

Iterative design of a mobile Mixed Reality game

Anne-Kathrin Braun, Johannes Löschner, Rod McCall

Kollaborative Virtuelle und Augmentierte Umgebungen

Fraunhofer FIT

Schloss Birlinghoven

53754 Sankt Augustin

anne-kathrin.braun@fit.fraunhofer.de

johannes.loeschner@fit.fraunhofer.de

rod.mccall@fit.fraunhofer.de

Abstract: In this paper we describe the process of redesigning a mobile outdoor mixed reality game. We introduce the design and concept of the first prototype and present the guidelines resulting from the first evaluation phase. The final section describes the redesign of the game based on these guidelines and patterns for game design.

1 Game Concept

The game we describe in this paper is called *TimeWarp*. *TimeWarp* is an outdoor Mixed Reality game played in the old part of the city of Cologne. Besides technical issues such as tracking approaches and user interaction techniques also temporal, social and spatial presence aspects of the *TimeWarp* game were investigated.

The story of the game is based on the legend of the *Heinzelmännchen* of Cologne, which were small elves who worked clandestinely for the citizens during the night until they disappeared one day. We extended this legend by spreading the rumor, that the elves are still in town, but they stuck in different time periods. The goal of this game is to find the *Heinzelmännchen* by the means of time travel. For that reason the players are equipped with a mobile Augmented Reality (AR) system. This AR system [BO06] consists of a backpacked laptop with an optical see-through display. To detect the player's position and orientation we use a 6 DOF hybrid tracking system consisting of an inertial sensor, which is attached to the head-mounted display, and a GPS receiver. We implemented three different user interaction techniques in this game: Interaction by the physical proximity to a real object, a gaze-based view pointer and a gyroscopic mouse. Additionally, the players are equipped with a handheld-based device, which provides an interactive map and further information on the game play and interaction techniques.

2 Design guidelines

A first prototype was implemented and tested in Cologne during summer 2007. The results of the test runs were evaluated and summed up in nine guidelines for designing such a system. A study of 24 people (16 male and 8 female) was conducted during two months with the objective of testing the gaming and usability aspects of TimeWarp [HB08]. Although various iterations of the system were tested a number of common themes emerged which were subsequently formulated into initial guidelines for the design of such systems. The guidelines are: (1) Understand Attention Allocation, (2) Simplify the Interaction Scheme, (3) User Safety, (4) Design appropriate paths through the environment, (5) Understand the Locale, (6) Interaction with Others, (7) Seamless Design, (8) Use a combination of real and virtual objects and (9) Provide a continuous experience. They are described in detail in [HB08]

3 Redesign of the game

To fully understand the game design itself and make a redesign possible in a structured way the Game Design Patterns (GDP) by Björk et al.[BH04] were used. With respect to each guideline the relevant game design patterns (GDP) were explored. Guideline 2 asks for a simplification of the interaction scheme. Even with only one device in a player's hand the switch between a map and an augmented view might still be confusing. To make this easier for the players, the GDP *Cooperation* has been introduced and therefore TimeWarp has been made to a cooperative game for two players. By adding the GDP *Competence Areas* all necessary interaction within the game has been split between players. This also serves to partially satisfy guideline 6 which asks for interaction with others. Requirements of guidelines 8, to use a combination of real and virtual objects, could partially be met by adding the GDPs *Rewards* and *Hybrid Space*. In the later progress of the game both players can choose different rewards. One of the most profound in terms of game design is probably guideline 9, which asks for continuous experience. To prevent players from getting bored when walking long distances, the game world has been decreased and the *Fog of War* has been added. The use of that pattern leads to greying out unexplored areas on the player's map and therefore also serves as a *Progress Indicator*. The players now know which areas still have to be explored.

4 Literaturverzeichnis

- [BH04] Björk, S.; Holopainen, J.; Patterns in Game Design. Charles River Media, 2005
- [BO06] Broll, W., Ohlenburg, J., Lindt, I., Herbst, I., and Braun, A.-K.: "Meeting Technology Challenges of Pervasive Augmented Reality Games". In *Proc. of the ACM Netgames 2006* (Singapore, Oct. 30-31, 2006). Also published in ACM Digital Library, 2006
- [HB08] Herbst, I.; Braun, A.; McCall, R.; Broll, W.: TimeWarp: Interactive Time Travel with a Mobile Mixed Reality Game. In: Proceedings for Mobile HCI 2008 – to appear