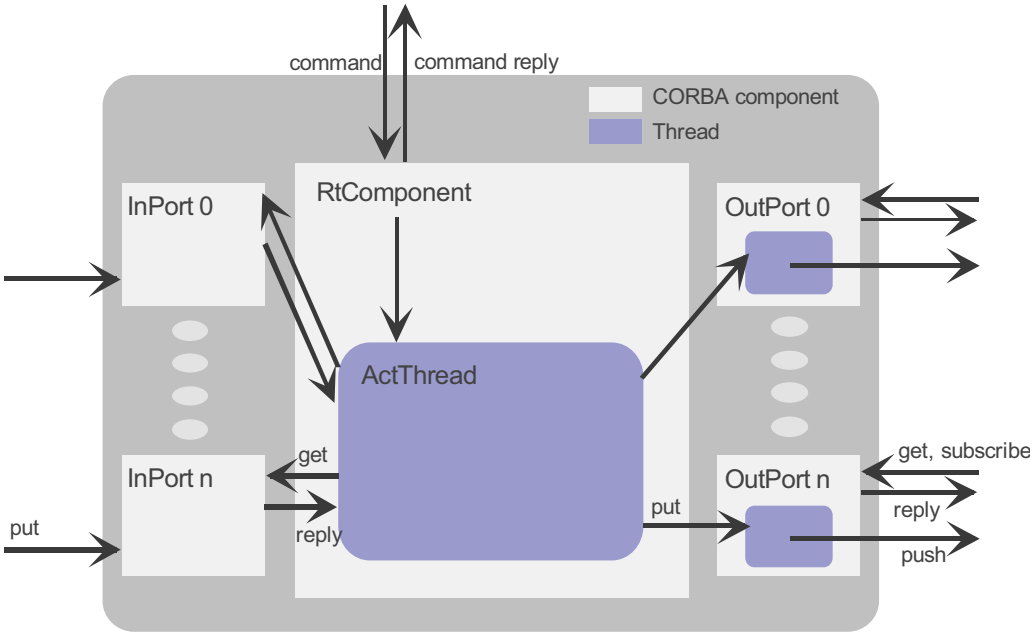
- Robot Middleware

What we have learned about system integration

- Robot systems are integration of many robotic technologies.
- Modularize structure is important.
- Behaviors of modules have typical patterns, which are characterized by flows of commands and data.
- We need specification of architecture.

General Framework of Robot Component

- Basic Structure of RT Component

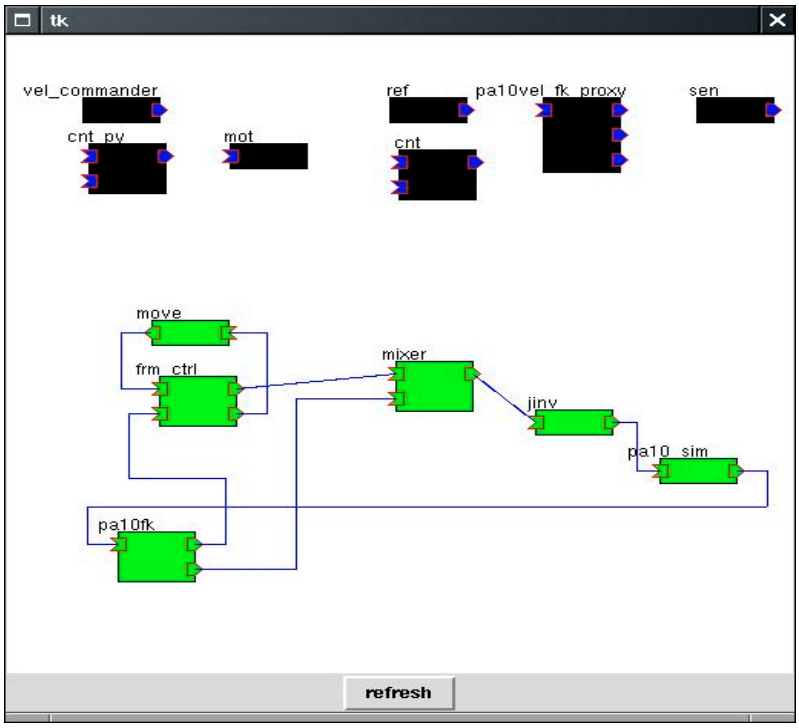


Current State of AIST-RTM

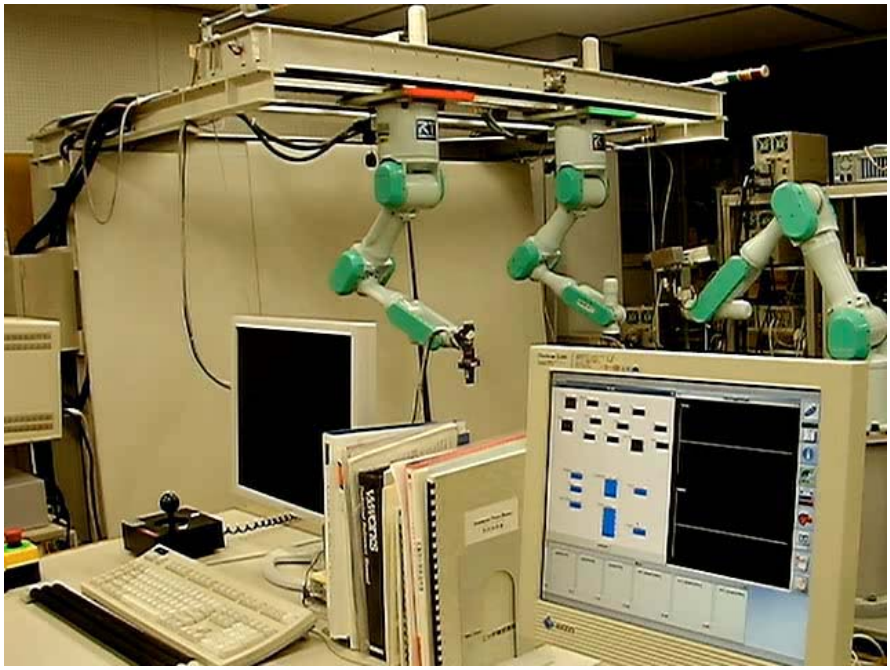
Version: RTM-0.1.0 (pre-α)

- Base
  - IDL of RtComponent, InPort, OutPort
  - Implementation of them
    - CORBA: omniORB
    - OS: Linux, Windows
    - Language: C++, python
- samples
  - Provide sample programs(motor, sensor, controller) as templates of components.
- services
  - Supply a sample of connection and activity management GUI.

Resolved Motion Rate Control of Manipulator



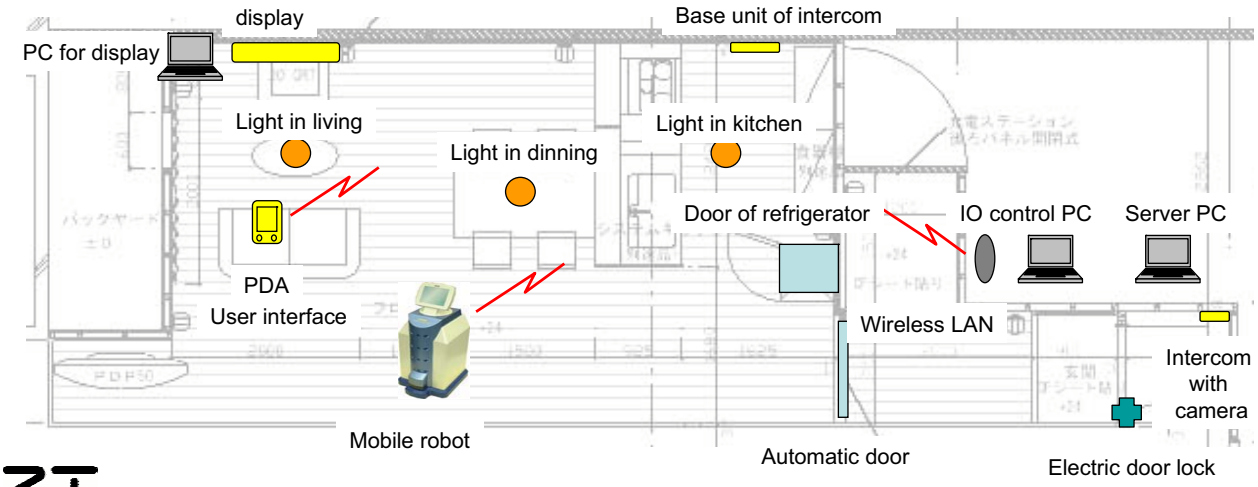
Force Control of Manipulator



Robotic Space Application(MEW)

Placement of RT Components

1. Mobility: autonomous mobile robot
2. Visual Function:
   - Image Input: Active camera on mobile robot, camera in intercom
   - Image Output: Display in living room
3. User Interface: PDA(menu selection, speech recognition)
4. Other household appliances: Lights(Living, Dining, Kitchen rooms), Door of refrigerator, automatic door, electric door lock, intercom



Example of Service Scenario

Specification of Robot Middleware

- Discussion in JARA WG
- In OMG
  - specification of Robot Component Framework based on PIM of SDO(Super Distributed Object).
  - expansion of the framework and preparation of common services for robotic application areas.

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END

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Discussion of Charter on Robotics Activities

November 2, 2004
Arlington, VA

Charter on Robotics Activities (draft version)

- We focus on adaptations and extensions of OMG technologies that apply specific domain of the robot systems, which include interactions with physical entities like conventional manufacturing systems, remote operation systems for hazardous environments, entertainment robots, intelligent transportation systems, and various pervasive intelligent systems with sensor(s) and/or actuator(s). We anticipate daily life support systems will become one of the emerging markets in near future. Examples include systems that have one or more of the following characteristics: Interaction with real world, Interaction with human, and Interaction with virtual world.
- We promote mutual understanding between robot community and OMG community.
- We endeavor to collaborate with other organization for standardization, such as the one of home information appliance, and make an open effort to increase interoperability in the field of robotics.
- We extend specifications for Platform Independent Models (PIMs), the Unified Modeling Language (UML), the Common Object Request Broker Architecture (CORBA) / Common Object Services (COS), the Model Driven Architecture (MDA) and other standards that fall into the OMG purview. We develop new standards for specialized systems where no current baseline specifications exists such as MDA for Robotics. This means that the object technology is not limited to software but is extended to real object. This effort promotes the use of OMG technologies in various markets.
- For technology areas that overlap with other OMG Task Forces, we coordinate with the appropriate OMG subgroups and the Architecture Board to determine where the work will be accomplished.

Comments and Suggestions

- The draft charter is **too long**.
  4th paragraph : no enumerate all the OMG tech.
  1st paragraph : not need to say in so much detail

- Simple is better

AIST

Charter for Robotics Activities in SDO (revised version)

The purpose of the Robotics activities is to foster the integration of robotics systems from modular components through the adoption of OMG standards. To realize this purpose, we will:

- Adapt and extend OMG technologies that apply to the specific domain of robotics systems where no current baseline specifications exist, such as MDA for Robotics. The object technology is not solely limited to software but is extended to real objects. This effort promotes the use of OMG technologies in various markets.
- Promote mutual understanding between the robotics community and the OMG community.
- Endeavor to collaborate with other organizations for standardization, such as the one for home information appliances, and make an open effort to increase interoperability in the field of robotics.
- Coordinate with the appropriate OMG subgroups and the Architecture Board, for technology areas that overlap with other OMG Task Forces, to determine where the work will be accomplished.

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Roadmap for Robotics Activities

sdo/04-11-05

Item	Status	DC Oct-2004	Burlingame Jan-2005	European Apr-2005	Boston Jun-2005	USA Sep-2005	TBD Nov-2005	TBD Jan-2006	POC / Comment
Charter on Robotics Activities	**In Process**	**issued**							Kotoku(AIST), Mizukawa(Shibaura-IT)
SDO model for Robotics Domain	**Planned**	**discussion**	**draft RFP**	**RFP**		**Initial Submittion**		**Revised? Submittion**	Kotoku(AIST), Suehiro(AIST), Lemaire(JARA), Sameshima(Hitachi)
Robotics Information Day [Technology Showcase]	**Planned**		**?**	**?**	**?**				Yokomachi(NEDO), Kotoku(AIST)
Robotics: Initial Survey [Clarification of Target Item]	**Planned**	**discussion**	**draft RFI**	**RFI**	**RFI due Presentation**		**review RFI response**	**review RFI response**	(JARA), et al.
						Official Start of Subgroups	**draft RFP**		
(Robot Middleware for Controller)	**Future**								to be discussed
(Robot Middleware for Specific Applications)	**Future**								to be discussed
(Robot Middleware Common Services)	**Future**								to be discussed
(Robot Middleware for Common Data Structures)	**Future**								to be discussed
	Future								to be discussed

sdo/04-11-06

SDO

Super Distributed Objects

Date: Tuesday, 2nd November, 2004
Reporting: Tetsuo Kotoku
Group email: sdo@omg.org
robotics@omg.org

➢Highlights from this Meeting:

– Tutorial Presentation [sdo/04-11-03]

(Dr. Takashi Suehiro, AIST)

– Charter of Robotics Activities [sdo/04-11-04]

(Special Thanks to Dr. Claude R. Baudoin)

– Roadmap [sdo/04-11-05]

• SDO model for Robotics Domain

• Robotics Technology SIG Proposal

SDO

Super Distributed Objects

Date: Tuesday, 2nd November, 2004
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Robotics Information Day [Technology Showcase]	Planned		?	?	?				Yokomachi(NEDO), Kotoku(AIST)
Robotics: Initial Survey [Clarification of Target Item]	Planned	discussion	draft RFI	RFI	RFI due Presentation		review RFI response	review RFI response	(JARA), et al.
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	Future								to be discussed

SDO

Super Distributed Objects

Date: Tuesday, 2nd November, 2004
Reporting: Tetsuo Kotoku
Group email: sdo@omg.org
robotics@omg.org

- **Next Meeting (**Burlingame, CA**):**
  - **Robotics Technology Information Day** (Mon.)
    Recruit new member
  - **SDO Meeting** (Sun.)
    - SDO model for Robotics Domain, (discussion of RFP contents)
    - Robotics Technology: initial survey (discussion of RFI contents)
    - Robotics Activities motion proposal (new SIG / rename SIG)
    - Tactics for recruiting new participants (discussion)

SDO Meeting Minutes – Washington DC (sdo/04-11-07)

OMG Documents Generated

sdo/04-11-01 SDO Final Agenda for Washington DC Meeting (Tetsuo Kotoku)
sdo/04-11-02 Introduction: Preceding Activities (Tetsuo Kotoku)
sdo/04-11-03 Invited Talk "Research on Task Intelligence and Robot Middleware" (Takashi Suehiro)
sdo/04-11-04 Charter Discussion (Tetsuo Kotoku)
sdo/04-11-05 SDO Roadmap (Tetsuo Kotoku)
sdo/04-11-06 PTC Report (Tetsuo Kotoku)
sdo/04-11-07 Minutes of Washington DC Meeting (Tetsuo Kotoku)

Agenda

09:20-09:30 Welcome and Review SDO Agenda
09:30-10:15 Presentation by Takashi Suehiro, AIST
10:30-11:00 Robotics Activity Charter Discussion
11:00-12:00 Robotics Activity Roadmap Discussion
13:00-14:00 SDO Model for Robotics Domain Discussion
14:00-14:30 Next Meeting Agenda Discussion

Minutes

2 November, Tuesday

Tetsuo KOTOKU, presiding co-chair
Meeting Week – Kick-off

- Called meeting to order at 09:20
- Tetsuo Kotoku introduced preceding activities.
  - ✓ sdo/04-11-02 Preceding Activities
- Tetsuo Kotoku reviewed the Agenda.
  - ✓ sdo/04-11-01 SDO Final Agenda for Washington DC

Invited Talk "Research on Task Intelligence and Robot Middleware"

- Takashi Suehiro (AIST) presented his research activities on intelligent manipulation, manipulation skill, dexterous hand, man-robot interface and vision system by using interesting video clips.
  - ✓ sdo/04-11-03 Invited Talk "Research on Task Intelligence and Robot Middleware"

Robotics Activity Charter Discussion

- Tetsuo Kotoku presented the Draft Carter posted on the mailing-list and its revised one.
- Claude R. Baudoin (Schlumberger-Doll Research) explained his mailed comments, and helped to edit the revised version.
- **Motion** to issue the charter for the robotics working group in SDO SIG. Motion adopted by unanimous consent.
  - ✓ sdo/04-11-04 Charter Discussion

Robotics Activity Roadmap Discussion

- Tetsuo Kotoku presented the Draft Roadmap.
- Claude R. Baudoin and Anthony Tarlano(NTT docomo) gave us their valuable comments and revised our roadmap.
- Olivier Lemaire(Matsushita Electric Works) made a query about the SDO roadmap except robotics.
- Seiichi Shin(The Univ. of Tokyo) answered the question. -No special activities now.
  - ✓ sdo/04-11-05 SDO Roadmap

SDO Model for Robotics Domain Discussion

- Free discussion on SDO model for robotics. No specific action was taken.

We discussed the charter and the roadmap again.

- Andrew Watson (OMG) suggested renaming SDO-SIG or setting up new Robotics-SIG.
- Andrew Watson suggested that we had better to prepare a document explaining the objectives of the RFP and the RFI in our roadmap.

Meeting Wrap-up, Plan for Burlingame

- Tetsuo Kotoku presented the Draft Agenda for the next Burlingame meeting.
- Olivier Lemaire suggested adding the item "Robotics Domain SIG motion proposal."
- Claude R. Bordin suggested adding the item "Tatics for recruing new members" and to invite OMG staffs for Bisuness Developing and Marketing.
  - ✓ sdo/04-11-06 PTC Report

ADJOURNED @ 14:30 pm

Prepared and submitted by Tetsuo Kotoku (AIST)