Robotics Domain Task Force Final Agenda ver.1.1.1 **robotics/2008-12-01**

OMG Technical Meeting - Santa Clara, CA, USA -- Dec.8-12, 2008

http://robotics.omg.org/

		TF/SIG				
		Host	Joint (Invited)	Agenda Item	Purpose	Room
Monday: Robotics Plenary(am) and WG activites(pm)						
9:00	9:45			Robotics Steering Committee	Arrangement	Lafayette, 2nd Floor
10:00	10:20	Robotics		Robotics-DTF Plenary Opening Session	Robotics plenary openning	
10:20	12:00			User Identification Service RFP 2nd Review - Su-Young Chi(ETRI), Hyunsoo Kim(Samsung), and Toshio Hori(AIST)	presentation, discussion, **Voting**	
12:00	13:00					Magnolia, Lobby Level
13:00	18:00			Architecture Board Plenary		Bayshore, 2nd Floor
13:00	15:30			Robotic Infrastructure WG (2.5h) - Noriaki Ando(AIST)	discussion	Napa 1, Lobby, Level
				Services WG(2.5h): User Identification Service RFP Meeting - Su-Young Chi, Hyunsoo Kim, and Toshio Hori	discussion	Napa 3, Lobby Level
15:30	18:00			Robotic Infrastructure WG (2.5h) - Noriaki Ando(AIST)	discussion	Napa 1, Lobby, Level
				Robotic Localization Services FTF (2.5h) - Kyuseo Han, Yeon-Ho Kim and Shuichi Nishio	discussion	Napa 3, Lobby Level
Tuesday: WG activities and Robotics Plenary						
9:00	11:00			Robotic Localization Services FTF (2h) - Kyuseo Han, Yeon-Ho Kim and Shuichi Nishio	discussion	Camino Real, 2nd Floor
				Services WG(2h): User Identification Service RFP Meeting - Su-Young Chi, Hyunsoo Kim, and Toshio Hori	discussion	Room 1335, 13th Floor
11:00	11:30	Robotics		**Special Talk:** Real World Robot Challenge in Tsukuba (RWRC2008) - Takashi Tsubouchi (Univ. of Tsukuba) and Makoto Mizukawa (Shibaura-IT)	presentation and discussion	Lafayette, 2nd Floor
11:30	12:00	Robotics		**Special Talk:** A Lightweight Message-Driven Component Framework for Robotic Systems - Saku Egawa (Hitachi Ltd.)	presentation and discussion	
12:00	13:00			**LUNCH**		Magnolia, Lobby Level
13:00	13:50	Robotics		**Invited Talk:** ROS: A new development environment for a new generation of robots **- Brian Gerkey (willow Garage)**	presentation and discussion	Lafayette, 2nd Floor
13:50	14:30	Robotics		The QoS and Fault-tolerance Issues on the Robot Component Execution Enviornment - Beom-Su Seo (ETRI) and Seung-Woog Jung (ETRI)	presentation and discussion	
14:30	15:10	Robotics		The issues on robot component directory service and repository Contents - Kang-Woo Lee (ETRI)	presentation and discussion	
				Break (30min)		
15:30	16:30	Robotics		**Special Talk:** Architecture Framework for Unmanned System (AFUS) - Laurent Rioux (Thales)	presentation and discussion	
16:30	17:10	Robotics		WG Reports and Discussion (Service WG, Profile WG, Robotic Localization Service WG)	presentation and discussion	
17:10	17:30	Robotics		Contact Reports: - Makoto Mizukawa(Shibaura-IT), and Yun-Koo Chung(ETRI)	Information Exchange	
17:30	17:40	Robotics		Roadmap and Next meeting Agenda Discussion **Robotics-DTF Co-Chair election**	Robotics plenary closing, **Voting**	
17:40				Adjourn plenary meeting		
17:40	17:45	Robotics		Robotics WG Co-chairs Planning Session (Preliminary Agenda for next TM, Draft report for Friday	planning for next meeting	Lafayette, 2nd Floor
Wednesday WG activity follow-up						
9:00	12:00			Robotic Localization Services FTF (3h) - Kyuseo Han, Yeon-Ho Kim and Shuichi Nishio	discussion	mendocino, Lobby Level
12:00	14:00			**LUNCH and OMG Plenary**		Magnolia, Lobby Level
14:00	18:00			Robotic Localization Services FTF (4h) - Kyuseo Han, Yeon-Ho Kim and Shuichi Nishio	discussion	mendocino, Lobby Level
18:00	20:00			**OMG Reception**		Mezzanine East/West, 2nd Floor
Thursday						
12:00	13:00			**LUNCH**		Magnolia, Lobby Level
13:00	18:00			Architecture Board Plenary		Bayshore, 2nd Floor
Friday						
8:30	12:00			AB, DTC, PTC		Magnolia, Lobby Level
12:00	13:00			**LUNCH**		Cypress, 2nd Floor
Other Meetings of Interest						
Monday						
8:00	8:45	OMG		New Attendee Orientation		San Tomas, 2nd Floor
9:00	12:00	OMG		Tutorial - Introduction to OMG Specifications		San Tomas, 2nd Floor
10:00	17:00	OMG		Tutorial - Introduction to the OMG System Modeling Language (OMG SysML)		Lawrence, 2nd Floor
18:00	19:00	OMG		New Attendee Reception (by invitation only)		Terra Couryard
Tuesday						
7:30	9:00	OMG		Liaison ABSC		Napa1, Lobby Level
9:00	15:00	OMG		Tutorial - Introduction to the OMG System Modeling Language (OMG SysML)		Stevens Creek, 2nd Floor
15:00	17:00	OMG		SysML Information Days		Stevens Creek, 2nd Floor
10:00	12:00	OMG		Seminar- Semantic Interoperability in Financial Networks: An Overview of ISO 20022		Cypress, 2nd Floor
Wednesday						
9:00	17:00	OMG		SysML Information Days		Stevens Creek, 2nd Floor
9:00	17:15	OMG		SOA Consortium Quarterly Meeting		Cypress, 2nd Floor
Thursday						
8:30	17:00	OMG		SOA Consortium Quarterly Meeting		Cypress, 2nd Floor
9:00	12:00	OMG		ManTIS Plenary		Alameda, 2nd Floor

Please get the up-to-date version from http://staff.aist.go.jp/t.kotoku/omg/RoboticsAgenda.pdf

Minutes of the Robotics DTF Plenary Meeting
June 23-27, 2008
Ottawa, Ontario, Canada
(robotics/2008-12-02)

Minutes Highlights

1) The revised submission for the Robotic Localization Service RFP was recommended for adoption.
2) As the 1st Review, the draft of User Recognition Service RFP was discussed
3) We have 2 Special Talks (Univ. of Auckland, and RoboCup) in the DTF plenary meeting
4) We have no volunteers for the Robotics-DTF Co-Chair. The Co-Chair election has been extended to the upcoming meeting in Santa Clara.
5) We decided to cancel the OMG Orlando Technical Meeting in September, 2008, due to the schedule conflicts with IROS2008 in Nice.

List of Generated Documents

robotics/2008-06-01 Final Agenda (Tetsuo Kotoku)
robotics/2008-06-02 Washington DC Meeting Minutes [approved] (Toshio Hori and Hyun-Soo Kim)
robotics/2008-06-03 Steering Committee Presentation (Tetsuo Kotoku)
robotics/2008-06-04 Roadmap for Robotics Activities (Tetsuo Kotoku)
robotics/2008-06-05 Opening Presentation (Tetsuo Kotoku)
robotics/2008-06-06 RLS revised submission presentation (Shuichi Nishio)
robotics/2008-06-07 User Recognition Service Interface RFP – DRAFT (Su-Young Chi)
robotics/2008-06-08 User Recognition Service Interface RFP presentation (Su-Young Chi)
robotics/2008-06-09 User Recognition Service Interface API examples (Su-Young Chi)
robotics/2008-06-10 Filter Condition (Itsuki Noda)
robotics/2008-06-11 University of Auckland Research in Robotic Software Engineering Environment (Bruce MacDonald)
robotics/2008-06-12 RoboCup (Itsuki Noda)
robotics/2008-06-13 Robotic Functional Services WG Meeting Report (Hyunsoo Kim)
robotics/2008-06-14 Robotic Localization Service WG Meeting Report (Yeon-Ho Kim)
robotics/2008-06-15 Robotic Localization Service (RLS) FTF Charter - DRAFT (Shuichi Nishio)
robotics/2008-06-16 Contact Report (Makoto Mizukawa)
robotics/2008-06-17 Announcement of JCK2008 in Toyama, Japan (Tetsuo Kotoku)
robotics/2008-06-18 Announcement of SIMPAR2008 in Venice, Italy (Itsuki Noda)
robotics/2008-06-19 UML profile for Robotics / Unmanned Architecture Framework (Laurent Rioux)
robotics/2008-06-20 Closing Presentation (Tetsuo Kotoku)
robotics/2008-06-21 Next Meeting Preliminary Agenda - DRAFT (Tetsuo Kotoku)
robotics/2008-06-22 DTC Report Presentation (Tetsuo Kotoku)
robotics/2008-06-23 Ottawa Meeting Minutes - DRAFT (Su-Young Chi and Geoffrey Biggs)

MINUTES
Monday, June 23, 2008, Albert, Lower Lvl
09:00 - 09:20 Steering committee

09:45 - 09:55 Robotics DTF Plenary meeting, Chair: Dr Kotoku, Quorum: 3
Joined organizations: AIST, ETRI, JARA, Samsung, Shibaura IT, Technologic Arts

- Minute takers: Geoffrey Biggs and Su-Young Chi
- Approval of minutes of Washington DC meeting
  - Approved: Shibaura-IT (motion), ETRI (seconded), Technologic Arts (white ballot)
- Special talk on RUPI Project not possible. Replaced with a talk by Itsuki Noda.

10:00 - 11:30 Robotic Localization Service Revised Submission Presentation (Albert, Lower Lvl)

Shuichi Nishio (JARA/ATR)
- First published 2007-06-25
- Revised submission 2008-05-02, 2008-05-03, 2008-05-04
  - Basic location representation is handled under GIS specification
  - Complex architecture "wraps" GIS framework
    - Robots can use GIS data
    - GIS *may* use (downgraded) robotic data
- Filter function decision still needed
  - In discussion, it was mentioned that it could be a compliance point.
  - From a process simplification point of view, leave in for now and consider removing in 12 months at FPF
- Confirm the voting member present (Quorum 3):
  AIST, ETRI, JARA, Samsung, Shibaura IT, Technologic Arts
- Voting for the vote- to-vote
  - JARA motioned a vote to vote process, Shibaura IT seconded.
  - Poll: 6 in favor, no objections, no abstain, motion passed
- Voting for the recommended for adoption of the revised submission (2008-05-01,-02,-03,-04,-05,-06)
  - JARA motioned, ETRI seconded, Shibaura IT proposed white ballot.
  - No objections, motion passed. Will go to vote at AB this afternoon.

13:20 - 14:00 Architecture Board plenary
Robotic Localization Service submission accepted

14:00 - 15:00 User Recognition Service Interface RFP (Capital, 2nd floor) Dr. Su-Young Chi (ETRI)

- Solicits proposals for a PIM and at least one CORBA PSM or C++ PSM of User Recognition API for HRI.
- User Awareness Module (UAM) is the basic module that performs user identification.
- User Identification Coordinator (UIM) integrates info from UAM and transmits it to robot applications.
- Information exchange protocols between these and the application are to be standardized.
- Extension: User Awareness Component (UAC) may be defined that represents the functionality of both the UAM and UIC.

Tuesday, June 23, 2008, Albert, Lower Lvl

13:00 - 18:00 Robotics DTF Plenary meeting continued

-Special Talk: University of Auckland research in robotic software engineering environments by Bruce MacDonald
- Focus on tools for developing robots.
- Target tools towards robot software engineers, who are not advanced trained programmers.
- Consider interaction between developer and robot - greater than developer and computer, more immersion.

14:10 - 15:00 Special Talk: RoboCup by Itsuki Noda

15:30 - 16:15 Robot User Recognition RFP 1st review by Dr. Su-Young Chi (ETRI)

- Many comments - too many to cover, so decided to defer to the next meeting.
  - Need to determine suitable scenarios.
  - Describe and compare the robot-specific API to other standards, especially the BioAPI document.
  - Describe the relationship to other standards (e.g. localization standard).
  - Information exchange protocols are not mentioned in the scope of the mandatory requirements.
- Issues to be discussed at the next meeting
  - RFP revision based on the first review and comments from it.
    - 2nd RFP formal review and AB (aiming to issue the RFP in December 2008 meeting).
  - Presentation of the RFP should include feedback on the comments.
- Schedule before the next meeting
  - Prepare revised RFP draft and presentation by early September, circulate by e-mail.
  - Make changes and improve the draft in September.
  - Meet in the first week of November if necessary for final amendments.
  - Submit the revised draft to the OMG server by November 7, 2008.
- No changes to roadmap since the last meeting.

16:15 - 16:25 Localization WG report

- Revised submission presented and discussed on Monday, with a vote-to-vote and recommendation vote (passed) and accepted by the AB review.
- No more sessions.
- Revised submission accepted by the AB. 6 members recommended: AIST, ETRI, JARA, Samsung, Shibaura IT, Technologic Arts
- Discussion towards FTF on Tuesday.
  - Reviewed draft of the proposed charter for FTF.
  - Filter condition was discussed. Further discussion will take place by e-mail after reviewing more real-word examples.
- FTF meeting at next OMG meeting in December, 2008.
- ETRI motioned to charter the FTF. Tsukuba Univ seconded. Tsukuba Univ proposed white ballot. No objections, motion passed.

Contact report by Makoto Mizukawa

- Offer from ISO/TC 184/SC 5 to add ORiN to ISO 20242.
- Coming conferences:
  - IROS 2008, Nice, France
  - ICCAS 2008, Seoul, Korea
- Real World Robot Challenge: Tsukuba Challenge, Nov 20-22, 2008

Contact report by Tetsuo Kotoku

- 3rd Japan-China-Korean joint robotics workshop, Sep 29 - Oct 1, 2008 in Toyama, Japan.

Contact report by Itsuki Noda

- International Conference on Simulation, Modeling and Programming for Autonomous Robots (SIMPAR 2008), Nov 3-7 in Venice, Italy.
- Considering organizing a workshop on standardization.

Proposal for UML profile for robotics / Unmanned Architecture Framework by L. Rioux

- SAE Technical committee AS-4 on Unmanned Systems.
- 5 standards already. One is an Architecture Framework for Unmanned Systems.

- Use UML as a standard for architecture framework, like DODAF and MODAF.
- Use a well-known language for robotics, reuse OMG standards.
- Guarantee interoperability between standards.

- Propose a call for RFP for a UML profile for Unmanned Systems / Robotics Architecture Framework.

Closing presentation and next meeting agenda by Tetsuo Kotoku

- Call for volunteers
  - Election for Robotics-DTF co-chair in Santa Clara technical meeting
  - Robotic Infrastructure WG co-chair
  - Robotic Data and Profiles WG co-chair
- Next meeting: December 8-12 (Santa Clara, CA, USA)
- Special talk candidates
  - Tsukuba Challenge 2008 report (Prof. Takashi Tsubouchi, Tsukuba Univ)
  - Robotics Project in Japan (Prof. Sato, Univ of Tokyo)
  - RUPI Project (Dr. Hyun Kim, ETRI)

Adjourned plenary meeting at 17:15

Attendee: 23 Participants

Bruce MacDonald (Univ. of Auckland)
Geoffrey Biggs (AIST)
Hiroyuki Nakamoto(SEC)
Hyunjin Min (Samsung)
Hyun-Soo Kim (Samsung)
Itsuki Noda (AIST)
Kyuseo Han (ETRI)
Laurent Rioux (Thales)
Makoto Mizukawa (Shibaura-IT)
Manfred Koethe (88solutions)
Miwako Doi (Toshiba)
Noriaki Ando (AIST)
Omar Bahy (IBM/Univ. Ottawa)
Seongho Choo (Kangwon National Univ.)
Shuichi Nishio (JARA/ATR)
Soohee Han (Kwangwon National Univ.)
Su-Young Chi (ETRI)
Takashi Suehiro (AIST)
Takashi Tubouchi (Univ. of Tsukuba)
Takeshi Sakamoto (Technologic Arts)
Tetsuo Kotoku (AIST)
Toshio Hori (AIST)
Yeon-Ho Kim (Samsung)

Prepared and submitted by Su-Young Chi (ETRI) and Geoffrey Biggs (AIST).

Robotics Domain Task Force
Steering Committee Meeting

8th December, 2008

Santa Clara, CA, USA

Hyatt Regency Santa Clara

Ottawa Meeting Summary

Recommend for Adaption of Robotic Localization Service (RLS) Specification:
[robotics/2008-05-01,-02,-03,-04,-05,-06]

Robotics Plenary: (23 participants)

- **Review revised submission for RLS-RFP**
- **2 Special Talk:**
  - **Univ. of Auckland (Bruce MacDonald) [robotics/2008-06-11]**
  - **RoboCup (Tsuki Noda) [robotics/2008-06-12]**
- **2 WG Reports [robotics/2008-06-13,-14]**
- **1 Contact Report [robotics/2008-06-15]**
- **1 New Activity Proposal [robotics/2008-06-19]**

Agenda

- Agenda Review
- Minutes and Minutes Taker
- Roadmap Discussion
- Next meeting Schedule

Agenda Review

Mon(Dec. 8th):

Steering Committee,
RUIS-RFP Revised Submission Presentation & Voting(AM)
WG activities(PM) Service WG , Infrastructure WG

Tue(Dec. 9th):

WG activities(AM) Localization WG, Service WG
Robotics-DTF Plenary(11:00-)

Wed(Dec. 10th):

WG activities Service WG, ?

Thu(Dec. 11th):

RUIS-RFP Voting (AM)

please check our up-to-date agenda
http://staff.aist.go.jp/t.kotoku/omg/RoboticsAgenda.pdf

Minutes and Minutes Taker

- Process:
  - Make a draft with in 5days
  - Send the initial draft to robotics-chairs@omg.org
  - Post the draft to the OMG server within a week
  - Make an announcement to robotics@omg.org
  - Send comments to robotics@omg.org
  - Approve the revised minutes at the Next meeting

- Volunteers for this Meeting
  - Geoffrey Biggs
  - Yeonho Kim

We have to post our meeting minutes within a week!

Publicity Activities

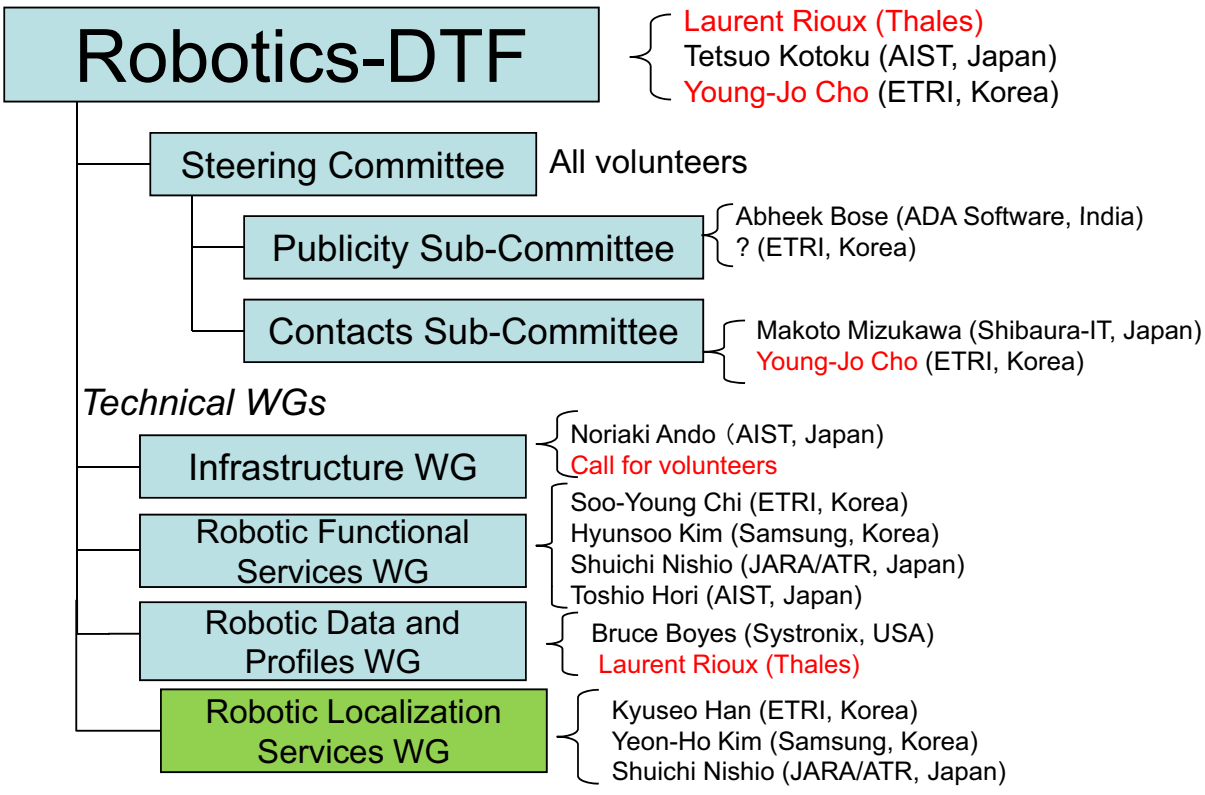
- Robotics-DTF fly sheet
- Robotics-DTF :
  Homepage: http://robotics.omg.org/
  Wiki: http://portals.omg.org/robotics
  Mailing List: robotics@omg.org

- Robotics Infrastructure WG:
  Wiki: http://portals.omg.org/robotics/InfrastructureWG
  Mailing List: omg-infrastructure@m.aist.go.jp
- Robotics Data and Device Profiles WG:
  Wiki: http://portals.omg.org/robotics/ProfileWG
  Mailing List: omg-profile@m.aist.go.jp
- Robotics Functional Services WG:
  Wiki: http://portals.omg.org/robotics/ServiceWG
  Mailing List: omg-service@m.aist.go.jp
- Robotics Localization Service WG:
  Wiki: http://portals.omg.org/robotics/LocalizationWG
  Mailing List: omg-localization@m.aist.go.jp

Roadmap Discussion

- Confirm the process of working items
- Create new items
  (we need volunteers)
-

Organization



Call for volunteer

- Robotics-DTF Co-chair
  - Not from Japan and Korea
  - Election will be held upcoming Santa Clara Technical Meeting

- Robotic Infrastructure WG Co-Chair
- Robotic Data and Profiles WG Co-Chair

Next Meeting Agenda

March 23-27 (Washington DC, USA)

Tuesday:

Steering Committee (morning)
WG activity [Parallel WG Session] (am)
Robotics-DTF Plenary Meeting (pm)
- •Guest and Member Presentation
- •Contact reports

Wednesday:

RLS-FTF Meeting
WG activity follow-up [if necessary]

Special Talk Candidates

- GearBox
  - Geoffrey Biggs

Call for Presentation

Roadmap for Robotics Activities

robotics/2008-12-04

Item	Status	Ottawa Jun-2008	Orlando (CANCEL) Sep-2008	Santa Clara Dec-2008	Washington DC Mar-2009	San Jose, Costa Rica Jun-2009	San Antonio, TX Sep-2009	Long Beach, CA Dec-2009	POC / Comment
Flyer of Robotics-DTF [Publicity Sub-Committee]	In Process								Abheek(ADA Software)
Robotic Localization Service RFP [Robotic Localization Service WG]	In Process	**Revised Submittion & Voting**							Shuichi Nishio (JARA/ATR) Kyuseo Han (ETRI) Yeon-Ho Kim (Samsung)
Human Robot Interaction RFP [Robotic Functional Services WG]	In Process	**1st review RFP**		**2nd Review & RFP issue**		**Initial Submittion**			Su-Young Chi (ETRI)
UML profile for Archtecture Framework for Robotics/Unmanned Systems [Robotic Data and Profiles WG]	Planned								
The QoS and Fault-tolerance Issues on the Robot Component Execution Enviornment [Robotic Infrastructure WG]	Planned								
The issues on robot component directory service and repository Contents [Robotic Infrastructure WG]	Planned								
Hardware-level Resources: define resource profiles RFP [Profile WG]	Future								
etc…	Future								
Robotics Information Day [Technology Showcase]	Future	**Seminar (CANCEL)**							
RLS Finalization Task Force	In Process	**Chartering FTF**				Report			
Related Events			**IROS2008**						

Robotics-DTF Plenary Meeting
Opening Session

8th, December, 2008

Santa Clara, CA, USA

Hyatt Regency Santa Clara

Approval of the Ottawa Minutes

Meeting Quorum : 3

AIST, ETRI, Hitachi, JARA, Kangwon National Univ., Samsung, Shibaura-IT, Univ. of Tsukuba, Technologic Arts, Thales

Minutes taker(s):

- Geoffrey BIGGS
- Yeonho KIM

Minutes review

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Robotics Plenary: (23 participants)

- Review revised submission for RLS-RFP
- 2 Special Talk:
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- 2 WG Reports [robotics/2008-06-13,-14]
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Agenda Review

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Steering Committee,
RUIS-RFP Review & Voting(AM)
WG activities(PM) Service WG, Infrastructure WG

Tue(Dec. 9):

WG activities(AM) Service WG, RLS-FTF
Robotics-DTF Plenary(11:00-)

Wed(Dec. 10):

WG activities

Thu(Dec. 11):

RUIS-RFP Voting (AM)
WG activities(PM)

please check our up-to-date agenda
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AIST

Agenda Review

Mon:
10:00-10:20 Opening Session
10:20-12:00 RUIS Review & Voting

Tue:
11:00-12:00 Special Talk
13:00-17:00 Special Talk
17:00-17:20 WG Reports and Roadmap Discussion
17:20-17:30 Contact Reports
17:30-17:40 DTF Co-Chair election
17:40 Adjourn

Thu:
09:00-11:00 RUIS Voting

please check our up-to-date agenda
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NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

Review Comments from AB

[Hugues VINCENT]

All,

Here are my preliminary comments on the User Identification Service Interface RFP (documents numbers robotics/2008-11-01).

First, the PDF file does not match the doc file. Since the .doc file seemed cleaner than the other one, I reviewed the .doc file.

Second, I don't know which RFP template was used but the one identified is ab/08-08-26 that refers to a non-existent document. The correct template document is ab/08-08-01. Taking into account this last document will have to be done and should not be too difficult a job on account of the revision bars that have been purposely left in the template document.

Next, specific comments:

Section 6.1:

IMHO, for the sake of readability:

The fourth line of this section should end with a : (colon) and not with a ; (semicolon)

The following line beginning with "A robot that is intended for…" should be bulleted.

The following line beginning with "A robot that provides …" should be bulleted at the same level than the previous bulleted line.

The 11 following lines should be bulleted with one more level. And no " is necessary at the end of the "Planetary robot explorer" line.

Besides, are you sure that UAV, drones and planetary robot explorer need to recognise users? It seems like out of sci-fi, doesn't it?

"In the proposed proposal" reads odd to me, which proposals are you speaking of?

The sentence "This means that even if the new environment that the identified user moved is difficult to recognize that user, the robot system can provide the service based on the previous ID information" is obscure; please rephrase.

Figure 1 looks bad (not wrong but bad: please enhance).

In the sentence beginning with "In this model, …" remove the parenthesis.

Section 6.3:

PIM and PSM for SDO: current last formal version is 1.1 [formal/2008-10-11]

UML Infrastructure: current last formal version is 2.1.2 [formal/2007-11-04]

UML superstructure: current last formal version is 2.1.2 [formal/2007-11-02]

Lightweight CCM is now incorporated into the CCM spec: version 4.0 [formal/2006-04-01]

Robotic Technology component spec 1.0 is formal now: formal/08-04-04.

Localization service: 1.0 Beta 1 [dtc/2008-07-01]

Section 6.4:

It seems that ISO/TC184/SC2 is also of interest here.

Section 6.5:

I'm clearly not an expert in that domain field, yet shouldn't it be of interest to ask for a standardized initialisation files schema (i.e. for an XML PSM)?

Section 6.7:

I propose to add in the issues to be discussed:

- Proposals shall discuss the way they bring real-time support (cf. section 6.2, point (6)).

Best regards,

Hugues VINCENT

[Victor Giddings]
Comments on User Identification Service Interface RFP
OMG Document: robotics/2008-11-01

General Comments

It is apparent that a significant amount of effort has gone into the drafting of this RFP. However, it could be improved significantly by focussing some of the statements in the requirements area. See the specific comments below for more detail.

I have a concern with the proposed scope of this RFP. The range of technologies to be brought under this RFP seems very broad. The data used by the different technologies would seem to be very disparate, e.g., facial recognition vs. fingerprint or other biometric recognition. My concern is whether there is enough commonality to allow unification in a single PIM. However, I am certainly not an expert in these fields, nor cognizant of the research, so I will defer to the consensus of the task force on this.

Specific Comments

Section numbers in the PDF have been mangled; they all start with 1.x. (They seem to be correct in the Word version -- but not in the .odt version, so this was probably simply a translation problem.)

In this review, I will use the section numbers that appear in the Word version.

Front cover:
Extra "<" remaining after "OMG Document"
"Letters of Intent due:" and "Submissions due:" - actual dates needed

Section 6.1: Problem Statement

Figure overlaps caption text.

The proposed architecture may be completely reasonable, but it is impossible to tell from this description. More description is needed to justify that this is the proscribed architecture around which the responses will be based (as opposed to allowing responders to propose their own architecture).

In particular, the description of the User Identification Coordinator is too general ("integrates ... and transmits") If both interfaces of this module are to be specified, there must be a desire to make this a replaceable module. Thus there would seem to be a more specific purpose for it than that described.

I also note that the proscribed modules (User Awareness Module and User Identification Module) do not appear in the mandatory requirements (section 1.20). I wonder if this is simply an example of an architecture that might be seen in responses to this RFP. If so, it should be more clearly stated.

Section 6.2 Scope of Proposals Sought

As an overview of the requirements for responses to the proposal, this section is satisfactory. However, there is a mixture of requirements and scope statements in this section.

Some of the statements are actually more detailed than the formal requirements in section 1.24. For example, the bullets under item (3) list a number of required data element, e.g., "essential information such as the (face or voice) feature vector and descriptor format with I.D" while the mandatory requirements just mentions "Basic data structure".

Also, there are no requirements that support many of the items in this scope statement. As an example, item (1) states: "The user recognition service interface specification shall provide a framework for supporting flexible configuration of its own functionalities." There aren't any requirements in 6.5 that support the "configuration of its own functionalities", nor is there an elaboration of what is required of the "framework". There are a number of other examples of this.

Section 6.5 Mandatory Requirements

I am surprised that Robotics Technology Components are not required to be used as part of the solution. All of the requirements are stated in terms of "modules". I do note that RTC is listed in 6.4 "Relationship to Existing OMG Specifications", but it is listed along with Lightweight CCM, a competing technology. It would seem that the responses to this RFP would be a standard component or set of component interfaces.

Victor Giddings
victor_giddings@omg.org

2nd review for User Recognition Service API RFP with Comments

2008-12-08

Santa Clara, CA, USA

Comments

- **User Recognition Service Interface RFP**
  - I'm still really not sure what you mean by the word " recognition." Is it to recognize that some observation is a human (to be served)? Or is it to identify a perso n, from some list of known persons? In the latter cas e, I believe the word "identification" is much suitable.
- Identification?
- Shall describe what the word "service robo t" means.

Reviews

- **User Identification Service Interface RFP**
- a set of common information to repr esent user identification.
- Based on the working draft of the ISO/TC184/SC2, the definition of service robot may be described as follow s;

A **robot** that is intended for use outside manufacturing envi ronment *or*

A **robot** that provides **service** excluding manufacturing rob ots

Domestic robotised assistant (home, hospital, public places)
Cleaning, mauling, moving, guiding, carrying, fetching
Rehabilitation robot, Orthosis (exo-skeleton), Prosthesis,
Surgery robot (mini-invasive robot, gesture assistant),
Teleoperated robot,
UAV, Drones.
Large structure maintenance robots,
Field robots (agriculture, demining, defence, security),
Micro-robot for inspection,
Surveillance robots, After disasters intervention robots,
Planetary robot explorer."

Comments

- Of course, you're saying something trivial, but I suppose your intention is somewhat different. Maybe: User recognition is an es sential factor for service robots. By recogni zing and identifying users, robots can perf orm services appropriate for them.
- I think you need more details here, about what is a possible assumption for biometri c systems and not for robotic systems.

Reviews

- User identification is an essential fact or for service robots. By recognizing and identifying users, robots can perf orm services appropriate for them.
- In case of Biometrics system, it is pos sible to request user's favorable co-o peration under controlled environme nts. On the other hand, robot system should approach the user by itself un der uncontrolled environments, and i dentify the user from much further di stance compared with biometrics syst em.

Comments

- Maybe "sensors"? Do you need to limit thi s to cameras?
- Is this necessary? If so, please provide a de scription why this is required.

Reviews

- sensors
- Human tracking is necessary for the r obot system to keep on tracking and following the identified user, which is essential to provide continuous servic e for that specific identified user. This means that even if the new environm ent that the identified user moved is difficult to recognize that user, the ro bot system can provide the service b ased on the previous ID information. On top of that, tracking functionality can save the overall computing resou rce of robot system, since the trackin g function requires much smaller co mputing resources than that of the re cognition function.

Comments

- You'd better provide some examples of use ful robotic services using identities.

Reviews

- Some examples of useful robotic serv ice are listed as follows;
  - Owner recognition
  - Intruder detection
  - User tracking
  - Access control
  - Searching watch-list
  - Searching missing child
  - User preference service
  - Human based photo retrieval
  - Etc.

Comments

- This shall be drawn in the figure.
- This shall be drawn in the figure.
- Fine, but this does not go on with the des cription in 6.1.
- Is the format information used for "specifyi ng user"? I think you mean something diff erent.
- This is rather confusing. If these are the au x. infos, what is the essential information?

Reviews

- user identity descriptor format or user ide ntity templatet , multi-modal data format , input data type, etc.
- The user identity descriptor format or user identity template shall include essential inf ormation such as the (face or voice) featur e vector and descriptor format with I.D. an d also may include auxiliary information , s uch as identification, gender, age, etc.

Comments

- This is something new. What is “error”?
- This is also a new word.
- Is this necessary?
- Is this optional?
- In 6.2, this service is described to be able t o use “various sensors.” That doesn’t matc h the description here.

Reviews

- Error message type
- of enrollee
- since this kind of information affects the o verall performance of the system, for exam ple the microphone for voice data and ca mera for image data
- Proposals shall specify the application prof ile such as the implementation example fo r each APIs

Comments

- Is this something defined elsewhere?
- I’m not familiar with URC, but isn’t URC an robotic system that this proposal is meant to? If so, it’s not something of “other fields ”

Reviews

- Proposals shall demonstrate its applicabilit y to existing user recognition technology
- Proposals shall discuss the possibility to ap ply the proposed model to other fields of i nterest such as intelligent network robot a pplications

Resolution to Issue #13130 (Error Type inconsistency)

2008.12.08
NISHIO Shuichi
JARA/ATR

Summary

- There are mismatches in the hierarchical structure of Error Type classes and Error Information classes, which shall correspond to each other.
- One solution will be to:
  - add ET_ErrorDistribution, derived from 'RoLo Error Type'
  - make ET_Gaussian, ET_UniformGaussian, ET_ParticleSet and ET_MixtureModel to be derived from ET_ErrorDistribution

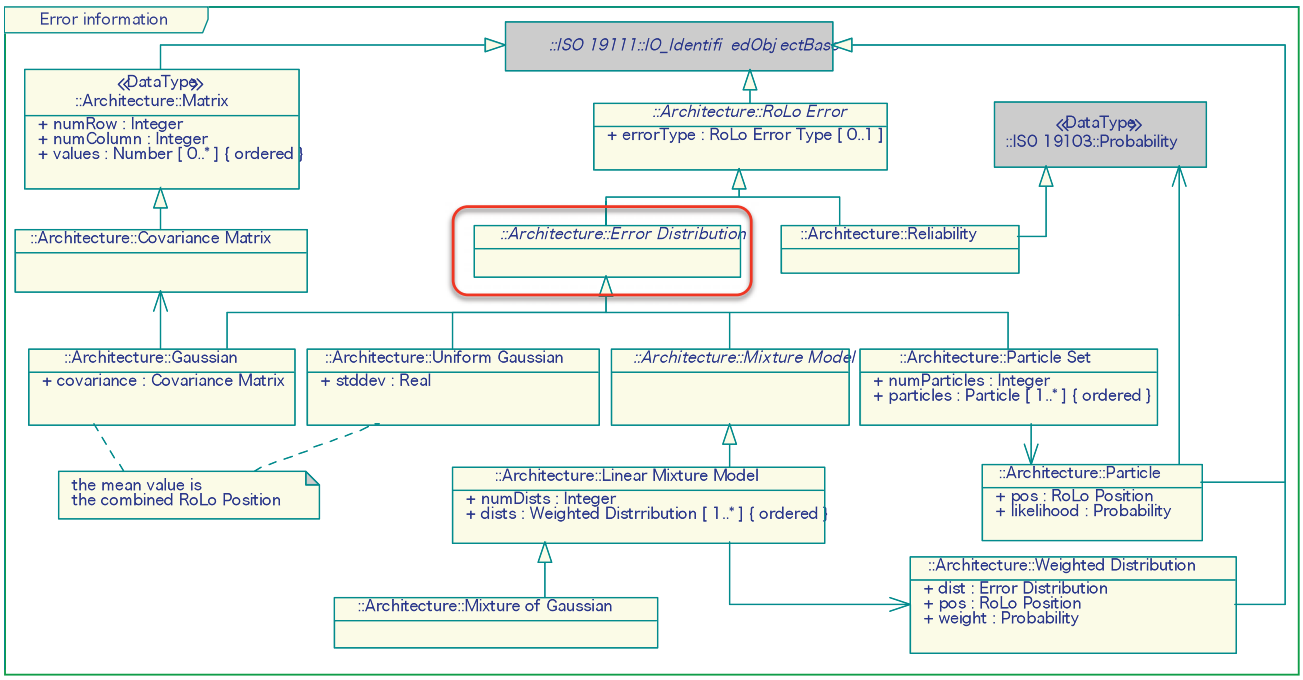

Figure 7 - Error information (Beta1)

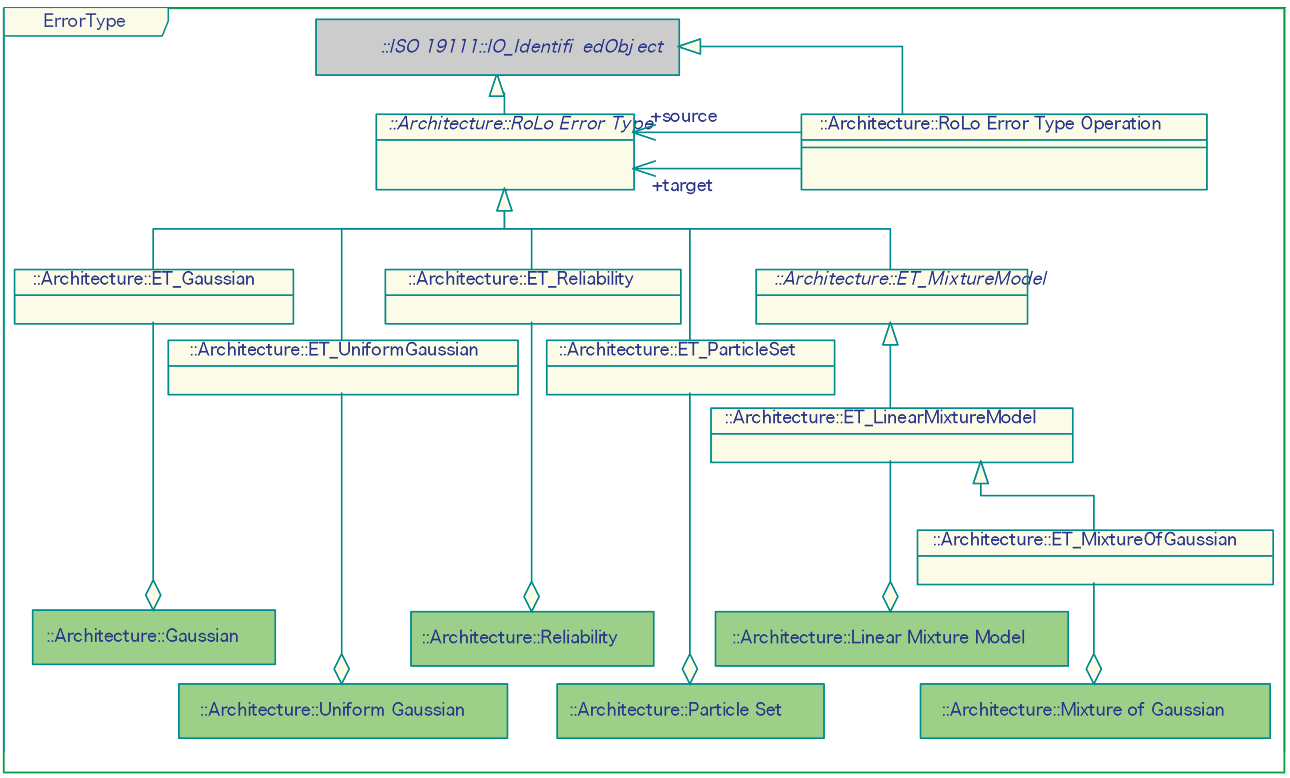

Figure 6 - Error Type (Beta1)

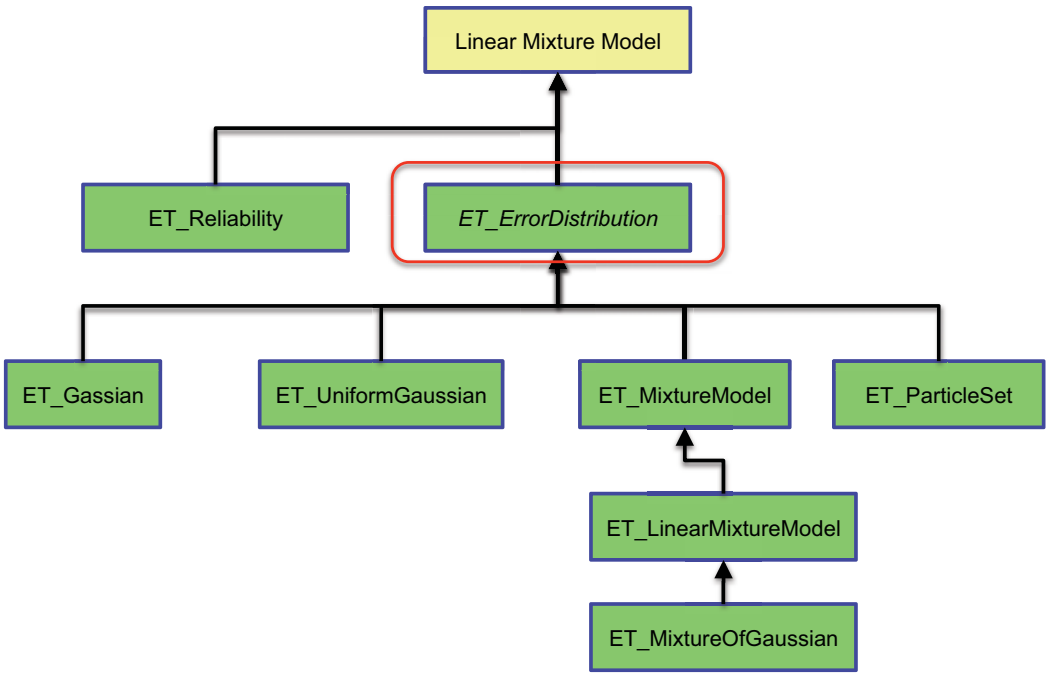

Figure 6 - Error Type (Resolution Proposal)
(Note: package name omitted)

Topics

Itsuki Noda

ITRI, AIST

AIST
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ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

Issues

- Filter Encoding
  - ➤to link to WFS's Filter Encoding
- Error Model
  - ➤mixture dist. and particle sets
- XML notations

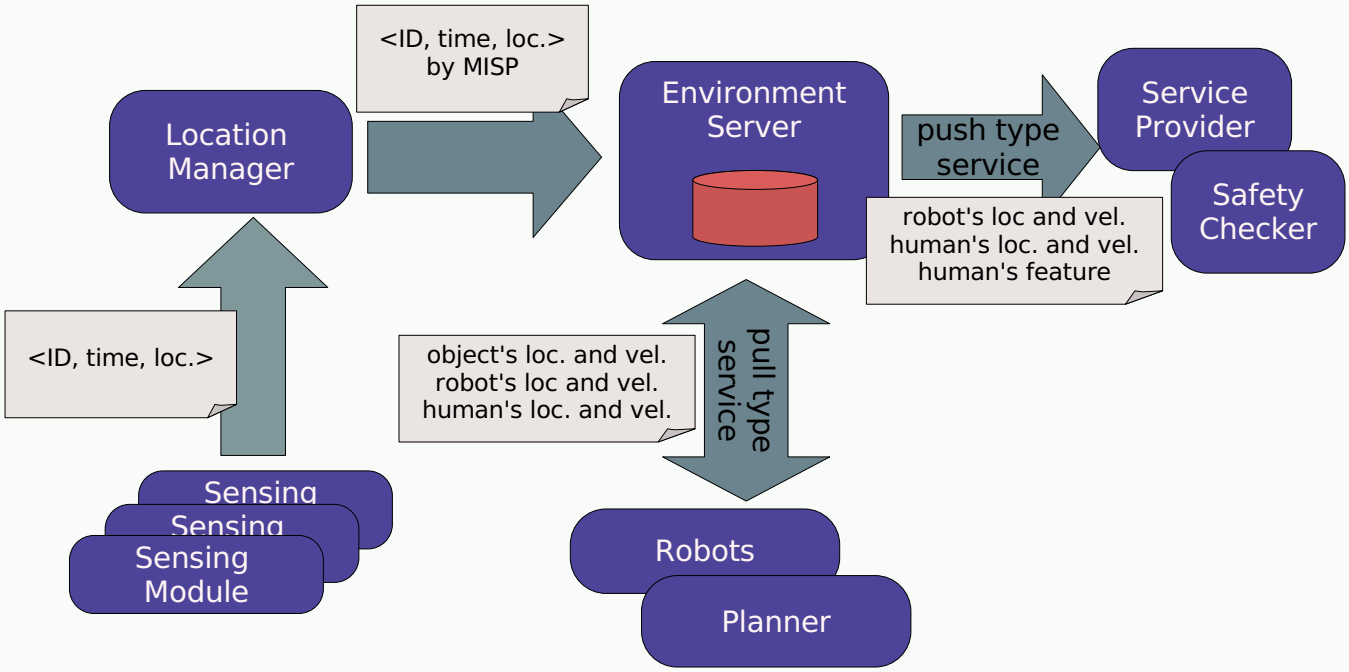
Filter Encoding

- Good news.
  - Most recent draft for ISO/DIS19143 (TC211) includes UML class charts of Filter encoding!!

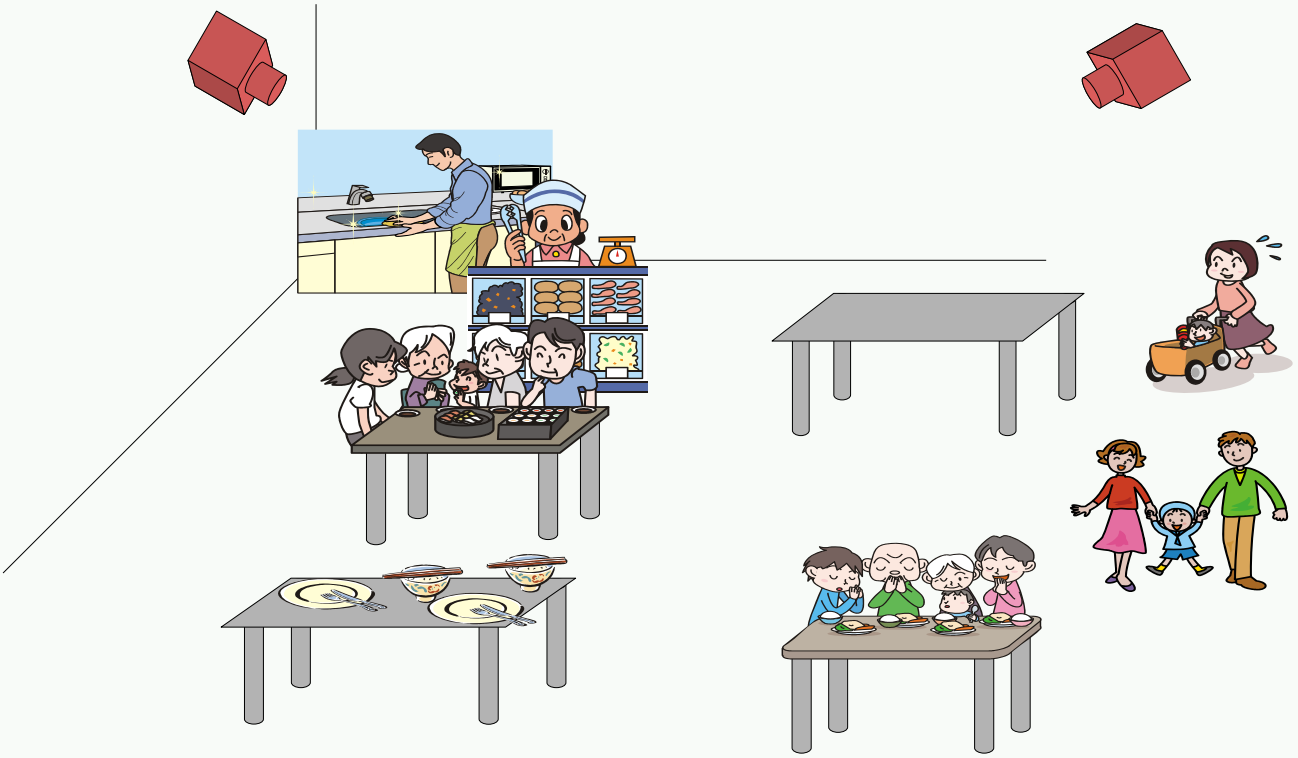
➤We can refer it instead of defining the chart by ourselves.

Example Usage of Filter Encoding

- Ex.: to trace plates and trays in a food court for clean-up robots.



Example Usage of Filter Encoding (cont.)



Example Usage of Filter Encoding (cont.)

- expected query (filter) for the environment server
  - to get locations of **all** people.
  - to get a location of robot **(id=3412)**
  - to get locations of people **detected in 10 minutes.**
  - to get locations of plates **used for a chinese restaurant (id = "plate:chinese:*")**
  - to get locations and speeds of people **who is within 10 meters to robot (id=3412)**

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

Remain Issues on Filter Encoding

- naming mechanism to specify an RoLo element or a part of the element.
  - In the case of the original filter encoding in WFS, XPath is used for it.
  - We can use XPath-like notation for RoLo, if each fragment of RoLo architecture has its own local name.
    - It is better that local name is just a short character string rather than long URI to form XPath-like notation.
- minor issue: The original filter encoding still has no “True” and “False”.

Error Model

- original (2008/06)

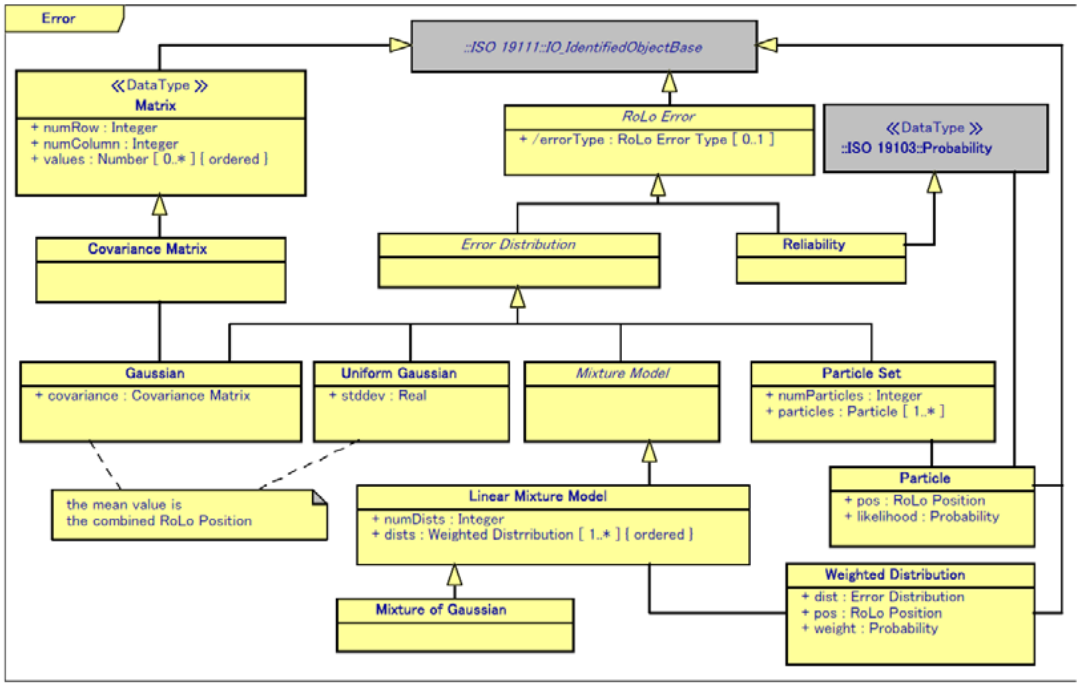
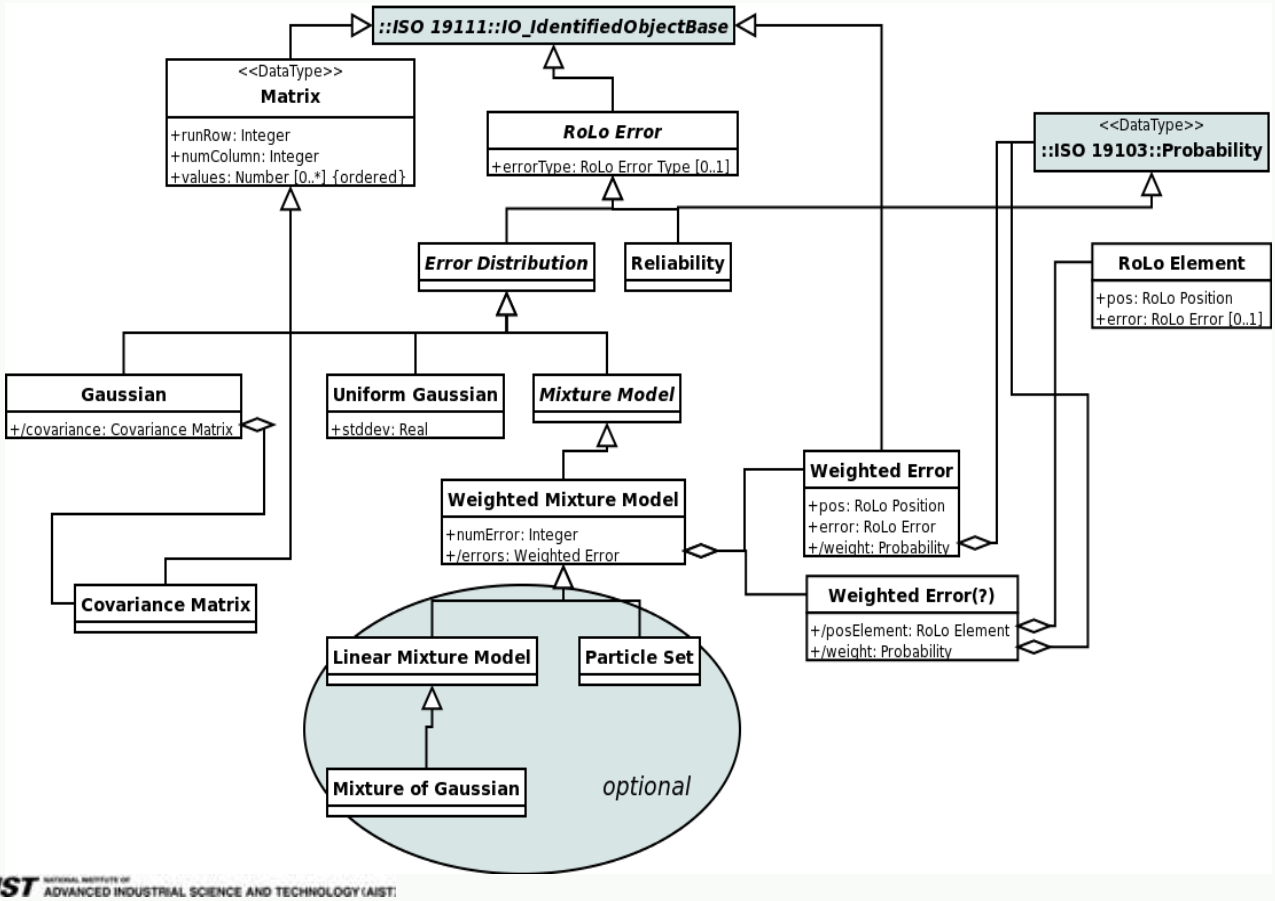


Figure 7 Error information

Proposal of Error Model



Changes

- Integrate “Particle Set” into “Mixture Model”.

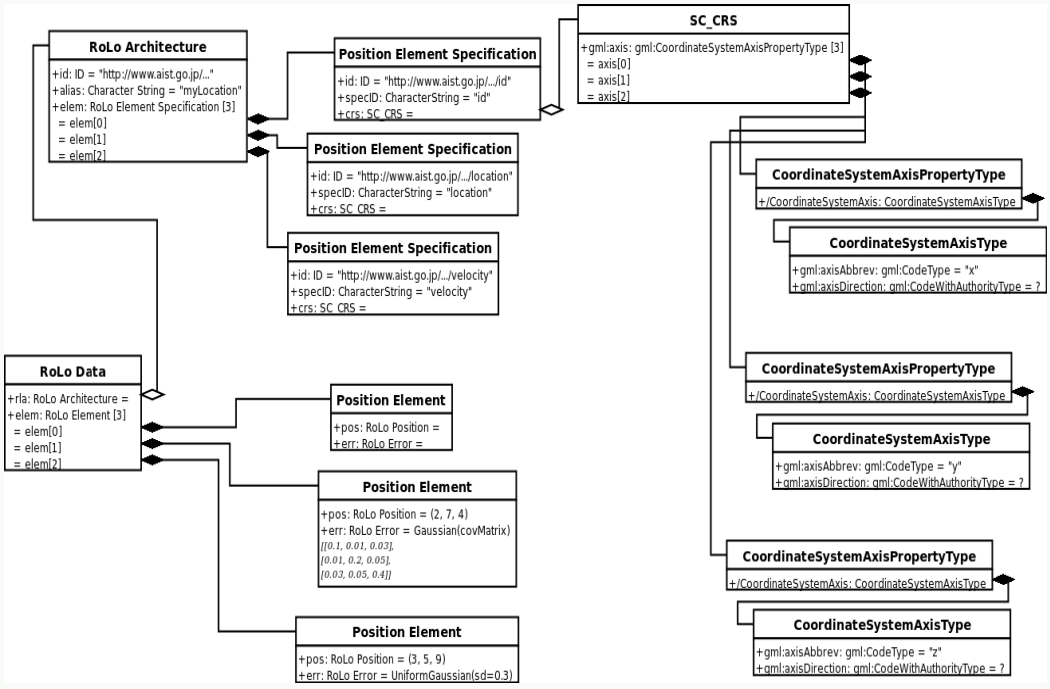
- Why?
  - Same Syntax
    - Both are a list of weighted partial distribution.
      - A particle is a kind of impulse distribution.
  - Same Semantics
    - a collection of primitive position and error information
  - Same Operations
    - Particle Filtering =~ EM algorithm

Mixture with EM vs Particle Filter

- Gaussian Mixture + EM
  - component dist. = a Gaussian with significant st. dev.
  - observation = a sample value with error (noise).
  - EM (filtering) = adjust weights (and sd. and mean) of component dists. to maximize the likelihood of the observation.
- Particle Filter
  - particle = a sampling of distribution
    =~ a Gaussian with tiny st. dev.
  - observation = possibility distribution of the true value.
  - filtering = adjust likelihoods of particles to maximize the likelihood of the observation.

XML, or naming issue

- How to map RoLo Data?
  - ex.:



XML

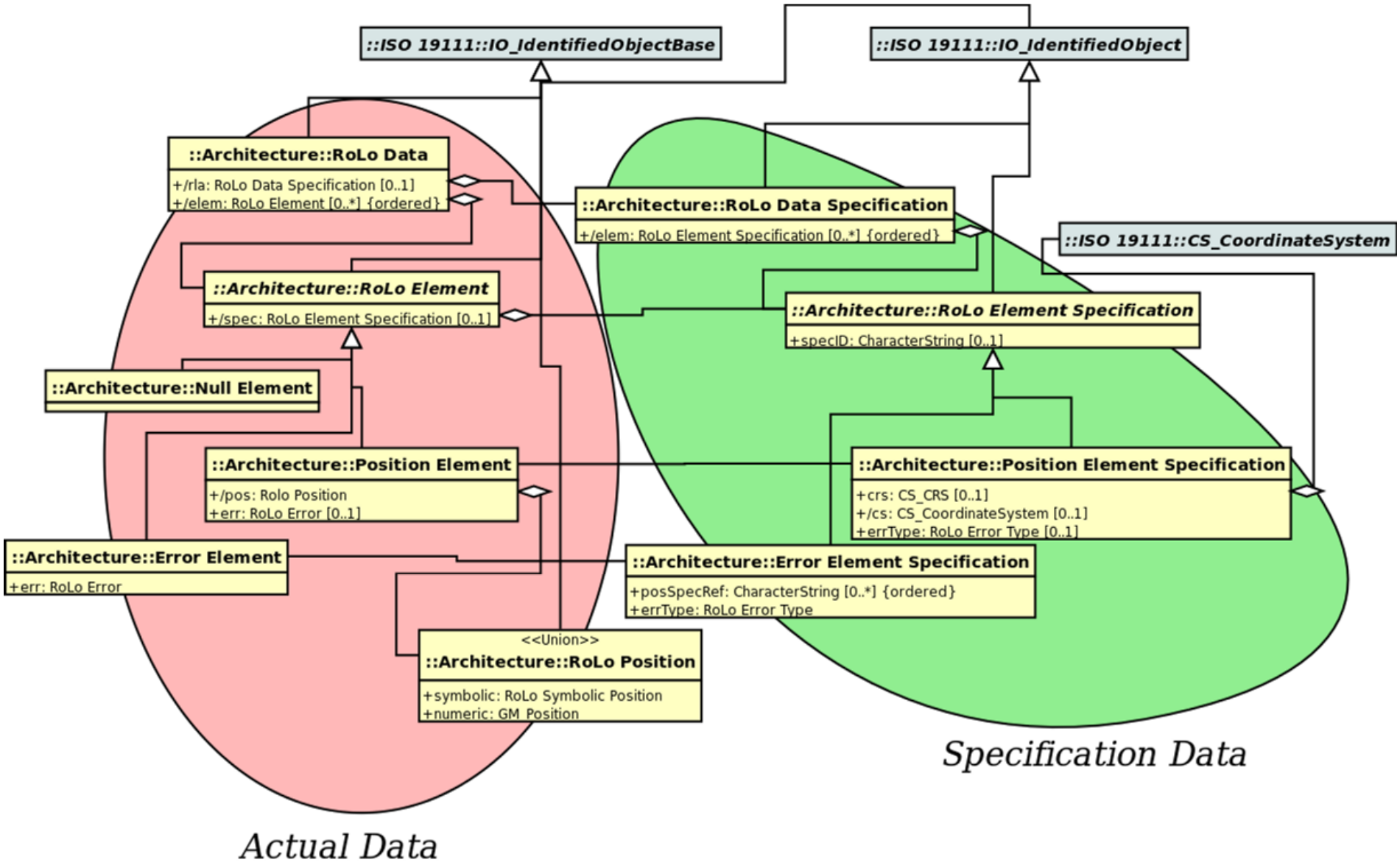
```
<myLocation>
  <id>
  </id>
</myLocation>
```

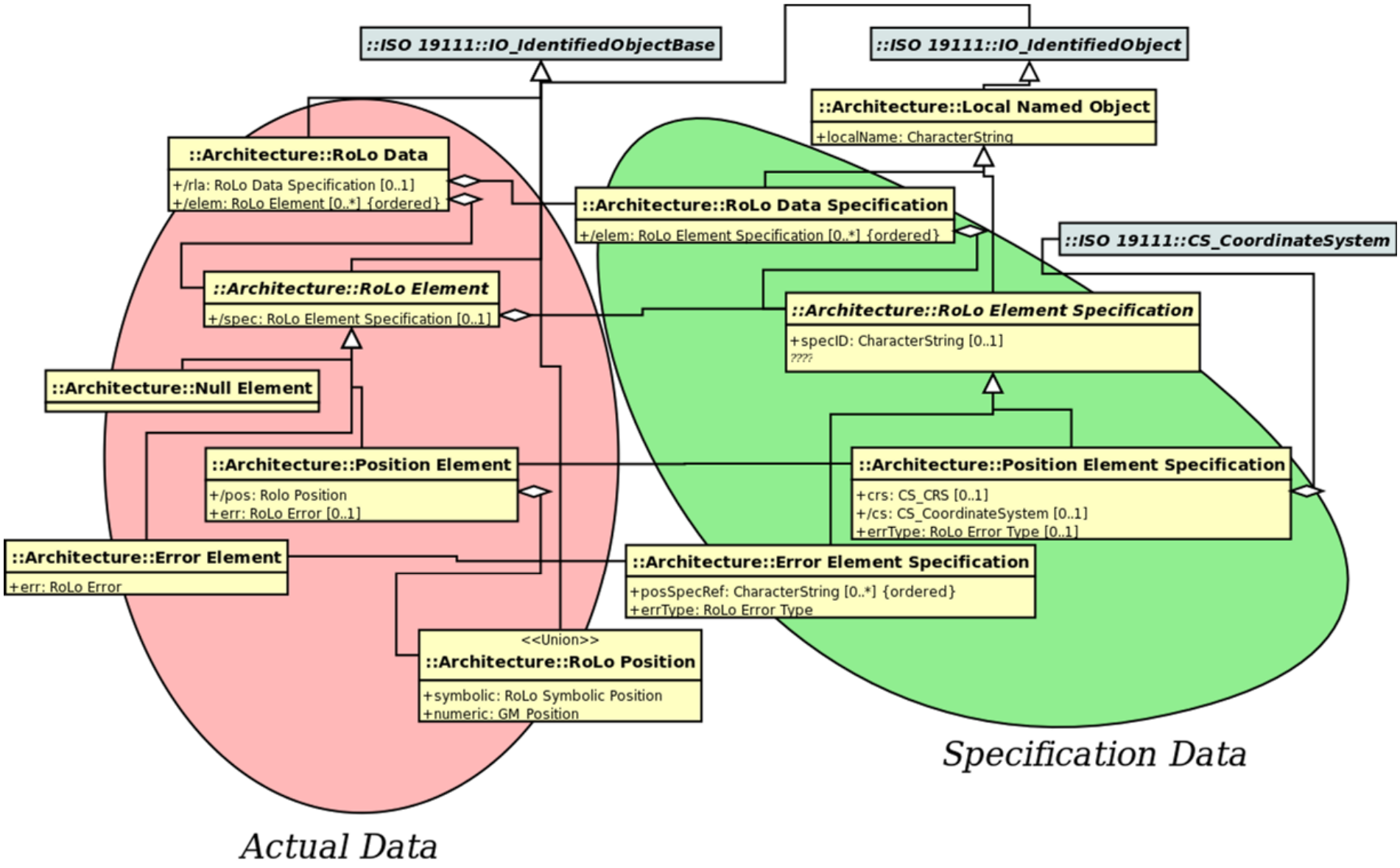
```
%%  -*- Mode: Memo -*-
=begin

= Name Mapping Rule

== (({RoLo Data})) and (({RoLo Data Specification}))

   * Suppose that "(({foo}))" is an instance of (({RoLo Data})) whose
     type is specified by (({RoLo Data Specification})) refered by
     "(({FooType}))".

   * Then, the XML schema to denote "(({foo}))" (or any (({FooType}))
     instance) is as follows:

       {{RoLoData}} ::=
         <xsd:element name="{FooType.localName}">
           <xsd:complexType>
             <xsd:sequence>
               {{RoLoElement}}*
             </xsd:sequence>
           </xsd:complexType>
         </xsd:element>

     where, each (({ {{RoleElement}} })) corresponds to each component of
     foo.elem.

== (({RoLo Element})) and (({RoLo Element Specification}))

   * Suppose that "(({bar}))" is an instance of RoLo Element whose
     type is specified by (({RoLo Element Specification})) refered by
     "(({BarType}))".

   * Then, the XML schema to denote "(({bar}))" (or any (({BarType}))
     instance) is as follows:

       {{RoLoElement}} ::=
         <xsd:element name="{BarType.localName}">
           <xsd:complexType>
             <xsd:sequence>
               <xsd:element name="pos" minOccurs="0" maxOccurs="1"
                            type="gml:PointPropertyType"/>
               <xsd:element name="err" minOccurs="0" maxOccurs="1"
                            type="rls:RoLoErrorType">
             </xsd:sequence>
           </xsd:complexType>
         </xsd:element>

== (({RoLoErrorType}))
```

* XML schema for (({RoLoError})) is as follows:

```
    <xsd:complexType name="RoLoErrorType">
      <xsd:choise>
        <xsd:element ref="rls:RoLoErrorTypeReliability"/>
        <xsd:element ref="rls:RoLoErrorTypeGaussian"/>
        <xsd:element ref="rls:RoLoErrorTypeUniformGaussian"/>
        <xsd:element ref="rls:RoLoErrorTypeAbstractMixtureModel"/>
      </xsd:choise>
    </xsd:complexType>

    <xsd:element name="RoloErrorTypeReliability"
                 type="ProbabilityType"/>

    <xsd:element name="RoloErrorTypeGaussian">
      <xsd:complexType>
        <xsd:element name="covariance" type="xsd:float"/>
      </xsd:complexType>
    </xsd:element>

    <xsd:element name="RoloErrorTypeGaussian">
      <xsd:complexType>
        <xsd:element name="covariance">
          <xsd:simpleContent>
            <xsd:extension base="gml:doubleList">
              <xsd:attrubute name="dimension" type="integer"/>
            </xsd:extension>
          </xsd:simpleContent>
        </xsd:element>
      </xsd:complexType>
    </xsd:element>

    <xsd:element name="RoloErrorTypeUniformGaussian">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="stddev" type="double"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>

    <xsd:element name="RoloErrorTypeAbstractMixtureModel">
      <xsd:complexType/>
    </xsd:element>

    <xsd:element name="RoloErrorTypeWeightedMixtureModel"
                 substitutionGroup="rls:RoLoErrorTypeAbstractMixtureModel"
                 type="rls:RoLoErrorTypeWeightedMixtureModelType"/>
```

```
<xsd:complexType name="RoLoErrorTypeWeightedMixtureModelType">
  <xsd:sequence>
    <xsd:element ref="rls:weightedError" maxOccurs="infinite"
                 type="rls:WeightedErrorType"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="WeightedErrorType">
  <xsd:sequence>
    <xsd:element name="pos" type="gml:Point"/>
    <xsd:element name="err" type="rls:RoLoErrorType"/>
    <xsd:element name="weight" type="ProbabilityType"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:element name="ParticleSet"
             substitutiongroup="rls:RoloErrorTypeWeightedMixtureModel"
             type="RoLoErrorTypeWeightedMixtureModelType"/>

<xsd:element name="LinearMixtureModel"
             substitutiongroup="rls:RoloErrorTypeWeightedMixtureModel"
             type="RoLoErrorTypeWeightedMixtureModelType"/>

<xsd:element name="MixtureOfGaussian"
             substitutiongroup="rls:LinearMixtureModel"
             type="RoLoErrorTypeWeightedMixtureModelType"/>
```


::ISO 19111::IO_IdentifiedObjectBase
::ISO 19111::IO_IdentifiedObject
::Architecture::RoLo Data
+/rla: RoLo Data Specification [0..1]
+/elem: RoLo Element [0..*] {ordered}
::Architecture::RoLo Data Specification
+/elem: RoLo Element Specification [0..*] {ordered}
::ISO 19111::CS_CoordinateSystem
::Architecture::RoLo Element
+/spec: RoLo Element Specification [0..1]
::Architecture::RoLo Element Specification
+specID: CharacterString [0..1]
::Architecture::Null Element
::Architecture::Position Element
+/pos: Rolo Position
+err: RoLo Error [0..1]
::Architecture::Position Element Specification
+crs: CS_CRS [0..1]
+/cs: CS_CoordinateSystem [0..1]
+errType: RoLo Error Type [0..1]
::Architecture::Error Element
+err: RoLo Error
::Architecture::Error Element Specification
+posSpecRef: CharacterString [0..*] {ordered}
+errType: RoLo Error Type
<<Union>>
::Architecture::RoLo Position
+symbolic: RoLo Symbolic Position
+numeric: GM_Position
Specification Data
Actual Data


::ISO 19111::IO_IdentifiedObjectBase
::ISO 19111::IO_IdentifiedObject
::Architecture::Local Named Object
+localName: CharacterString
::Architecture::RoLo Data
+/rla: RoLo Data Specification [0..1]
+/elem: RoLo Element [0..*] {ordered}
::Architecture::RoLo Data Specification
+/elem: RoLo Element Specification [0..*] {ordered}
::ISO 19111::CS_CoordinateSystem
::Architecture::RoLo Element
+/spec: RoLo Element Specification [0..1]
::Architecture::RoLo Element Specification
+specID: CharacterString [0..1]
????
::Architecture::Null Element
::Architecture::Position Element
+/pos: Rolo Position
+err: RoLo Error [0..1]
::Architecture::Position Element Specification
+crs: CS_CRS [0..1]
+/cs: CS_CoordinateSystem [0..1]
+errType: RoLo Error Type [0..1]
::Architecture::Error Element
+err: RoLo Error
::Architecture::Error Element Specification
+posSpecRef: CharacterString [0..*] {ordered}
+errType: RoLo Error Type
<<Union>>
::Architecture::RoLo Position
+symbolic: RoLo Symbolic Position
+numeric: GM_Position
Specification Data
Actual Data

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Real World Robot Challenge in Tsukuba (RWRC 2008)

- Tsukuba Challenge 2008 -

Takashi Tsubouchi, Professor

University of Tsukuba,

and

Makoto Mizukawa, Professor

Shibaura Institute of Technology

robotics/2008-12-13

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Intelligent Robot Laboratory
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Tsukuba Challenge

(November 20 and 21, 2008)

The second challenge event in Japan

Funded by

New Technology Foundation (NTF)

and

Tsukuba City

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知能ロボット研究室 Intelligent Robot Laboratory Yamabico PROJECT SINCE 1977

Tsukuba Challenge

(November 20 and 21, 2007)

Organizers:

Chair: Shin'ichi Yuta, (U. of Tsukuba)

Makoto Mizukawa (Shibaura IT)

Hideki Hashimoto (U. of Tokyo)

Hirofumi Tashiro (NTF)

Prersons from Tsukuba city

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Tsukuba Challenge

- http://www.robomedia.org/challenge/index.html
- **Real World Robot Challenge (RWRC)**

- **It is not so called "competition"**
- **Generalization of robotics technologies by means of "Development of methodology for the mission completion and disclosure of technical information"**

Tsukuba Challenge 2008Mission

- Autonomous run for 1km on the street for pedestrians
- The robot must stop at the goal
- The robot must be self-contained
- Environment as they are
  - No special treatment for the surface of the street
  - No postponed in case of rain
  - There are pedestrians and bicycles
- No CASH Prize

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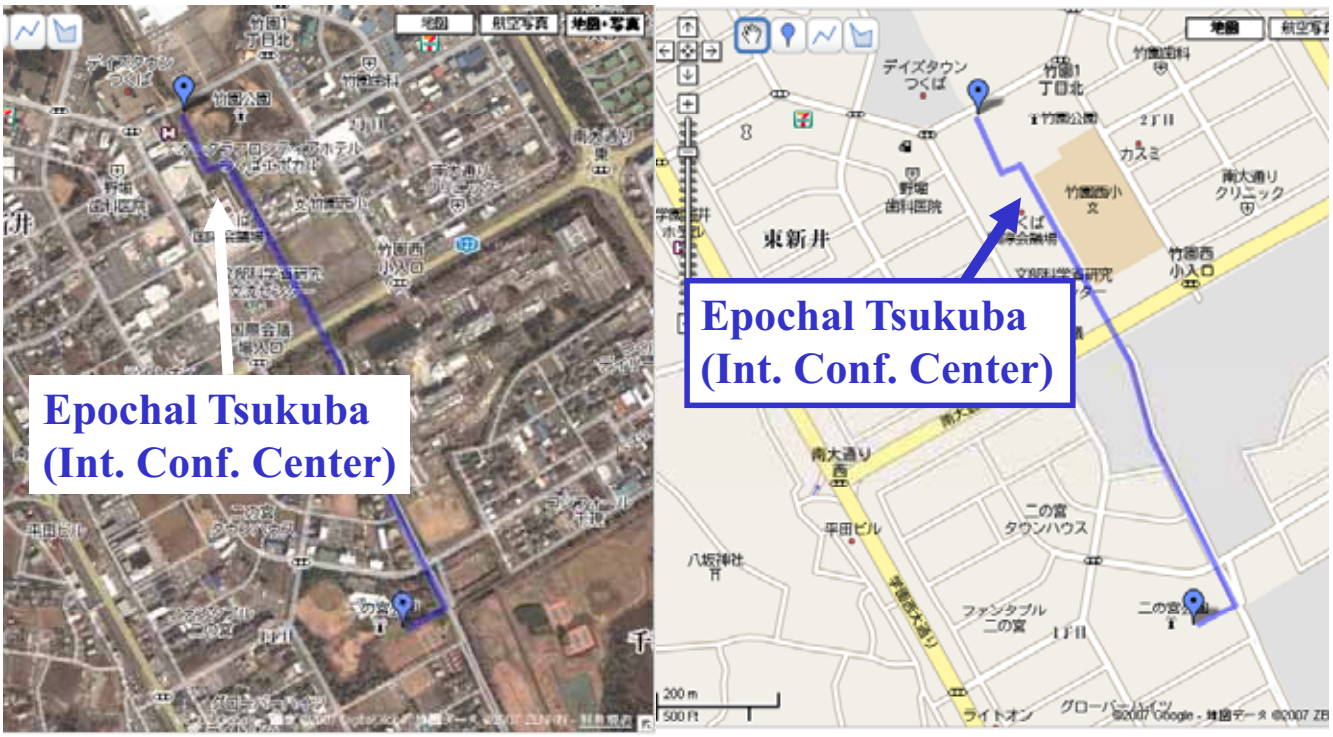
Regulation

- Robot size within 75cm (W) , 120cm (L), 150cm (H)
- Robot weight within 100kg
- Maximum speed 4km/h
- Emergency stop switch
- Accompanying operator for malfunction when the robot moves with power

- Design the robot in accordance with environmental and ecological attention

Environment at the Tsukuba Challenge (2007)



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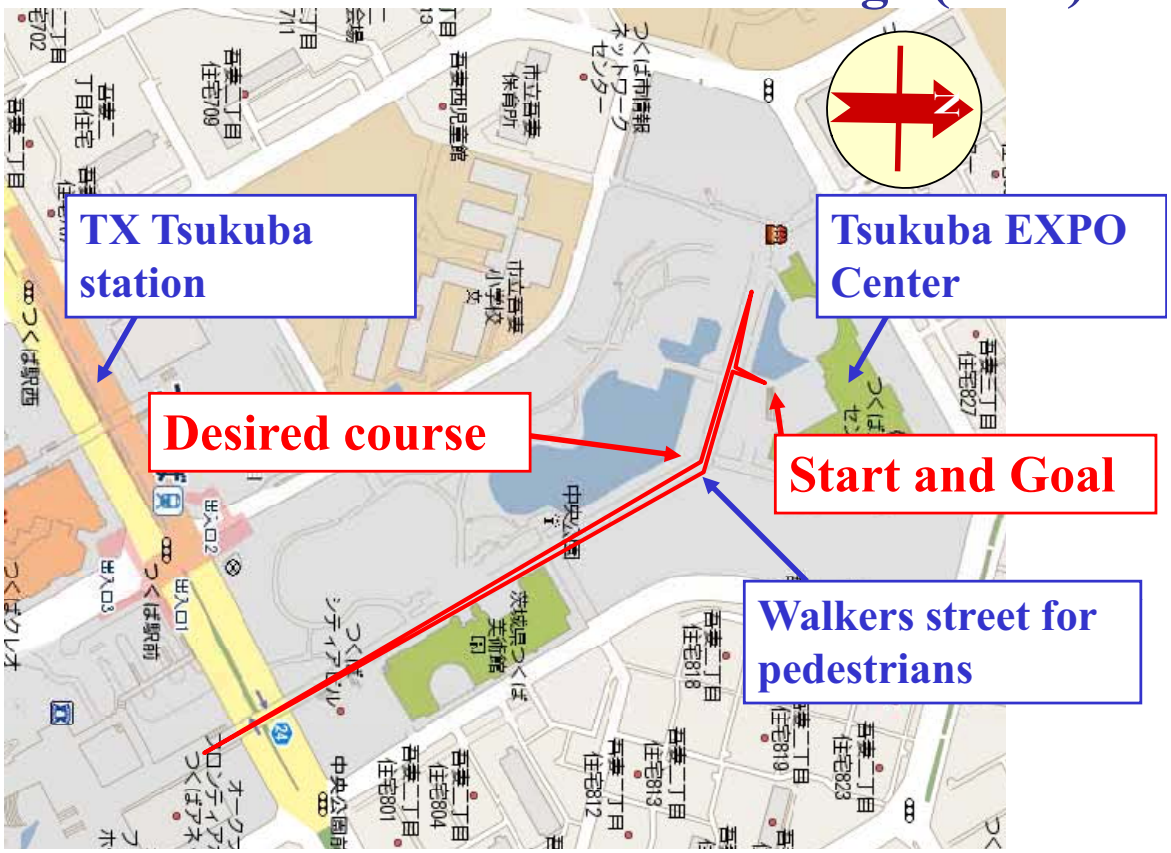
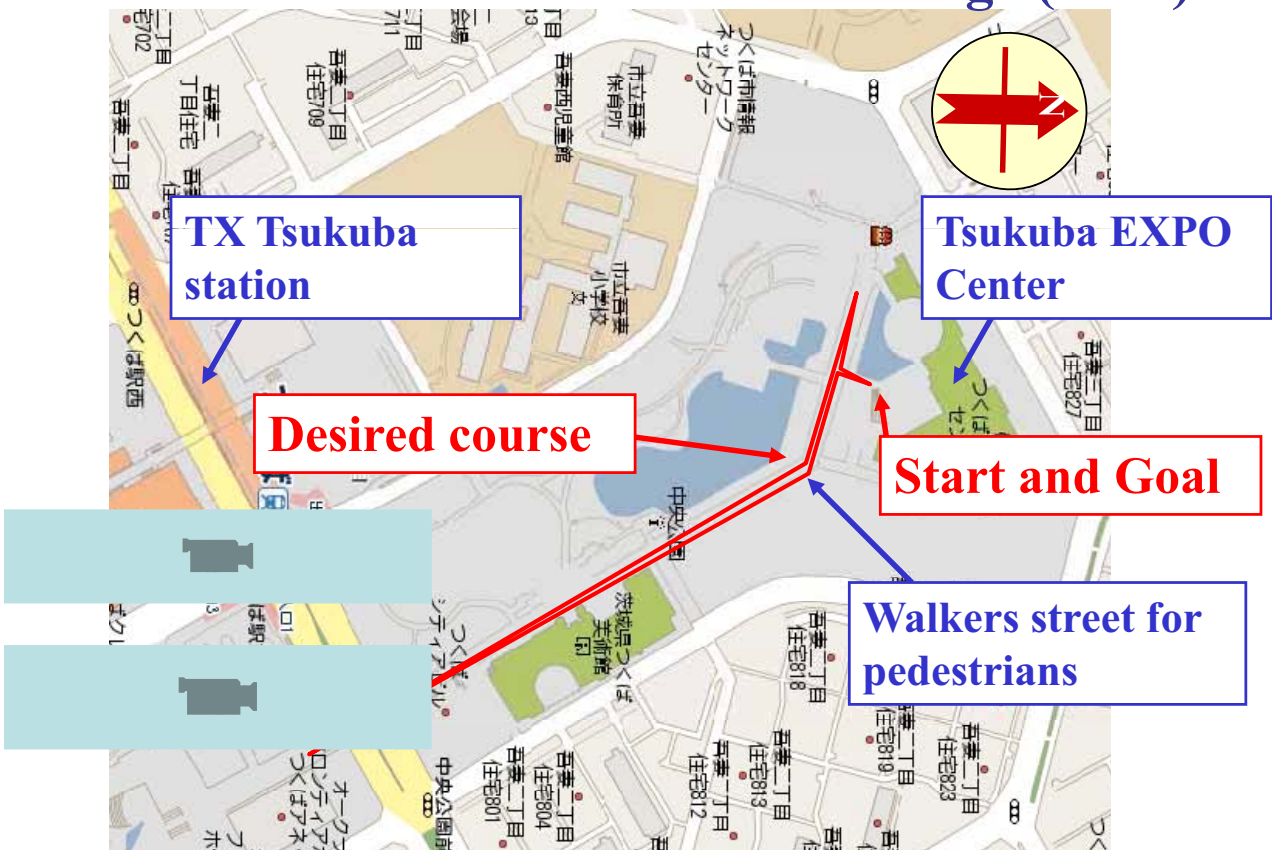
Environment at the Tsukuba Challenge (2008)



Environment at the Tsukuba Challenge (2008)



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Test Running Days

- more than the last year
  - August 3, September 7, October 5 and 17,
  - November 2, 16 , 18 and 19

Participants and Results

- 50 groups entry
- On 20 Nov. : Trial Run
  - (100m from start within 12min.)
    - 47 groups tried ／ 22 groups passed
- On 21 Nov. : Final Run
  - (1km from start, within 2hrs.)
  - Only 1 group mission completed

    "YAMAHA Motor Tsukuba Challenge TF"

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Photo's and Movies of Prof. Mizukawa's lab.

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University of Tsukuba "Okugaigumi" Trial

Takashi Tsubouchi, Yoichi Morales, Alexander Carballo, Yoshitaka Hara, Atsushi Aburadani, Hiroyasu Kuniyoshi, Atsushi Hirosawa, Yusuke Suzuki, Mehrez Kristou, Tomoya Yamaguchi, Yukiko Sawada, and Naoki Morikawa

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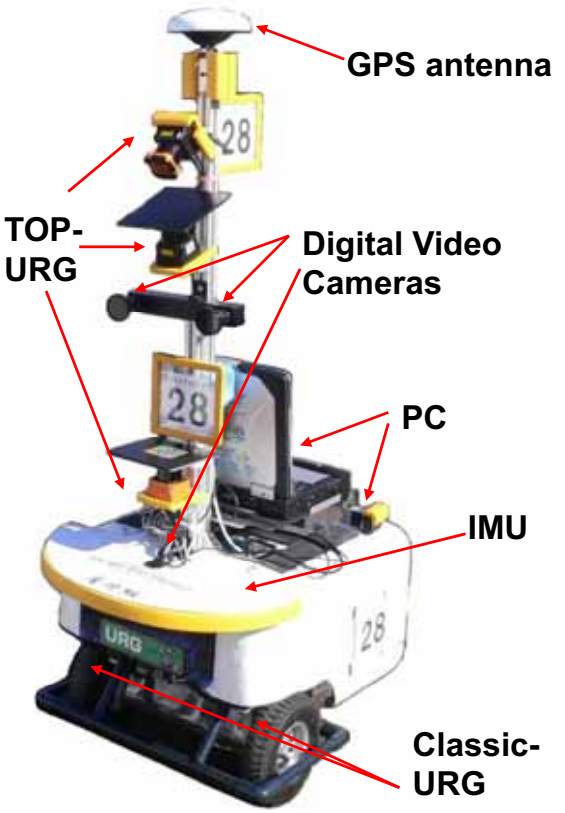
For the participation into the Tsukuba Challenge from the Intelligent Robot lab.

- Participated into the challenge for polishing our outdoor mobility technologies.
- We had mission completed last year.⇒What kind of approach do we take for this year?
  - Rather than small or step by step improvement,
  - liked and prefered to have new technologic challenges for us
- Compared to the course last year
  - wide street, but must use only the east side half
  - oncoming robots and operators
  - catching up with slow robot going ahead of the later started
  - street side detection developed last year seems to be not enough

  etc. etc. etc.

Yamabico "Hitotsubo" for 2008



Complete Redesign of Total System of the Robot

- Recheck the date flow
- Vision system
  - Stereo vision (obstacle detection)
  - Edge orientation detection for pavement tiles (position correction)
- Use of LIDAR (Sokuiki sensor) system
  - Street tree trunk detection (position correction)
  - Wall detection of the buildings (position correction)
- Matured algorithm - naturally taking the obstacle avoidance into account for the path following algorithm

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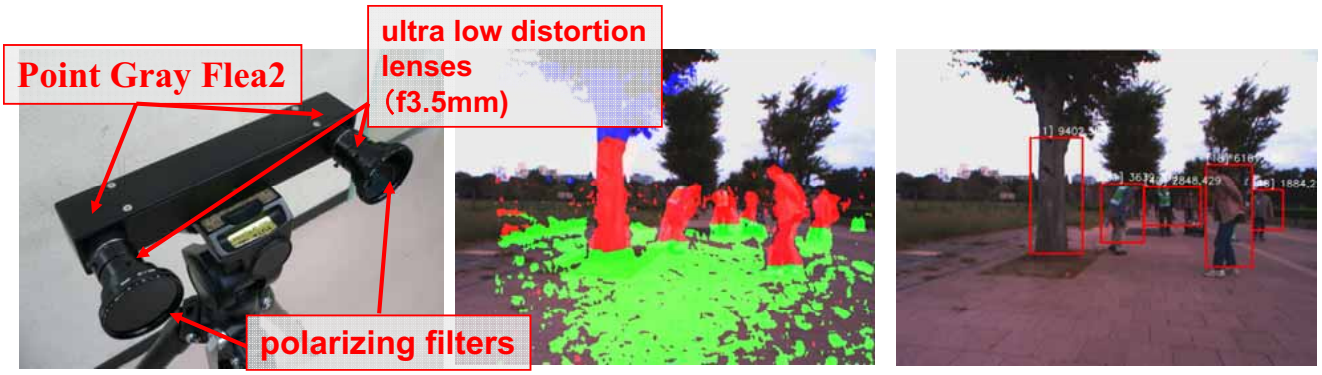
Vision system - stereo

- **Aim: Obstacle detection**
  - Coloring with height
    - Calculate only heights of obstacles based on the disparity image
    - Green : (ground) 0-0.1m, Red: obstacles (0.1-2m), Blue: Obstacles (2m-)
  - Extract brobs for the "red" obstacles
  - Filter the brobs taking account of deviations of distance and size and identify them as walkers, trees and other obstacles
  - Center x-y coordinate and width of the filtered brobs are transferred the obstacle avoidance process
  - **Implementation: Open CV ver. 1.1**



Stereo camera | coloring with height | extracted obstacles

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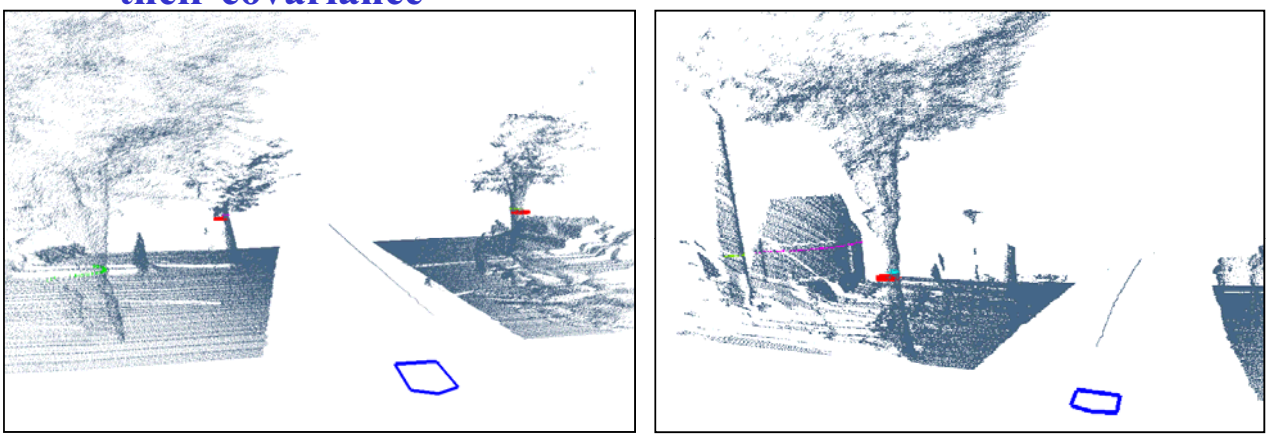
LIDAR (Sokuiki sensor) system

Street tree trunk detection (position correction)

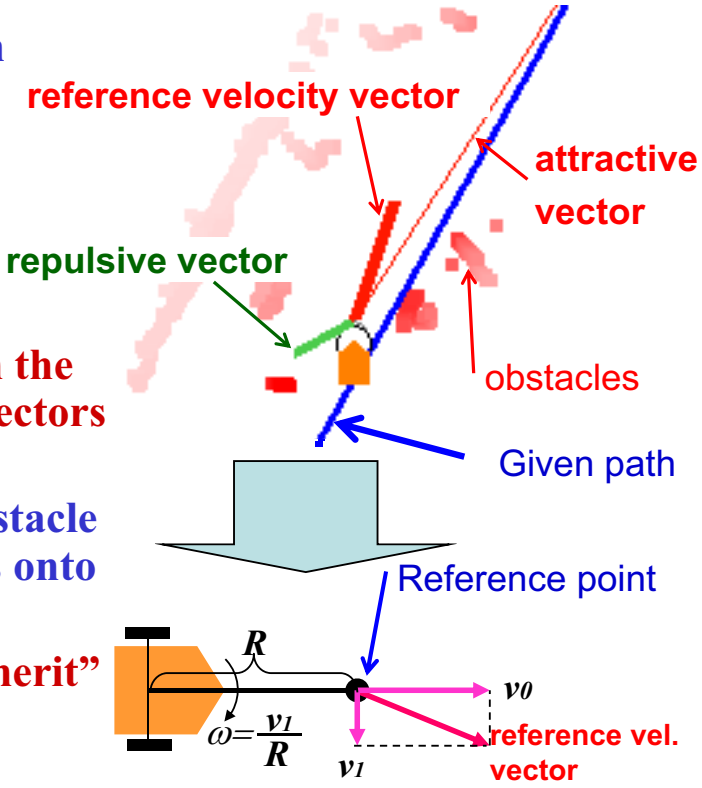
- **Aim: Correction of dead-reckoned postion**
  - Clustering based on distance
  - Circle fitting of the clusters
  - Tree trunks are detected based on the size, radius and their covariance



Tree trunk detection (red: fitting success, green: fitting missed)

Path following and obstacle avoidance

- Keeping good enough position estimation
- Go along the path (folded line segments on the ground) fundamentally
- Reference velocity vector
  = attractive force vector from the given path + repulsive force vectors from the obstacles
- Naturally the robot avoids obstacle if any on the path and returns onto the path
- Local minima problem is a “merit”
- Look ahead velocity control



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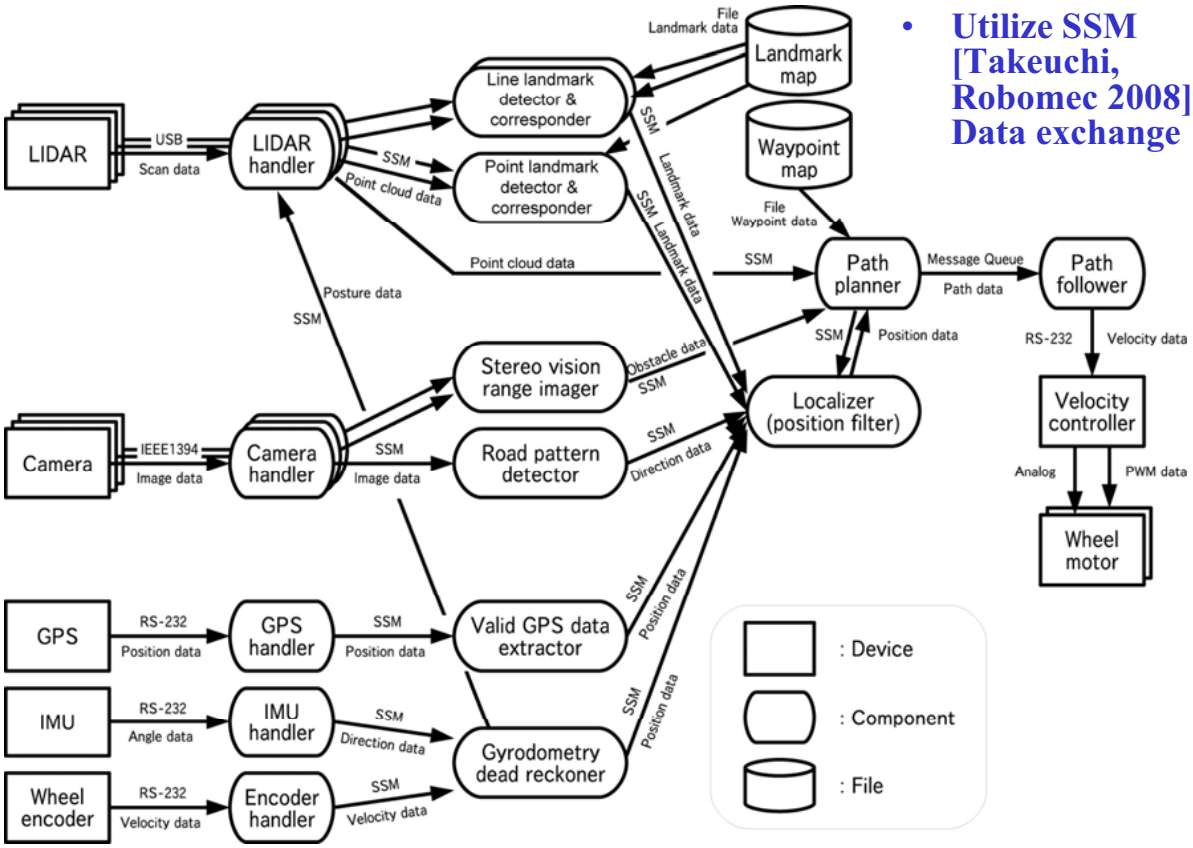
Path following and obstacle avoidance

- Videos

Date processing flow



- Utilize SSM [Takeuchi, Robomec 2008] for Data exchange

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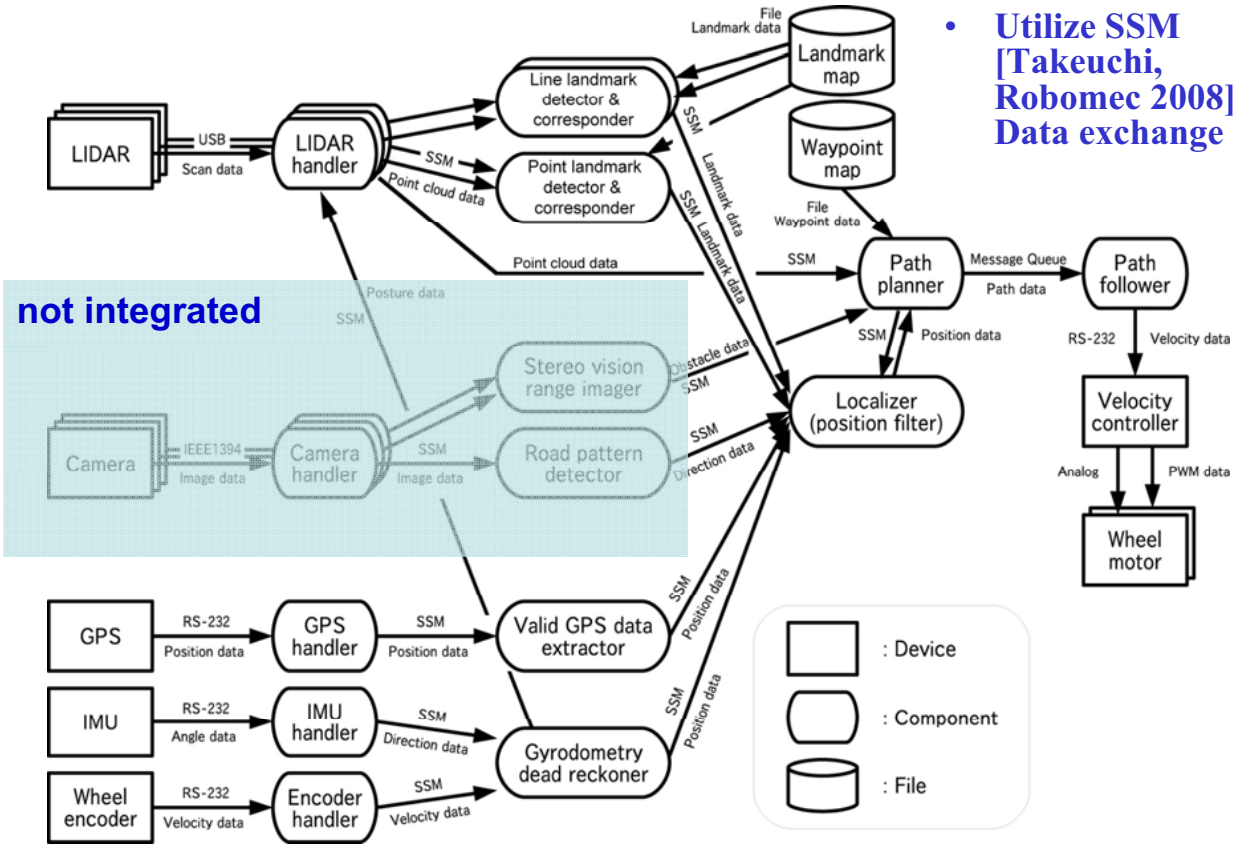
Integretion

- In the indoor laboratory environment, the stereovision and other systems are connected and integrated. Experiments have sccess.
- However and unfortunately, image processing computer could not recognize the IEEE 1394 IF at the test run just before the trial and the final.
- The vision could not utilized at all.

Date processing flow



- Utilize SSM [Takeuchi, Robomec 2008] for Data exchange

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Result

- At test run, 2 times mission completed and 3 times completed with some human assistance.
- The trial passed at the first trial
- However, we had found a phenomenon that important process hanged up sometimes.
  - This phenomenon arose at the final run - retired.
  - There are 18 major sub-processes (5ms-1s periods).
  - More robust implementation on software necessary for critical case of OS context switch.
- At 255m run, the hanging up prevented the running.

robotics/2008-12-14

HITACHI
Inspire the Next

A Lightweight Message-Driven Component Framework for Robotic Systems

Saku Egawa

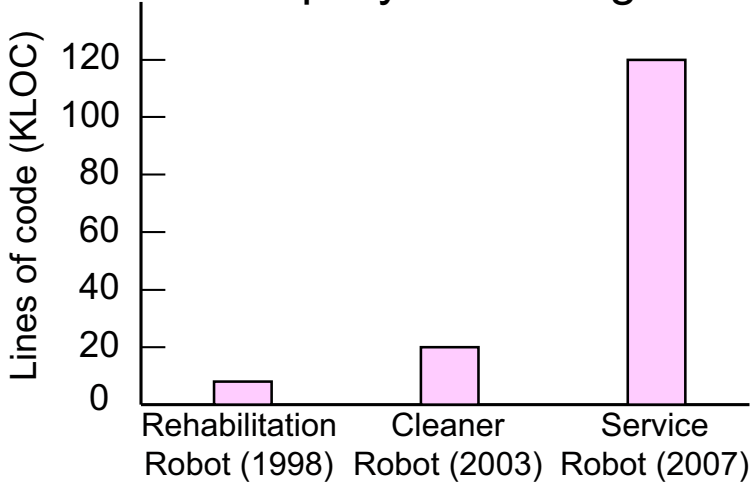
Mechanical Engineering Research Laboratory

Hitachi, Ltd.

Robotics in Hitachi

- Hitachi has been developing robots since the 1970's.
  - Industrial robots
  - Plant maintenance robots
  - Rehabilitation robots
  - Cleaner robots
  - Service robots

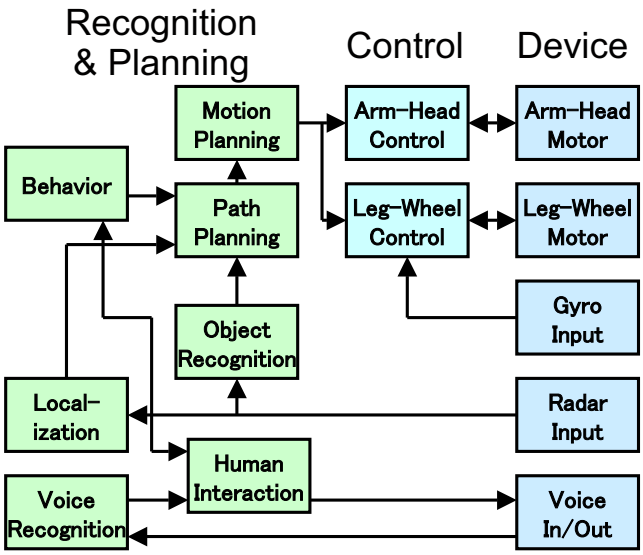
- Code size is rapidly increasing.



Service Robot "EMIEW2"

3 Challenges

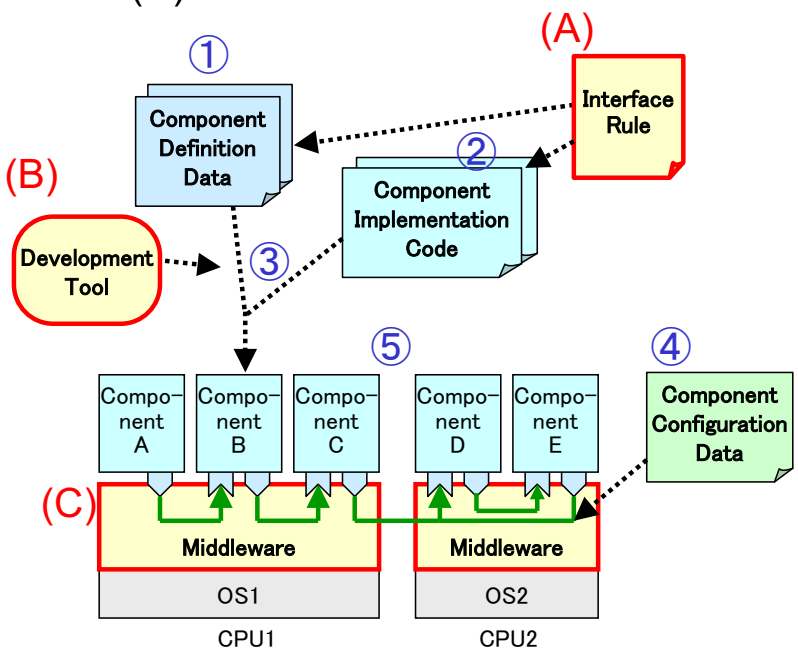
- Difficulties with robotic systems
  - Include both real-time control and information processing.
  - Limited computational resources require distributed processing.
  - High programming skill is needed.
  - Software re-use is difficult.
- Solution: Component Framework
  - Middleware enables real-time distributed system programming.
  - Encapsulation mechanism enables software re-use.



Software architecture of Robot "EMIEW2"

4 Component framework

- Hitachi has developed Message-Driven Component (MDC)
  - (A) Interface rule (API, description language)
  - (B) Development tools
  - (C) Middleware



Development Process

① Write component definition data files.

② Implement components with C++.

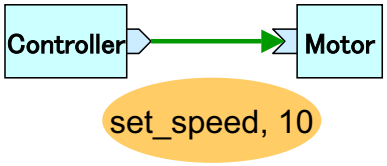
③ Build program.

④ Write configuration data.

⑤ Run program.

5 Features of MDC

- What is a “message” ?
  - A packet containing a command and data
  - A copy is sent asynchronously (one-way and queued)
  - Its arrival invokes execution of the command.

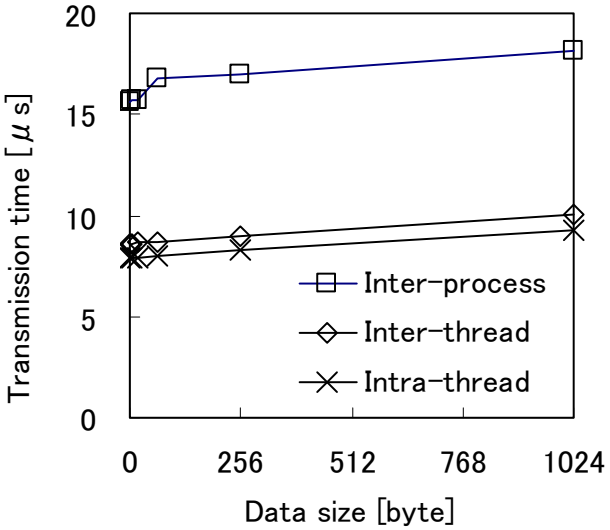


- Why “message-based” ?
  - Marshaling not needed
  - Efficient in distributed systems
  - No concurrency problem
  - Compatible with state machine model
- Benefits
  - Lightweight middleware owing to simple design
  - Re-use support by separation of definition, implementation, and configuration
  - Flexibility and scalability

merl

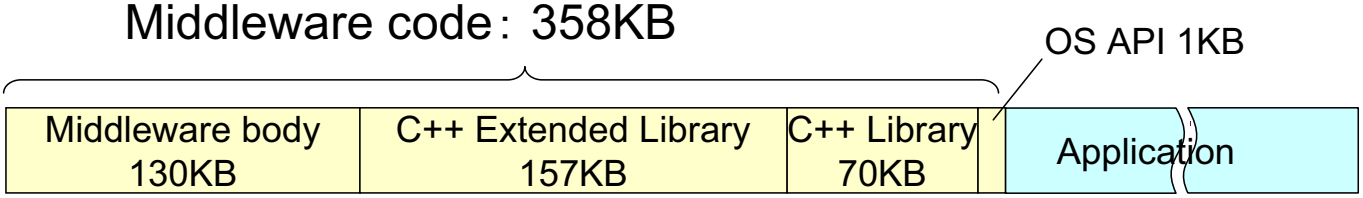
6 Lightweight

- Fast inter-component communication
  - Applicable to machine control
- Small code size
  - Applicable to single-chip microcontrollers



Communication speed (500MHz CPU)

Middleware code: 358KB

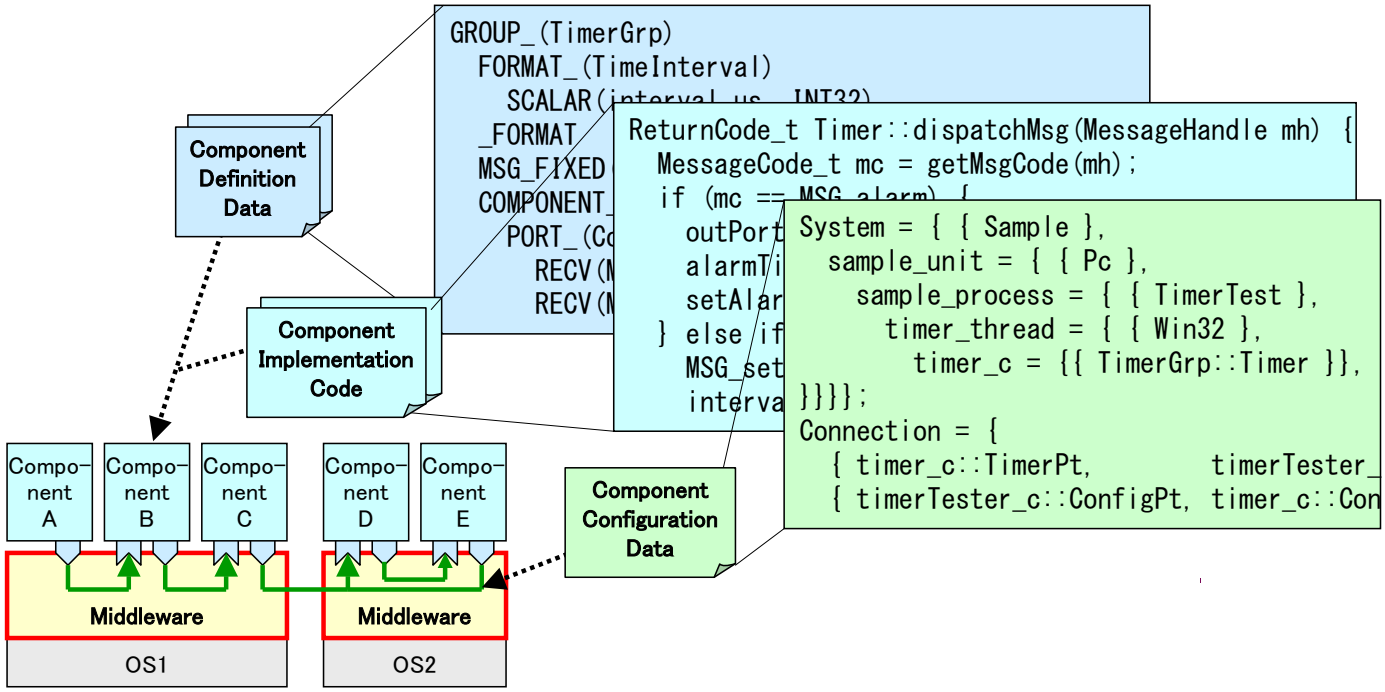


Software Code Size

merl

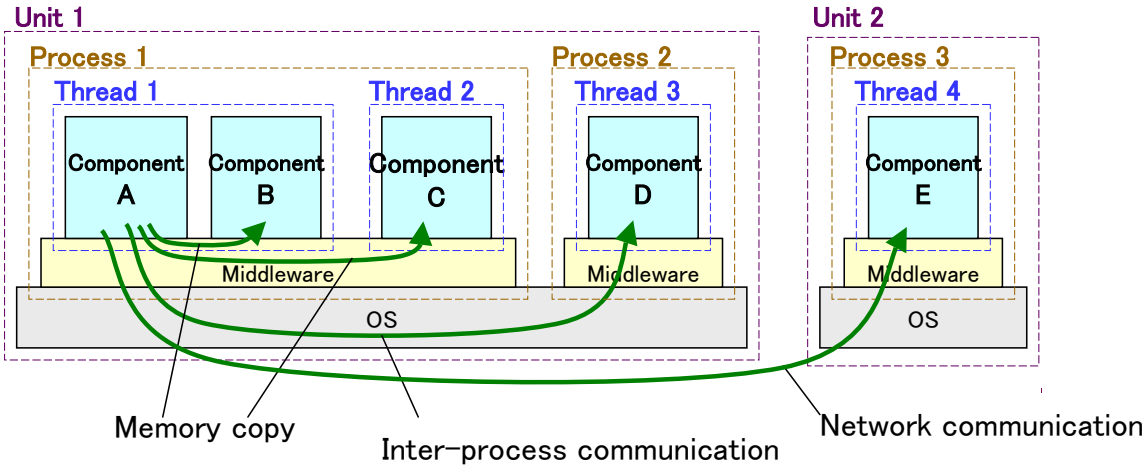
7 Re-use support

- Definition, implementation, and configuration of components are separately described.
  - Components are easily assembled to enable various applications.



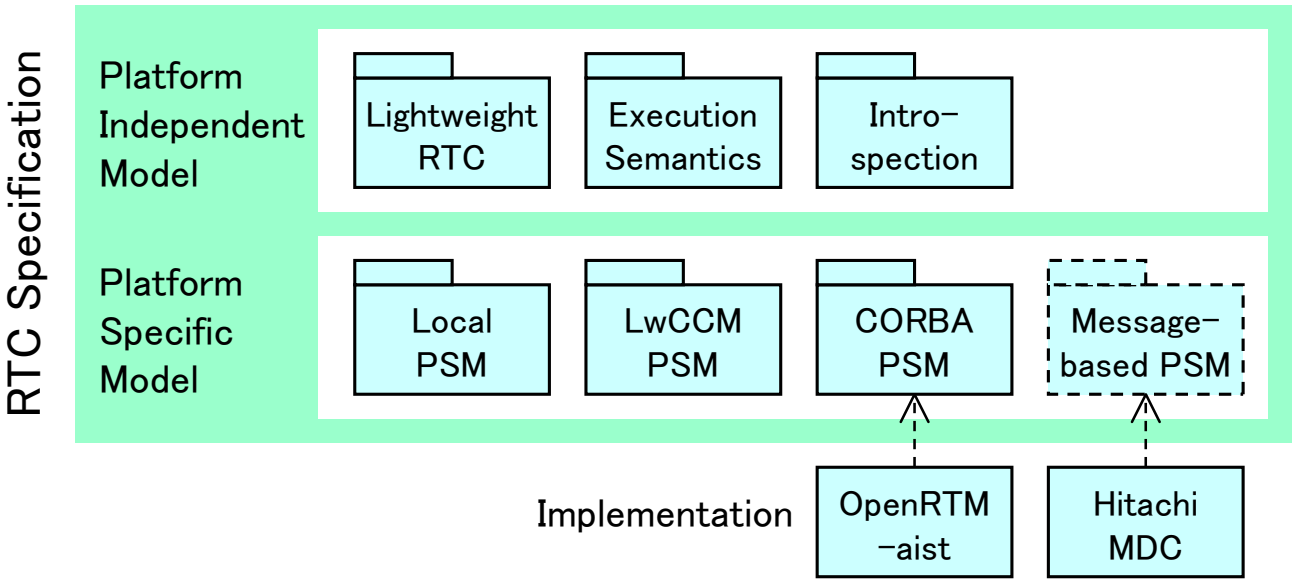
8 Flexibility

- Components run in any location.
  - Any unit (CPU), any process, any thread
- Configuration can be changed at start-up time.
- Supports multiple operating systems



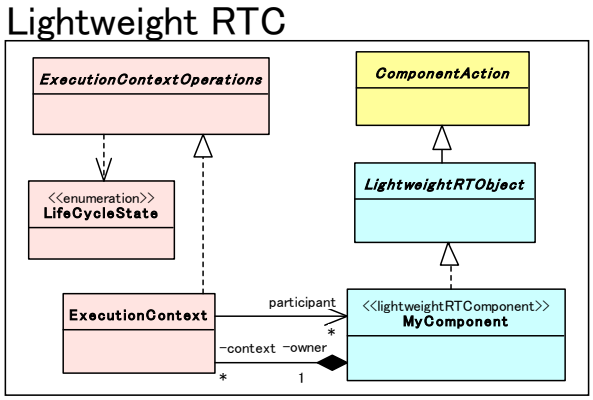
9 RTC compatibility issue

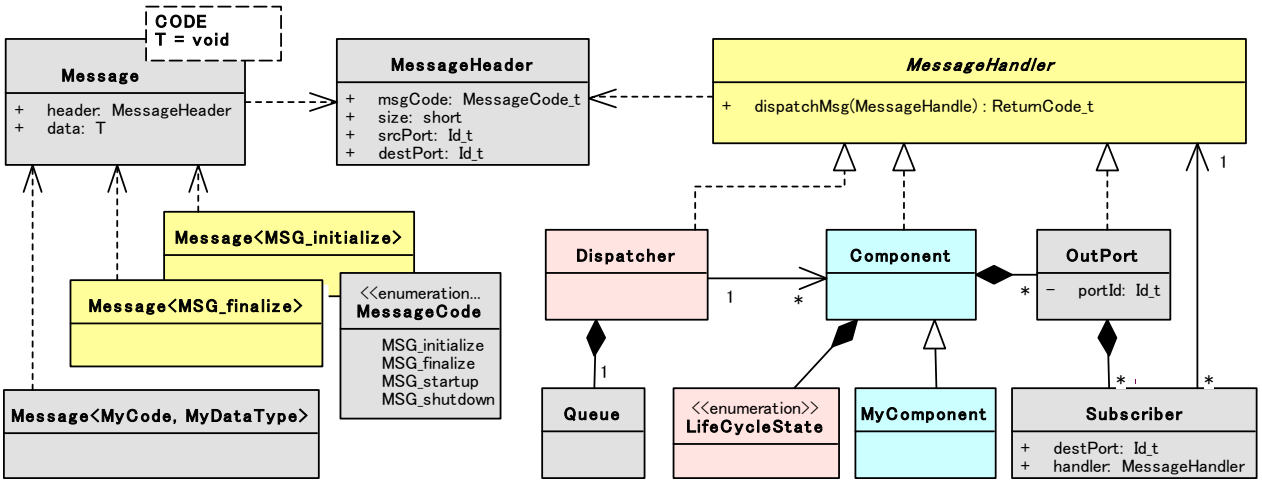
- Current version of MDC is ***NOT*** OMG RTC compliant.
- Harmonization with RTC model is needed to make interoperation easier.
- MDC could be redefined as a PSM of RTC PIM.



10 LwRTC – MDC mapping

- Lightweight RTC PIM to MDC mapping is possible.
  - ExecutionContext → Dispatcher
  - ComponentAction → MessageHandler + Message





RTC extension

Extension of RTC needed before MDC to become RTC compliant

- Lightweight RTC
  - Accept single ExecutionContext — multiple-component models.
- Execution Semantics
  - Add message-driven execution model.
- Introspection
  - No extension (currently not supported by MDC)
- PSM
  - Add message-based PIM

Conclusion

- Hitachi has developed a Message-Driven Component (MDC) framework.
- MDC is lightweight and flexible enough for robotic applications.
- Extension of RTC specification is needed before MDC to become RTC compliant.

Hitachi is interested in possible collaboration with any organizations with ideas about revising RTC.

ROS: A new development environment for a new generation of robots

Brian Gerkey

December, 2008

Willow Garage

Willow Garage

Autonomous Personal Robots will Change the World

Willow Garage

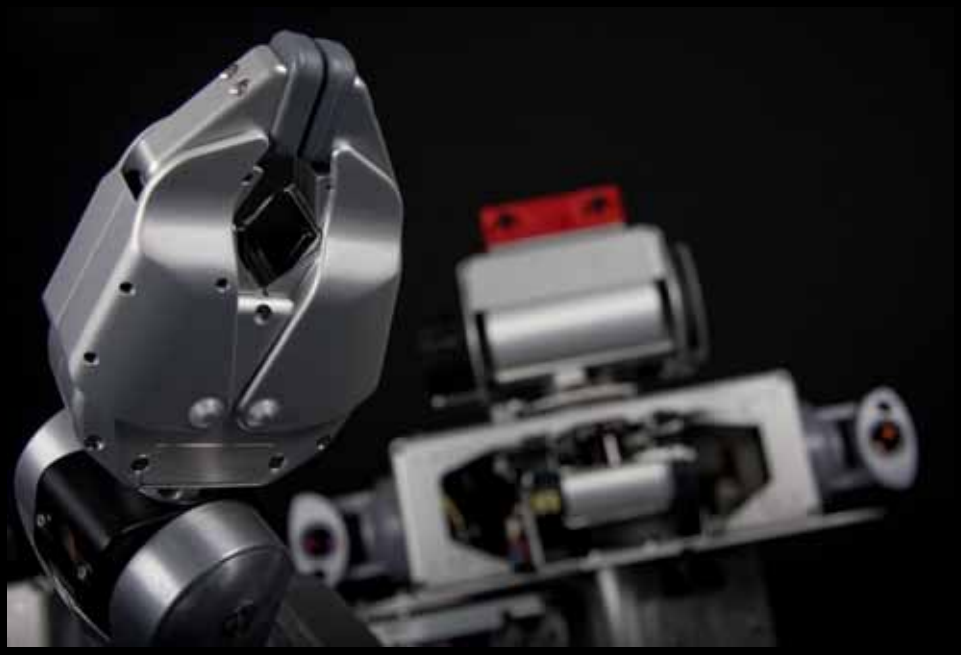
PR1

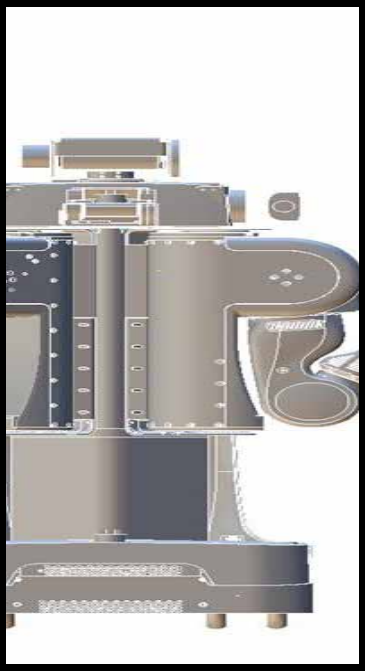
Willow Garage

PR1 (teleoperated)

Willow Garage

PR2





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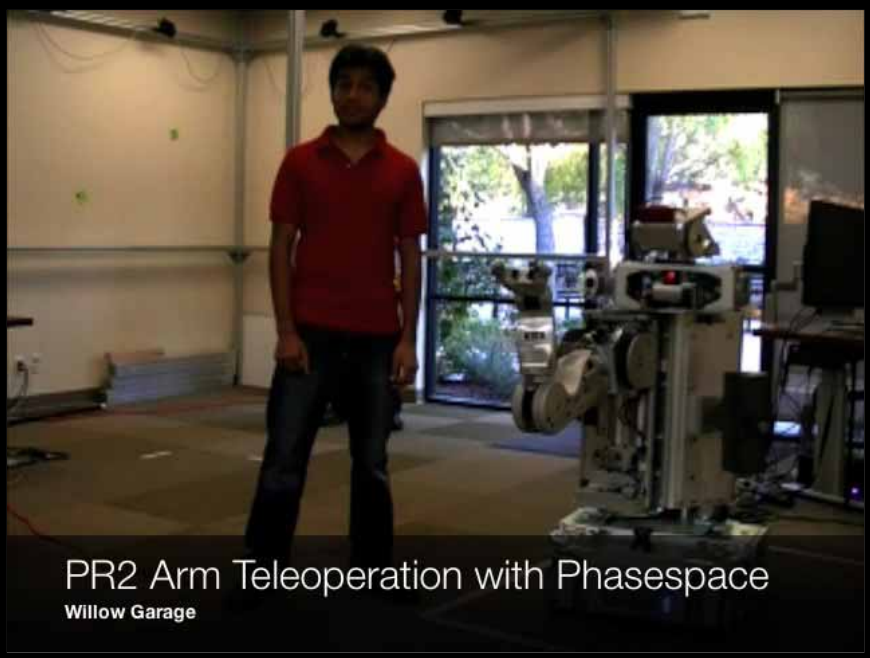
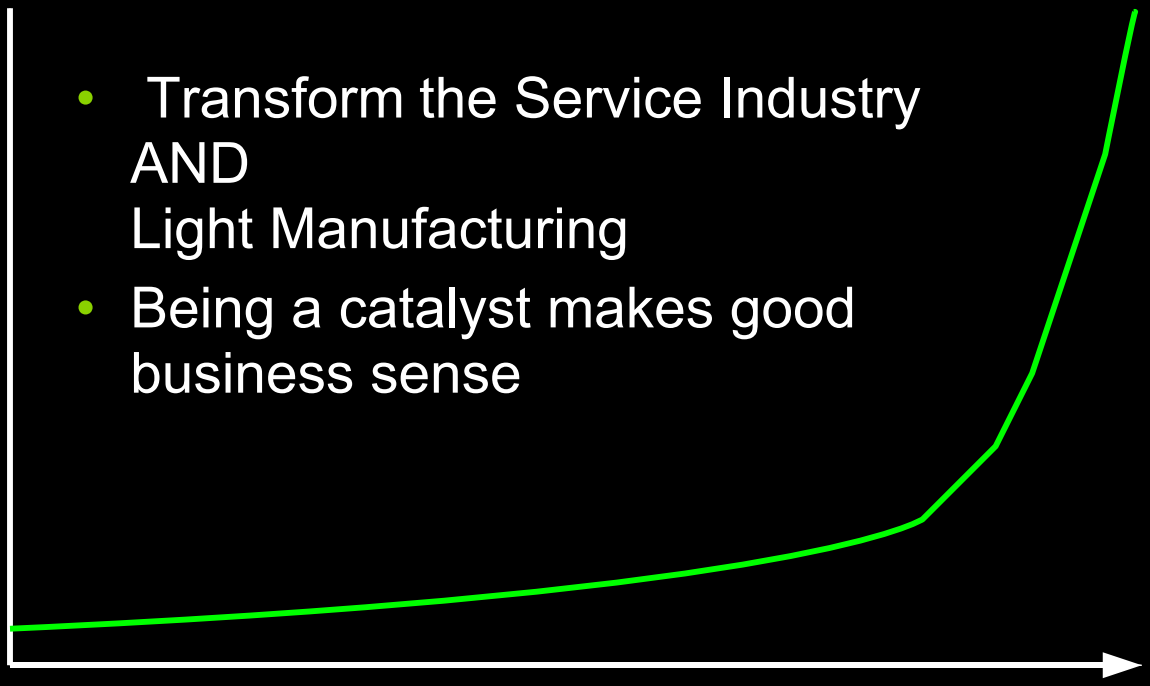
PR2 (teleoperated)



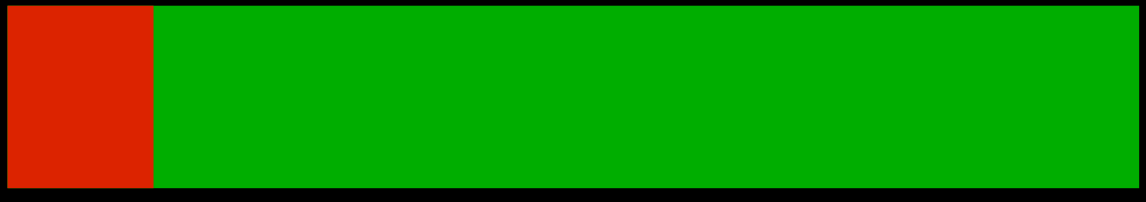
Future Exponential Growth in Personal Robots

- Transform the Service Industry
  AND
  Light Manufacturing
- Being a catalyst makes good business sense



Time to Productivity

vs



An Open Platform is the Catalyst

- Modular hardware with open interfaces
- Open Source software available for everyone to use
  - Linux (or maybe Ubuntu) for robotics
- Willow Garage will make available 10 PR2 robots to research labs at no cost

How do we fund open platforms?

- This kind of effort is hard to sustain
  - VC funding?
  - Government grants?
  - Industry funding?
- Willow Garage is unique
  - Privately funded
  - Mix of research and development
  - Committed to impact through open source
  - Will spin off companies later (timing)

ROS

- Robot Operating System
  Robot Open Source
- Goal: Improve Robotics Research
  - Leverage the work of others
  - Replicate results – Good Science
  - “No more trial by video”

ROS philosophy

- UNIX design = lots of small programs
- Programs debugged in isolation
- Piped or scripted to do complicated things
- Spectacularly successful
- ROS attempts to do this for robotics

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What is ROS?

- Robot Operating System
  - Really a meta-operating-system
  - Sits on top of a Unix-like OS
- Goal: support modularity via message passing
- Make it easy, fun, very hackable
- Coding time: write small programs. Debug them
- Runtime: programs find each other, make botnet
- BSD license

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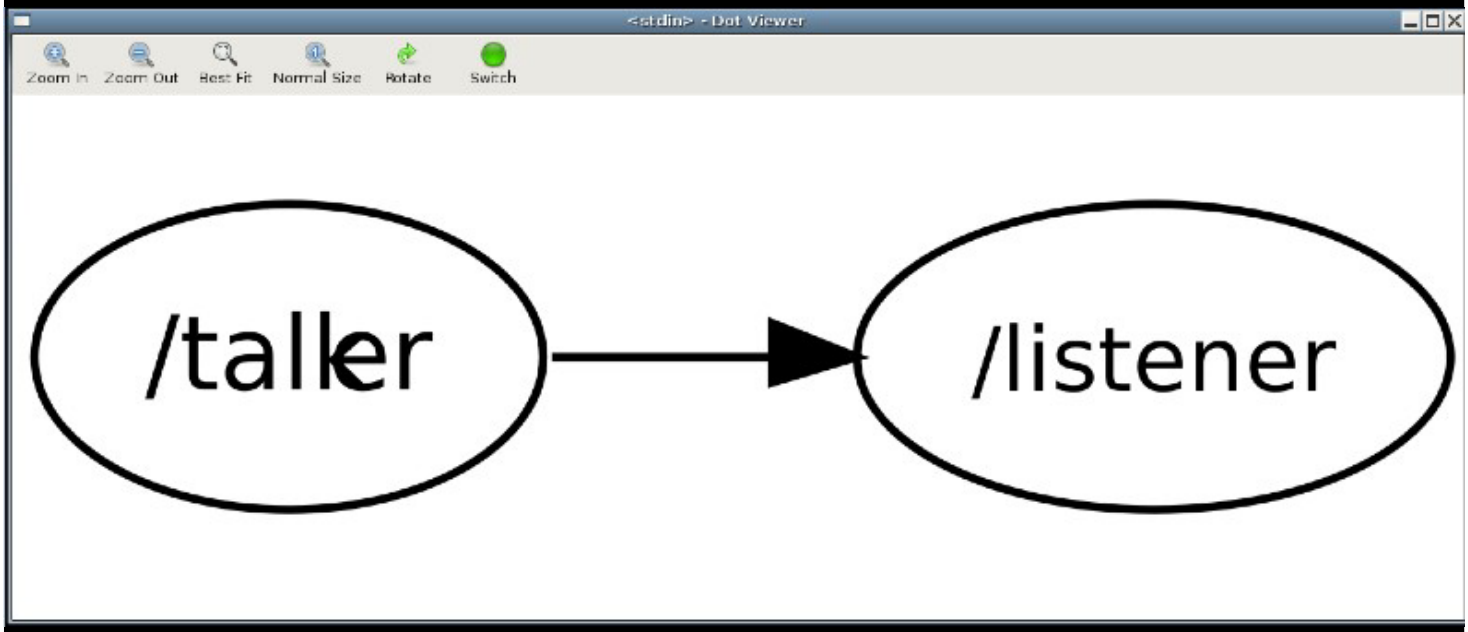
ROS Overview

- At runtime, ROS botnet is a graph
  - Nodes are programs using the ROS libraries
  - Edges are P2P communication between nodes
- Nodes communicate in two ways:
  - anonymous pub/sub to named topics: ”laser”
  - service (RPC) calls: some program provides a ”classify_image” service
- Message code generators from very simple IDL
- Master node: no data, just directory

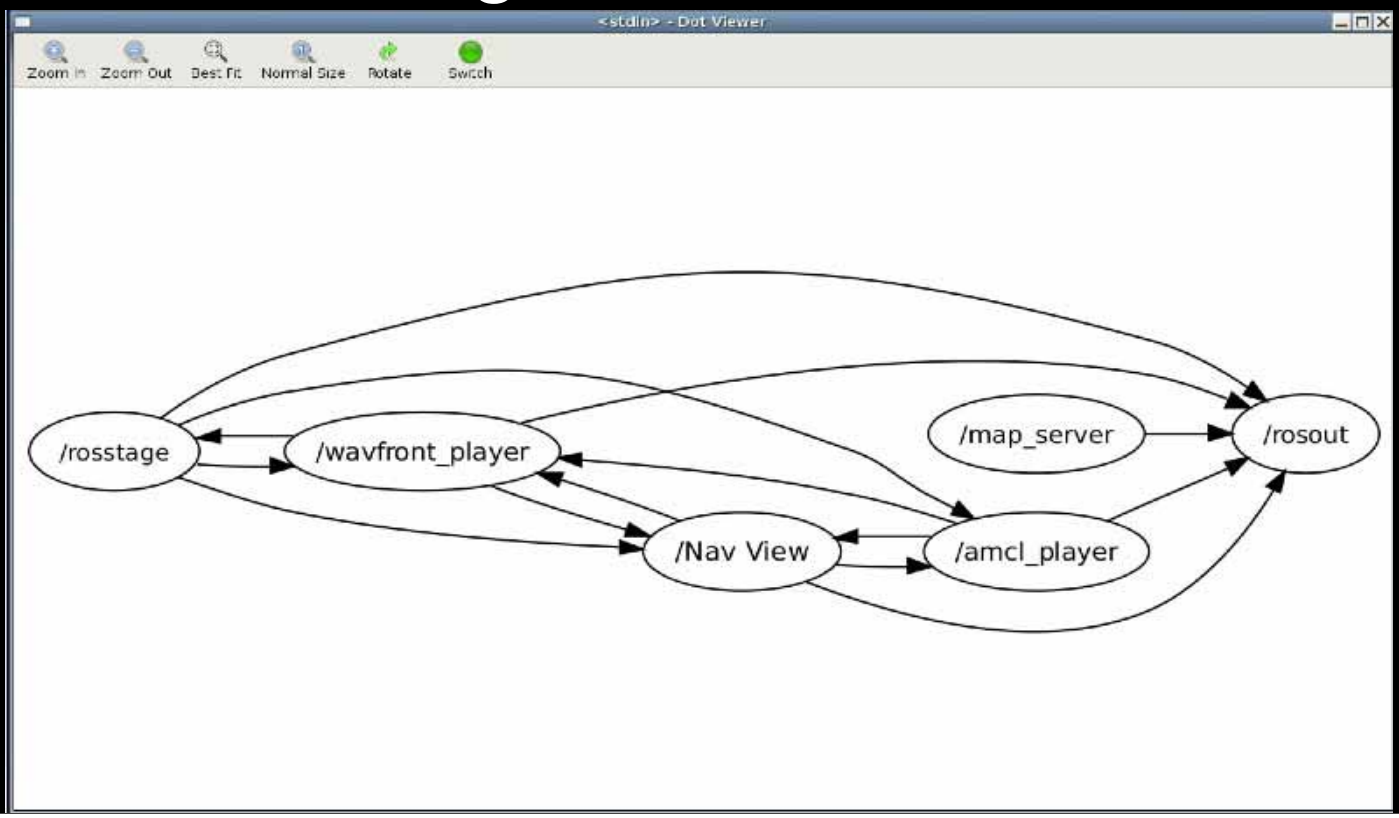
ROS Overview (cont'd)

- Console-friendly tools, easily extensible
- Loosely defined package manager
  - A directory and an XML file make a package
  - Hardware drivers, vision, numerics, controllers, navigation, planners, messages, etc.
- Recursive build system
- ~200 packages on Sourceforge
- Wrap other open-source projects:
  - Player, OpenCV, ffmpeg, OGRE, etc.

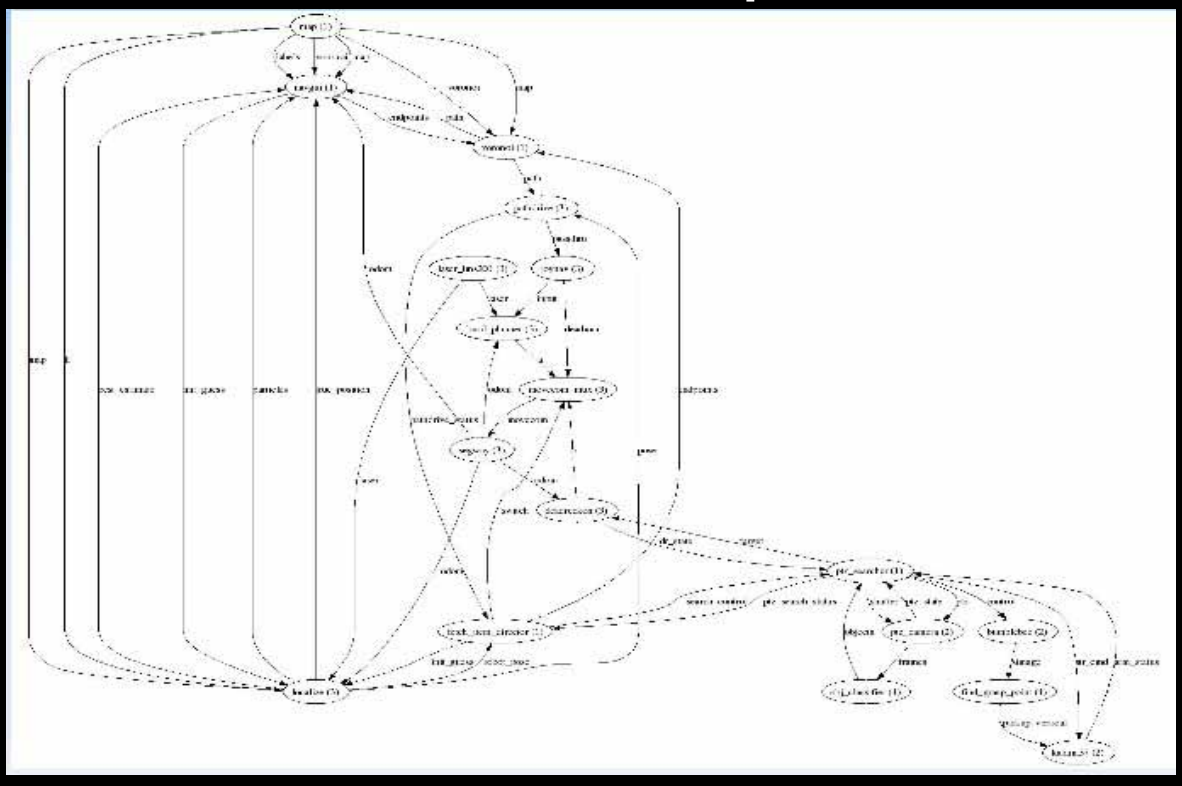
Minimal example



2D navigation in simulation



Fetch a stapler



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ROS Design

- Unix-inspired – small tools
- Modularity
- Flexibility
- Re-use of components
  - with or without framework
- Cross-language, cross-platform
  - Linux, OS X, eventually Windows
  - C++, Python, LISP, soon Octave / Matlab
- Leverage modern open source tools

Willow Garage

ROS Features

- Distributed
- Coordinate transforms built in
- Focus on whole-body calibration
- General robot description
- Visualizations
- Lots of useful algorithms

ROS: A Distributed System

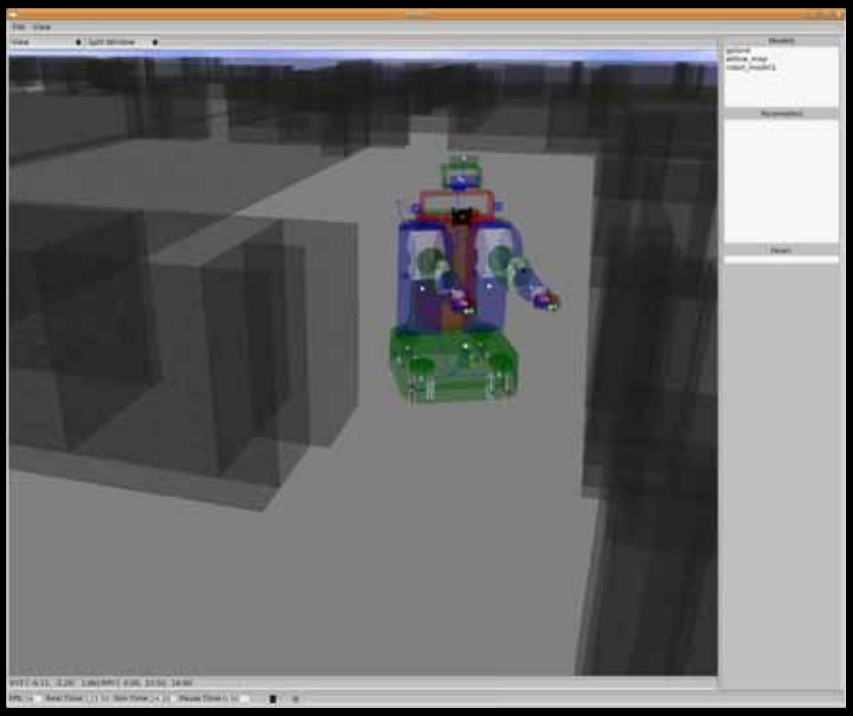
- Personal Robots need lots of computation
  - Sensing
  - Planning
- ROS makes it trivial to move computation around the network
  - Initiating processing nodes
  - Understanding state of the computation
  - Monitoring distributed log messages

ROS General Robot Description

- Robot kinematics and dynamics described in XML
- Inspired by PR2, not dependent on it
  - Ex: Stanford, CMU-Intel use Segway with Barrett arm
  - ROS format being merged into OpenRAVE
- 3D Physics simulation
  - Currently based on Gazebo
  - Even low-level control loops can be simulated

ROS General Robot Description

- 3D Physics simulation
  - Currently based on Gazebo
  - Even low-level control loops can be simulated



ROS Transforms

- Problem: Sensors can move relative to robot body
- PR2 is articulated (others, too)
  - Head
  - Forearm cameras
  - Torso
- Solution: Provide tools to reason about any piece of data in any frame

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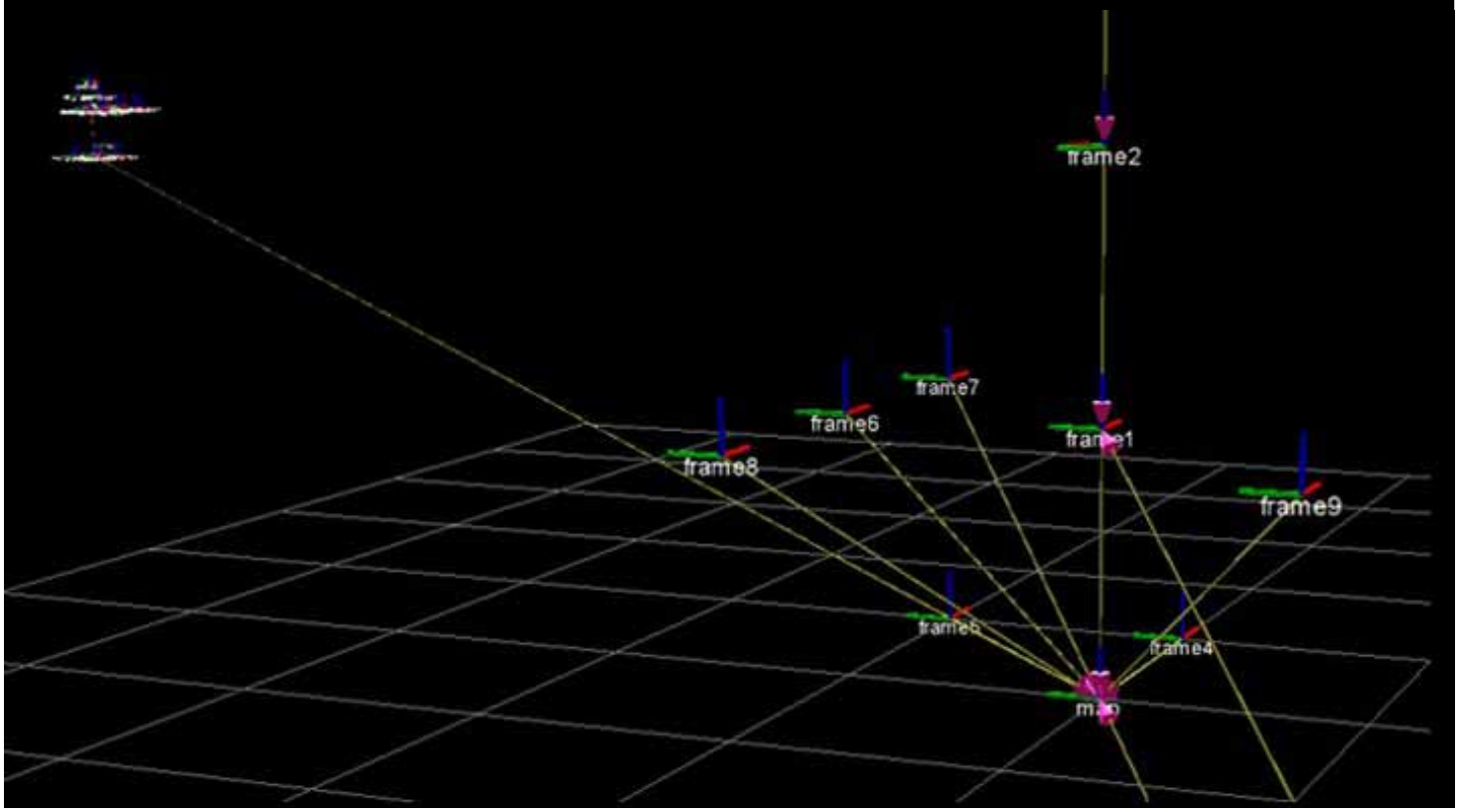
ROS Transforms



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ROS Calibration

- Ability to act is only as good as a robot's calibration
- Sensor registration/data fusion requires accurate calibration
- Calibration is not well-addressed by the academic community
- “Calibration is the most important element of a robotic software platform”

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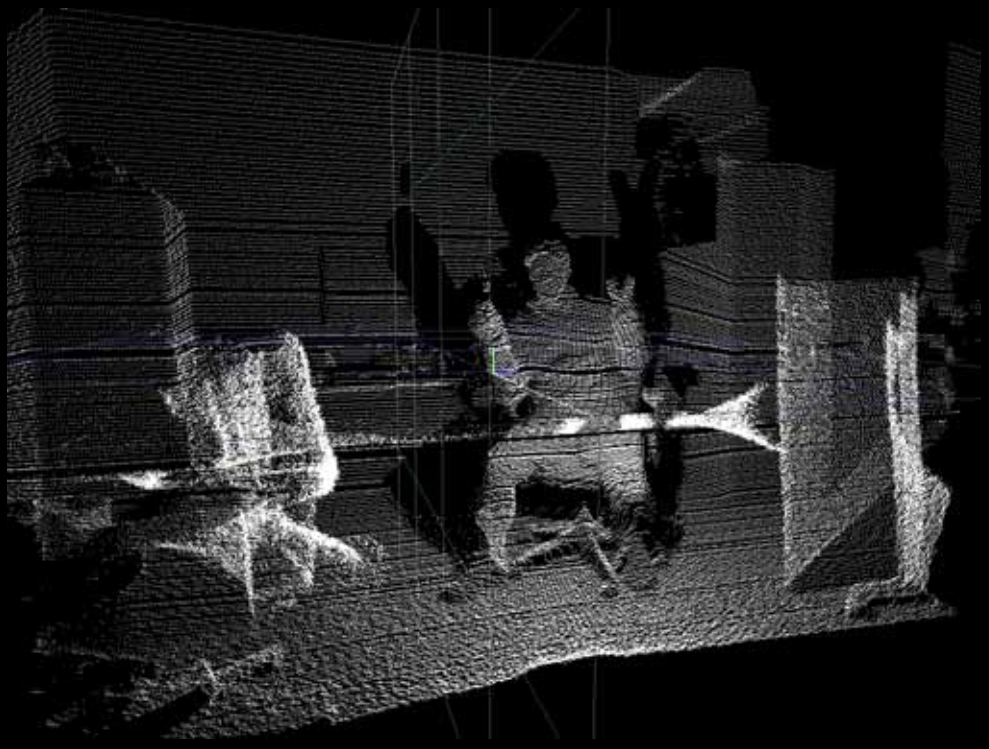
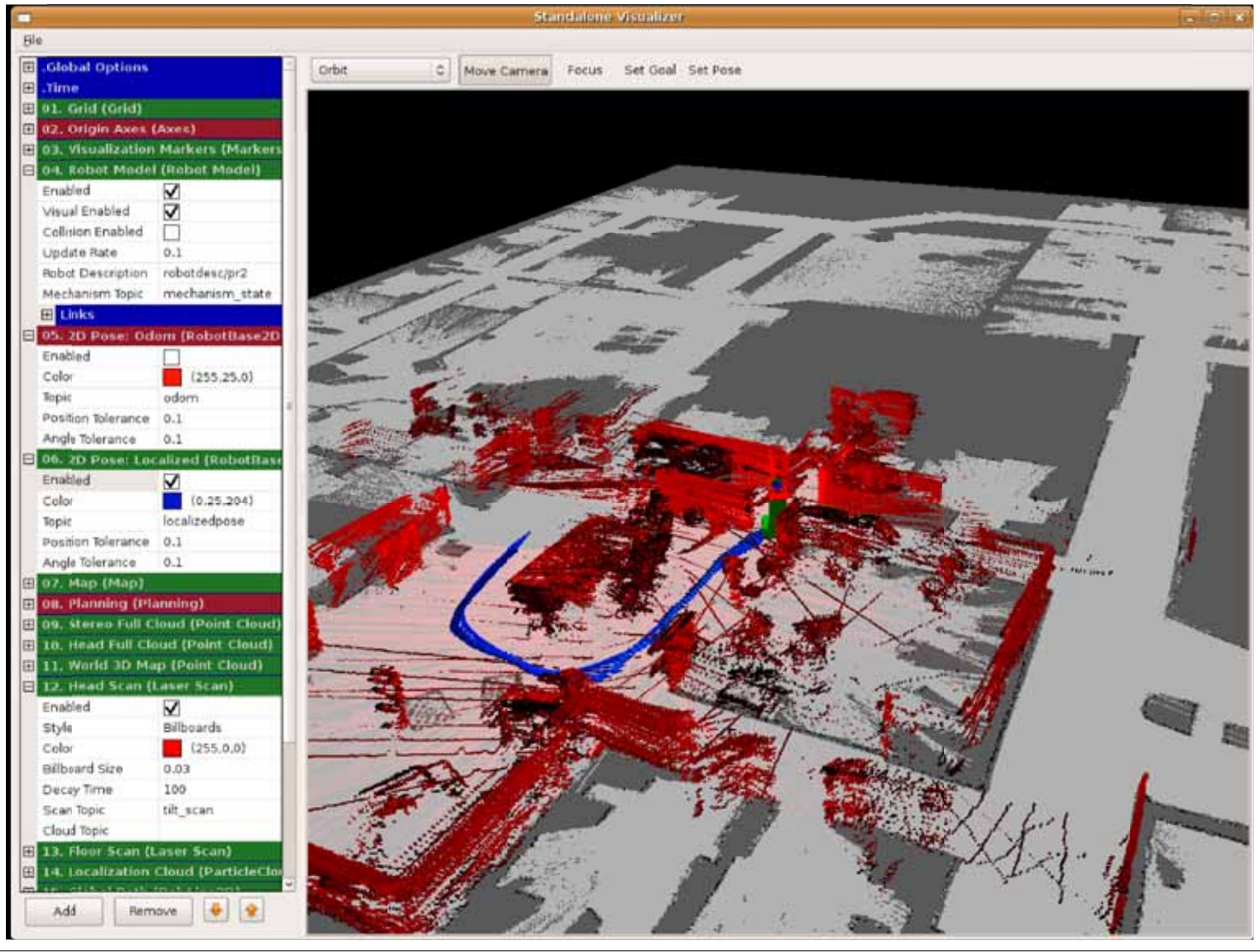
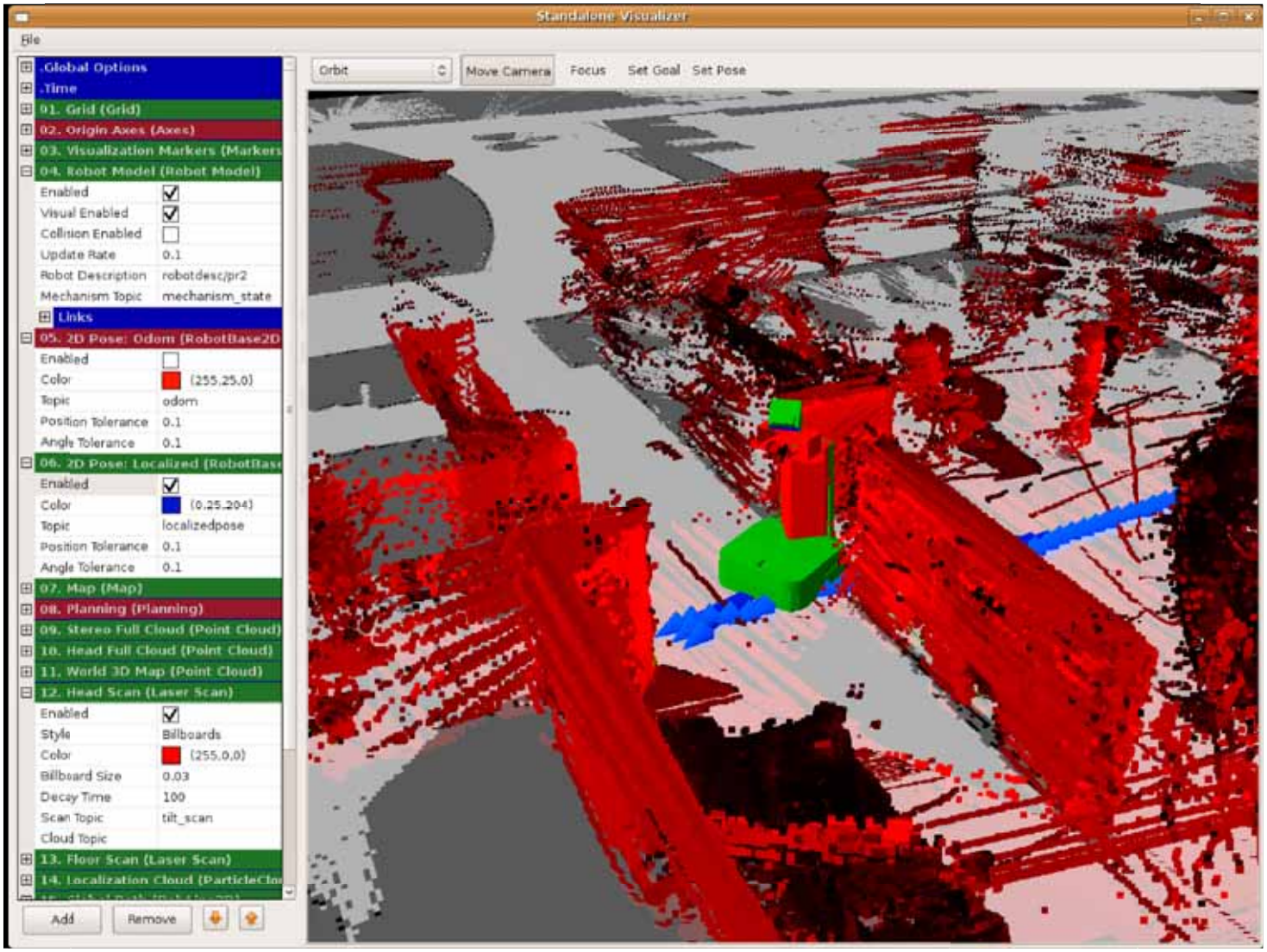
ROS Visualizations







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ROS Algorithms

- Large and Growing Library
- 2D+ Navigation stack
  - Laser-based localization
  - Graph-based planning library
- Manipulation stack
  - Sampling-based planning library
  - Grasp-planning code
- Perception
  - Visual odometry
  - 3D processing pipeline

ROS Status

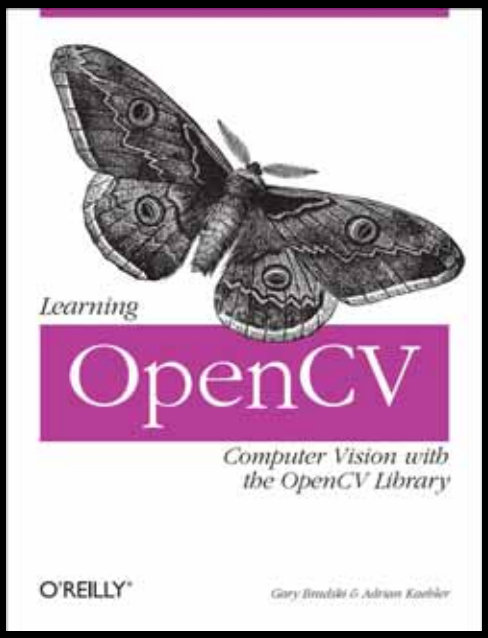
- Under active development
  - no release yet
- Join the mailing list to be notified of news and releases
  - http://ros.sourceforge.net

Supported Open Source Libraries

- Player: 2D Navigation/planning
- ROS: mobile manipulation + distributed computing
- OpenRAVE: mobile manipulation, planning
- OpenCV: computer vision/machine learning
- TREX: High-level planning and execution
- ManyEars: sound source localization

OpenCV

- Willow Garage is actively enhancing OpenCV for robotics
- ROS hooks available
- New book out



OpenCV:

- Full function computer vision software
- Statistical machine learning
- Free for commercial use

General Image Processing Functions

Image Pyramids

Geometric descriptors

Segmentation

Camera calibration, Stereo, 3D

Features

Transforms

Utilities and Data Structures

Tracking

Machine Learning:
- Detection,
- Recognition

Fitting

Matrix Math

Willow Garage

Open Source Perspectives

- Academic
  - Faculty
  - Students
  - Administration
- Industry
  - Business model matters
  - Ex: Intel, Disney
- Government

Willow Garage

Acknowledgements

- Stanford STAIR Project
  - esp. Morgan Quigley and Andrew Ng
- Willow Garage
  - esp. Eric Berger and Keenan Wyrobek


Willow
Garage


Willow
Garage

- OMG Santa Clara Meeting (2008/12/09) -

QoS Issues on the Robot Component Execution Environment

Beom-Su, Seo.
Seung-Woog, Jung
Intelligent Robot Control Research Team
u-Robot Research Division
ETRI 한국전자통신연구원
Electronics and Telecommunications Research Institute

robotics/2008-12-16

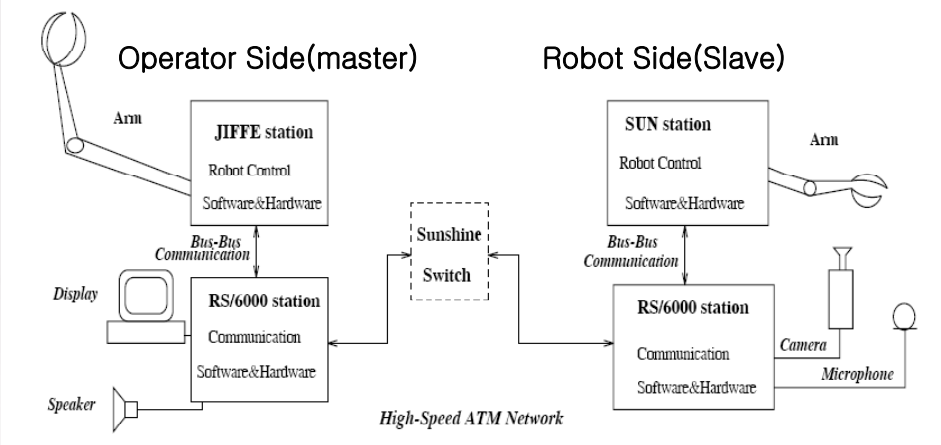
Contents

※OPRoS : Open Platform for Robotic Services

QoS in Robotics

A telerobotics application examples

- Very strict timing constraints

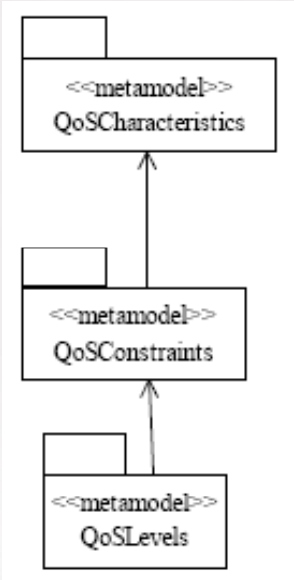


Klara Nahrstedt, Jonathan Smith, QoS Negotiation in a Robotics Environment, in *Proc. of Workshop on Distributed Multimedia Applications and QoS Verification*

UML QoS Meta Model

UML QoS Meta model

- QoS Characteristics
  - "represents quantifiable characteristics of services"
- QoS Constraints
  - "limits the allowed values of one or more QoS Characteristics"
- QoS Levels
  - "represents the different modes of QoS that a subsystem can support"

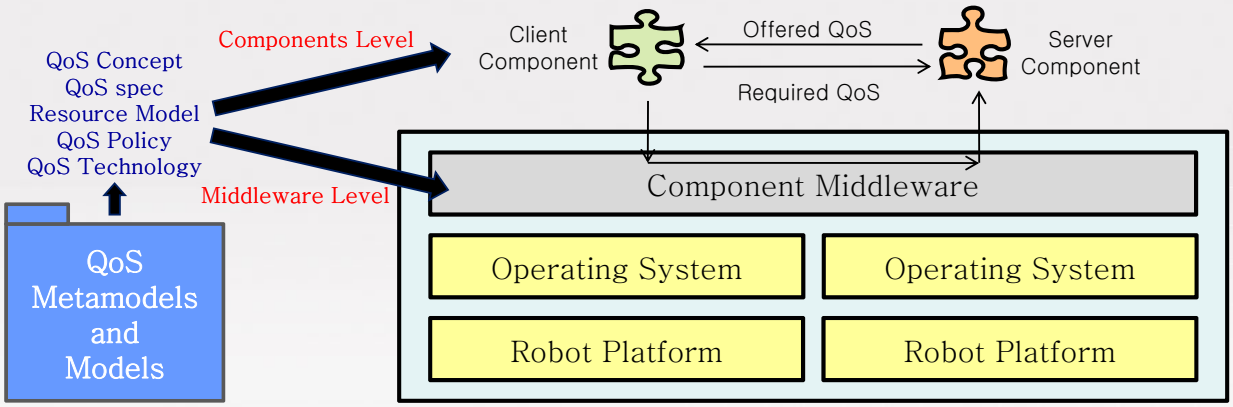


* UMLTM Profile for Modeling Quality of Service and Fault Tolerance Characteristics and Mechanisms Specification", Version 1.1, 2008/04/08, OMG

OPRoS QoS Technology

QoS Technology in Distributed Environment for Robotics

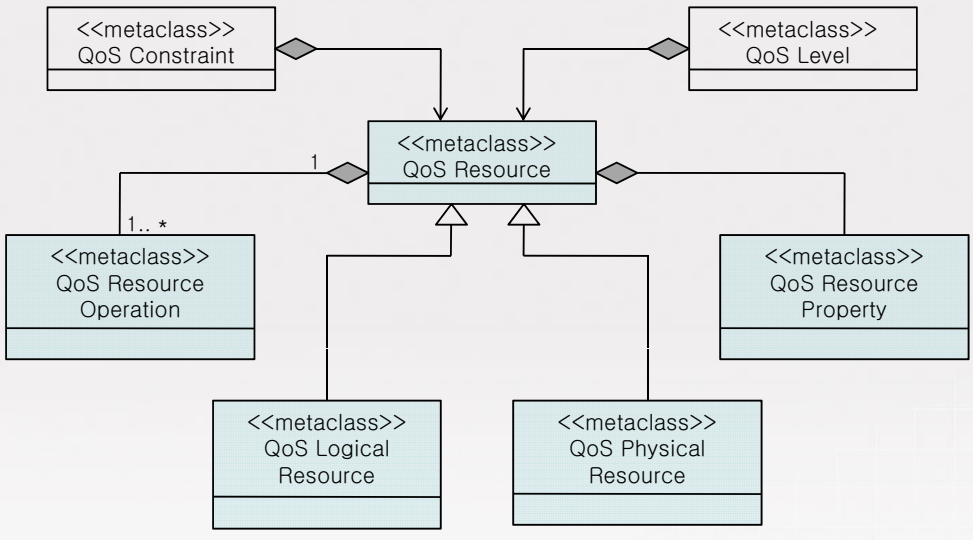
- Metamodel/Model and QoS Specification for End-to-End QoS
- QoS Supporting Technology (How to guarantee QoS)



※OPRoS : Open Platform for Robotic Services

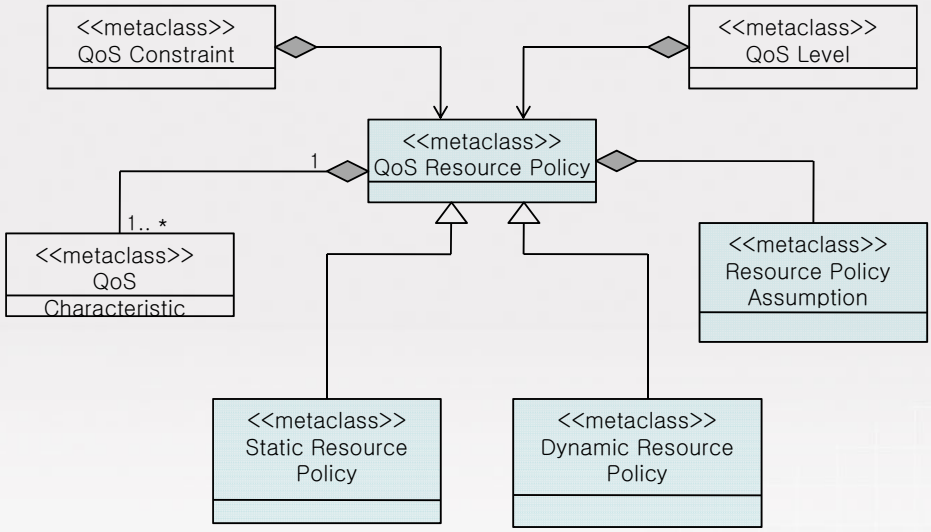
OPRoS QoS Meta Model(1)

Resource Metamodel



OPRoS QoS Meta Model(2)

■Resource Policy Metamodel



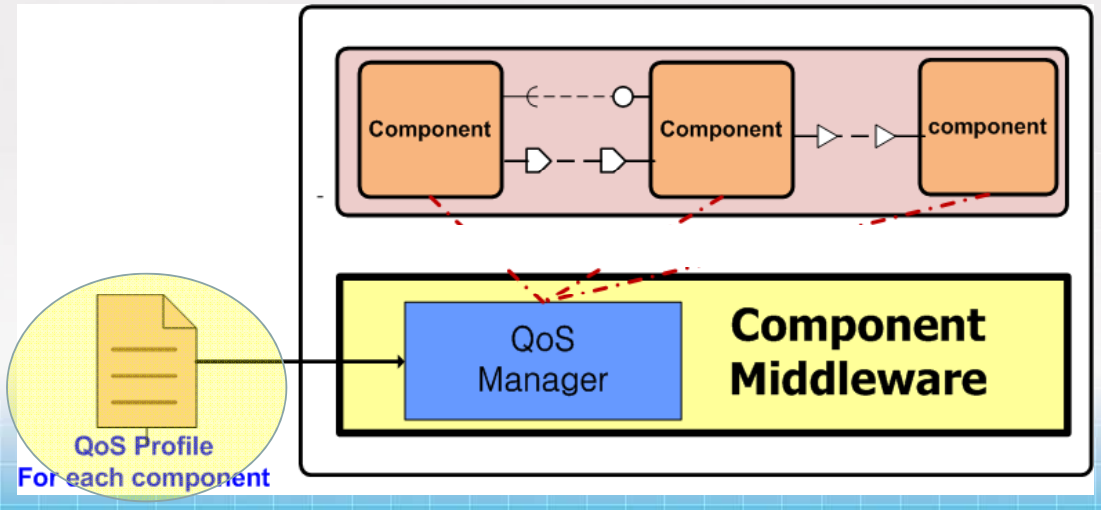
OPRoS QoS Meta Model(3)

- QoS Characteristics in consideration of robots

Category	Description	Such as…
Performance	Characteristics to express the performance requirements	Execution Time, Response Time, Completion Time, Throughput, Jitter, Blocking Time, Waiting Time, Transfer Rate, Transfer Delay, Period, Frequency, Recognition Rate, Acceptance Ratio, Success Ratio, Efficiency, Data Loss Rate, Settling Time, Overshoot, Undershoot, Velocity, ,Acceleration, Torque, etc.
Reliability	Characteristics to express the reliability requirements	Failure Rat, Mean Time To Failure, Mean Time To Repair, Mean Time Between Failure, Lifetime, etc.
Accuracy	Characteristics to express the accuracy requirements	Resolution, Steady State Error, Backlash, Error(Target vs. Observed), Accuracy, etc.
Demand	Characteristics to express the operation requirements	Resource Utilization, Memory Requirement, Storage Requirement, Bandwidth Requirement, Power, Energy, Operating Voltage, Operating Current, Operating Temperature, Operating Humidity, Operating Pressure, Operating Angle, etc.

QoS Standard Issues

- OMG QoS Profile
  - Too general, not sufficient in robotic
  - Need to be enhanced and updated for robotics
- The possible standardization activities in the infrastructure WG
  - Establish the QoS profile for the robot component



- OMG Santa Clara Meeting (2008/12/09) -

Fault-tolerance Issues on the Robot Component Execution Environment

Seung-Woog, Jung
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u-Robot Research Division

ETRI 한국전자통신연구원
Electronics and Telecommunications Research Institute

robotics/2008-12-17

Contents

- Faults in Robotics
- Fault Tolerance Architecture
- Fault Tolerance Standard Issues

Faults in Robotics

- Fault
  - deviation from the expected behavior
- Fault Detection
  - the process of determining that a fault has occurred
- Fault Recovery
  - the process of recovering the fault
- Fault Tolerance
  - Fault Detection and Fault Recover

Faults in Robotics

- Date II
  - CMU Field Robotics Center(FRC)
  - explored the Mt. Spurr (Aleutian Range, Alaska) volcano (1994)
  - High-temperature, fumarole gas samples are prized by volcani c science

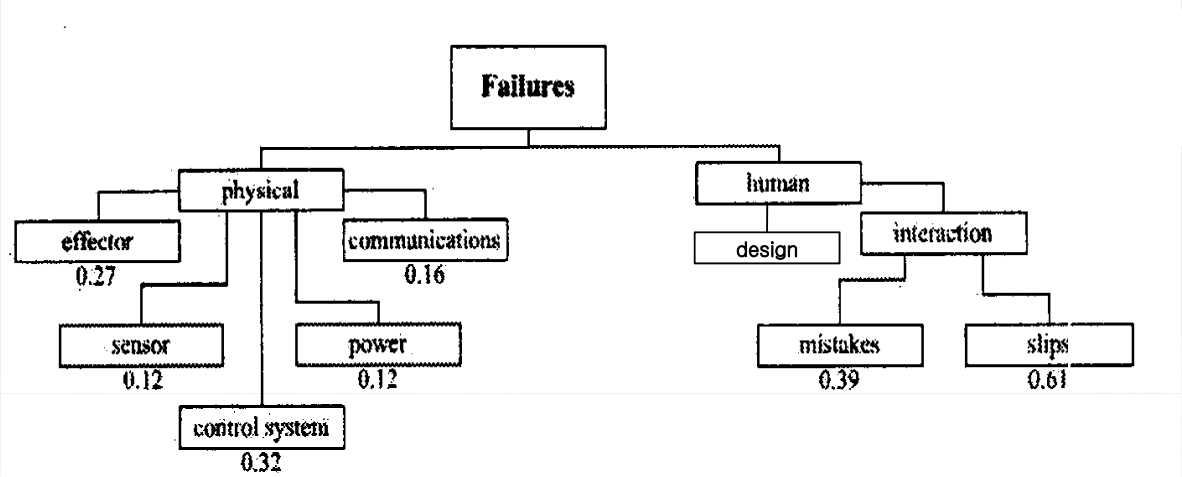
- Spirit
  - NASA's Mars Exploration Rover (Jet Propulsion Laboratory)
  - solar-powered rover

Faults in Robotics

- Service Robots
  - Human Task Support, Entertainment, Guiding
  - In faults : may behave in an unpredictable or dangerous manner
  - detecting and recovering from faults : improve the performance of the robots

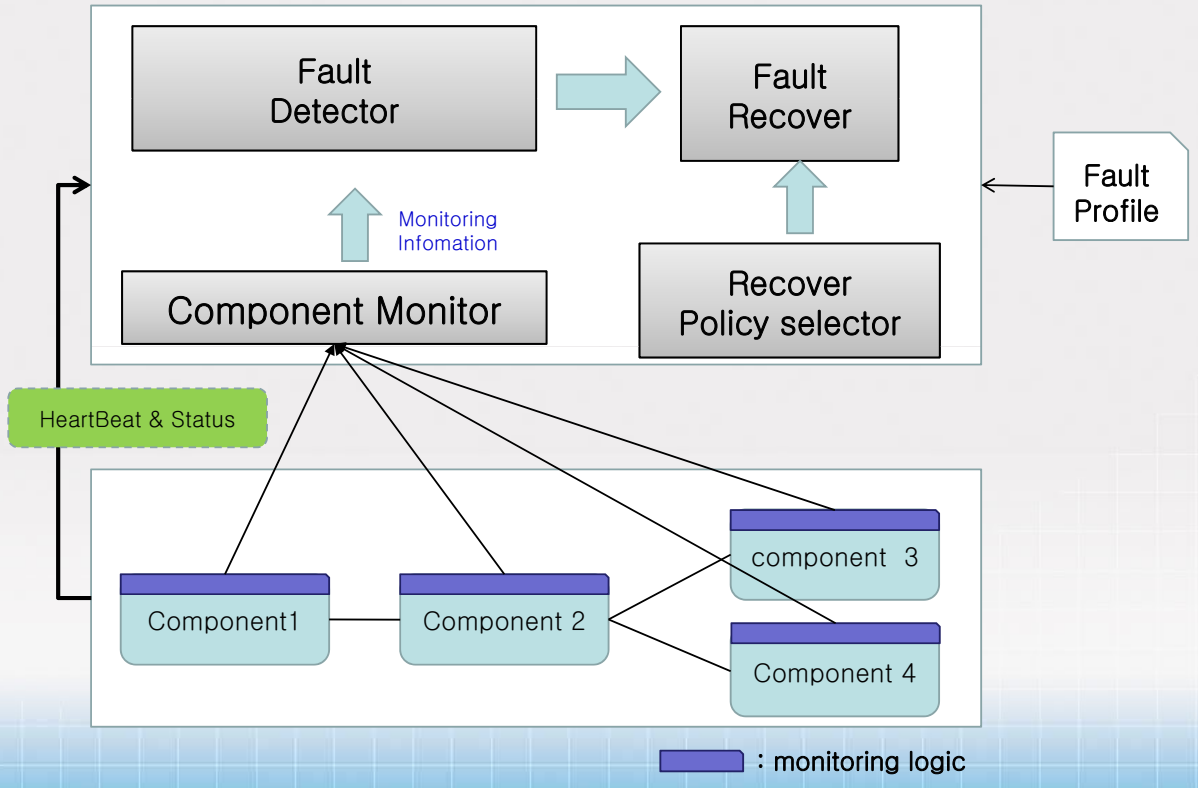
Faults in Robotics

- Faults Taxonomy



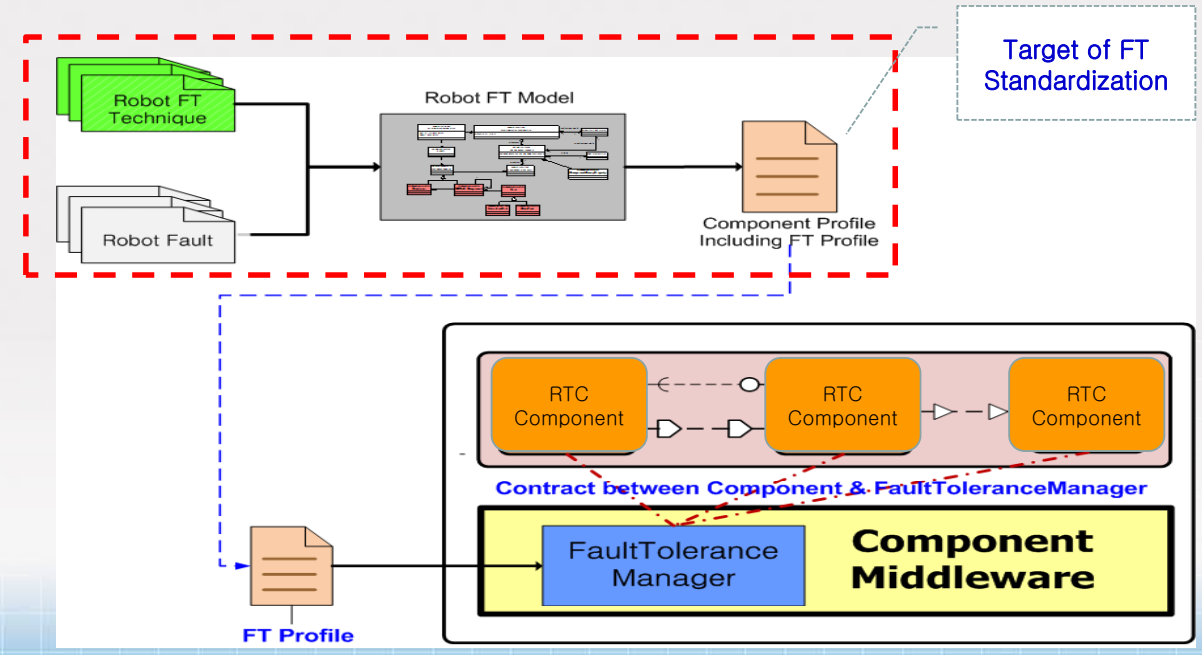
J. Carlson, R. R. Murphy, and A. Nelson, "Follow-up Analysis of Mobile Robot Failures," IEEE Int'l Conf. on Robotics & Automation, pp. 4987-4994, 2004.

Example of Fault Tolerance Architectu



Fault Tolerance Standard Issues

- FT standardization activities
  - Establish the FT Model and profile for the RTC components



Issues on RTC Directory Service

Kang-Woo Lee

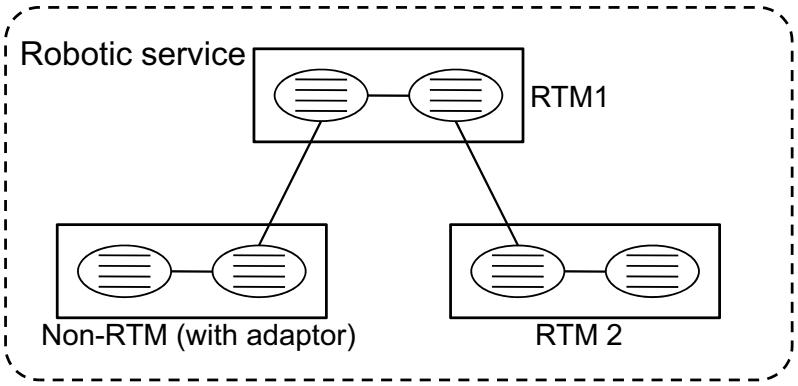
u-Robot Server Research Team
ETRI, Korea

RT-Component (RTC) Specification

- An OMG Standard on robotic components and their lifecycles
  - First standardization on RTCs and RT-Middlewares (RTMs)
  - Achieves the portability of robotic components
  - A RTC can be run on any RTMs (of same PSM)
- A reference implementation is available
  - OpenRTM-aist (ver. 0.4.2, CORBA-PSM, open source)

What is the next step of the RTC?

- A candidate would be “Interoperability of RTMs”
  - RT-components of *different RT-Middlewares* can work together to provide a robotic service
  - Moreover, they can interoperate with non-RTM (e.g. MSRS, Players/Stage, OPRoS, etc.)

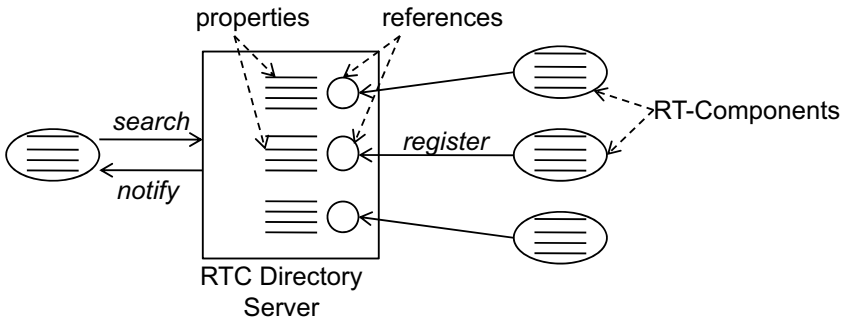


Interoperability of RTMs

- Why is it important?
  - Basic infrastructure for “Multi-Robot Collaboration”
  - More advanced and intelligent robotic services
    - Services by combining multiple robots (of different capabilities)
    - Ubiquitous robotic services (RT + Ubiquitous devices)
- Key considerations
  - *How to search appropriate RTCs running at diverse RTMs?*
  - How to combine them into an robot application
- The second one is partially covered by RTC specification (if the runtimes use a same PSM)
  - Standard on communication protocol is crucial (e.g. IIOP)

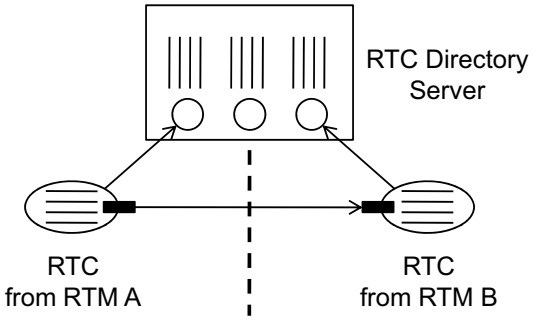
RTC Directory Service

- Manage the references and properties of running RTCs
  - RTC registration/unregistration
- Search the appropriate RTC based on
  - RTC identifier, and/or
  - RTC properties
- Notified upon the changes on target RTCs



Why “RTC Directory Service”

- A step toward “Interoperation of RTM”
  - Clients can search appropriate RTCs from different RTMs and weave them to build applications
  - Inter-RTC Directory lookup protocol enables to combing RTCs from a larger geographical area



Why "RTC Directory Service" (Cont'd)

- Provide "property-based RTC search" without accessing remote RTCs directly
  - Enable power and easy search method
  - Save unnecessary communications during the search
- Enable clients to keep track of their target RTCs
  - Clients get notified when the status of the RTCs are changed

query string:
`location='Room L89' && comp_id='Camera' && type='robot'`

means:
All camera components in any robot located at the 'Room L89'

matcher string:
`location='Room L89' && comp_id='Camera'`

means:
Notify me whenever a camera component at 'Room L89' is registered or unregistered

Current Status

- No relevant specification in Robotic DTF
- OpenRTM-aist provides its own directory service
  - Dependent on the CORBA naming service
  - Only RTC references are registered (cf. Properties are kept in RTC itself)
  - Property-based search is not directly supported
  - Unlikely to interoperate with other RTC implementations, though they are also based on CORBA
- Related standard specifications in OMG
  - CORBA naming service
  - CORBA trader service

Summary

- Two considerations on “Interoperability of RTMs”
  - Searching right RTCs from diverse RTMs
  - Combining them into a robot application
- We proposed “*RTC Directory Service*” in order to address the first consideration
  - Manage the references to RTCs along with their properties
  - Provide a property-based search method to the clients

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Architecture Framework for Unmanned Systems (AFUS)

SAE/AS4 – JAUS - AIR5665

L. Rioux - THALES

Research & Technology

robotics/2008-12-19

The Thales picture

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Architecture Framework: A structure that supports the organisation and development of architectures for systems

What for ? To provide

- Objectives
- Rules
- Infrastructure

For the creation, the use of system architectures.

AFUS: Architecture **F**ramework for **U**nmanned **S**ystems

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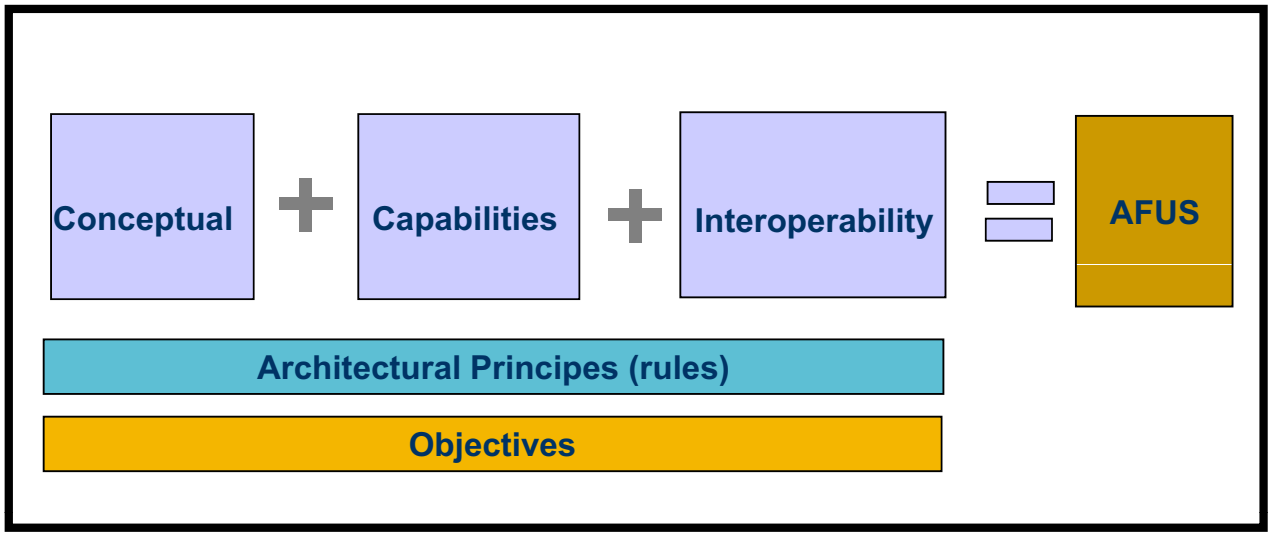
3 views:



- **Conceptual:** lexicon + concepts
- **Capabilities:** what the US can do in the conceptual terms
- **Interoperability:** various aspects of intereroperablity across US

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Objectives

Support for all classes of unmanned systems

Interoperable operator control units

Interchangeable/interoperable payloads

Interoperable unmanned systems

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Architectural Principles (1/2)

-Clear semantics:

It is clear from the representation what semantic are intented

-Orthogonality and Separation of concerns

Concept that two or more things will undergo changes independent of one another.

-Technology independence

Unmanned Systems will evolve for many years

-Platform independence

Many platforms exist (UGVs, UAVs). The framework must not flavor one platform over others.

-Mission independence

No assumed mission or restriction on types of mission that an US can carry out.

-Compute capability independence

No assumption about the number or type of compute capabilities available on the US (even far in the future, there will be unmanned systems with minimal compute capabilities)

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Architectural Principles (2/2)

-Operator Use Independence

No assumption about how the operator will, or should use an US.

-Communications Independence

No assumption should be made about how communications will be carried out by the unmanned system

-Autonomy Level independence

Unmanned Systems will exhibit varying levels of autonomy (as described in ALFUS).

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Conceptual view (1/6)

About nouns (what abilities unammned systems have)

Conceptual view is the collection of

-Terms,

-Definitions,

-Attributes

Required for the architecture framework

Concept	Topics
Identity	Identification, Authority, Safety and Autonomy
Composition	Platform/Vehicule, Communication Equipment, Sensors, Actuators and emitters.
Knowledge	Measurements, Detection, World model, Time, Space, Mechaninics and Energy
Actions	Decide, Plan, Team, Move, Acutation and environmental Effects

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Conceptual view (2/6)

Authority

- Is a right, delegated or given, to perform a specific action on a resource.

Safety

- The probability and severity of the mishap occuring together form risk

Autonomy

- Is an unmanned system's own ability of sensing, perceiving, analyzing, communicating, planning, decision-making and acting/executing to acheive its goal assigned.

Composition: answer to What am I ?

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Conceptual view (3/6)

Platform/vehicle

- Physical unammed systems have an infrastructure, or platform, that contains or supports the various devices, mechanisms and stores needed by the unmanned system.

Communication Equipement

- US sends and received signals (messages) to and from other US and C2 systems.

Sensors

- US senses the world around them throught a hardware interface, a sensor, which responds in specific ways to specific phenomena in the environment.

Actuators: is a mechanical device that can change shape in response in a signal

Emitters: is anything that can discharge a substance or radiation into the environment.

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Knowledge: what do I Know ?

Measurement:

- Is the processing of a raw sensor product within a customary unit which may include the combinaison of numerous raw of sensor products.

Detection: is a computational process resulting in cooreleation of raw of sensor product within an a priori ontology.

World model: is a logical representation of the real-world, internal to an US.

Time: is measured on a time scale using time tags, intervals, durations and frequencies [NELSON01]

Mechanics

- The field of physics called mechanisms deals with motion (kinematics) and forces that cause motion (kinetics or dynamics)

Energy

- US require energy and must carry consumable, stored energy for self contained operation

Actions: what can I do ?

Decide:

- is a final product of the specific mental/cognitive process of an individual or a group of persons/organizations which is called decision making.

Plan:

- Planning is the proces of « thinking » about the activities required to create a desired future on some scale.

Team:

- A team comprises any group of systems, and people linked in a common purpose.

Move: Mobility for an US to change its location or orientation under its own power.

Actuation: include articulation, manipulators and actuators Actuation is a chain of links connected at joints with angular or linear actuators.

Environment Effects alter the environement in some way.

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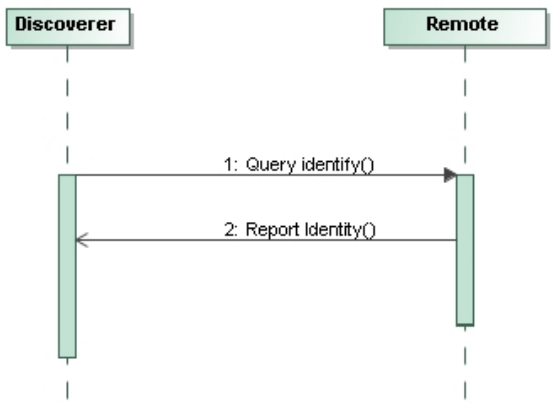
CAPABILITIES: What unmanned systems can do.

Discovery:

- Learning about nearby entities for the purpose of possible interactions.

  Include: dynamic discovery and their capabilities.



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Communication

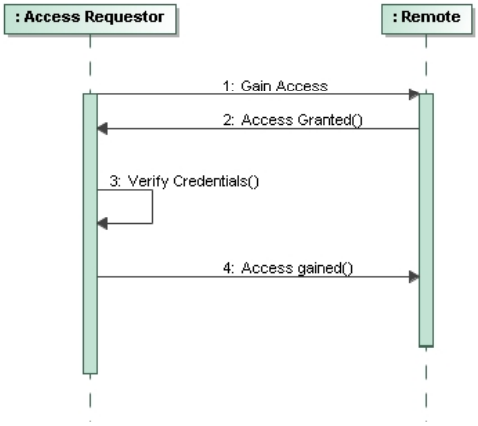
- Communication is about exchanging information with the world outside the unmanned system, as well as internally within it.

Access

Control capabilities include gaining, transferring and relinquishing access to systems and their capabilities

Example:

Gain Access



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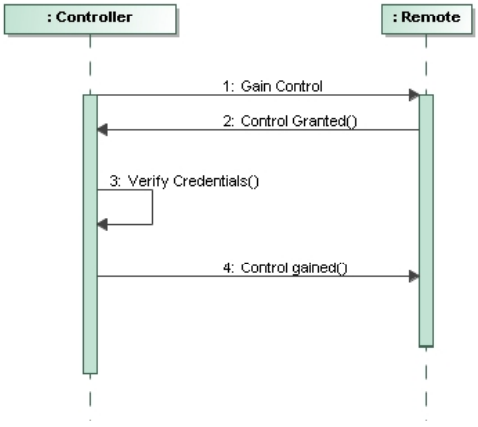
Control

- Control capabilities include gaining, transferring and relinquishing control of systems and their capabilities

Scenario:
gain Control



Platform

- US are embodied in a platform. A platform has a number of characteristics, including its physical dimensions, bays, sensing devices, hardpoints for paylaods, etc.

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Mobility

Mobility encompasses a variety of capabilities that permit an unmanned system to maneuver.

Each mobility capability focuses on different abstraction used to express the mobility instructions to the unmanned system.

- **Cordonate system**

  System for representing a Point in an n-dimensional space

- **Position:**

  A coordinate of a point is the components of a tuple of numbers represent the location of the point in a coordinate system.

- **Orientation:**

The orientation of a rigid body is the components of a tuple of numbers represent the rigid body's rotation about the various of axes in a specific Coordinate system.

- **Pose:** is the combination of Coordinates and Orientation in a specific Coordinate System.

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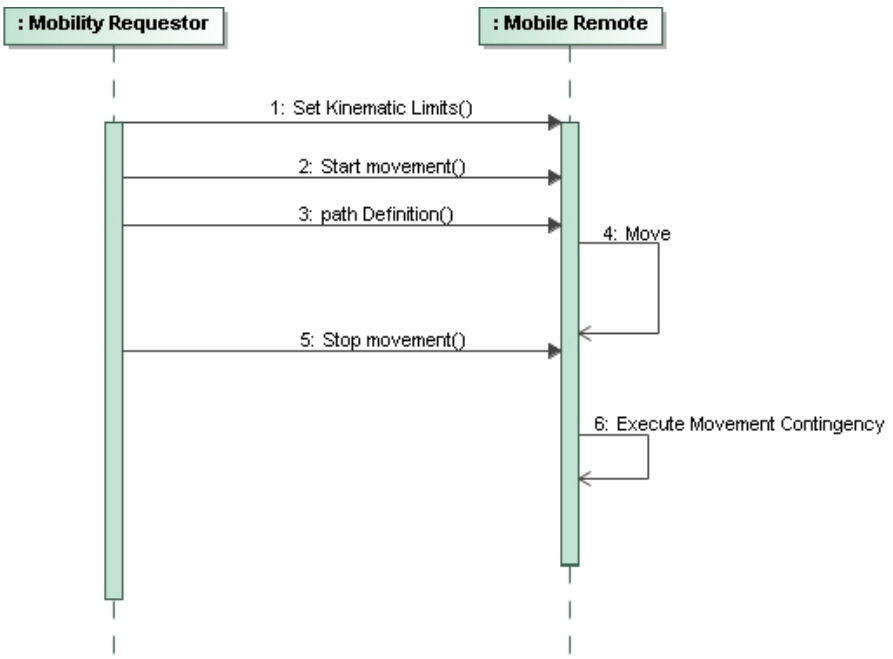
Scenario: Path Mobility



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Command

- Command is the ability to control and command one or more unmanned system.

Perception

- Perception is the « process of acquiring, interpreting, selecting and organizing sensory information » [Wake]

Effects

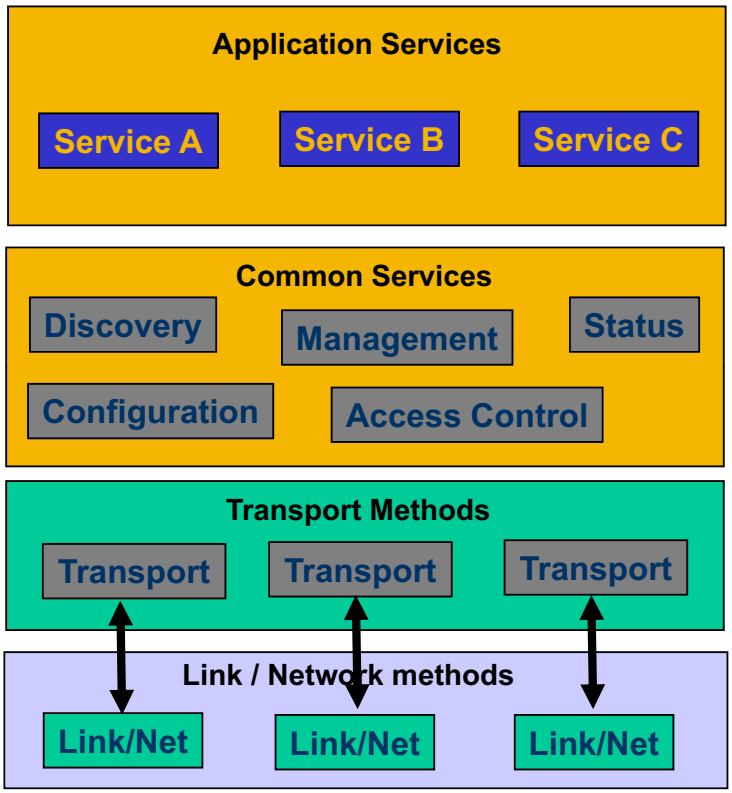
- Environement effects is an ability to alter or affect the environement in some way. This include grasping, pushing, and/or pulling objects, generating emissions such as heat, light, sound and subtances.

Interoperability view is the guidelines

The various aspects of interoperability across unmanned systems.

Standards facilitate and highly recommended:

- Physical data formats (including endianism, real number formats, variable lenght formats, alignment and padding.
- Logical message formats (including field semantics, complex structures and optional elements)
- Message exchange rules, including sequences and timeouts
- Physical form factors, electrical connections and wave forms.



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AFUS: help designer to design an US

OMG Standardisation:

- AFUS and UML:

- Conceptual view: Could be UML data types
- Capability: Could be UML sequence diagrams which specify the capabilities of the US
- Interoperability: UML composite structure and interfaces to model the interoperability.

➔ UML profile for AFUS.

RTC services: reused Common Services

Discovery, Configuration, Management, Status, Access Control

THALES

Infrastructure WG Progress Report

Noriaki Ando, AIST

robotics/2008-12-20

Topics

- Recruiting co-chair
- Purpose of Infrastructure WG
- Brief introduction to two special talk from ETRI
- Discussion

Purpose of infra. WG

- The purpose of the Infrastructure Working Group of the Robotics Domain Task Force is *to standardize fundamental models, common facilities, and middleware to support the development and integration of a broad range of robotics applications*.

Infrastructure WG Co-Chair

- Co-chairs
  - Saeha Kim (SNU, resigned)
  - Rick Warren (RTI, resigned)
  - Noriaki Ando (AIST)
- New co-chair candidate
  - Beom-Su Seo (ETRI)
- The DTF approval is required

Proposal and Issues

- The QoS and Fault-tolerance Issues on the Robot Component Execution Environment
  - Beom-Su Seo (ETRI) and SeungWoog Jung (ETRI)
- The issues on robot component directory service and repository contents
  - Kang-Woo Lee (ETRI)

QoS, FT and Directory service

- QoS
  - Communication between RTCs
  - Execution rate/priority etc..
- Interoperability
  - Device level, device profile
  - Communication layer, Interface level, CORBA/Web service
  - Directory service
- Directory service
  - No specification
  - CORBA naming/trading services are not enough

Next step

- RFI
  - Deployment and configuration
- Discussion
  - QoS, FT
  - Directory service
- Roadmap
  - RFP for new specification
  - RTF for improvement RTC model

- OMG Robotics DTF-
- Robotic Functional Services Working Group -

Meeting Report

- Santa Clara TC Meeting -

Santa Clara (CA, USA) – Dec 09, 2008

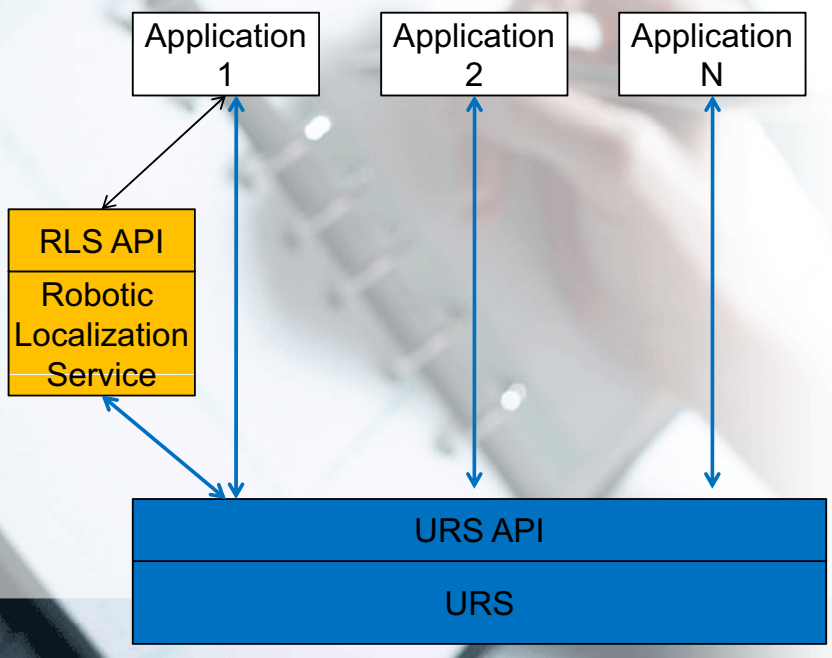
Functional Services WG Report 1

- What we want to do?
  - We want to have a standard to make Robot industry to be able to use any vendor's user recognition algorithm without the need of re-development.
- Why we need URS, when we have Localization service?
  - The entity and its id is not enough for what we are trying to do. (Re-development problem to adopt other vendor's user recognition and detection algorithm)
  - Same reason as the difference between the BioAPI and URS (see next page)

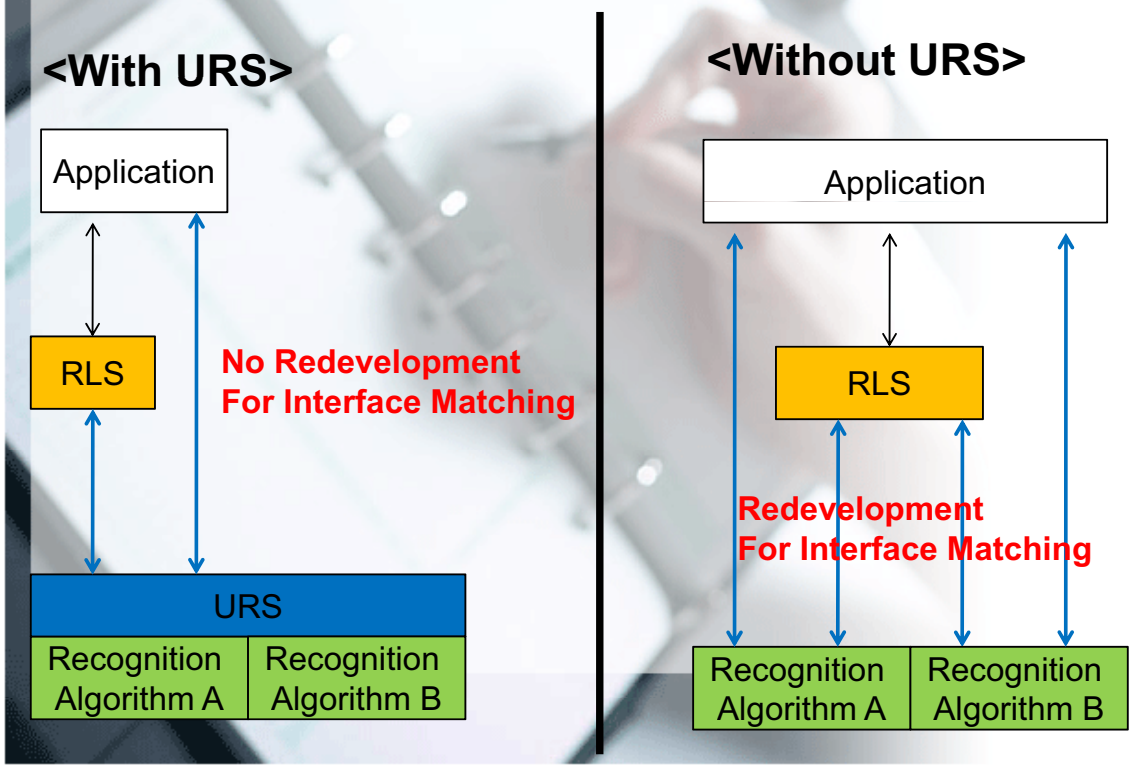
Functional Services WG Report 2

- Why not the existing standard, such as BioAPI?
  - We need unique robotic application environment.
    - BioApi needs controlled environments and favorable user.
  - We need to deal with higher level interface for robot application.
    - BioApi only deals with APIs inside the Biometric recognition.
  - We need to deal with the multiple user.
    - BioApi only deal with one person.
  - We need to deal with detection technology.
    - BioApi does not include interface for detection technology.
  - We need unique event handling. (for example, one person appeared or disapeared)
    - BioApi assumes that the person is always there.
  - We need unique error handling (for example, the distance is too far from the person, robot need to approach the person or ask the person to come closer.
    - BioApi does not include error handling interface, we need.

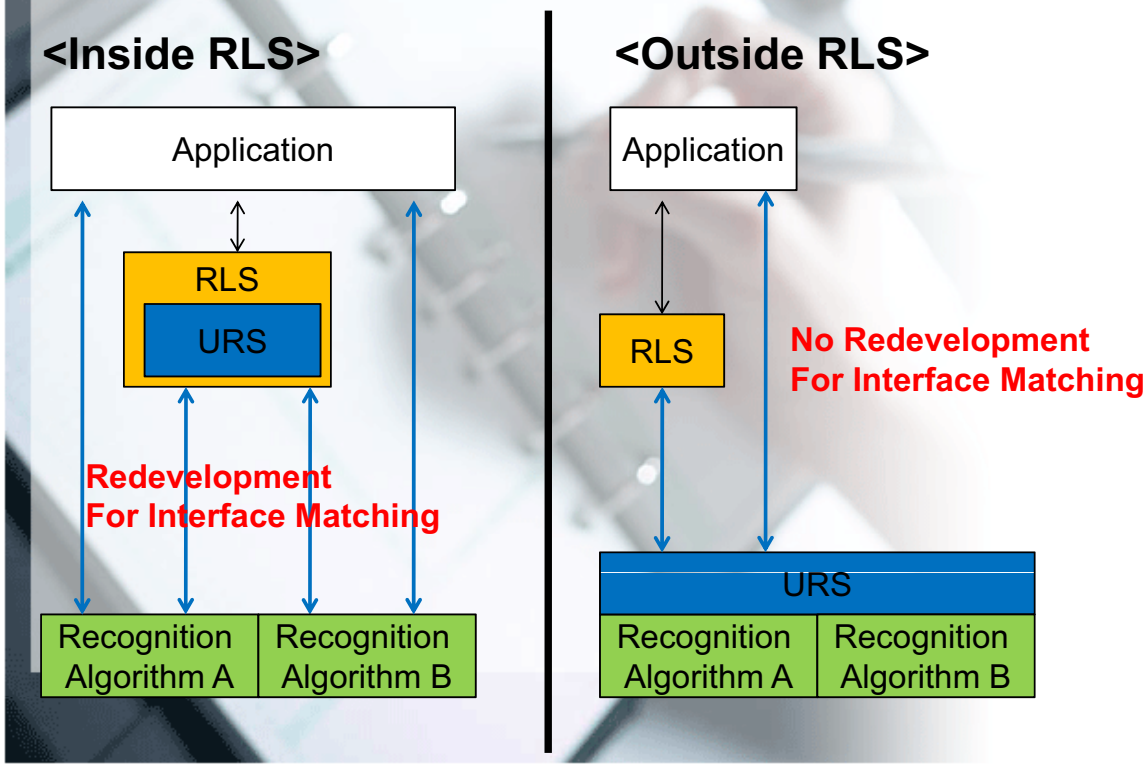
Relationship between URS and RLS



Why URS ?



What if URS inside RLS ?

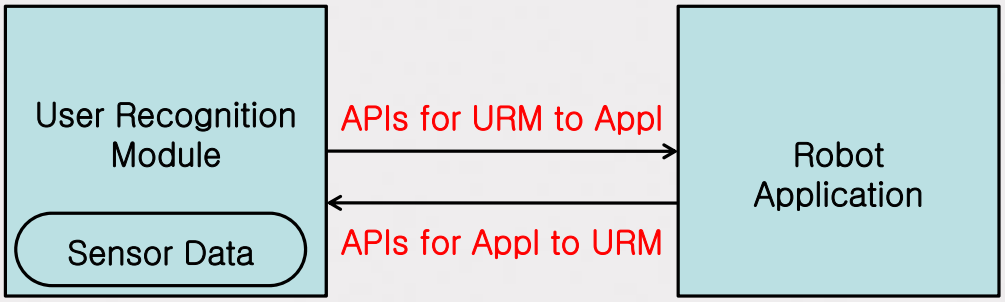


Roadmap

Item	Status	Washing ton D.C March-2008	Ottawa June-2008	Orlando Sep.-2008	Santa Clara Dec.-2008	Washing ton D.C March-2009	Europe June-2009
Human Robot Interaction Service	On-going	Discussion	1st review of RFP	cancel	2nd review of RFP and AB	Discussion between potential submitters	Initial submission

API examples for User Recognition Interface

The structure of the proposed system (1)



▪URM (User Recognition Module) is the basic module that performs user identification, such as face recognizer, speaker recognizer, user recognizer or human tracker based on biometric information, sound source localization and multi-modal recognizer (for example, voice and vision).
▪In this model, the information exchange protocols between URM and Robot Application are to be standardized.

When the URS-API is used?

- Command from Application to User Recognition Module
  - "Identify the person who have just asked to play a music"
  - "Where is your mother?"
  - "Who is calling me from the right hand side?"
  - "Who is that person visible from the camera image?"
- Event from User Recognition Module to Application
  - "We have found (possible person's ID with likelihood list) from the 60 degree direction"
  - "(possible person's ID with likelihood list) is calling you from 130 degree direction"
  - "(possible person's ID with likelihood list) has disappeared from our camera view"

Application to URM (1)

Enumeration

- int GetNumberOfUIM();
- UIMInfo GetUIMInfo(int nth);
  - Function for UIM Enumeration in the Identification System
- UIMInfo {
  - Int UIMID;
  - Int Media; (such as image, sound, distance, human sensor)
  - BOOL NeedEnrollment;
  - };
- BOOL Initialize()
- BOOL Destroy()
- Void SetProperties(UIMID, Properties p)
  - Property is used when certain information is to be set for a specific UIM
- Properties GetProperties(UIMID)
  - Get property information assigned for a specific UIM.

Application to URM (2)

Enrollment

- BOOL EnrollUser(UIMID, UserInfo);
  - Enrol process is assigned to the UIM, including user interface for enrollment.
  - The result indicates success or fail, using BOOL.
  - The registered data is managed by the UIM itself.
- EnrollInfo GetEnrollmentData(UIMID, UserInfo);
- EnrollInfoArray GetEnrollmentData(UIMID);
  - These two functions are used when the registered data is needed for backup etc.
  - The first one is used for separate data, and the second one is used for all user's data registered at the UIM.
- BOOL DeleteEnrollment(UIMID, UserInfo);
  - This is used to delete the registered data.

Application to URM (3)

Matching

- BOOL AddCandidate(UserInfoArray);
  - To pre-set the specific users as the matching candidate. In this case, the users need to be pre-registered.
- BOOL RemoveCandidate(UserInfoArray);
  - To remove the specific user from the matching candidate list.
- UserInfoArray GetCandidateList();
  - To get the user list, registered as the matching candidate.
- UserInfoArray MatchUser(UIMID);
- UserInfoArray MatchUser();
  - To perform the user identification.
  - This can give command for user identification to a specific UIM.
  - This can also give command to all UIM, and get the combined results.
  - When the user is more than one person, the return value is UserInfoArray (User ID with likelihood list and the position information may be transmitted.).

Application to URM (4)

- PositionInfo FindUser(UserInfo);
  - To find the specific user (if the user can be found, the position of that user can be returned) – even if the user is not found, the system may return the previous history of that user, such as “your mother has moved into the main bedroom five minutes ago”.
- UserInfoArray GetUserMap();
  - This returns the list of visible users, including the position info.

Event Control

- Void SetEvent(UIMID, EventInfo, CallBack, OnOff);
  - This set or reset a certain Event.
  - This is the self-controlled Event of UIC to Application, without the request of Application.
  - It should be noted that only the pre-set Event may happen (pre-set Event : Events that was set by Application by “SetEvent”.)
- Void RaiseEvent(EventInfo);

URM to Application (1)

Event List

- SoundDetected
  - The direction of the sound is detected
- MotionDetected
  - The position of the motion is detected
- PersonFound
  - A user is found, but not identified
- UserIdentified
  - The user is identified
- UserProbabilityChanged
  - The likelihood of the user ID has been changed
- SpecificUserAppeared
  - The specific user that Applciaton has requested, has appeared.

URM to Application (2)

- User Identification Module needs events for user disappearance, since it has the user tracking feature.

- PersonDisappeared
  - A user has disappeared (including multiple user cases)
- SpecificUserDisappeared
  - Specific user that Application requested, has disappeared.

- Separate Event may be needed according to the relative position between the user and the robot
- PersonInsideArea
  - When somebody approached within certain distance from the robot.

URM to Application (3)

Events more specific than "PersonFound", may be needed.

- FaceDetected
  - The user's face is detected, but not identified (including the position information)
- VoiceDetected
  - The user's voice is detected, but not identified (including the position information) – this is when the speech/non-speech discrimination is possible.

Auxiliary information of the user recognition

- UserGenderClassified
  - User is not identified, but the gender is classified.
- UserAgeClassified
  - User is not identified, but the age is classified.

Robotic Localization Service WG Report

2008.12.09 Shuichi NISHIO

Santa Clara Meeting

- 08/Dec 15:30-18:00
- 09/Dec 09:00-11:00
- 10/Dec 09:00-12:00 (added)

Topics

- 48 issues raised so far
  - most issues are typos
  - several issues require discussion
  - most issues are solved until now
- Two remaining issues to be discussed
  - Definition of orientation in common data formats
  - XML-PSM definition and RoLo Element local naming issue
    (new isssue raised)
- Continue discussion tomorrow morning

Planned schedule

- 2008.12.30: Revised specification & initial report
  (for issues repoted until 2008.12)
- 2009.01: First distribution of report
- 2009.02: First vote
- 2009.02.23: Comments due
- 2009.03.01: Revised documents & reports
- 2009.03: Second report distribution & vote
  (if necessary)
- 2009.03.23-27: Washington D.C. Meeting
- 2009.05: Document upload to OMG server
- 2009.06: Architecture Board

Dr. Lee will be the editor

Contact Report:

ISO / TC 211 Tsukuba Meeting

2008.12.09

NISHIO Shuichi

ISO/TC 211 meeting

Location: Tsukuba, Japan
Date: 2008/12/01 - Introduced

Two invited talks on RLS activity

- WG10 meeting (PT19155)
- Workshop standards in action

WG10: Ubiquitous Public Access

- 19151: Geographic Information - Logical Location Identification Scl
  Leader: HaeKyong Kang
- 19154: Ubiquitous Public Access
  Leader: Prof. Ki-Joune Li
- 19155: Geographic information - Place Identifier (PI)
  Leader: Dr. Keisuke Uehara

Other actions related to RLS

- 19143: Geographic information - Filter encoding
  ISO/CD 19143 (N2529) -> DIS to be released

ISO/TC184/SC2 Software Standardization

Why, What, How?

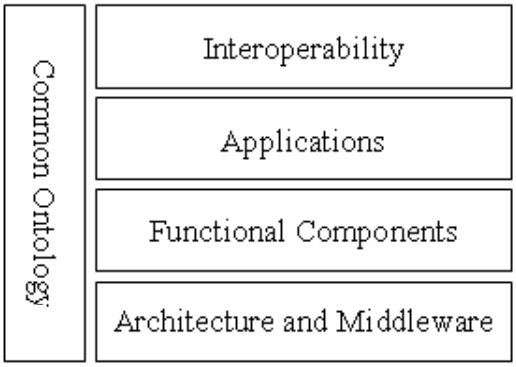
Hyun Kim, Ph.D.
hyunkim@etri.re.kr

Why S/W standards ?

- Service robots have various application domains and technological fields.
  - A toy robot in home to a space robot in Mars
  - Hardware control to ubiquitous computing
- S/W modularity and standards make it possible to develop service robots cheaper, faster and better.
  - Common features and customized development
  - Modularity, Reusability, and Reliability
- Let's get started now to take the initiative.
  - After the market is fully open, it may be too late to standardize.

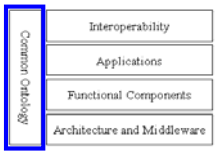
What S/W standards are needed?

- Common Ontology
- Architecture and Middleware
- Functional Components
- Applications
- Interoperability



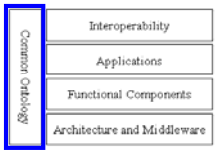
- Just my opinion
- Divide into 5 areas

Common Ontology



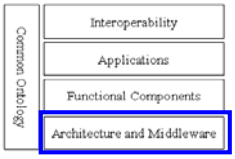
- Terminology, Representation method (notion) and Common ontology
  - Terminology (SC2/PT3)
  - Representation method (SC4/EXPRESS, OMG/UML)
  - Ontology

Common Ontology



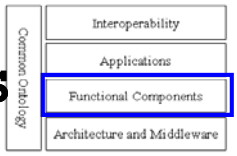
- Terminology, Representation method (notion) and Common ontology
  - Terminology (SC2/PT3)
  - Representation method (SC4/EXPRESS, OMG/UML)
  - Ontology
- *Common ontology* is a formal specification of a shared concept and relationships that can exist for software design and development of service robots.
  - Formal: The ontology should be machine readable.
  - Shared: The ontology should capture consensual knowledge accepted by the communities.
  - Conceptualization (Concept and relationships) : An ontology is an abstract model by having identified the relevant concepts of those phenomena.
  - Semantic network for domain concept

Architecture and Middleware

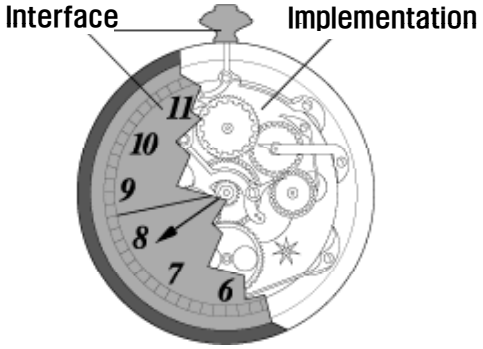


- While the *software architecture* is related to a high-level design principal and a generic model including software design, analysis, functional specification and integration, the *middleware* is a kind of software platform based on the architecture.
  - Architecture, communication and integration framework (SC5)
  - A component model (OMG/RTC)

Robotic Functional Components



- The *robotic functional components* specify the common interfaces of service robot's core functions such as human-robot interaction, navigation and manipulation.

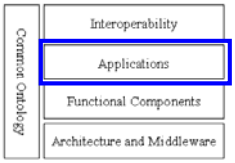



```
public interface IWatch {
    public void setTime(Time t);
    public Time getTime();
    …
}

public interface Navigation {
   public Map getNavigationMap();
   public AOperation navigate(Path[] path);
   public void stop (String details);
    …
}
```

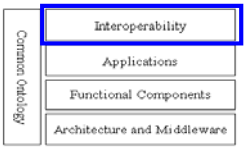
Interface is the abstraction of internal implementation

Applications



- The *applications* deal with robot tasks executed by different components
  - Task composition and execution model
    - Includes the evaluation model for fault tolerance and robustness
  - Robot programming language
  - Development tools and facilities

Interoperability



- When the robot is used not only as standalone one but also as one of autonomous devices together with other devices in our daily life, the *interoperability* becomes important.

- *Interoperability* deals with seamless integration and communication between robots, environments, and service/contents.
  - Interoperability between robots with different models
  - Interoperability between robots and the environment including ubiquitous sensor networks
  - Interoperability between robots and different kinds of service/contents

Thank you

Contact Report

Prof. Makoto Mizukawa
mizukawa@sic.shibaura-it.ac.jp
Shibaura Institute of Technology
Tokyo, Japan

ORiN: Current Status

- Offer from ISO/TC 184/SC 5 (24th, June,2007)

  Architecture, communications and integration frameworks, has drawn our attention to possible overlaps with their work item ISO 20242, Industrial automation systems and integration - Service interface for testing applications, and potentially other SC 5 projects. Also the former robot companion standard ISO 9606 may be relevant to the RAPI proposal.

- Japan domestic committee (14th, Nov,2008) of the SC5 approved to add ORiN specification to ANNEX of ISO20242 Part 4.

Conferences and Exhibitions

- 2008 IEEE/RSJ International Conference on Intelligent Robots and Systems (**2008 IROS**) **http://www.iros2008.org/**
  - Acropolis Conf. Center, Nice, France
  - Sep 22-Sep 26 2008
- 2008 International Conference on Control, Automation and Systems (**ICCAS 2008**) **www.iccas.org**
  - COEX in Seoul, Korea
  - October 14 - 17, 2008

Conferences and Exhibitions

- **IFR International Conference on Robotics**
  - COEX in Seoul, Korea
  - October 14 - 16, 2008
- **ROBOT WORLD2008**

  http://www.robotworld.or.kr/2008/eng/main.asp
  - COEX in Seoul, Korea
  - October 15 - 19, 2008
- **RoboDevelopment**

  www.robodevelopment.com
  - Santa Clara Convention Center, Santa Clara, CA
  - November 19-20, 2008

RWRC (Real World Robot Challenge)
Tsukuba Challenge, Nov 20-22, 2008

- 1km Navigation in Natural environment on the pedestrian road in Tsukuba City
- No traffic control to pedestrians and bicycles
- New features in 2008
  - Round trip
  - Passing
  - bi-directional traffic
- Only 1 team completed the mission.

2008 Tsukuba challenge
Team Mizukawa Lab.

http://www.robomedia.org/challenge/index.html

Coming Conferences

- 2009 IEEE International Conference on Robots and Automation (**ICRA2009**)
  http://www.icra2009.org/
  - Kobe, Japan
  - May 12 - 17, 2009

Robotics-DTF Plenary Meeting
Wrap-up Session

9th, December, 2008

Santa Clara, CA, USA

Hyatt Regency Santa Clara

Document Number

robotics/2008-12-01 Final Agenda (Tetsuo Kotoku)
robotics/2008-12-02 Ottawa Meeting Minutes [approved] (Su-Young Chi and Geoffrey Biggs)
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Document Number (cont.)

robotics/2008-12-13 Special Talk: Real World Robot Challenge in Tsukuba (RWRC2008) (Takashi Tsubouchi)

robotics/2008-12-14 Special Talk: A Lightweight Message -Driven Component Framework for Robotic Systems (Saku Egawa)

robotics/2008-12-15 Invited Talk: ROS: A new development (Brian Gerkey)

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robotics/2008-12-20 Infrastructure WG Progress Report (Noriaki Ando)

robotics/2008-12-21 Robotics Functional Services Working Group Meeting Report (Su-Young Chi)

robotics/2008-12-22 Robotic Localization Service WG Report (Shuichi Nishio)

AIST

Document Number (cont.)

robotics/2008-12-23 Contact Report: ISO/TC211 Tsukuba Meeting (Shuichi Nishio)

robotics/2008-12-24 Contact Report: ISO/TC184/SC2 Software Standardization (Hyun Kim)

robotics/2008-12-25 ORiN: Current Status (Makoto Mizukawa)

robotics/2008-12-26 Closing Presentation (Tetsuo Kotoku)

robotics/2008-12-27 Next Meeting Preliminary Agenda - DRAFT (Tetsuo Kotoku)

robotics/2008-12-28 DTC Report Presentation (Tetsuo Kotoku)

robotics/2008-12-29 Ottawa Meeting Minutes - DRAFT (Geoffrey Biggs and Yeonho Kim)

Call for volunteer

- Robotics-DTF Co-chair
  - Laurent Rioux (Thales)
  - Young-Jo Cho (ETRI)
- Robotic Infrastructure WG Co-Chair
  - Beom-Su Seo (ETRI)
- Robotic Localization Service WG Co-Chair
  - Jaeyeong Lee (ETRI)

Organization

Robotics-DTF
- Laurent Rioux (Thales)
- Tetsuo Kotoku (AIST, Japan)
- Young-Jo Cho (ETRI, Korea)

Steering Committee — All volunteers

Publicity Sub-Committee
- Abheek Bose (ADA Software, India)
- Call for Volunteer

Contacts Sub-Committee
- Makoto Mizukawa (Shibaura-IT, Japan)
- Call for Volunteer

Technical WGs

Infrastructure WG
- Noriaki Ando (AIST, Japan)
- Beom-Su Seo (ETRI)

Robotic Functional Services WG
- Soo-Young Chi (ETRI, Korea)
- Hyunsoo Kim (Samsung, Korea)
- Shuichi Nishio (JARA/ATR, Japan)
- Toshio Hori (AIST, Japan)

Robotic Data and Profiles WG
- Bruce Boyes (Systronix, USA)
- Call for Volunteer

Robotic Localization Services WG
- Jaeyeong Lee (ETRI, Korea)
- Yeon-Ho Kim (Samsung, Korea)
- Shuichi Nishio (JARA/ATR, Japan)

Next Meeting Agenda

Plan 1

March 23-27 (Washington DC, USA)

Tuesday:

Steering Committee (morning)
WG activity [Parallel WG Session] (am)
Robotics-DTF Plenary Meeting (pm)
- •Guest and Member Presentation
- •Contact reports

Wednesday:

RLS-FTF Meeting
WG activity follow-up **[if necessary]**

Next Meeting Agenda

Plan 2

March 23-27 (Washington DC, USA)

Monday:

Steering Committee (morning)
User Recognition Service RFP 3rd Review and Voting(am)
WG activity (pm)

Tuesday:

WG activity (am)
Robotics-DTF Plenary Meeting (pm)
- •Guest and Member Presentation
- •Contact reports

Wednesday:

WG activity follow-up **[if necessary]**

Thursday:

User Recognition Service RFP 3rd Review and Voting(am)

Special Talk Candidates

- GearBox Project
  Dr. Geoffrey Biggs
- Robotics Project in Japan
  Prof. Sato (University of Tokyo, Japan)
- RUPI Project
  Dr. Hyun Kim (ETRI)

Attendee (29 participants)

- Akihiko Ikezoe (SEC)
- Beom-Su Seo (ETRI)
- Brian Gerkey (Willow Garage)
- Geoffrey Biggs (AIST)
- Hong-Seong Park (KNU)
- Hugues Vincent (Thales)
- Hyun Kim (ETRI)
- Hyun-Soo Kim (Samsung)
- Itsuki Noda (AIST)
- Jeong-Seok Kang (KNU)
- Kenichi Wada (Hitachi)
- Kim Siman (Tobesoft)
- Kyuseo Han (ETRI)
- Laurent Rioux (Thales)
- Makoto Mizukawa (Shibaura-IT)
- Miwako Doi (Toshiba)
- Noriaki Ando (AIST)
- Saku Egawa (Hitachi)
- Seung –Woog Jung (ETRI)
- Shuichi Nishio (JARA/ATR)
- Soo-Hee Han (KNU)
- Sung-Soo Kang (KOSTA)
- Su-Young Chi (ETRI)
- Takashi Suehiro (AIST)
- Takashi Tubouchi (Univ. of Tsukuba)
- Takeshi Sakamoto (Technologic Arts)
- Tetsuo Kotoku (AIST)
- Toshio Hori (AIST)
- Yeon-Ho Kim (Samsung)

Robotics Domain Task Force Preliminary Agenda ver0.0.1 **robotics/2008-12-27**

OMG Technical Meeting - Washington DC, USA -- Mar. 23-27, 2009

http://robotics.omg.org/

		TF/SIG				
		Host	Joint (Invited)	Agenda Item	Purpose	Room
Monday: Robotics Plenary(am) and WG activites(pm)						
12:00	13:00					
13:00	18:00			Architecture Board Plenary		
14:00	18:00			Robotic Infrastructure WG (4h) - Noriaki Ando(AIST) and Beom-Su Seo (ETRI)	discussion	
				Services WG(4h): User Recognition Service RFP Meeting - Su-Young Chi (ETRI), Hyunsoo Kim (SamSung), and Toshio Hori (AIST)	discussion	
Tuesday: WG activities and Robotics Plenary						
9:00	9:45			Robotics Steering Committee	Arrangement	
10:00	12:00			Robotic UML Profiling Meeting (2h) - Laurent Rioux (Thales)	discussion	
				Services WG(2h): User Recognition Service RFP Meeting - Su-Young Chi, Hyunsoo Kim, and Toshio Hori	discussion	
12:00	13:00	**LUNCH**				
13:00	13:15	Robotics		Robotics-DTF Plenary Opening Session	Robotics plenary openning	
13:15	14:00	Robotics		**Special Talk: <Call for Presentation>** **- TBA**	presentation and discussion	
14:00	14:45	Robotics		**Special Talk: <Call for Presentation>** - **TBA**	presentation and discussion	
				Break (30min)		
15:15	16:30	Robotics		WG Reports and Discussion (Service WG, Infrastructure WG, Robotic Localization Service WG)	presentation and discussion	
16:30	17:00	Robotics		Contact Reports: - Makoto Mizukawa(Shibaura-IT), and Young-Jo Cho(ETRI)	Information Exchange	
17:00	17:15	Robotics		Robotics-DTF Plenary Wrap-up Session (Roadmap and Next meeting Agenda)	Robotics plenary wrap-up	
17:15				Adjourn plenary meeting		
17:30	17:45			Robotics WG Co-chairs Planning Session (Preliminary Agenda for next TM, Draft report for Friday'	planning for next meeting	
Wednesday WG activity follow-up						
9:00	12:00			Robotic Localization Services FTF (3h) - Jaeyeong Lee, Yeon-Ho Kim and Shuichi Nishio	discussion	
				Services WG(3h): User Recognition Service RFP Meeting - Su-Young Chi, Hyunsoo Kim, and Toshio Hori	discussion	
12:00	14:00	**LUNCH and OMG Plenary**				
14:00	18:00			Robotic Localization Services FTF (4h) - Jaeyeong Lee, Yeon-Ho Kim and Shuichi Nishio	discussion	
				Services WG(4h): User Recognition Service RFP Meeting - Su-Young Chi, Hyunsoo Kim, and Toshio Hori	discussion	
18:00	20:00	**OMG Reception**				
Thursday						
12:00	13:00	**LUNCH**				
13:00	18:00			Architecture Board Plenary		
Friday						
8:30	12:00			AB, DTC, PTC		
12:00	13:00	**LUNCH**				
Other Meetings of Interest						
Monday						
8:00	8:45	OMG		New Attendee Orientation		
18:00	19:00	OMG		New Attendee Reception (by invitation only)		

Please get the up-to-date version from http://staff.aist.go.jp/t.kotoku/omg/RoboticsAgenda.pdf

robotics/2008-12-28

Robotics-DTF

Date: Friday, 12th December, 2008
Chair: T. Kotoku, L. Rioux, and Y. –J. Cho
URL: http://robotics.omg.org/
email: robotics@omg.org

➢Highlights from this Meeting:

Robotics-DTF Co-chair election
Laurent Rioux (Thales) and Young-Jo Cho (ETRI)

Robotics Plenary: (29 participants)

- **2nd review of Robotic User Identification RFP**
- **4 Special Talk [robotics/2008-12-13,-14,-15, -19]**
  - **ROS: A new development environment for a new generation of robots (Brian Gerkey) [robotics/2008-12-15]**
- **3 New work item Talk [robotics/2008-12-16,-17,-18]**
- **3 WG Reports [robotics/2008-12-20,-21,-22]**
- **3 Contact Report [robotics/2008-12-23,-24,-25]**
- **Preliminary Agenda for upcoming meeting [robotics/2008-12-27]**

Robotics-DTF

Date: Friday, 12th December, 2008
Chair: T. Kotoku, L. Rioux, and Y. –J. Cho
URL: http://robotics.omg.org/
email: robotics@omg.org

➢Deliverables from this Meeting:

- **Nothing Special**

➢Future deliverables (In-Process):

- **Robotic User Recognition Service RFP**
- **Robotic Configuration and Deployment (potential RFP)**

➢Next Meeting (Washington DC, USA):

- **Review of User Recognition Service RFP**
- **Guest presentations**
- **Roadmap discussion**
- **Contact reports**

Minutes of the Robotics DTF Plenary Meeting - DRAFT
December 8-12, 2008
Santa Clara, CA, USA
(robotics/2008-12-29)

Minutes Highlights

1) **Laurent Rioux (Thales) and Young-Jo Cho (ETRI) have been elected as Robotics-DTF Co-Chairs.**
2) **As the 2nd Review, the draft of Robotic User Identification Service RFP was discussed, but we decided to have more discussions to issue the RFP.**
3) **We have one invited talk of Dr. Brian Gerkey (Willow Garage).**
4) **We have 3 special talks (Tsukuba Challenge, Hitachi, AFUS).**
5) **We have 3 new work item talks (QoS, Fault-tolerance, Directory service)**

List of Generated Documents

robotics/2008-12-01 Final Agenda (Tetsuo Kotoku)
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robotics/2008-12-29 Santa Clara Meeting Minutes - DRAFT (Geoffrey Biggs and Yeonho Kim)

MINUTES
Monday, December 8, 2008, Lafayette, 2nd floor

09:00 – 09:20 Steering Committee

10:00 – 10:10 Robotics DTF Plenary Meeting, Chair: Dr Kotoku, Quorum: 3
Joined organizations: AIST, ETRI, Hitachi, JARA, Kangwon National Univ., Samsung, Shibaura-IT, Univ. of Tsukuba, Technologic Arts, Thales

- Minute takers: Geoffrey Biggs and Yeonho Kim
- Approval of minutes of Ottawa meeting
  - Approved: Shibaura-IT (motion), Thales (seconded), ETRI (white ballot).

10:10 – 12:00 User Identification Service RFP 2nd Review (Lafayette, 2nd floor)
Su-Young Chi (ETRI)

- Dr Nishio gave several comments.
- Review comments received from two Architecture Board members, to be responded to.
- Use word "identification" instead of "recognition" in title ("recognition" does not include selecting a single identity from a list of possible identities).
- More clearly define what the difference, particularly in assumptions made, between biometric systems and robotic systems.
- Issue of if tracking should be included in RFP was raised.
- Change the scope of the RFP to only the interface between the user identification module and applications.
- Significant confusion over wording around “user identification,” “user awareness” and “user recognition.” It was noted that one interpretation of Figure 1 is identical to the localization standard. Will discuss during WG sessions.

Tuesday, December 09, 2008, Lafayette, 2nd Floor

11:05 – 17:40 Robotics DTF plenary meeting continued

11:05 – 11:35 Special talk: Tsukuba Challenge 2008 report, Prof Tsubouchi, Univ. of Tsukuba

- Almost same rules as 2007 Tsukuba Challenge.
- 50 groups entered, 1 group finished.
- New route this year, more difficult than last year (straight line), involving reversing direction twice and returning to start point.

11:35 – 12:05 Special talk: A lightweight Message-Driven Component Framework for Robotic Systems, Saku Egawa, Hitachi, Ltd.

- Hitachi has developed a minimum component framework, Message-Driven Component (MDC).
  - Messages contain a command and data, are asynchronous, with no data marshalling (application is responsible for building data part of message).
  - Lightweight and fast: only 358KB of code for the middleware.
- Not currently compatible with RTC standard. Could add an MDC-based PSM. Need some extensions to RTC for MDC to become RTC-compliant:
  - Lightweight RTC needs to accept single-Execution Context, multiple-component models.

    - Execution semantics need a message-driven execution model (stimulus response execution semantics is not enough).
    - Add MDC PSM.

13:05 – 14:00 Invited talk: ROS: A new development environment for a new generation of robots, Brian Gerkey, Willow Garage

- Willow Garage's goal is an open platform: modular hardware with open interfaces, open source software. "Linux for robotics."
- PR2 robot: make 20 or so, possibly more. Not a unique robot.
- WG is privately funded, committed to open source, will spin off companies later.
- ROS: Robot Operating System (or Robot Open Source) is flagship software system.

14:00 – 14:30 The QoS and Fault-tolerance Issues on the Robot Component Execution Environment, Beom-Su Seo, ETRI

- QoS technology in distributed environment for robotics.
- QoS characteristics in consideration of robots: performance, reliability, accuracy and demand.
- OMG QoS profile is too general and broad, not sufficient for robotics. Need to enhance and update it. Establish a "QoS profile" for the robot component standard.
- Add a QoS manager to component middleware.
- Faults in robotics: faults, fault detection, fault recovery and fault tolerance. Tolerance is the ability to detect and recover, providing continuous service in spite of faults.
- Add a fault tolerance manager to component middleware. Need a Fault Tolerance profile that tells how to recover from faults.

14:30 – 15:00 Issues on RTC Directory Service, Kang-Woo Lee, ETRI

- Interoperability of RTMs. Make RT-Components of different RT-Middlewares work together to provide a robotic service. Moreover, allow them to interoperate with non-RTM systems, e.g. MSRS, Player, OPRoS, etc.
- RTC Directory service to manage the references and properties of running RTCs. (Registration/unregistration).
- No relevant specification in Robotics DTF. OpenRTM-aist provides its own directory service based on the CORBA naming service. Does not provide all desired features.
    - Related standards in OMG: CORBA naming service, CORBA trader service.

15:30 – 16:10 Architecture framework for unmanned systems (AFUS), Laurent Rioux, Thales

- Principles: Clear semantics, orthogonality and separation of concerns, independence from technology, platform, mission, compute capability, operator use, communications, autonomy level.
- Supports dynamic discovery and access control to remote entities.
- AFUS in OMG:
    - Can make AFUS conceptual view UML data types, capability could be UML sequence diagrams, interoperability could be UML composite structure.
    - AFUS Common Services could be reused in RTC.

16:10 – 16:20 Infrastructure WG report

- Restart WG after two new topics proposed by ETRI.

- Confirmed purpose of Infrastructure WG.
- New co-chair: Beom-Su Seo (ETRI).
  - Approved: AIST (motion), Thales (second), Shibaura-IT (white ballot).
- Proposed issues by ETRI:
  - QoS and fault-tolerance
  - Directory service
- Next step is to make an RFI for deployment and configuration, a roadmap for RFP for new specifications, and RTF for improvements to the RTC model.

16:25 – 16:55 Robot Functional Services WG report
- Had discussion on what trying to do, to clear up misunderstandings from Monday's discussions.
- Clarified why URS is needed rather than using the localization service or the BioAPI standard.
- Still significant disagreement over wording.

16:55 – 17:05 Localization WG report
- 48 issues raised so far, most typos, and most solved.
- Two remaining issues to be discussed (on Wednesday morning):
  - Definition of orientation in common data formats.
  - XML-PSM definition and RoLo Element local naming issue (new issue).
- Planned schedule presented.
- Dr. Lee has volunteered to be the report editor.

17:05 – 17:15 Contact report by Shuichi Nishio
- ISO/TC211 Tsukuba Meeting, 2008/12/01
- Two invited talks on RLS activity.

17:15 – 17:25 Contact report by Hyun Kim
- ISO/TC184/SC2 Software Standardization meeting, Seoul.

17:25 – 17:30 Contact report by Makoto Mizukawa
- ORiN project current status:
  - Offer from ISO/TC184/SC5, 24 June 2007
  - Japan domestic committee, 14 Nov 2008, of the SC5 approved to add ORiN specification to ANNEX of ISO20242 Part 4.
- Conferences:
  - IROS 2008, Nice, France
  - ICCAS 2008, Seoul, Korea
  - IFR International Conference on Robotics, Seoul, Korea
  - ROBOT WORLD 2008, Seoul, Korea
  - RoboDevelopment, Santa Clara, CA, Nov 19-20 2008
- Tsukuba Real World Robot Challenge, Nov 20-22, 2008
- Coming conferences:
  - ICRA 2009, Kobe, Japan

Closing presentation and next meeting agenda by Tetsuo Kotoku

- Call for volunteers
  - Election of new DTF co-chairs: Luarent Rioux (Thales) and Young-Jo Cho (ETRI)
    - Approved: AIST (motion), Kangwon National Univ. (second), Thales (white ballot).
  - Kyuseo Han no longer Localization WG co-chair.
  - Election of Localization WG co-chair: Dr. Lee
    - Approved: JARA (motion), Thales (second), ETRI (white ballot).
- Next meeting: March 23-27, Washington DC, USA
- Special talk candidates
  - Gearbox Project, Geoffrey Biggs, AIST, Japan
  - Robotics Project in Japan, Prof. Sato, Univ. of Tokyo, Japan
  - RUPI Project, Dr. Hyun Kim, ETRI, Korea

Adjourned plenary meeting at 17:40

Attendee: 29 Participants

- Akihiko Ikezoe (SEC)
- Beom-Su Seo (ETRI)
- Brian Gerkey (Willow Garage)
- Geoffrey Biggs (AIST)
- Hong-Seong Park (KNU)
- Hugues Vincent (Thales)
- Hyun Kim (ETRI)
- Hyun-Soo Kim (Samsung)
- Itsuki Noda (AIST)
- Jeong-Seok Kang (KNU)
- Kenichi Wada (Hitachi)
- Kim Siman (Tobesoft)
- Kyuseo Han (ETRI)
- Laurent Rioux (Thales)
- Makoto Mizukawa (Shibaura-IT)
- Miwako Doi (Toshiba)
- Noriaki Ando (AIST)
- Saku Egawa (Hitachi)
- Seung –Woog Jung (ETRI)
- Shuichi Nishio (JARA/ATR)
- Soo-Hee Han (KNU)
- Sung-Soo Kang (KOSTA)
- Su-Young Chi (ETRI)
- Takashi Suehiro (AIST)
- Takashi Tubouchi (Univ. of Tsukuba)
- Takeshi Sakamoto (Technologic Arts)
- Tetsuo Kotoku (AIST)
- Toshio Hori (AIST)
- Yeon-Ho Kim (Samsung)

Prepared and submitted by Geoffrey Biggs (AIST) and Yeon-Ho Kim (Samsung).