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Face-to-Face Applications: the Usage of Large Screens to Increase Co-Present Social Engagement

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Abstract. Together with Giorgio De Michelis and Flavio De Paoli (my PhD Supervisors, [gdemich, depaoli]@disco.unimib.it), we are investigating how to stimulate social engagement of small groups (e.g. best friends, couples) through shared applications displayed on large screens controlled by smartphones. The research area is IxD.

1 Introduction

In the last years, there has been the rapid worldwide diffusion of smartphones and tablets. Together with personal computers, they offer wide possibilities for interacting with digital content in any situation: (i) sitting at a desktop and (ii) standing or sitting anywhere. Moreover, the growth of large high-resolution displays allows the design of new systems offering new interaction possibilities. For example, [5] and [7] offer technical solutions to support simultaneous interaction of co-located people by sharing digital information on multi-touch large screens. Their solution is effective for small groups of people standing at arm's distance from the screen. At any rate, there could be ergonomic problems: the so-called 'Gorilla Arm syndrome' and the need of incessant moving when people interact on very large touch displays [3]. Moreover, in situations in which users involved prefer to interact in a more comfortable position, such a physical setting is not adequate for many reasons. For example, standing in front of the screen reduces the screen view to others participants (e.g., to students in a classroom sitting at their desks); people may prefer not to move to get close to the screen to touch it (e.g. family members would like to control the smart TV while sitting on the sofa in the living room). In similar cases, there is the need for a solution that lets users interact with the screen from a distance. Systems composed of a large screen and hand-held devices (e.g., smartphones) can overcome these limitations allowing users to interact with the digital content displayed by distant large screens. In these cases, there are interesting challenges for interaction designers, who

have to define (i) the correspondence between interfaces on the smartphone and the ones on the shared screen facilitating the command and control by users, and (ii) how simultaneous interaction of multiple users can be managed to avoid inconsistencies and conflicts.

The use of distant large screens to share experiences gets the most positive feedback in terms of potentiality and possibility of practical use within groups of co-located people [2]. Accordingly, our aim is to stimulate the social engagement of small groups through co-present interaction with social applications displayed on shared large screens.

2 Motivation: Base Scenario

Let us consider two friends (Alice and Bob) sharing a traditional application with standard control devices (e.g., keyboard and mouse). Only one user at a time can operate the application (Figure 1a): while Alice is free to act, Bob can only see Alice's behavior and what is displayed on the shared screen. Bob can be part of Alice's interaction by pointing at the screen to show the content of his interest, or asking Alice to perform a certain action.

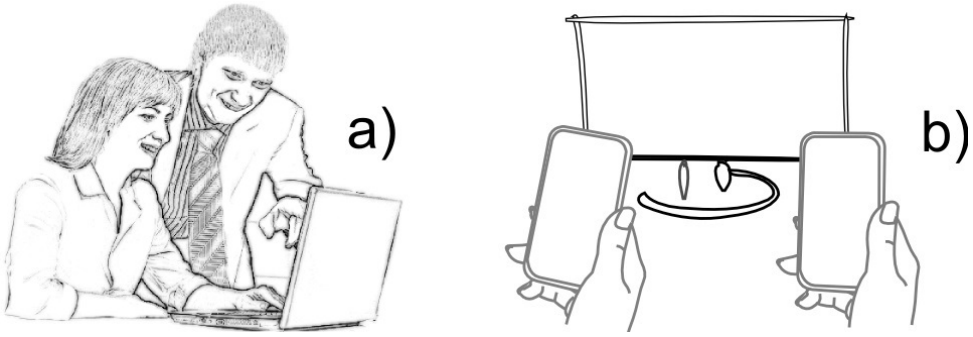

Figure 1: Alice and Bob using (a) traditional interaction and (b) social interaction.

To overcome these limitations, we let Alice and Bob use their smartphones as control devices removing the obstacle of one user at a time (Figure 1b): Alice and Bob can sit on a sofa comfortably, and interact with the shared screen, simultaneously, with the same possibilities (only when their actions interfere, the system may enforce lock-up mechanisms).

3 Overcome Challenges

3.1 Interacting with Large Screens: Smartphone Interaction

Different techniques to control distant screen have been investigated: pointer-based [6], direct (e.g. touch), bodily (e.g. Kinect) and mobile interaction (e.g. smartphones) [4]. According to the scenarios described in section 1, the most suitable technique seems to be the mobile interaction with some improvements. The existent techniques do not satisfy some of the principles we consider crucial: (i) users should be able to operate the smartphone with one hand, using the most common touch gestures with the thumb (drag/swipe and tap), without looking at it too often (the gaze should always be at what is displayed on the shared screen [4]); and (ii) the effects of control operations have to be reported on the visualization interface to give feedback making users aware of what is going on.

According to the first principle, the *action* is made on the smartphone and the corresponding effects are *visualized* on the large screen: *action* and *visualization* are decoupled. According to the second principle, different colors – one for each user – give feedback about what happens on the large screen.

[1] displays the presented interaction style. Moreover, a single-user prototype was designed to evaluate the effectiveness and naturalness of the interaction. It allows basic interactions such as the control of a set of pictures, audio and video streams, navigation and selection of elements, map control and so on. Users took a questionnaire using a 6-point Likert scale. Answers were given considering several factors including usability (Mean: 5.1, Mode: 5) and naturalness (Mean: 4.9, Mode: 5). Users generally appreciated the proposed interaction style.

3.2 Multi-User Simultaneous Interaction

Two factors could increase social engagement: (i) freedom of acting so that every user can take the initiative and (ii) social awareness so that every user can understand what the others are doing exploiting feedback on the shared screen. Therefore, how to manage concurrency?

When users interact with different areas of the large screen, there is no problem. Problems may arise when multiple users are acting on the same section since each of them may focus on a specific portion of the displayed content. For example, if two users are browsing the same list, a user may be focusing on the head of the list and the other on the tail. In such cases, it is

necessary to adopt presentation artifacts letting users co-navigate the list. A solution is provided by a multi-focus fisheye effect [1] to magnify the parts of the list associated with each user. Moreover, the border of each fisheye lens is colored (feedback aforementioned) to let watchers understand who is associated with that lens. In any other case in which there could be conflicts, two approaches can be adopted: (i) instruct the application to enforce control policies, or (ii) let users discuss and negotiate control policies that are then enforced by themselves (hence without inclusion of control mechanisms in the application). The former is preferred to prevent from unwanted situations (e.g., displaying sensible information without explicit consensus of the participants); the latter is advisable in the most common situations when users face many possible alternatives (e.g., select the next video to play among a shared set). Social awareness gives users the tools to make informed decisions engaging them.

4 Why a Doctoral Consortium?

Several questions are unanswered:

1) What kinds of face-to-face applications could be designed? YouTube4Two [1] is an example, but interactions are infrequent (users prefer not to interact while the video is playing).

We thought about a sort of “Facebook4Two” or an application to book hotels by two co-present persons. Gathering ideas at the consortium could be interesting.

2) How to measure social engagement given by applications designed for co-present use? How to measure “engagement” qualities of the proposed interaction?

3) How to go beyond smartphone interaction? Kinect or Nintendo Wii offer different interaction settings, but can they be used comfortably for controlling large screens? For example, users might suffer the ‘Gorilla Arm syndrome’ or get annoyed due to the ambiguity between wanted and unwanted commands.

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