An Interactive Presentation Service for SmartRoom

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Abstract—Digital services in SmartRoom support collaborative work of people. Our reference case is conferences and seminars when each speaker makes a talk showing the presentation prepared in advance. In this demo, we show the basic SmartRoom presentation service can be extended using interactive features of sensor screens and mobile smartphones. A speaker can update her/his presentation during the talk if the public wide-screen supports sensor-based control for drawings. Any interested participant can easily follow the updates using the own smartphone, in addition to the wide-screen.

I. Problem

Nowadays collaborative work of people in various problem domains has gained much attention due to rapid development of information technologies and Internet [1], [2]. Our reference example SmartRoom system, which is designed for automated events such as conferences, lectures, and seminars [3]. The system provides a set of services that are constructed in a shared information space, i.e., based on the generic smart spaces approach [4], [5]. This space is maintained by the Semantic Information Broker (SIB). Programs (agents) interacting with the SIB are called Knowledge Processor (KP). Construction of a service can involve activity of several KPs.

Presentation-service is one of the SmartRoom services. Each presentation consists of a set of slides. The service supports the slide show that each speaker presents during her/his talk, see the model in Fig. 1. Prior to the event, the organizer with the help of the client administrator creates a conference (fills in: name, start time). Then, through the same client, the organizer creates a list of speeches in which a topic is filled for each speaker. The presentation is selected, which can be taken from the local file system or downloaded via
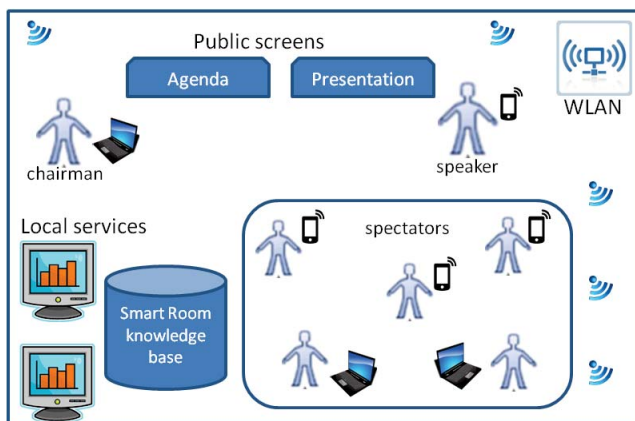

Fig. 1. SmartRoom system in a nutshell

the content-service. When the list of speakers is prepared, the organizer starts the conference. The list of speakers appears on the agenda screen, and the first slide of the first speaker is displayed on the presentation screen.

During the presentation, the speaker can show slides on the presentation screen using a mobile client. SmartRoom participants can download a copy of the presentation using the mobile client and analyze it independently of the presentation screen. The service also provides the possibility of drawing on the slides of presentations, using the mouse, if the screen is not interactive, and if the screen is an interactive board, then you can draw on the board itself.

This service displays only the presentation slides and allows, but during conferences there is a need to show not only slides, but also other information. For example, this may be an article found during a speech on the key words of a slide or questions from conference participants, linked to a specific slide, on the basis of a speech. We consider drawing as an important function to augment the Presentation-service. The user can make notes on slides (outline, underline, add necessary information). Participants of the event, while viewing the presentation from their mobile devices, cannot see everything that will be drawn on the current slide on the presentation screen. The problem is to expand the Presentation-service or similar services for the mobile client to implement the new features. Note that the smart spaces approach supports such kind of service extensions, e.g., see [6].

The studied extension of the Presentation-service is shown (Fig. 2). The speaker draws a formula or other visual elements on the board, which complements the information presented on the slide. Participants of the event (when viewing the presentation from their mobile devices) see the same drawing that was just drawn on the slide by the speaker.

The rest of this short paper is organized as follows. Section II describes demo software implementation of the proposed interactive presentation service. Section III discusses possible extension of the implemented service for advancing functions of collaborative work in SmartRoom. Section IV summarizes the key results.

II. Service Implementation

In the implemented demo application, the service is available both for speakers to make talks with presentations and for conference participants that use SmartRoom mobile clients for viewing presentations. The extended service can display slides from the current presentation as well as drawing is available on the presentation slides. For a mobile client, it is possible to flip through slides regardless of the presentation shown on

the main screen. The mobile client downloads the presentation via the HTTP protocol from the main service.

The software agent (service) for the PC (Linux, Windows) is written using the Qt framework, the raphic part is described in the QML language, and the logic in C++. Part of the service for the Android mobile client is written in Java. Table I shows the object-oriented view on modified SmartRoom code.

Briefly, the architecture of the service is as follows: The (C++) KnowledgeProcessor class is responsible for the interaction of the agent with the SIB (the Smartslog library is used to interact with the SIB). Class (C++) Projector displays the slides on the QML form. Class (C++) PresentationSlicer divides the PDF file of the presentation into separate images, each correspond to a presentation slide. The HttpServer class provides access to presentation resources (slides) to a mobile client. The mobile client downloads not a presentation, but slides (in graphic format, PNG). The class (java) Projector of the Android mobile client allows you to manage the presentation (previous slide, next slide) regardless of the main presentation on a public screen.

TABLE I.   NEW AND MODIFIED CLASSES IN OBJECT-ORIENTED IMPLEMENTATION

Class name	Description	Changes
KnowledgeProcessor	Implements access to intellectual space	none
Httpserver	Allows mobile client to download presentation slides	none
Projector	Displays slides on QML Form	none
PresentationSlicer	Splits presentation into separate slides (images)	none
PresentationService	The main class, organizes the work of all other classes.	none
QML Forms	GUI, drawing on slides	Added memorization of information about the picture (on mobile client)
Projector	Controls the presentation of the presentation on the smartphone	Added display of the picture on the presentation

III.   POSSIBLE SERVICE EXTENSIONS

The implemented extension to the presentation-service (as Fig. 2 showed above) provides a base for further extensions to advance the SmartRoom function. There are other tasks
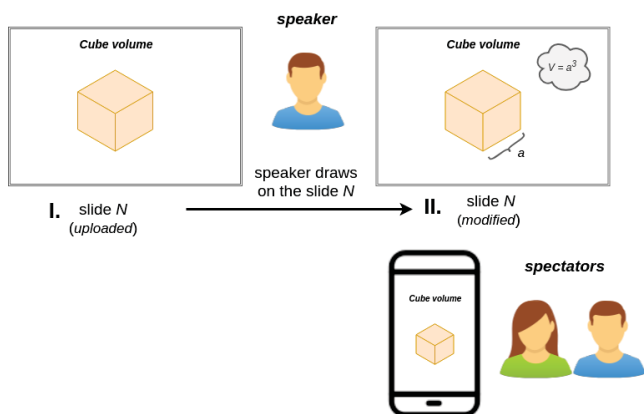

Fig. 2.   Presentation-service in SmartRoom

TABLE II.   FURTHER POSSIBLE SERVICE EXTENSIONS

Extension	Description
1. Questions for discussion	Throughout the presentation, conference participants can attach questions for a specific slide using a mobile client. Then at the end of the presentation, the time will come to answer the questions, for this the speaker can open the slides of his presentation and view the list of questions accumulated during the presentation. A speaker can display a specific question on the presentation screen for discussion.
2. Extraction from external sources	Search for additional information on the subject of the current slide on the Internet. For example, publications are searched for on the topic of a slide, and articles found are proposed to be attached to the corresponding slide.
3. Assistance to the machine operator	The operator of the machine has a monitor behind his workplace which displays operational data on the operation of the machine, and also has a mobile device. It is intended to notify the operator about any events related to the operation of the machine using a monitor and a mobile device. For example, display on the monitor tips for action in any situations.

that need to be addressed. Possible service extensions are summarized in Table II.

Feedback extension. During the conference participants have questions to the speaker related to the information on a particular slide. Then the problem arises: to remember the questions without interrupting the presentations and to return to the questions at the end of the presentation.

Slide augmentation extension. During a slide show, it becomes necessary to refer to a scientific article related to the information on the slide. This information can be useful for a speech. When extracted from external sources the references are shown on the slides as augmented information.

Multiple screens extension. Additional information can be displayed on the surrounding screens (TVs, mobile device, PC monitor). This way, the service extends the presentation screen to a set of screens. For instance, screen B scrolls questions that appear online, screen B lists related publications of the speaker, and screen C shows visual models that close to the discussed one by the speaker.

IV.   CONCLUSION

This short paper discussed our implemented demo service, which supports online drawings by the speaker during her/his talk. The service extends an existing SmartRoom service for presentation of slides on the wide public screen in the room. A speaker can update her/his presentation during the talk if the public screen supports sensor-based control for drawings. Any interested participant can easily follow the updates using the own smartphone, in addition to the wide-screen. We also showed that this way of service extension can be further developed to achieve many new advanced services for digital collaborative work environments.

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