
REXplorer: A Mobile, Pervasive Spell-Casting Game for Tourists

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Abstract

REXplorer is a mobile, pervasive spell-casting game designed for tourists of Regensburg, Germany. The game uses location sensing to create player encounters with spirits (historical figures) that are associated with historical buildings in an urban setting. A novel mobile interaction mechanism of "casting a spell" (making a gesture by waving a mobile phone through the air) allows the player to awaken and communicate with a spirit to continue playing the game. The game is designed to make learning history fun for young (and young at heart) tourists and influence their path through the city.

Keywords

Pervasive game, mobile phone, moblogs, location services, persuasive technology

ACM Classification Keywords

K.8 [Personal Computing]: Games. H.5.2 [Information Interfaces and Presentation] User Interfaces: *Interaction Styles*. I.4.8 [Image Processing and Computer Vision]: Scene Analysis – *Motion*. J.5. [Arts and Humanities]: Architecture.

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Introduction

Video games have a unique ability to captivate and engage their audience. A new research field known as “Serious Games” attempts to channel that energy to help inspire, educate, and train their target user base [5][7]. [8] extends this concept to the realm of pervasive games. In REXplorer, the serious game concept is applied to the domain of tourism, helping visitors engage with the history and culture of their destination.

REXplorer is specifically targeted at the “tour guides are boring” crowd, focusing on tourists ranging in age from 15-30 that grew up playing video games at home. It is not designed as a tour guide replacement, but instead as a new way to acclimate tourists to their surroundings and raise interest in the history and culture of the city. REXplorer is a part of the Regensburg Experience¹ (REX) museum in Regensburg, Germany, extending the visitor experience beyond the museum walls. Regensburg is a UNESCO world heritage site and the best-preserved medieval city in Germany, mostly untouched by widespread bombings in WWII. The game is currently in a functional prototype and testing stage. Full deployment is expected early summer 2007.

One of the primary design goals of this project is to create a game that can operate year round with a very limited staff. Other pervasive game prototypes, such as [4], utilize “puppet mastering” or “wizard of oz” techniques in which human intervention ensures the proper function of the game. Puppet mastering

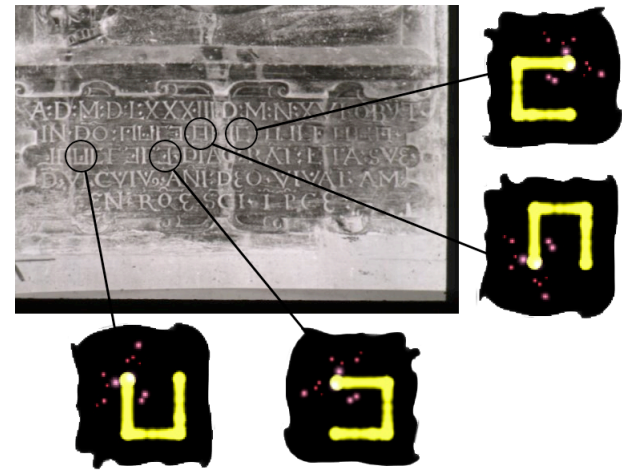


figure 1. A gravestone inscribed with a secret language serves as inspiration for the gesture vocabulary for REXplorer. The long-term goal of the player is to help scientists decode the mystery behind this gravestone.

effectively limits the availability of the game to scheduled events, and reduces the overall economic feasibility.

Game Storyline

Players are introduced to REXplorer through a short introductory movie in the REX Museum where they rent the game device. The story centers around a gravestone inscribed with a mysterious secret language shown in figure 1. The gravestone itself is a real artifact, located in the Regensburg cathedral, and archeologists have not yet been able to decipher the text.

The movie explains that the symbols on the gravestone are linked to paranormal activity detected in the city.

¹ <http://www.rex-regensburg.de>

REX Scientists (fictional characters) have created a special new device (see figure 2) that can measure this paranormal activity. Drawing the gravestone symbols in the air using the device excites medieval elements (wind, fire, earth, and water) and establishes a communication channel to the spiritual world. The players are tasked with helping scientists discover the true meaning of the gravestone symbols by researching the link between the symbols and the paranormal activity by collecting data throughout the city.

As the players progress through the game they encounter spirits that are located in front of significant buildings. The spirits reveal their “cliff hanger” stories related to significant events and periods in the cities history, and send the players on different quests. Points are rewarded for encountering new characters and completing quests, thereby influencing players’ movement by leading them from site A to B.

The design rationale of this storyline is important for several reasons:

1. It justifies the choice of gestures using a real historical artifact.
2. It engages the player in a high-level game long quest of deciphering the gravestone inscription.
3. It brings together the variety of significant historical contexts (stretching back to Roman times to present day) under one coherent storyline as each spirit represents a different period or historical figure.
4. It engages players to narratively and physically link city sites, creating an interconnected mental map.
5. It justifies renting a special device.



figure 2. The REXplorer measurement device consists of a Nokia N70 mobile phone and a GPS receiver packaged together in a protective shell. A soft overlay transforms the standard phone keypad to an 8 key game interface.

Rental vs. Personal Equipment

Previous pervasive games, such as [2] focus on using games to enhance everyday activities, thus require that the game be played with personal equipment. One of the fundamental design decisions of REXplorer is to provide rental equipment to the players instead of allowing players to use their own personal mobile phone. There are several pros and cons to the rental approach. The main disadvantage is the pervasiveness of the game is limited in its temporal availability – the game is not a constant everyday experience for any individual. However, since our target group consists of tourists, and tourism is not an everyday activity, this is an acceptable consequence.

The biggest advantage of renting hardware is that the lowest common denominator constraint can be ignored; i.e., the game implementation is not limited by the common capabilities of today’s mobile phones. Currently the gesture recognition and location detection can only be done with special hardware and software, making it impractical for players to use their own mobile phones. Another important advantage of the rental approach is that equipment can be disguised to create an appropriate mysterious atmosphere, which

might be lost if players used their own phone or knew the true nature of the equipment.

Lastly, the device rental process is an opportunity to introduce the players to the game and give them other materials necessary for successful play. For example in REXplorer, the players are provided with a souvenir brochure. The front of the brochure is a map marked with sites of interest. The back side of the brochure has game instructions including a legend of gestures and device buttons.

Playing REXplorer

To give the reader a feel for what it is like to play REXplorer, we will describe a standard playing scenario:

Jonathan and Barbara have just seen the introductory video in the REX museum and are ready to start playing REXplorer. Barbara is holding the device and Jonathan is in charge of the map as they leave the museum. Shortly after they walk out the door, a visual heartbeat on the device starts to beat faster, with both audio and vibration feedback, indicating that they are near an important building.

From the video Barbara knows that she needs to cast a spell. Jonathan flips over the map, and looks at the different gestures, and points to "wind" for Barbara to try. After glancing at the map to get an idea of the gesture motion, Barbara holds down the gesture button and waves the device through the air, just as she saw in the introductory video. As she moves the device, she sees feedback showing her gesture progress. Once the gesture is complete, she releases the button, and a short "tornado" video shows her that she has successfully completed the wind gesture. Johannes

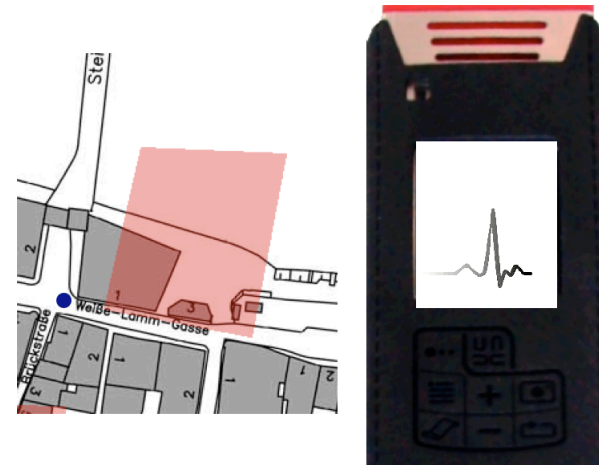


figure 3. When players are moving around the city, a slow heartbeat indicates that there is no abnormal activity

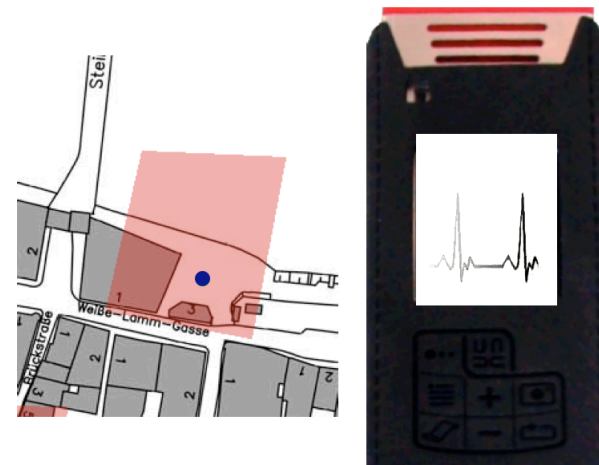


figure 4. As players move into a hotzone, the heartbeat animation speeds up, and there is additional vibration and audio feedback.

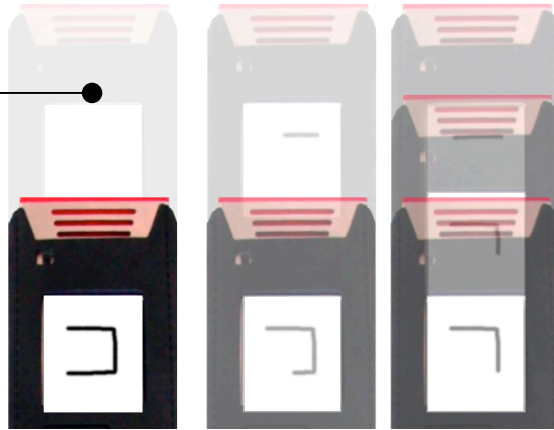


figure 5. Players perform gestures by waving the device through the air. A visualization of the gesture on the screen shows the gesture progress.

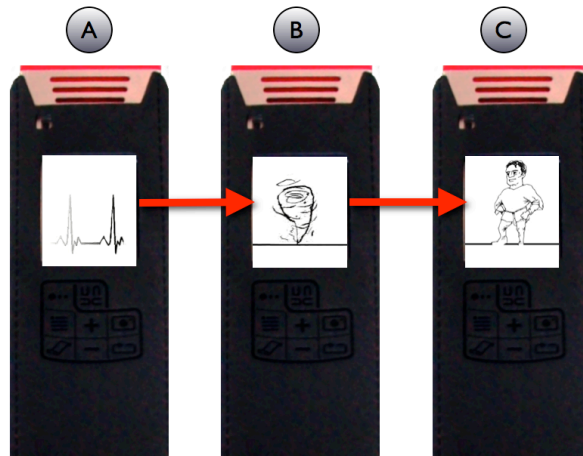


figure 6. An example character interaction. (A) The player enters the hotzone, and the heartbeat is excited. (B) After the player has successfully performed the wind gesture, the device shows the corresponding element. (C) The spirit communicates through the loudspeaker of the phone and his likeness appears on the device screen.

Kepler (a famous mathematician from the 1600's) greets the players through the loud speaker of the phone, and his likeness is displayed on the device screen. Kepler talks about the planets and presents Barbara and Jonathan with a quest challenge. After listening carefully to the text, Barbara understands that she must cast a "fire" spell to accept the quest. She looks at Jonathan and asks "which one was fire, again". Jonathan shows her the gesture legend, and she successfully accepts the quest. Johannes Kepler then sends them to their next destination where they can listen to the closure part of the "cliff-hanger".

Spell-Casting through Gesture Recognition

The gesture recognition process is supported primarily through camera-based motion estimation as in [1][9]. As motion samples are collected, they are rendered to the screen to allow players to see their gesture progress. After the gesture is complete, the motion trail is normalized and the data is passed to a gesture recognition algorithm. REXplorer is the first pervasive and mobile game to enable magic wand style spell-casting.

Location Detection

Currently, location detection is accomplished through a GPS receiver housed together with the mobile phone in the protective case. However, preliminary tests show that GPS alone is not reliable enough for our game as designed, and we are exploring design alternatives.

Travel Blog

As visitors move through the city interacting with characters, their game progress is tracked by a server at the REX museum. At the end of the game, the users are presented with a souvenir blog customized to show

their personal experiences in the city. The blog uses Google Maps² to provide an interactive map that shows the users' path through the city and highlights the points of interest they visited. Players are also encouraged to take pictures and videos during their visit. This media automatically appears on the blog with location marked in the map. The blog provides a nice summary of their experience to share with friends and family. More importantly, it allows users to explore history in more depth after their visit by providing summary text, images, and links to more information.

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² <http://maps.google.com>

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