

GPS Odyssey – a Location Based Interactive City Game

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ABSTRACT

The interactive city game GPS Odyssey has been developed as a contribution to a special performance of the theatre of Stuttgart, which focused on the subject of “Ulysses“. The project introduced mobile PDAs with GPS receivers in a scientific and artistic context where real-time visualization of multiple GPS tracks was required.

INTRODUCTION

Since recently more and more location based games are available on the market. The reasons for this trend are: (1) mobile computer are getting cheaper and more powerful, (2) many mobile phones are already equipped with GPS receivers, (3) data transfer is getting cheaper and faster and (4) GPS receivers are getting cheaper and more reliable. Some examples of recently developed location based games are *GPS Mission* (Orbster 2009), *NavBall* (NavBall 2009), *PacManhattan* (PacManhattan 2009) or *virtualpunk* (Virtualpunk 2009). Since the game industry itself is a huge market and also location based services are seen as a very fast expanding market, it can be expected that this is only the start of a very flourishing sector of the economy. Whereas in the past spatial data and GIS software were only available for a small amount of experts we can see today that Geoinformatics products can be used by everyone. In the following we will show how we realized a location based game that is played in front of an audience with the aim to entertain the audience but also to improve the knowledge of the local historical and cultural background of a city.

BASIC IDEA OF GPS ODYSSEY

If the King of Ithaca, Odysseus, had been equipped with a satellite navigation system, one of the most influential works of occidental literature would have been sacrificed to the demands of efficiency. The interpretation of the “Odyssey”, with the challenge of solving a variety of tasks at different stages of a journey, served as an inspiration for a thrilling city game to which the audience is invited to contribute. According to the motto “The journey is the reward”, several teams of audience members are each guiding a mobile player equipped with a GPS receiver (further on called „Mobinaut“) to special places within the city. As soon as the Mobinauts reach one of these places and the team members identify the place correctly, points can be scored by answering questions related to this place. In addition to scoring points, the personal goal for each member of the audience is also to score the consciousness about his or her own mental map of the city, and to gain knowledge of the city in a playful and interactive way. The Project was developed by the Universitaet Stuttgart, Institute of Urban Planning and Design and Institute for Photogrammetry.

SYSTEM ARCHITECTURE

One PC server connected to a beamer or a graphic wall is needed to run the game and to visualize the movements of the Mobinauts to the audience. Each Mobinaut has to have a GPS receiver and a mobile phone for the communication with the team and for transferring the actual position to the server via an internet connection. Modern mobile phones have all these features already integrated. The costs for the data transfer can be disregarded because only a small amount of data has to be transferred during one game. The costs for the communication with the team are depending on the mobile phone contract, but will also be not significant. The installation of the software can be done automatically from an internet server. Only the content of the game has to be changed, dependent on the place where the game is played. The time which is needed to create a new content depends on the complexity of the game.

Since the game can potentially be played everywhere, a positioning system is needed which is globally available. For our application a positioning accuracy of about 10m is needed which can basically be provided by all GNSS. The most important feature for us is availability, because the game is played in real-time and the positions of all players must be visible all the time. At the moment the software is realized based on GPS and we have sometimes the problem that in street canyons not enough satellites are visible to calculate the actual position. Galileo is expected to offer an improved availability in comparison to GPS. Therefore, we hope that the problem weakens by using Galileo. However, we think that a combined Galileo/GPS receiver would be the best solution. Also the combination of Galileo with other GNSS will help to overcome this problem.

Figure 1 shows the used system architecture with four Mobinauts. Altogether thirteen wireless connections are used (4 GSM connections for the communication of the teams with the Mobinauts, 4 Bluetooth (BT) connections for the communication of the GPS receivers with the PDAs, 4 GPRS connections for transferring the GPS coordinates to a server, 1 UMTS connection for the communication of the mobile PC - which is connected to a beamer - with the server).

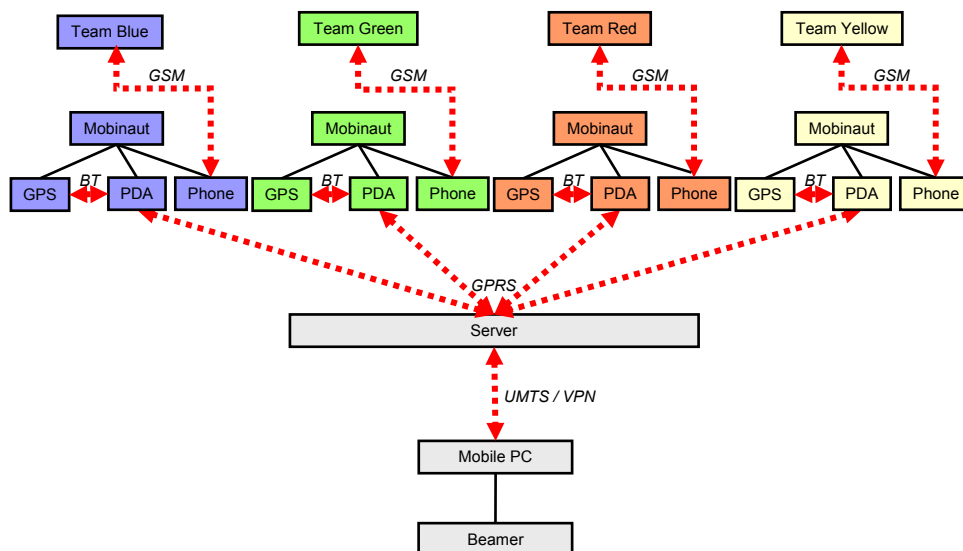


Figure 1: System architecture.

RULES OF THE GAME

The audience is divided into four teams. Each team guides a mobile player to interesting places within the inner centre of a city. The actual positions of the Mobinauts are transferred via a wireless internet connection live to a server at the place where the game is played. A software tool especially developed for this purpose converts the signals into an abstract graphic visualization on a graphic wall in order to allow the audience to keep track of every movement of the Mobinauts in real-time.

Each team guides its Mobinaut with a mobile phone by giving him instructions in which direction he should move through the urban space to special places within the city where questions about the history of those places can be found. The questions are represented with symbols on the playing field which is shown on the graphic wall to the audience. Beside these symbols, the playing field shows only the actual positions of the Mobinauts and their moving tracks. To accelerate the speed of the game, each Mobinaut is equipped with a bicycle and a hands-free headset (Figure 2).



Figure 2: Mobinauts equipped with GPS, PDA, Mobile Phone and bicycle.

Since the positions of the Mobinauts as well as the places where the questions can be found are only indicated by abstract symbols on the playing field, the challenge for the teams consists in guessing at which position within the „real city space“ the Mobinauts are located by interpreting their movement tracks. In order to interpret the movement tracks properly, it is necessary to recall one's personal mental map of the city and recognize points of references. Figure 3 shows the playing field at the beginning of the game.

When a Mobinaut arrives at a position where a question can be found, the team must identify the place of the Mobinaut. If the team identifies correctly this place, it can gain points by answering the question related to this place within 30 seconds. If the team does not know the answer of the question, it has the possibility of using a joker. If it decides to use the joker, the Mobinaut can ask pedestrians for assistance. The joker can only be used once by each team during the whole game. If the answer of the question is correct, the color of the question symbol is changed to the color of the team and the team gets one point. A question that is already correctly answered cannot be answered again by the other teams.

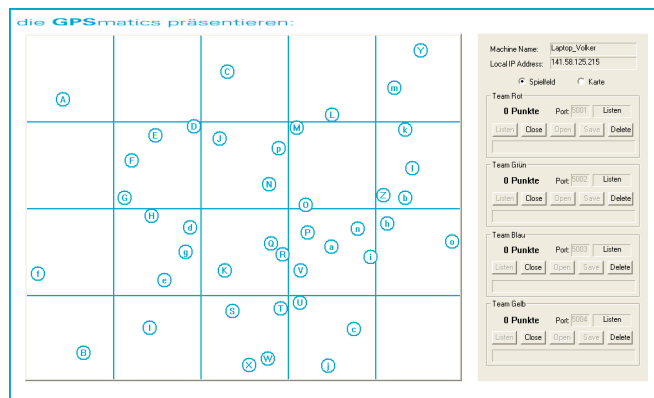


Figure 3: Playing field at the beginning of the game.

The playing field is divided into squared grid cells (claims). If one team holds the majority of questions in one claim, the color of the claim switches to the color of the team and three extra points are added to the score. If another team gets the majority of the same claim later by answering more questions in this claim correctly, the color of the claim is changed to the color of the other team and the three points for this claim are transferred from the previous team to the new team. This is the strategic part of the game. Each team has to keep track on the positions of the Mobinauts of the other teams. Depending on the position of the own Mobinaut, the positions of the other Mobinauts, the color of the claims and the distances to the unanswered questions the team must decide to which question the own Mobinaut should move. Sometimes this leads to a “race” between two or more Mobinauts. Figure 4 shows the playing field after 50 minutes.

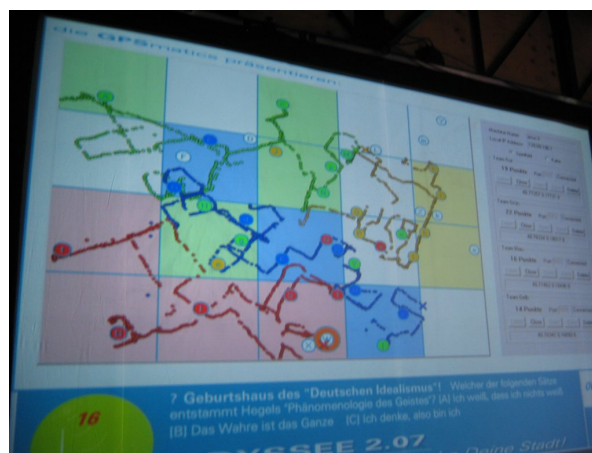


Figure 4: Playing field after 50 minutes.

If the team fails to find the correct answer or is not able to answer within 30 seconds, one of the other teams can gain the opportunity to respond to the question by blowing a whistle. The team which blows the whistle first is allowed to answer the question. If two or more teams are blowing the whistle at the same time, a moderator decides which of the teams was the loudest. The entire match is presented by a moderator, who is also free to make humorous comments during the game.

The moderator is also a referee in case of unclear situations. The duration of the game is 60 minutes. Before the game is over, all Mobinauts must come back to the place where the audience watches the game. If a Mobinaut is not back in time, the team gets five points deducted. The winner of the game is the team with the highest number of points. After the end of the game, the winning team is awarded with a price and the GPS tracks are superimposed on a real map in order to show the „Odyssey” of the Mobinauts. Figure 5 shows some impressions of the game.



Figure 5: Impressions of the game.

CONCLUSIONS

The game asks for concentration, reactivity, strategic planning and team spirit of the players. In addition to that, knowledge of facts concerning the local historical and cultural background of a city must be activated to answer the questions. The game was performed four times and was received each time very enthusiastically by the audience and we got a lot of feedback and questions about the realization of the game. Therefore, location based games are not only a good entertainment but also an interesting way to make people understand modern geoinformation technology in a playful way. For more information (including a video) of the project please see: www.labor8.de/GPS-ODYSSEY

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