Development of Smart Room Services on Top of Smart-M3

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SmartRoom System

Collaborative work activity: conferences, lectures, meetings, etc.

Evolution of SmartConference system (FRUCT, SPIIRAS)
Functions to be made smart

1. Presentation
   - slide show
   - multiple sources for slides (e.g., video flows)
   - audio support (e.g., microphone)
   - interactive (e.g., online drawings)

2. Activity organization
   - agenda: automatic updates
   - chairman control and collaborative construction
   - background activity: online discussion

3. Local and remote participation

4. Content collection, analysis, summarization

5. Collaborative work (e.g., planning social events and tours)
Components

- **Users**: activity participants (end-users of services)
  1. chairman
  2. active speaker (in turn relay manner)
  3. spectators (inactive speakers, guests)

- **Access/control**: from clients on personal (mobile) devices

- **Services**: a distributed system deployed on surrounding devices, computers, Internet services

- **Interoperability platform**: Smart-M3
Development Method

**Class:** smart spaces service-oriented systems

**Conceptual blocks:**

1. digital environment
2. service set
3. computing infrastructure
4. ontological modeling
5. service construction and delivery
Digital (Service) Environment: Distribution

On the agent level

- Smart space is a named search extent of shared information
- Agents run on various computational devices
- Cooperative utilization of the smart space content

System

- Computing equipment is localized in a room
- WLAN provides connectivity
- External computing systems (corporate, global)

Extensions

- Resource-consuming processing can be delegated
- Existing Internet services can be used
Digital (Service) Environment: Interfaces

- Core services: **Agenda** and **Presentation**
- Two big public screens are user interfaces for the services: **Agenda-screen** and **Presentation-screen**
- Information for all participants is visualized on public screens (composed from multiple services)
- End-user clients: personal screens
- SmartRoom UI elements: public screens and clients
Service Set

Lecture services
- Contents
- Presentation
- Video lecture
- Test assignments

Meeting services
- Ad-hoc agenda
- Focus on spectator
- Minute notes

Conference services
- Agenda
- Presentation
- Management

Composition
- Presentation
- Agenda

World information services
- Citation index
- Weather forecast
- Points of interest nearby

Sensor services
- Temperature
- Light/illumination
- Noise
- User presence

Activity tracking services
- Event recording
- User presence
- Summary report

Activity type
- Conference
- Meeting
- Lecture

Informational
- Passive
- Control

SmartRoom Infrastructure

SIB

SmartRoom space
(knowledge base)
Computing Infrastructure

- interoperable information sharing platform
- Smart-M3 SIB: desktop computer or server
- Infrastructural KP: service-level knowledge processors
- Delegation of service processing to the infrastructure
- Deployment
  - Cluster near SIB: online 24/7 service mode, ease of installation and control
  - Device-specific: make an embedded or consumer electronics device a SmartRoom participant
  - Server: extensive or complex processing, data source mediation
## Service Construction and Delivery

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Explicit representation</td>
<td>Service is represented as an ontological instance in the smart space. A change in the representation activates the delivery</td>
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<tr>
<td>Compositional visualization</td>
<td>UI element uses multiple services and composes the most important information on a area-restricted screen</td>
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<tr>
<td>Personalization</td>
<td>End-user UI element uses personal information and context when visualizing the services</td>
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<tr>
<td>Collaboration</td>
<td>Service representation is constructed in a P2P manner by several KPs, including clients</td>
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</tbody>
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Conclusion

Reference smart space system?

- Multi-agent: IoT-like variety of devices and computing facilities
- Multi-service: core, extension, composition
- Digital services: visualization, personalization
- Development split
  1. digital environment
  2. service set
  3. computing infrastructure
  4. ontological modeling
  5. service construction and delivery
Open source code:
http://sourceforge.net/projects/smartroom/