

Via Mineralia – a pervasive museum exploration game

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ABSTRACT

Via Mineralia is a serious pervasive game with the goal of transporting information in a playful manner to visitors of a minerals exposition. While in competitive pursuit of points for the search of and the answering of knowledge questions about exhibits they get to explore the museum in a guided fashion. First evaluations showed that especially for younger visitors this is a very promising approach for conveying information that might otherwise be regarded as unattractive or dry.

Keywords

Games, Pervasive Computing, Museums, RFID

INTRODUCTION

In today's multimedia world it becomes harder and harder for classical museums and expositions to keep their visitors interested with classical displays alone. In this publication we present Via Mineralia as a successful example of how a classical minerals exposition can be enriched with an interactive gaming experience. The aim is to capture the attention of the visitors, to convey knowledge about the exhibits, and to provide them with a guided path around the museum, all in a playful way. Via Mineralia is currently in its pre-production stage and will be installed in the "Terra Mineralia" museum [2] at Freiberg in 2008.

RELATED WORK

Many researchers agree that handheld-(PDA-)based multimedia applications are a well-suited means to improve the experience of visiting museums, cultural heritage sites, etc. A lot of work has already been done in this field, mostly with respect to handheld information systems or electronic tour guides, e.g. [4]. Considerably less work, however, has so far explored the possibility of enriching such experiences by use of informative (or "serious") games, especially w.r.t. the possibilities of pervasive games. A successful example is "REXplorer" [3], an outdoor exploration game situated in the historical city of Regensburg, Germany. With [1] we were already able to implement a location-based, RFID and PDA driven pervasive game. Many important technical and design

lessons have been learned from this work and could be transferred to the work on Via Mineralia.

GAME CONCEPT

The game principle behind Via Mineralia is similar to a classical treasure hunt. Players start out with the objective of looking for a specific exhibit. Each player carries a PDA, fitted with an RFID reader, which serves as game interface. It displays an initial hint for each object. Additional hints can be bought by spending points from a special hint account. These hints incrementally narrow down the search space (e.g. "located in western wing of museum", "display is standing close to a window", etc.) and thus speed up the search. If convinced he found the object in question, the player scans an RFID label attached to or close to it. Upon finding the correct exhibit, a series of up to four questions is asked about it through the PDA. These questions can be answered completely on the basis of museum information displayed close to it. For right answers, points are awarded and the hint account is refreshed gradually. After answering all questions, the search for a new exhibit is started, repeating the process. This way a sort of guided tour through the museum is provided. The set and succession of search objects can be random or specified by a specific theme, e.g. "volcanic minerals tour", "gem tour", "local minerals tour", etc. A tour consists of ten to twenty search objects. Upon completion of the tour, a final score is awarded depending on the success rate of the search and the amount of questions answered correctly. This score, if high enough, is then logged in a high-score list on the game server, where a player can leave his name or nickname as a record. This warrants competitiveness between players and increases replay value. To keep the game interesting for new visitors, a daily high-score list is kept in addition to the all-time high-score.

GAME ARCHITECTURE

Applications like exhibition or museum guides have to handle large amount of multimedia and text information. To address this task and to get dynamic access to information about the exhibits, this game relies on a client-server architecture. It is based on RFID labels at exhibits, PDAs with RFID readers and a central game server hosting all relevant data. To realize high-performance communication between PDAs and the server machine a WiFi network is established. Furthermore, the demands of an easily extendable and highly configurable architecture are supported by hardware as well as by software. Used

software components, namely the Apache web server, MySQL, PHP, and a proprietary client software facilitate an easy to use and intuitive system for developers and users. Using a web-based approach offers the possibility to handle a multiplicity of services, not only museum guides but every kind of application representing information. Likewise, consistency of the data is guaranteed using a central database. To get information about a certain exhibit, an attached RFID label with a unique ID is scanned with the RFID reader plugged into the PDA. This ID is transmitted using the WLAN capabilities of the PDA in the form of a http request variable to the web server. All multimedia and text data associated with this ID is transmitted back to the PDA where the client application illustrates received information in a web browser. To facilitate the editing of game information as well as the addition of new exhibits and content, a user friendly content management system has been implemented for the game. This provides museum staff and minerals experts, who are normally not as knowledgeable about the internals of databases and web servers, with an easy way to contribute specialized content to the game.

GAME DEPLOYMENT

Starting out as the development result of a student course, the game is targeted for installation in the “Terra Mineralia” exhibit [2] in Freiberg which will open its doors in 2008. Terra Mineralia will host the largest mineral exhibition worldwide. Currently, a pre-production model of the game is installed in the mineralogical collection of the TU Bergakademie Freiberg. This collection comprises about 80.000 specimens and is open to the public on 4 days a week. The WLAN infrastructure is located one floor above the actual exhibition. It consists of three WiFi access points (APs) which are arranged in a linear chain with a distance of approximately 25 meters between two APs. The APs themselves are also interconnected through WiFi which is due to architectural constraints of the building. Roaming support is available so that the game can be played with only slight interruptions when changing between access points. The game server, which centrally manages the game and handles all the PDA connections, is directly connected to one of the access points and gets forwarded requests from the other two. So far, about 300 specimens have been registered in the database and associated with digital content. Each registered item is assigned to a nearby RFID tag which is glued to the back of a paper label.



Figure 1: Pre-Production installation of the game in the mineral exposition.

EXPERIENCES AND CONCLUSION

We presented Via Mineralia, a pervasive search and quiz game with the goal to enrich the experience of museum visitors. Players walk through the mineral museum and collect points by searching exhibits with as little as possible hints and by giving correct answers to questions about the respective exhibits. The former objective motivates players to explore the museum space whereas the latter one motivates to gather actual information about the objects on display. Social interaction between visitors is fostered in a cooperative way by playing together in a group and trying to find objects and answer questions as a team, and in a competitive way by trying to gain a higher score than other players/visitors. The game Via Mineralia was played by miscellaneous persons during development and appealed to younger as well as older people. During a test run day it was evaluated by students from a local secondary school between 5th and 9th grade and was received enthusiastically. It was noticed that they explored the museum in a very intensive way and attentively read all the museum placards at the displays. The attraction of being better than the schoolmates and to lead the high-score list added considerably to the motivation. PDA handling as well as the game principles were comprehended easily.

Future work consists of improving the WLAN infrastructure and to create additional multimedia content about some of the exhibits like videos, images and informative texts. Possibilities of integrating an encompassing story which ties the separate exhibits together are also being explored.

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