

Sharable multitouch screens in cultural heritage and tourism applications

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I. INTRODUCTION

Cultural heritage assets keep alive the history of a territory and of its inhabitants. Several systems have been developed to support people during their visits to historical sites and museums, with the goal of improving the overall user experience. In many cases, people travelling together would appreciate the possibility of collaborating in gathering information and planning a personalized itinerary. Large sharable multitouch screens may offer this possibility. This paper is about ongoing research that is investigating possible applications of large multitouch screens in cultural heritage and tourism. In particular, an application is described, which aims at allowing tourists to get information about a territory and create itineraries for their visits by interacting together on a large screen.

II. A TOURISM APPLICATION

Informative touristic material that people carry during their trips still heavily relies on traditional media, such as paper guidebooks, leaflets, etc. Recent works (e.g., [1]) have investigated the possibility of using ICT to provide useful information. In order to explore collaborative approaches, the use of large multitouch screens is being investigated. They must not be considered as alternative to mobile devices, on which many electronic guides are implemented [2] [3] [4], but as complementary, extending people's possibilities to collect information.

We foresee the wall screen being placed in public spaces with a lot of traffic, such as waiting areas of airports or train stations, tourism information offices, etc. The proposed system could very well become a "spotlight" for attractions, events, accommodation facilities, etc.

To the best of our knowledge only a few proposals of applications on multitouch screens related to tourism exist in literature, but they are implemented on tabletop displays (see [5] [6]), suited to private (home) or semi-public (office, shop, hotel) locations and not to public spaces, as in our case. They are all very recent prototypes whose impact on user experience has not been deeply evaluated.

The application we developed provides information to tourists, allowing them to create and manage their own touristic itinerary by interacting with a multitouch wall screen. Information range from sites of cultural or historical relevance, fairs, events to accommodation facilities and transportation. The application is implemented on a screen provided by MultiTouch Ltd [7]. It relies on the Frustrated

Total Internal Reflection (FTIR) technology. The screen size is 2 x 1.2 meters but it is possible to use screens up to 16 meters large.



Figure 1. The main screen of the application.

Figure 1 shows the main screen of the application. By touching on one of the three images on the right side of the screen, the user can access information of three types: 1) points of interest (*LUOGHI*, in Italian), such as museums, monuments, parks, churches, theaters and other landmarks; 2) events (*EVENTI*), such as concerts, fairs and other festivities that are scheduled for the coming days in the city or the neighboring area; 3) hotels (*HOTEL*) or other accommodation facilities. Figure 1 refers to a situation in which a couple of tourists desires information on interesting landmarks. They touch the image *LUOGHI* and a series of images appears in the lower side of the screen, each representing a landmark. Each tourist can browse among these images or drag some of them to the center of the screen. These images can be moved, rotated and resized by hand gestures. While one tourist is browsing for interesting landmarks, in a similar way the other one can get information about events or hotels.

Once tourists have examined a certain number of items among landmarks, events, hotel, they can create their own touristic itinerary. They drag the pictures of the items they want to visit in the upper part of the screen. In Figure 1, the tourists have chosen "Heineken Beer Festival", a church and "Sailor Monument" for their own itinerary. They can add other items, or remove them by dragging them out.

Additional functionalities provided by the application are represented by four icons. By dragging the "i" on an image in the central area of the screen, the tourists receive, through a popup window, information about the object

depicted: e.g., summary, opening hours, tickets of a museum. For hotels, guests' opinions are also downloaded from the "booking.com" online service. If the tourists want to get geographical information, they will drag the "map" icon but, depending on the area where the icon is dragged, results may vary. If they drag the icon on the group of images displayed in the lower area, a map depicting all the positions of those places will be shown. In this way, the tourists can get an overview of the relative distances of the places shown, so that they are able to better plan their visit, depending on the time they have available. If, instead, the icon is dragged on to a picture in the main area of the screen, the map will show in greater detail where the place is. Finally, if the icon is dragged in the uppermost area (the itinerary created so far), a map will appear giving detailed instructions on how to go from one place to next one.

The Flickr icon (see Figure 1) is used to display, from the Flickr photo sharing online service, images having metadata matching the object being inquired. For example, the users might be looking at information concerning the "Heineken Beer Festival" held in the city they are visiting: dragging the Flickr icon on the image representing that festival, the application will recover photos having such tags as "Heineken" and the name of the city.

Once the tourists are satisfied with the itinerary, they can send it to their e-mail account by clicking on the mail envelope icon. A virtual keyboard then appears and they can type the email address. They will receive a personalized brochure, i.e. a PDF document, where the itinerary is illustrated, together with all related maps to guide them along the planned tour. We are now working on sending the defined itinerary on the users' mobile phone through Bluetooth or WiFi.

So far, the prototype has undergone only formative evaluations. Groups of 2-5 students of our HCI course, aged 21-25 years old, were involved in the evaluation sessions. We observed them interacting with the multitouch screen while performing some assigned tasks. Such preliminary studies have confirmed that users find this novel technology highly engaging. We are well aware that rigorous user studies in the field are necessary to deeply investigate several challenges that emerged during our research.

The multitouch technology is still considered as being new and "hi-tech", since it is not yet marketed to a wide consumer public. Its potential to captivate the interest of tourists and passers-by appears very high. Some challenges came out during the design of the software applications for multitouch wall displays we developed in cultural heritage and tourism domains (e.g., [8]). These challenges are related to the collaboration possibilities offered by such displays, to the identification of who is touching a certain screen point of the wall display and to the interface elements arrangement in order to avoid interferences among users accomplishing their tasks.

The choice of a multitouch technology depends very much on the context in which it will be installed: tabletop displays have their natural collocation in private (home) or semi-public (office, shop, hotel) installations, while for

public installations in open spaces wall displays are better. Multitouch wall screens, like the one we are working on, adopt image processing techniques which correctly detect each gesture. However, when multiple users are interacting, the system cannot recognize the interaction flow of each of them: it perceives that a finger is touching an object on the screen, but not whose person the finger is. Thus, large displays are well suited for collaborative tasks in which it does not matter to determine which user contributed to the overall result. Table displays permit user identification; for example, Diamond Touch [9] recognizes touch inputs of different users thanks to a transmitting antenna behind the surface of the display and a receiver below each user's seat.

Very challenging are the social aspects of public interaction spaces; answers to the following questions should be provided: are public displays only for entertainment? Are there other reasonable deployment scenarios? How to best integrate multitouch screens into the social context? Lack of space prevents us to further analyze such challenges, which can be discussed at the conference.

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