<table>
<thead>
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<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tr>
<td>9:00-12:00</td>
<td>Robotic Localization Services FTF (3h) - Wonpil Yu, Jaeyeong Lee, Lee, Yeon-Ho Kim and Shuichi Nishio</td>
<td>Tidewater 1, 2nd FL</td>
<td>discussion</td>
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<tr>
<td>12:00-13:00</td>
<td>Architecture Board Plenary</td>
<td>Regency CD, Ballroom Lvl</td>
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<tr>
<td>14:00-18:00</td>
<td>Robotic Infrastructure WG (4h) - Noriaki Ando (AIST) and Beom-Su Seo (ETRI)</td>
<td>Suite 1808, 18th FL</td>
<td>discussion</td>
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<tr>
<td>12:00-13:00</td>
<td>Services WG(4h): User Identification Service RFP Meeting - Su-Young Chi (ETRI), and Toshio Hori</td>
<td>Suite 1811, 18th FL</td>
<td>discussion</td>
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<td>13:00-18:00</td>
<td>Architecture Board Plenary</td>
<td>Kennedy, 3rd FL</td>
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<td>9:00-12:00</td>
<td>LUNCH</td>
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<td>12:00-13:00</td>
<td>Robotics Steering Committee</td>
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<td>Arrangement</td>
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<td>10:00-12:00</td>
<td>Robotic Localization Services FTF (2h) - Wonpil Yu, Jaeyeong Lee, Lee, Yeon-Ho Kim and Shuichi Nishio</td>
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<td>discussion</td>
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<tr>
<td>14:00-14:45</td>
<td>RTC Directory Service for Interoperability between Robotic Software Platforms - Kano-Woo Lee and Huu Kim (ETRI)</td>
<td>Kennedy, 3rd FL</td>
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<td>14:45-16:45</td>
<td>Modeling of Risk Assessment for Service Robots - Yoshihiro Nakajo (AIST)</td>
<td>Kennedy, 3rd FL</td>
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<td>14:15-14:45</td>
<td>GearBox (Peer-Reviewed Open-Source Libraries for Robotics) - Geoffrey BIGGS (AIST)</td>
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<td>presentation and discussion</td>
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<td>15:15-15:45</td>
<td>Break (30min)</td>
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<td>15:45-16:45</td>
<td>Contact Reports: Makoto Mikiwaka (Shibaura IT) and Young-Jo Cho (ETRI)</td>
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<td>Information Exchange</td>
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<td>9:00-12:00</td>
<td>Robotic Localization Services FTF (3h) - Wonpil Yu, Jaeyeong Lee, Lee, Yeon-Ho Kim and Shuichi Nishio</td>
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<td>13:00-18:00</td>
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<td>discussion</td>
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<td>Architecture Board Plenary</td>
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<td>12:00-13:00</td>
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<td>Regency AB, Ballroom Lvl</td>
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<td>9:00-12:00</td>
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<td>8:00-8:45</td>
<td>OMG Strategies and Technologies for Cloud Computing Interoperability Workshop</td>
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<td>9:00-12:00</td>
<td>Tutorial - Introduction to OMG's Specification Tutorial</td>
<td>Tidewater 2, 2nd FL</td>
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<tr>
<td>15:00-17:00</td>
<td>OMG Certification Program Overview</td>
<td>Arlington, 3rd FL</td>
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<td>10:00-12:00</td>
<td>OMG New Author Seminar</td>
<td>Prince William, 3rd FL</td>
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<td>17:00-18:00</td>
<td>OMG New Attendee Reception (by invitation only)</td>
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<td>13:00-17:30</td>
<td>Tutorial - Introduction to the OMG Systems Modeling Language (OMG SysML™)</td>
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<td>17:00-18:00</td>
<td>RTF-FF Chair's Workshop</td>
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<td>13:00-17:00</td>
<td>Ontology Definition Metamodel Tutorial</td>
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<td>18:00-19:00</td>
<td>OMG Authors Focus Group Meeting</td>
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<td>8:30-17:00</td>
<td>SOA Consortium Quarterly Meeting</td>
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Minutes of the Robotics DTF Plenary Meeting
December 8-12, 2008
Santa Clara, CA, USA
(robotics/2009-03-02)

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)
robotics/2008-12-02 Ottawa Meeting Minutes [approved] (Su-Young Chi and Geoffrey Biggs)
robotics/2008-12-03 Steering Committee Presentation (Tetsuo Kotoku)
robotics/2008-12-04 Roadmap for Robotics Activities (Tetsuo Kotoku)
robotics/2008-12-05 Opening Presentation (Tetsuo Kotoku)
robotics/2008-12-06 Review comments from AB (Hugues VINCENT and Victor Giddings)
robotics/2008-12-07 2nd review for User Recognition Service API RFP with Comments (Su-Young Chi)
robotics/2008-12-08 Resolution to Issue #13130, Error Type inconsistency (Shuichi Nishio)
robotics/2008-12-09 Topics - Robotic Localization Service FTF (Itsuki Noda)
robotics/2008-12-10 Name Mapping Rule (Itsuki Noda)
robotics/2008-12-11 RoLo Architecture (Itsuki Noda and Takeshi Sakamoto)
robotics/2008-12-12 Revised RoLo Architecture (Itsuki Noda and Takeshi Sakamoto)
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 environment for a new generations of robots (Brian Gerkey)
robotics/2008-12-16 The QoS Issues on the Robot Component Execution Environment (Beon-Su SEO)
robotics/2008-12-17 Fault-tolerance Issues on the Robot Component Execution Environment (Seung-Woog Jung)
robotics/2008-12-18 The Issues on robot component directory services and repository contents (Kang-Woo Lee)
robotics/2008-12-19 Special Talk: Architecture Framework for Unmanned System (AFUS) (Laurent Rioux)
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)
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 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.

  • Hitachi has developed a minimum component framework, Message-Driven Component (MDC).
    ◦ Messages contain a command and data, are asynchronous, with no data marshallling (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).
Santa Clara Meeting Summary

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]
Agenda

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

Minutes and Minutes Taker

- Process:
  - Make a draft with in 5 days
  - 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
  - Beom-Su Seo
  - Geoffrey Biggs

We have to post our meeting minutes within a week!
Next Meeting Agenda
June 23-27 (San Jose, Costa Rica)

Monday:
- Localization FTF (AM)
- Service (PM)
- Infrastructure (PM)

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

Wednesday:
- Localization FTF
- WG activity follow-up [if necessary]
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<th>San Jose, Costa Rica</th>
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<th>Long Beach, CA</th>
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<td>Robotics Information Day [Technology Showcase]</td>
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<td>Robotic Localization Service RFP [Robotic Localization Service WG]</td>
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<td>Shuichi Nishio (JARA/ATR) Kyuseo Han (ETRI) Yeon-Ho Kim (Samsung)</td>
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Related Events
Robotics-DTF Plenary Meeting
Opening Session

24th March, 2009
Washington DC, USA
Hyatt Regency Cristal City

Approval of the Santa Clara Minutes

Meeting Quorum: 4
AIST, ETRI, JARA, Samsung, Shibaura-IT, Univ. of Tsukuba, Technologic Arts,

Minutes taker(s):
- Geoffrey Biggs
- BeomSu Seo

Minutes review

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]
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- 3 Contact Report [robotics/2008-12-23,-24,-25]
- Preliminary Agenda for upcoming meeting [robotics/2008-12-27]
Agenda Review

Mon (Mar. 23):
RLS-FTF
WG activities [Service WG, Infrastructure WG] (PM)

Tue (Mar. 24):
Steering Committee (AM)
WG activities [Service WG, RLS-FTF] (AM)
Robotics-DTF Plenary (PM)

Wed (Mar. 25):
WG activities [RLS-FTF, Service WG]

Thu (Mar. 26):
RLS-FTF

please check our up-to-date agenda

Agenda Review

Tue:
13:00-13:15 Opening Session
13:15-14:00 New Work Item Talk
14:00-14:45 New Work Item Talk

15:15-15:45 Special Talk
15:45-16:45 WG Reports and Roadmap Discussion
16:45-17:15 Contact Reports
17:15-17:30 Wrap-up Session
17:30 Adjourn

please check our up-to-date agenda
RTC Directory Service for Interoperability between Robotic Software Platforms

Kang-Woo Lee

Network Robot Research Team
ETRI, Korea

Interoperability of RTCs

- What is it?
  - The RT-components of different RT-Middlewares can work together to provide robotic services

- 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 right RTCs from diverse RTMs?
  - How to combine them into an robot application

- The second one is partially covered by RTC specification
RTC Directory

- Manage the references and properties of running RTCs
  - RTC registration and unregistration

- A Client can search the reference of RTCs having appropriate properties from the directory and combine them to build a robotic application

![Diagram of RTC Directory]

Benefits from RTC Directory (1/2)

- Content-based component addressing
  - Searching components not only by their id, but also by their properties
  - Query expressions are declarative
  - Save unnecessary communications to remote components during the query evaluations

**query string:**
location='Room L89' & type='Camera'

**means:**
All camera components located at the 'Room L89'
Benefits from RTC Directory (2/2)

- Content-based component tracking
  - If a client is able to define a condition and register it on the directory
  - Then he will be notified whenever any matching components are registered or unregistered
- Used in component assembly, it enables an application to be more reconfigurable

matcher expression:
location='Room L89' & type='Camera'

means:
Notify me whenever a camera component at 'Room L89' becomes available

Issues on RTC Directory Service

- Reconsideration on the properties in the RTC model
  - Support for container types (e.g. array, list, etc.)

- RTC registration protocol
  - Support for disconnection (planned or unplanned) on both sides
  - Consistency between Directory server and RTCs

- Data coherency protocol
  - Prevent clients from looking up inconsistent property values
  - An update on a property of a component should be propagated to the RTC Directory
Issues on RTC Directory Service (Cont’d)

- Search interface using RTC properties
  - SQL-like query approach

- Tracking RTCs
  - Property expression to identify the target RTCs
  - Notification protocol

- Inter-RTC Directory search protocol

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 RTCs”
  - Searching right RTCs from diverse RTMs
  - Combining them into a robot application

- We proposed “RTC Directory” in order to address the first consideration
  - Manage the references to RTCs along with their properties
  - Provide a property-based component search and component tracking
Modeling of Risk Assessment for Service Robots

Safety Intelligence Research Group (SIRG),
National Institute of Advanced Industrial Science and Technology (AIST)
Yoshihiro Nakabo

Contents

• Objective: Safe Robots
• International safety standards (ISO/IEC)
• Proposal
  – Object oriented approach to robot safety
  – Models for risk identification
  – Model for overall risk assessment
• Conclusion
Next generation service robots

- For Business: Cleaning, Welfare, Security, Guidance
- Home: House keeping, Hobby, Security

- Service robot
  = close proximity with human
  -> Safety issue should be clarified

Next generation industrial robots

- Power assisting robot: already used in some motor companies
- Next generation cell production robots
Safety of next generation robots

- Socially accepted safety technology required (unless almost zero risk for unknown new products)
- Previously:
  - Industrial robots -> separation of human and robots
  - Service robots -> no fundamental principles
- Recently:
  - "Collaborative operation" included in International Standard for safety of industrial robots (ISO10218)
  - New ISO standardization in progress for service robots
  - "Safety guidelines for next-generation robots” in Japan

Int. Standards for Safety of Machinery

ISO/IEC Guide 51 determines hierarchical structure

- **type-A standards (basic safety standards)**
  - ISO12100: Safety of machinery — Basic concepts, general principles for design —
  - ISO14121: Safety of machinery — Risk assessment —

- **type-B standards (generic safety standards)**
  - ISO13849: System safety
  - ISO13855: Safety distances
  - IEC61508: Functional safety
  - IEC61496: Safety sensors

- **type-C standards (machine safety standards)**
  - Machine tools, Chemical plants, Electric lifts
  - Industrial robots, Earth-moving machinery, Press machines
• Safety: freedom from unacceptable risk
• Risk: combination of the probability of the occurrence of harm and the severity of that harm
• Harm: physical injury or damage to the health of people, or property or the environment

ISO12100 Safety of Machinery

Communication with users

Protective measures taken by the user including those based on the information for use provided by the designer

- Organization
  - safe working procedures
  - supervision
  - permit-to-work systems
- Provision and use of additional safeguards
- Use of personal protective equipment
- Training, etc.

Residual risk after all protective measures have been taken
ISO 14121 Risk Assessment

- Risk assessment:
  Systematic analysis and evaluation of the risks associated with machinery.
- Should be executed by safety assessors, robot designers and engineers
- Details are explained latter...

IEC 61508 Functional Safety

- The V Model: software safety integrity and the development lifecycle

![V Model Diagram] from IEC61508-3
Example of recommended technologies

- Depends on SIL (Safety Integrity Level)
- Validation for safety requirements

Example:

<table>
<thead>
<tr>
<th>Technique/Measure*</th>
<th>Ref.</th>
<th>SIL1</th>
<th>SIL2</th>
<th>SIL3</th>
<th>SIL4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Computer-aided specification tools</td>
<td>E.2.4</td>
<td>R</td>
<td>R</td>
<td>HR</td>
<td>HR</td>
</tr>
<tr>
<td>2a. Semi-formal methods</td>
<td>Table B.7</td>
<td>R</td>
<td>R</td>
<td>HR</td>
<td>HR</td>
</tr>
<tr>
<td>2b. Formal methods including for example, CCS, CSP, HOL, LOTOS, OBJ, temporal logic, VDM and Z</td>
<td>C.2.4</td>
<td>---</td>
<td>R</td>
<td>R</td>
<td>HR</td>
</tr>
</tbody>
</table>

NOTE 1 – The software safety requirements specification will always require a description of the problem in natural language and any necessary mathematical notation that reflects the application.

NOTE 2 – The table reflects additional requirements for specifying the software safety requirements clearly and precisely.

* Appropriate techniques/means shall be selected according to the safety integrity level. Alternate or equivalent techniques/means are indicated by a letter following the number. Only one of the alternate or equivalent techniques/means has to be satisfied.

from IEC 61508-3

Problems

- Many individual processes and large amount of documentation
- Frequent communication between users, designers and safety assessors
- Waterfall instead of Agile

- Could be solved by modeling and CAD related tool assistance
Proposal

• Object Oriented modeling for robot safety
  – Definitions of safety, risk and other terms
  – Include processes for risk assessment, risk reduction and evaluation
  – Construct framework through UML profiling

• Accelerate development of safe service robots
• Change process from waterfall to agile

Risk reduction process

Risk assessment

Is residue risk acceptable?

Yes
No

Risk reduction

Step 1. Intrinsic safety
Step 2. Safe guard
Step 3. Information for use

Concepts for safety of machinery:

• No zero risk
• Start from risk assessment (determining requirements)
• Three step risk reduction
• Judge residue risk
• Safeguards = Functional safety
Risk assessment process

1. Determination of the limits of the machinery
2. Hazard identification
3. Risk estimation
4. Risk evaluation

Is residue risk acceptable?
- Yes
- No

Risk reduction

Risk analysis

Limits of machinery

Consideration of necessary phases and tasks
Extraction of those concerned with each phase or task

Operation manual
Detailed design document

Consideration of definition of object operation
Study the structural model of machine

Use case diagram
Class diagram of machine

Study operation scenario

Activity diagram

Create scenario (activity diagram) for each use case
Example of hazards

<table>
<thead>
<tr>
<th>Type of group</th>
<th>Examples of hazards</th>
<th>Potential consequences</th>
</tr>
</thead>
</table>
| Mechanical hazards  | - Acceleration, deceleration (kinetic energy)  
|                     |   - Angular parts                          
|                     |   - Approach of a moving element to a fixed parts  
|                     |   - Cutting parts                           
|                     |   - Falling objects                         | - Being run over               
|                     |                                           | - Being thrown                
|                     |                                           | - Crushing                    
|                     |                                           | - Cutting or severing          |
| Electrical hazards  | - Arc                                     | - Burn                     |

- Example of hazards listed in ISO 14121
- Any combination of origin and potential consequences should be considered
- Hazards classified by group type

Example of typical hazards

- Subset of the hazard table from ISO 14121
Class diagram

- UML diagram can be used for modeling ISO hazard description (includes humans and environment as elements of risk)

Example of hazardous situations

<table>
<thead>
<tr>
<th>Phase of machine life cycle</th>
<th>Examples of tasks</th>
</tr>
</thead>
</table>
| Transport                  | - Lifting  
- Loading  
- Packing  
- Transportation           |
| Assembly and installation  | - Adjustments of the machine  
and its components  
- Assembly of the machine  |
| Commissioning              |                                                      |
| Setting  
Teaching/programming      | - Adjustment and setting of  
and/or process changeover  
protective device and other  
components                   |

Listed life cycle:
- Transport
- Assembly and installation, Commissioning
- Setup, Teaching/programming and/or process changeover
- Operation
- Cleaning, Maintenance
- Fault finding/Troubleshooting
- Decommissioning, Dismantling

- All phases of machine life cycle should be taken into account
- Each phase consists of separate tasks
Hazard Identification

Hazard identification by:

- Extracting risks from activity diagrams and class diagram of object machine
- Considering potential consequences and origin of hazards

Process to be continued until all risks identified

Rest of Processes in Risk Assessment

- Risk estimation (quantitative analysis)
  - Severity of harm
  - Probability of occurrence
    - Exposure of person to the hazards
    - Occurrence of hazardous events
    - Possibility of avoiding or limiting the harm
- Risk evaluation (if the risk has been adequately reduced)
- Documentation
Conclusion

• Proposed an object oriented modeling of ISO based risk assessment
• All processes and safety related concepts can be modeled by using UML models
• Standardization of proposed UML should be useful for the propagation of known safety principles, development of CAD-based risk assessment and design of safety related robot modules
• Future work will be focused on developing UML profile, implementing risk estimation and evaluation
Gearbox
Reusable robot software

Geoffrey Biggs

Software reusability

• Reusability must occur on more than one level.
• Monolithic components restrict implementation details to a single system.
• Current robot software is not truly reusable.
  – Restricted to the framework it is written for.
  – Using a component that is written for a different framework requires considerable work (porting, framework bridges, etc.).
Gearbox

- Separate function and integration to solve the usability problem.
- Collection of libraries of robot software.
  - Hardware driver implementations.
  - Algorithm implementations.
  - Utility libraries.
- Individual libraries.
  - No framework connecting the libraries together.
  - No required global dependencies.

Reusable libraries

- Gearbox libraries are used by frameworks.
  - RT-Middleware: create components that provide interface(s) for Gearbox libraries' functionality.
  - Player: write drivers that interact use Gearbox libraries to provide functionality.
  - Orca: wrap Gearbox libraries in Orca interfaces.
Reusable libraries

• Can use the same implementation in many frameworks.
• Code changes in the implementation are available to all frameworks immediately.
  – No need to merge code changes manually between different frameworks.
  – Maintenance for one framework is maintenance for all.

Reusable libraries

• Unix-like model of development.
  – Many programs and libraries, few common APIs, no integration.
  – Massive reuse of implementation.
Gearbox concepts

• Freedom of implementation.
  – Developers are not restricted in language, API, programming style, etc.
  – No requirement for consistency between libraries.

• Importance of ease-of-use.
  – Easy to install.
  – Software works, does what it claims to do.
  – Well-documented.

Gearbox concepts

• Libraries are subjected to a peer-review process before acceptance into Gearbox.
  – Similar to Boost.
  – Allows other Gearbox developers and users to comment on library’s design, suitability, and implementation.
  – Can help catch usability issues and bugs in the source.
Build system

- CMake-based unified build system.
- All libraries built using a single set of build scripts.
  - Makes what used to be a painful process simpler.
- Users can easily select which libraries should or shouldn't be compiled and installed.
- CTest support provides automated testing of libraries with CDash integration to display results.
Advantages of Gearbox

- Wider, easier reuse of functional robot software.
- Easier maintenance – test libraries without the framework getting in the way.
- Easy installation of a variety of robot functionality.
- Freedom to use software in any way desired – with or without a framework.
- Ease development of new frameworks – gain lots of functionality rapidly.

Disadvantages

- Difficult to convince people to develop independent libraries.
  - More work initially to design and implement an API.
  - May need to integrate the library with a framework before it can be used.
- Writing libraries for a wider audience can be difficult.
- Must write documentation.
Gearbox

• Advantages outweigh the disadvantages.
  – Modular software design is best practice anyway.
  – Everyone benefits from a single piece of software with little extra work.

• Number of libraries rapidly increasing.
  – Now have 9 libraries
  – Data communications libraries, laser scanner drivers, GPS drivers, battery information drivers, ...
User Identification Service Interface

2009-03-24

Su Young Chi, Ph.D.
Toshio Hori, Ph.D.
Hyun Soo Kim, Ph.D.
Hyun Kim, Ph.D.
Young Jo Cho, Ph.D.

Motivation

- User Identification Service has an important role for intelligent robots
  - Owner recognition
  - Intruder detection
  - User Location Tracking
  - Access Control
  - Searching watching-list
  - User Preference Services
  - ...

- It is different from Localization Service as well as Biometrics
  - BioAPI
  - RLS
The Structure of Proposal Standard

UI Module 1 (User Identification Components) -> UIM (User Identification Manager) -> UI Module 2 (User Identification Components) -> Robot Application

- Combine and Integrate technologies from UI Modules
- Execute User Recognition and Identification
- Checks for user’s status

Sensors

Robot Application
- Send Event of user status
- Query and Request and return User ID & its attributes

Standard Interface

Differences to BioAPI

<table>
<thead>
<tr>
<th>BioAPI</th>
<th>Robot UIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Time Operation</strong></td>
<td><strong>Continuous Operation</strong></td>
</tr>
<tr>
<td>User identification is a one-time event. Once a user is authorized, the intended transaction starts, and the authentication module no longer intervenes.</td>
<td>Interacting users change continuously. Thus the process should be able to track the users appropriately. For keeping the user’s identity, It should be acts tracking, re-recognition, verification</td>
</tr>
<tr>
<td><strong>Single User</strong></td>
<td><strong>Multi-user</strong></td>
</tr>
<tr>
<td>Recognize single user</td>
<td>In many cases, more than one user exists and the robot should be aware</td>
</tr>
<tr>
<td><strong>Controlled Environment</strong></td>
<td><strong>Uncontrolled Environment</strong></td>
</tr>
<tr>
<td>The capturing process is strictly regulated and the users are extremely cooperative because the failure in authentication results in inconvenience or even a danger for that user.</td>
<td>The robot must recognize the users continuously. Thus, it is unrealistic to expect users to cooperate constantly for the robots.</td>
</tr>
<tr>
<td><strong>User ID</strong></td>
<td><strong>User ID and Position</strong></td>
</tr>
<tr>
<td>Answer the question “Who is the person?”</td>
<td>Answer not only “Who is the person?” but also “Where is that person?”</td>
</tr>
<tr>
<td><strong>Passive</strong></td>
<td><strong>Active</strong></td>
</tr>
<tr>
<td>The authentication function is called when it is needed.</td>
<td>The authentication function should be running continuously. The function not only responds to the request of the application to identify a certain user, but also raises events when a new user appears or disappears.</td>
</tr>
</tbody>
</table>
Differences to RLS

Request the position of object including human and return ID and position

UIM (User Identification Manager)
- Execute User Recognition and Identification
- Checks for user’s status

UI Module 1 (User Identification Components)
- Combine and Integrate technologies from UI Modules

UI Module 2 (User Identification Components)
- Query and Request from User ID & its attributes

Sensors

Robot Application
- Send Event of user status

Standard Interface

How can we communication between User Identification Manager and Robot Application?

- Query from Application Service to User Identification Manager
  - “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 Identification Manager to Application Service
  - “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”

- Request from Application Service to User Identification Manager
  - Following the father
  - Approaching the person appears 60 degree left
User Identification Manager to Application Service(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 Application has requested, has appeared.

User Identification Manager to Application Service(2)

- **User Identification Manager** 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.
User Identification Manager to Application Service (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

- **UserGender Classified**  
  - User is not identified, but the gender is classified.
- **UserAge Classified**  
  - User is not identified, but the age is classified.

Application Service to User Identification Manager (1)

Enumeration

- `int GetNumberOfUAM();`
- `UAMInfo GetUAMInfo(int nth);`  
  - Function for UAM Enumeration in the HRI Demon System
- `UAMInfo {`  
  - `Int UAMID;`
  - `Int Media: (such as image, sound, distance, human sensor)`
  - `BOOL NeedEnrollment;`
  - `};`
- `BOOL Initialize()`  
- `BOOL Destroy()`  
- `Void SetProperties(UAMID, Properties p)`  
  - Property is used when certain information is to be set for a specific UAM
- `Properties GetProperties(UAMID)`  
  - Get property information assigned for a specific UAM.
Application Service to User Identification Manager (2)

Enrollment

- **BOOL EnrollUser(UAMID, UserInfo);**
  - Enrollment process is assigned to the UAM, including user interface for enrollment.
  - The result indicates success or fail, using BOOL.
  - The registered data is managed by the UAM itself.
- **EnrollInfo GetEnrollmentData(UAMID, UserInfo);**
- **EnrollInfoArray GetEnrollmentData(UAMID);**
  - 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 UAM.
- **BOOL DeleteEnrollment(UAMID, UserInfo);**
  - This is used to delete the registered data.

Application Service to User Identification Manager (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(UAMID);**
- **UserInfoArray MatchUser();**
  - To perform the user identification.
  - This can give command for user identification to a specific UAM.
  - This can also give command to all UAM available to UIC, 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 Service to User Identification Manager (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(UAMID, 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);**
Infrastructure WG Progress Report

Beom-Su Seo (ETRI)
Noriaki Ando (AIST)

Discussion in this meeting

• Confirming RFP process
  – “RTC Container RFP”
• Confirming WG process
  – Picking up keywords for our RFP scope
  – Use case discussion to define scope of RFP
  – Survey for collecting information
• Use case discussion
• Assignment of survey topic
• Next meeting and private meeting
Keywords

- Deployment
- Configuration
- QoS
- Fault tolerance
- Directory service

Related Technologies Survey

- About
  - Directory and discovery
  - Deployment and configuration
- OMG related standard
  - CCM (Dr. Ando)
  - Software radio (Dr. Ando)
- Other
  - Web service (Dr. Lee)
  - Ice Box (Dr. Biggs)
  - OSGi (Dr. Lee)
  - EJB (Dr. Soo)
- What is robotic specific functionality?
- Mailing list discussion.
- Presentations will be made in the next meeting.
Use case for infrastructure

Use case

- Subject is middleware or platform
- Middleware provides the following functionality
  - RTC registration
  - RTC lifecycle management
  - Download and deployment RTC
  - Monitoring and triggering RTC
  - Find and bind component
  - Configure component
- More concrete use case will be proposed and discussed in the next meeting
Next step

• Survey for directory service, D&C related technologies
  – Presentation in the next meeting
• Use case discussion
  – More concrete use case
  – Make clear scope of our RFP
• Roadmap
  – RFP for new specification (Title is needed)
  – RTF for RTC specification (if needed)
  – 1st review RFP in San Antonio
  – 2nd Review and issue RFP in Long Beach
Robotic Localization Service
WG Report

2009.03.24

Shuichi Nishio
Yeon-Ho Kim
Jaeyeong Lee

Washington DC meeting

- 23 Mar. 9:00-12:00, 14:00-18:00
- 24 Mar. 10:00-12:00
- 25 Mar. 9:00-12:00, 14:00-18:00
- 26 Mar. 9:00-12:00, 14:00-18:00
Progress

- Comment deadline has passed (2009.2.23)
- So far, we have 76 issues raised
  - 51 issues: raised until 2008.12
  - 25 issues: newly raised after Santa Clara meeting
- First revision & voting
  - Vote for 47 issues with proposed resolution (2009.2.6)
  - 32 issues were passed but 15 issues not.
- Washington DC meeting (2009)
  - We have discussed on the resolution of
    - 15 issues not passed at 1st voting
    - 29 issues (excluded at 1st voting or newly raised)
  - two remaining issues to be discussed
    - Sequence diagram
    - Hierarchical relationship for CRS & RoLo Data Spec instances
- Continue discussion tomorrow morning

Planned Schedule

- 2009.04: Revised specification & second report
- 2009.04: Second vote
- 2009.05: Document upload to OMG server (due: 5.25)
- 2009.06: Architecture Board (Costa Rica meeting)
Contact Report
- Korea Intelligent Robot Standard Forum -

March, 2009

Young-Jo Cho, Ph.D.
Chair, Steering Committee of KIRSF
Co-chair, Robotics DTF, OMG
Research Fellow, IT Convergence Technology Research Laboratory, ETRI

Introduction to Korea Intelligent Robot Standard Forum (KIRSF)

We help pave the way for country’s leap into a Northeast Asian hub of the intelligent robotics industry

Purpose & Activities

To activate Korea intelligent robot industry thru research and enactment of standards.

☐ Research on standardization of intelligent robot technologies.
☐ Enactment of KIRSF standards.
☐ Promotion of public standards (nation’s standards or international standards) with the forum standards.
☐ Information gathering and analysis related to intelligent robot standard technologies.
☐ Enhancement of mutual collaboration and understanding of standards thru seminar, workshop, exhibitions, etc.
Organization and Status of KIRSF

KIRSF was founded at 8th of September 2005, gathering the standardization efforts had been managed separately by two ministries(MOCIE and MIC) for about 2 years.

We have currently 97 members mainly from Korea robot industry


Steering Committee of KIRSF

Adopts the standardization items, enacts, modifies and withdraws forum standards.
Enacts, revises, and withdraws operating rules, and establishes business plans.
Decides the organization subcommittees/working groups and operating policies.
Resolves other major issues concerned with the business and operation for the forum

<table>
<thead>
<tr>
<th>#</th>
<th>Affiliation</th>
<th>Name</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>ETRI</td>
<td>Y.-J. Cho</td>
<td>Chair</td>
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<tr>
<td>2</td>
<td>Kyunghee Univ.</td>
<td>S.K. Lee</td>
<td>V-Chair</td>
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<td>Y.D. Kim</td>
<td>-</td>
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<td>D.H. Lee</td>
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<td>K.H. Lee</td>
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<td>24</td>
<td>KAR</td>
<td>Y.H. Cho</td>
<td>Secretary</td>
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Contact Report:
ISO/TC184/SC2

Tetsuo Kotoku
AIST, Japan

Schedule

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<th>Boardroom 4</th>
<th>WG1</th>
<th>WG8</th>
<th>WG7</th>
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- WG1 : Vocabulary on robots and robotic devices
- WG3 : Industrial Safety
- WG7 : Personal care safety
- WG8 : Service Robots
WG1 (Vocabulary on robots and robotic devices)

Korea: 4, Japan: 3, UK: 3, USA: 1, France: 1, Germany: 1

WG1 Roadmap

1. CD proposal by the end of June, 2009.
2. Review on CD voting results in Nov, 2009 and Mar, 2010 meetings
3. DIS by the end of March, 2010.
5. FDIS by then end of Nov, 2010.
6. IS publication by the beginning of 2011.
WG8 (Service Robots)

Korea: 6, Japan: 5, UK: 3, France: 1

Resolutions

55. (Appointment of experts) by each country
60. (Workshop Organization – Following Res. 49-) by everyone.
62. (Characteristics of mobile robot) by each country.
63. (Environments for the service robot) by UK
64. (Halal food processing by robot) by UK
Evening Event

Proposal

ISO/TC184/SC2

• Until now:
  local liaison to AG1(WG8)

• Future:
  official liaison to SC2
Robotics-DTF Plenary Meeting
Wrap-up Session

24th March, 2009
Washington DC, USA
Hyatt Regency Cristal City

Document Number

robotics/2009-03-01 Final Agenda (Tetsuo Kotoku)
robotics/2009-03-02 Santa Clara Meeting Minutes [approved] (Geoffrey Biggs and Yeon-Ho Kim)
robotics/2009-03-03 Steering Committee Presentation (Tetsuo Kotoku)
robotics/2009-03-04 Roadmap for Robotics Activities (Tetsuo Kotoku)
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robotics/2009-03-09 Robotic Functional Services WG Report (Su-Young Chi)
robotics/2009-03-10 Infrastructure WG Progress Report (Noriaki Ando)
Document Number (cont.)

robotics/2009-03-11 Robotic Localization Service FTF Report (Jaeyeong Lee)
robotics/2009-03-12 Contact Report: Korea Intelligent Robot Standard (Young-Jo Cho)
robotics/2009-03-14 Wrap-up Presentation (Tetsuo Kotoku)
robotics/2009-03-15 Next Meeting Preliminary Agenda - DRAFT (Tetsuo Kotoku)
robotics/2009-03-16 DTC Report Presentation (Young-Jo Cho)
robotics/2009-03-17 Washington Meeting Minutes - DRAFT (Geoffrey Biggs and Beom-Su Seo)

Organization

Robotics-DTF

Steering Committee

Publicity Sub-Committee

Contacts Sub-Committee

Technical WGs

Infrastructure WG

Robotic Functional Services WG

Robotic Data and Profiles WG

Robotic Localization Services WG

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

Abheek Bose (ADA Software, India)
Call for Volunteer

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

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

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

Bruce Boyes (Systronix, USA)
Laurent Rioux (Thales)

Jaeyeong Lee (ETRI, Korea)
Yeon-Ho Kim (Samsung, Korea)
Shuichi Nishio (JARA/ATR, Japan)
Next Meeting Agenda
June 22-26 (San Jose, Costa Rica)

Monday:

- Localization FTF (AM)
- WG activity [Parallel WG Session] (am)

Tuesday:

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

Wednesday:

- Localization FTF
- WG activity follow-up [if necessary]

Related Events

- Organized Session on Standardization at ICCAS-SICE2009 in Fukuoka, Japan Aug. 18(Tue.)-21(Fri.), 2009
  http://www.sice.or.jp/ICCAS-SICE2009/

- Workshop on standardization at CLAWAR 2009 in Istanbul, Turkey Sep. 9-11, 2009
Attendee (15 participants)

- Beom-Su Seo (ETRI)
- Geoffrey Biggs (AIST)
- Hyun Kim (ETRI)
- Itsuki Noda (AIST)
- Makoto Mizukawa (Shibaura-IT)
- Noriaki Ando (AIST)
- Shuichi Nishio (JARA/ATR)
- Su-Young Chi (ETRI)
- Takashi Tubouchi (Univ. of Tsukuba)
- Takeshi Sakamoto (Technologic Arts)
- Tetsuo Kotoku (AIST)
- Toshio Hori (AIST)
- Yeon-Ho Kim (Samsung)
- Young-Jo Cho (ETRI)
- Yoshihiro Nakabo (AIST)
<table>
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<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Purpose</th>
<th>Room</th>
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<tr>
<td>9:00</td>
<td>Robotic Localization Services FTF (3h)</td>
<td>discussion</td>
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<td></td>
<td>- Jaeyeong Lee(ETRI), Yeon-Ho Kim(Samsung) and Shuichi Nishio(JARA/ATR)</td>
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<td>12:00</td>
<td>Architecture Board Plenary</td>
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<td>13:00</td>
<td>Robotic Infrastructure WG (4h)</td>
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<td>- Noriaki Ando(AIST) and Beom-Su Seo (ETRI)</td>
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<td>14:00</td>
<td>Services WG(4h): User Identification Service RFP Meeting</td>
<td>discussion</td>
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<td></td>
<td>- Su-Young Chi (ETRI), and Toshio Hori (AIST)</td>
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<td>12:00</td>
<td>Robotics-DTF Plenary Opening Session</td>
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<td>13:00</td>
<td>Special Talk: &lt;Call for Presentation&gt;</td>
<td>presentation and discussion</td>
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<td>15:15</td>
<td>Robotics WG Reports and Discussion (Service WG, Infrastructure WG, Robotic Localization Service WG)</td>
<td>presentation and discussion</td>
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<td>16:30</td>
<td>Contact Reports:</td>
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<td>- Makoto Mizukawa(Shibaura-IT), and Young-Jo Cho(ETRI)</td>
<td>Information Exchange</td>
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<td>17:00</td>
<td>Robotics-DTF Plenary Wrap-up Session (Roadmap and Next meeting Agenda)</td>
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<td>17:15</td>
<td>Adjoint plenary meeting</td>
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<td>17:30</td>
<td>Robotics WG Co-chairs Planning Session (Preliminary Agenda for next TM, Draft report for Friday)</td>
<td>planning for next meeting</td>
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<tr>
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<td>12:00</td>
<td>LUNCH and OMG Plenary</td>
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<td>14:00</td>
<td>Services WG(3h): User Identification Service RFP Meeting</td>
<td>discussion</td>
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<td></td>
<td>- Su-Young Chi, Hyunsoo Kim, and Toshio Hori</td>
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<td>18:00</td>
<td>OMG Reception</td>
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<td>8:30</td>
<td>AB, DTC, PTC</td>
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<td>12:00</td>
<td>OMG Receptions</td>
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<td>8:45</td>
<td>New Attendee Orientation</td>
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<tr>
<td>18:00</td>
<td>New Attendee Reception (by invitation only)</td>
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Please get the up-to-date version from [http://staff.aist.go.jp/t.kotoku/omg/RoboticsAgenda.pdf](http://staff.aist.go.jp/t.kotoku/omg/RoboticsAgenda.pdf)
Highlights from this Meeting:

Robotics Plenary: (15 participants)

- 2 New Work Item Talks
  - RTC directory service for interoperability between robotic software platforms (Kang-Woo Lee) [robotics/2009-03-06]
  - Modeling of risk assessment for service robots (Yoshihiro Nakabo) [robotics/2009-03-07]

- 1 Special Talk
  - GearBox: Peer-reviewed open-source libraries for robotics (Geoffrey Biggs) [robotics/2009-03-08]

- 3 WG Reports [robotics/2009-03-09,-10,-11]
- 2 Contact Reports [robotics/2009-03-12,-13]
- Preliminary agenda for upcoming meeting [robotics/2009-03-15]

Deliverables from this Meeting:

- Nothing Special

Future deliverables (In-Process):

- Robotic Localization Service FTF Report
- Robotic User Identification Service RFP
- Potential RFP of Robot Technology Component (RTC) Container

Next Meeting (San Jose, Costa Rica):

- Review of User Identification Service RFP
- Guest presentations
- Roadmap discussion
- Contact reports
Minutes of the Robotics DTF Plenary Meeting - DRAFT
March 23-27, 2009
Washington DC, USA
(robotics/2000-03-17)

Minutes Highlights
- 2 New Work Item Talks
  - RTC directory service for interoperability between robotic software platforms (Kang-Woo Lee) [robotics/2009-03-06]
  - Modeling of risk assessment for service robots (Yoshihiro Nakabo) [robotics/2009-03-07]
- 1 Special Talk
  - GearBox: Peer-reviewed open-source libraries for robotics (Geoffrey Biggs) [robotics/2009-03-08]
- 3 WG Reports [robotics/2009-03-09,-10,-11]
- 2 Contact Reports [robotics/2009-03-12,-13]
- Preliminary agenda for upcoming meeting [robotics/2009-03-15]

List of Generated Documents
robotics/2009-03-01 Final Agenda (Tetsuo Kotoku)
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robotics/2009-03-17 Washington Meeting Minutes - DRAFT (Geoffrey Biggs and Beom-Su Seo)

MINUTES
Tuesday, March 24, 2009, Suite 1808, 18th Floor
09:00 – 09:45 Steering Committee

Tuesday, March 24, 2009, Kennedy, 3rd Floor
13:05 – 13:15 Robotics DTF Plenary Meeting, Chair: Dr Kotoku, Quorum: 4
Joined Organizations: AIST, ETRI, JARA, Shibaura-IT, Technologic Arts, Univ. of Tsukuba
- Minutes takers: Geoffrey Biggs and Beom-Su Seo
- Approval of minutes of Santa Clara meeting
  Approved: AIST (motion), Shibaura-IT (second), Technologic Arts (white ballot).

13:15 – 13:55 RTC Directory Service for Interoperability between Robotic Software Platforms,
Kang-Woo Lee, ETRI

- Benefits of RTC Directory:
  - Content-based component addressing
  - Content-based component tracking
  - Used in component assembly, it enables an application to be more reconfigurable
  - Current status
  - No relevant specification in Robotics DTF
  - OpenRTM-aist uses CORBA naming service
  - Related OMG standards are CORBA naming service and CORBA trading service
  - Two considerations for interoperability of RTCs:
    - Searching for the right RTC from diverse RTMs
    - Combining them into a robot application

13:55 – 14:45 Special talk: Modelling of Risk Assessment for Service Robots, Yoshihiro Nakabo, AIST

- Socially-accepted safety technology is required (new products may need almost zero risk).
- No fundamental safety principles for service robots, unlike industrial robots.
- ISO12100 Safety of Machinery
- ISO14121 Risk Assessment
- IEC61508 Functional Safety
- Propose object-oriented modelling robot safety.
- Model all processes and safety-related concepts using UML.
- Propose standardising the UML model in OMG.

15:15 – 15:45 Special talk: GearBox: Peer-reviewed open-source libraries for robotics, Geoffrey Biggs, AIST

- Software reusability on more than one level.
- GearBox: a collection of libraries of functional robot software.
- GearBox libraries can be used by frameworks.
- Reusable libraries – Unix-like model of development

15:50 – 16:30 User Recognition Service WG report

- Structure of proposed standard
- Differences from BioAPI
  - Continuous operation vs single time operation
  - Multi-user vs single user
  - Uncontrolled environment vs controlled environment
  - User ID and position vs User ID
  - Active vs passive
- Still disagreement from Dr Nishio about the need for this standard and if it is sufficiently different from the localization standard.

16:30 – 16:45 Infrastructure WG report

- Chose keywords for RFP scope.
- Deployment, configuration, QoS, fault tolerance, directory service.
Title: "RTC Container RFP"
Use case discussion.
Will perform a Related Topics Survey for directory and deployment services.

16:45 – 16:55 Robotic Localization Service WG report
- So far, 76 issues raised. 2 issues still unresolved.
- Aiming for Architecture Board at Costa Rica meeting.

16:55 – 17:05 Contact report by Young-Jo Cho
- Korea Intelligent Robot Standard Forum

17:05 – 17:20 Contact report by Tetsuo Kotoku
- ISO/TC184/SC2 working group meeting in Orlando.
- Motion to create official liaison with SC2.
  ETRI (second), Shibaura-IT (white ballot), motion passed.

Closing presentation and next meeting agenda by Tetsuo Kotoku
- Call for volunteers
- Next meeting: June 23-27, San Jose, Costa Rica

Adjourned plenary meeting at 17:30

ATTENDEE  (15 Participants)
- Beom-Su Seo (ETRI)
- Geoffrey Biggs (AIST)
- Hyun Kim (ETRI)
- Itsuki Noda (AIST)
- Makoto Mizukawa (Shibaura-IT)
- Noriaki Ando (AIST)
- Shuichi Nishio (JARA/ATR)
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- Toshio Hori (AIST)
- Yeon-Ho Kim (Samsung)
- Young-Jo Cho (ETRI)
- Yoshihiro Nakabo (AIST)

Prepared and submitted by Geoffrey Biggs (AIST) and Beom-Su Seo (ETRI).