Increasing Awareness of Remote Audiences in Webcasts

Rhys Causey
University of Toronto
Knowledge Media Design
Institute
40 St. George Street
Toronto, Ontario, M5S 2E4
rhys@kmdi.utoronto.ca

Jeremy P. Birnholtz
University of Toronto
Knowledge Media Design
Institute
40 St. George Street
Toronto, Ontario, M5S 2E4
jeremy@kmdi.utoronto.ca

Ron Baecker
University of Toronto
Knowledge Media Design
Institute
40 St. George Street
Toronto, Ontario, M5S 2E4
rmb@kmdi.utoronto.ca

ABSTRACT
In webcasts that involve both a local and remote audience, the amount of interaction with remote participants is typically very limited. Video conferencing offers a much higher level of interactivity, but is constrained by high bandwidth requirements and poor scalability. Our research aims to bring some of the advantages of videoconferencing to ePresence, an open-source webcasting infrastructure, by increasing mutual awareness of local and remote participants.

Categories and Subject Descriptors
H.5.1 [**Information Interface and Presentations**]: Multimedia Information Systems; H.5.1 [**Information Interface and Presentations**]: User Interfaces

Keywords
Awareness, webcasting, videoconferencing, video communications

1. INTRODUCTION AND BACKGROUND
Traditionally, interaction between a speaker and local audience is possible through vocal and non-vocal communication. Typically, the speaker interacts with his audience through speech, and different types of presentation material. However, other subtle interactions also take place – for instance, when an instructor looks to students for signs of comprehension. Providing for these subtleties in web-based presentations with remote audiences is difficult, and has been the subject of much prior research.

In particular, Jancke et al. [7] looked at various ways of increasing the presence of remote audiences with TELEP, a system used in research seminars on the Microsoft campus. With TELEP, on-campus Microsoft employees watching from their offices could be represented by digital images or low-resolution videos, and, with a 15-second delay, could interact with the speaker, local audience, and other remote viewers through text.

Baecker et al. [1] used VoIP to enhance interactivity with remote participants in webcasts, suggesting that the experience could be improved if remote participants were given the option of interacting with the speaker and local audience through voice. Work by Isaacs and Tang [6] suggests that these interactions could be further improved, and a better sense of awareness could be provided through the use of video.

Chen [4] reported on a system designed to test the hypothesis that distance teaching would be possible if the instructor were able to see the remote students, and remote students could see each other. His work described a video conferencing system in which remote students would be tiled on a wall-sized in-room display, and had reports indicating that it was successful in building a strong sense of awareness of those participating remotely.

Our research focuses on increasing awareness of remote participants in ePresence, an open-source webcasting infrastructure [2]. To accomplish this goal, we are carrying out an observational study of how lecturers maintain and use awareness of their audiences [3]. This work is helping to inform the design of a remote viewing interface to increase interactivity and mutual awareness of remote participants, and an in-room awareness display, which makes remote participants more visible to the speaker and local audience.

2. THE REMOTE VIEWING EXPERIENCE
Our primary goal with the remote viewing interface is to increase the ability of remote participants to interact naturally in real time. To do this, we allow remote participants to see each other through slow-scan video or digital images, and give them the option of interacting with text or voice. In order to facilitate voice conversation, we use a hand raising metaphor; participants would "raise their hand" to request to join the conversation, which would be between that participant, the speaker, the local audience, and any number of other remote participants. Remote participants not a part of the conversation would receive it as a part of the regular webcast feed.

The remote viewing interface for our modified version of ePresence is shown in Figure 1. As with traditional webcasts, the participant receives the video feed, as well as presentation material. Also, questions, comments and discussion can be sent to other remote participants and the in-room display using a persistent chat system [5].

Figure 1: The client interface, which uses awareness to improve the webcasting experience.

The remote viewing interface shows participants their "mirror image" (if they have a webcam), or a digital image (if they have one uploaded). Participants can "raise their hand" to request permission to enter into a voice conversation with the viewing room or enter directly into it if given prior permission from a moderator. Once entered into the voice conversation, their webcast video switches to a slow-scan/minimal-delay room feed. This negligible delay enables participants to converse naturally, giving them the ability to clarify a position, or ask follow-up questions. Once they exit or are removed from the voice conversation, they are switched back to the regular webcast feed.

Colours and icons are used to distinguish between the states of remote participants. For awareness of others watching remotely, there is full list of the remote participants, along with small representations. Also, the system automatically detects and stores a list of activity speaking remote participants, and the first participant in this queue is given a larger representation above the full user list.

3. THE IN-ROOM EXPERIENCE

Jancke et al. [7] reported that presenters and local audience members were typically unaware of the remote audience in webcasts, even with prior knowledge that the talks were being broadcast. In order to increase awareness of remote participants, we use a large in-room display typically positioned within the periphery of the visual field of the local participants, so that it is viewable, but not a distraction.

Figure 2 shows a small portion of the in-room display. The display consists of large representations of remote participants, and a chat window, which displays their questions, comments, and contributions to discussion. Colours and icons are used to identify the states of remote participants; for instance, participants in the voice conversation would be bordered green, and those with their "hand raised" bordered red. These colours serve to quickly distinguish the active remote participants; the speaker and local audience would therefore be able to quickly identify those participants who are currently available in the voice conversation, and those who have something they want to say.

Figure 2: A small portion of the in-room display.

We additionally distinguish between those who are simply able to talk (in the voice conversation) and those who are actively talking. All participants in the voice conversation have graphical sound level indicators at the bottom of their representation, and when the system determines a remote participant is speaking, a chat bubble icon appears. This allows the speaker and local audience to quickly identify who is currently talking, in the case where multiple remote participants are permitted to speak.

4. CONCLUSIONS

We have described a system for increasing awareness and presence of remote participants as part of an open-source webcasting product. We are planning a rigorous evaluation of the system in the near future, and are currently using it to facilitate the teaching of a course to two campuses simultaneously. We have also been using this system for group meetings featuring people from around North America, and it seems to be effective in engaging remote participants, allowing them to more easily interact with the presenter and local audience. Major observations from these uses and evaluations will also be presented as part of the demonstration.

5. REFERENCES

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