

CU-Later: A Communication System Considering Time Difference

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ABSTRACT

Despite the widespread use of technology for social communication across distance, a number of barriers to such contact still exist. One such barrier is the problem of communicating with people in different time zones. To address this problem, we propose the CU-Later system which considers the time difference between two locations. CU-Later is a system which allows synchronizing activities across time zones by displaying recorded video of a remote activity after a time shift. As one example of its use, the system connects two remote dining tables and lets users see and hear each other having dinner despite actually having done so at different times. We discuss the design of this system and a preliminary field test of time-shifted video.

Author Keywords Time Difference, Remote Communication Awareness, Video, Home

ACM Classification Keywords H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms Design, Human Factors

INTRODUCTION

Although there are various means of communication such as mobile phones, video phones, instant messenger, and e-mail, remote communication issues are still not resolved. This is especially true for people living in different time zones. In many cases, there are limited time windows where people can communicate with each other. For people separated by time zones, synchronous communication often involves extensive planning and/or calculating appropriate times to talk. Cao et al. [1] reported that family members living in other time zones prefer using telephone and video chat to email despite the difficulty posted by time difference, because they want to hear/see their partner's voice/face.

There are many research projects that have explored the issue of remote communication; however, these are not focused on the effects of the time zone differences on communication. FamilyWindow [2] discusses communication based on time difference and proposes that the system record video that is captured and transmitted by the remote user. Therefore, this system seems like a video mail exchange hub.

To address this issue, we propose a system which communicates awareness information, natural behavior, and recorded conversation through video of daily activities transmitted in a time-shifted way to facilitate interactive communications with one another without having to worry about the other's time.

CU-LATER

In this paper, we propose the CU-Later system, which facilitates communication over multiple time zones. The CU-Later system transmits what happened in the remote location after a time shift that compensates for the change in time zones. This system connects two remote dining tables to allow the users to share a meal together by showing what the remote user is eating and recording their conversation. Users can only see the others' previous video which is recorded as they participated in the same activity in their time zone.



Figure 1. Concept of CU-Later.

Using a camera and microphone, the CU-Later system captures scenes in daily life such as the menu in one house. It then displays the video at the remote partner's house when they participate in a similar activity. This introduces a time shift for sharing activities such as dinner. In addition, this system records the state of the remote user watching this activity while eating. Conversation is recorded as well, leading to a type of delayed interactive communication as each partner responds to the comments from the previous video.

Scenario: A daughter lives in Atlanta and her family lives in Tokyo. The time difference has Tokyo 9 hours ahead of Atlanta. The daughter watching the video from the previous day and listening to the parents conversations hears the mother say that "recently our daughter seems to be having a lot of oily food. I want her to have healthy food". Then the

daughter says (to the recording) “I’m having healthy food! Today dinner is Japanese Nimono.” The next day, when the parents watch the recording of their daughter, they feel relieved and happy to watch their daughter’s healthy face and follow-up by saying “Your cooking looks good. Next time you should try a fish dish.”

System Architecture

The CU-Later system consists of PC, display, built-in camera and microphone (Figure 2). The CU-Later software displays the previous video to the remote party. It also displays the real time video captured from the local camera in the bottom right corner of the screen. This system displays information synchronized from the same period of the remote party after a time shift. However, since people have different schedules and the system cannot continuously record video due to privacy issues, we attached a motion sensor to the system so that it records only when they are eating. Thus, by detecting whether the person is sitting at the table, the system only records scenes such as breakfast, lunch, tea time or dinner. This way, it minimizes any privacy concerns since both parties are in the same time and situation. By using Flash Media Server to transmit video to the remote party, we believe that the system can be used for other remote communication situations such as between couples and families with different lifestyles.

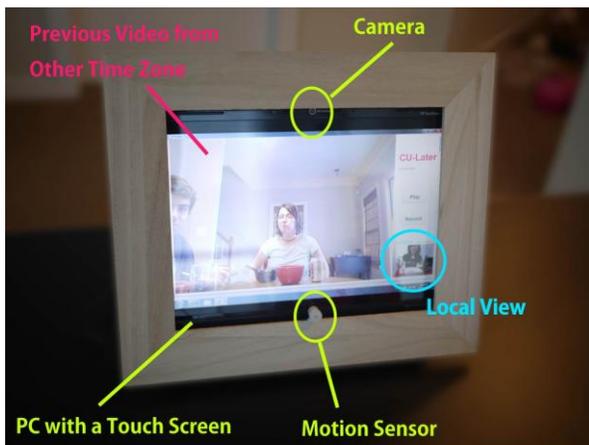


Figure 2. Prototype of the system.

PRELIMINARY FIELD TEST

To determine the effectiveness of the system, we conducted a preliminary field test. One Researcher (an author of this paper) and a laboratory member recorded a number of dinner scenes, exchanged the recordings, and watched them at their respective homes. We exchanged 4 videos times of people in House A having dinner alone and people in House B having dinner with her friends and roommate. We wanted to know how actually using the system felt and whether one can hear the voices and sounds recorded repeatedly.

Findings

We found that video framing was important. At first, we didn’t specifically mention framing and therefore the House A video only showed a face. The House B video presented the state of having dinner and the entire meal, so it was easy to understand what she was eating as well as feeling awareness and togetherness. We also found that it is better to define the actual location (where to put the display) to enhance the feeling of having dinner together.

The person in House A enjoyed the system because she could hear the conversation of the remote party and understand the state of the remote party having dinner. In addition, the users started to talk naturally to answer each other’s questions and share funny stories and laughs as well. Both people often explained the situation toward the other person. For example, “I’m watching the TV show 24” or “I’m eating curry”. Furthermore when the remote party didn’t talk, people talked to the other like if they are in the same place. We commented towards the video recordings repeatedly and believed we had interactive communication through the system.

Before the preliminary field test, we worried about how to record the sound because the system recorded only new sound. We could understand each conversation but feel it is better to hear the previous sound only faintly. Therefore, through experimentation, we need to determine whether or not the system should record older sounds.

CONCLUSION AND FUTURE WORK

We proposed a communication system that considers time zone difference called the “CU-Later” which informs what happened at the remote location over a time shift. We are planning to create a physical prototype that will fit well in the home environment, helping to frame a good view of the meal. We will also refine the prototype to automate recording at the appropriate times. Next, we are planning to carry out a long-term experiment in everyday life with multiple people living in another time zones to understand how time-shifted conversations change and evolve with time and to see how such a system may be appropriated in the everyday communication practices of people separated by time zones.

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