

Small group interaction methods on location aware mobile audio guides

Martin Wermers

RWTH Aachen University

martin.wermers@rwth-aachen.de

<http://hci.rwth-aachen.de/wermers>

I. INTRODUCTION

The use of audio guides in tourism is a wide spread and popular way to convey additional rich information about visited sites, like historical buildings of a city or exhibits in a museum. However, most audio guides isolate users of a small group from each other, due to the use of headphones and because in most systems it is impossible to listen to the audio content together in sync. This makes it hard to interact and communicate with others, like family members or friends, and the experience tends to be rather individual.

In 2009, the Media Computing Group of RWTH Aachen university [5] developed the Aixplorer [2], a mobile audio and multimedia tour guide for the city of Aachen [6]. In its current state, it serves as an audio guide for the town hall [7] and its vicinity, but it is planned to extend the system over the next years in order to help tourists explore the city and its rich cultural and historical heritage while offering location aware information. The audio guide features automatic room detection through wifi tracking combined with a very intuitive interface and is thus easy to use, even for typical museum visitors like elderly persons. Nevertheless the system lacks features for small groups, resulting in separated use with low communication and interaction among group members.

In my thesis I want to handle this problem and hence I aim to research new ways to enable and encourage communication and interaction between tourists in a small group when using a mobile audio guide. It has the universal purpose to explore how to achieve a richer group experience in such systems.

II. RESEARCH QUESTION

Several studies (e.g. [3] and [4]) successfully utilized games to encourage collaboration between visitors in a museum. Thus, one idea to accomplish the aforementioned goals is to develop a quiz-like game on the Aixplorer system for groups of up to four persons. As the questions will relate to the audio content, the visitors will hear the contents synchronously. For that reason and through the use of headsets with only a single over-ear earphone as suggested by Grinter et al. [1], I expect to enable unintermediate group

conversation. To increase the amount of interaction among group members, it is conceivable that the new system will offer team formation, to let players answer questions in collaboration.

Due to the synchronous play-back, visitors will no longer be able to decide all alone on the content selection, which may lead to problems when different interests come into play. Hence it is necessary to identify an appropriate mechanism for content selection, that pleases the whole group. Possible ways could be the implementation of a simple voting system or alternative to that, letting a single player resp. team decide and alternate rotative. Since it is planned to assign points for giving correct answers, a third option would be to let the player or team with the lowest score make the selection.

Further aspects that need close consideration are social conventions in museums. Most persons avoid being loud in a museum as not to disturb other visitors. However, when playing a collaborative game, chances that players forget to comply with usual social conventions are existent. Therefore, user tests of the different prototype systems will have to take these aspects into account.

As social conventions may impose too many limits on the research, I plan to extend the system to the core of the city in a second prototype. In this stage, I want to examine how location awareness through GPS can help small groups to explore the sights of an unknown city. Besides suggestions for nearby places of interest including descriptions for navigation, problems like overcrowding could be addressed through an online system which provides live data for users of the system at places of interest. Another possible use for GPS are small games, e.g. the interactive and collaborative measurement of the size of an historic square by gathering the location data of each player standing in another corner of the square.

Apparently there are many ideas for research, so in conclusion here are the main research questions in summary:

- Is a quiz an appropriate way to increase communication and interaction among group members?
- Which of the proposed methods for content selection are appropriate?

- Will users accept the fact to be constrained in their liberty concerning the selection of audio content?
- How can location aware technologies help tourists to explore an unknown city in a collaborative way?
- Will the proposed ideas lead to a richer group experience?

III. RELATED WORK

Hope et al. [3] examined familial relationships in a museum. They developed a quiz that family members can optionally use, either as a guide through the exhibition or as a pure game. The authors came to the conclusion that through the additional information the quiz provides learning took place for adults and children. They also stated that their system can motivate conversation between family members. However, their study lacks quantitative data and thus should be verified by further studies.

Grinter et al. [1] presented a method for audio guides, which allows shared listening for pairs of visitors. This *eavesdropping* method enables users to automatically hear the content the companion is currently listening to whenever the user has not selected any content himself. In their study, the authors figured out that in this way awareness of what companions are interested in is conveyed, thus resulting in increased possibilities for communication and interaction. They also showed that using headsets with only a single over-ear earphone increases the possibilities for ad hoc communication and thus reduces isolation. Unfortunately, the eavesdropping method is only applicable for groups of two.

Mystery at the Museum (Klopfer et al. [4]) is a collaborative game for museum education, that reminds intensively of old graphic adventures such as Maniac Mansion [8] regarding many aspects of design. Both have in common the appearance of three different characters players can choose from and that all characters need to collaborate to solve a main riddle which is embedded in an exciting story. Game aspects like interviewing virtual persons in different places, gathering items and solving riddles are other facets that recall the classic computer adventure. A huge difference concerning gameplay is that not one player controls all three characters (a technologist, a detective and a biologist), instead each role is played by a team of two visitors. Also, the rooms are not virtually displayed but are in fact the rooms of the museum. Since collaboration between the three roles is essentially needed to solve the game, communication and interaction between museum visitors was unequivocally increased as user tests showed.

IV. PROJECT SCHEDULE

In the first two weeks I will design and evaluate an initial paper prototype for the UI of a quiz system. After that, I will start with the first software prototype, which will be build upon the current Aixplorer system in Aachen's town hall. I estimate around four or five weeks for implementation and one or two weeks for a corresponding user study. The time for each following prototype is also set to six weeks including a user study at the end. The second prototype will extend the quiz game to the city center of Aachen, while the third prototype will try to implement additional features like a GPS game or an indicator for overcrowding of sights. The last six weeks are reserved for writing down my findings in an elaborate diploma thesis. The schedule in summary:

- Initial Paper Prototype for a quiz system: 2 weeks
- First Software Prototype around current Aixplorer system (town hall only): 6 weeks
- Second Prototype - quiz game in the city: 6 weeks
- Refined Prototype with additional features, like a GPS game or indicator for overcrowding: 6 weeks
- Writing the thesis: 6 weeks

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