



German Abstract

Innovative Entwicklungen im Bereich graphischer Informationssysteme (GIS) finden seit je her Anwendung im touristischen Bereich. Auf dem Stand der Fraunhofer Gesellschaft (Halle 11 Stand A 24) auf der CeBIT 2003 (12. bis 19. März in Hannover) werden unter dem Thema »Mobile Tourism« Entwicklungen und Ergebnisse verschiedener Projekte aus dem Bereich GIS in touristischen Anwendungen präsentiert. Schwerpunktmäßig werden Dienste vorgestellt, mittels derer Interessierte vor Ort Zugriff auf aktuelle, positionsbezogene Informationen (LBS: Location Based Services) erhalten können. Durch die rasante Entwicklung mobiler Endgeräte und dem Ausbau neuer, breitbandiger Telekommunikationsnetze wird den genannten Diensten eine starke Bedeutung in der Zukunft zugemessen. In den vorgestellten Projekten werden diese mobilen Dienste um innovative Visualisierungsmöglichkeiten und -techniken wie die Nutzung von 3D, Multimedia Inhalten und Augmented Reality im Außenbereich erweitert. Ziel ist es die Anwendbarkeit und Nutzbarkeit solcher Dienste in Zukunft zu erhöhen.

Mobile Tourism – New GIS-based Applications at the CeBIT Fair

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GIS in Tourist Applications

A wide range of tourist services include geographic and location-based information in order to guide and inform the tourist about a region, city or single objects. Therefore, GIS are established and used in many tourism applications, because GISs offer an attractive way to provide information to the service supplier (e.g. travel business) and, also to the tourist to address it.

The work of the Fraunhofer Institute for Computer Graphics (IGD) primarily focuses on tourism applications using GIS in a mobile environment. Two facts will need to be considered: The targeted users are generally neither familiar with the topic nor with the use of a GIS. Hence, simple and intuitive user interfaces are required for such services.

Tourists usually stay in areas that are unfamiliar to them and this is why any kind of orientation guidance is welcome. To date, analog maps are mostly used to get an impression of the unknown visited area. These maps often include representations of points and areas that might be of interest (e.g. historical buildings, amusement parks). Additionally, flyers and posters are used to promote up-to-date information (e.g. on events).

The tourist applications developed at Fraunhofer IGD allow the service provider to combine both kinds of information into one visualisation. The user can filter the information to get only those points of interest or events that they are interested in and are within their immediate surroundings (Location-based Service). The use of tourist applications combined with innovative visualization techniques (e.g. Outdoor Augmented Reality) will be an interesting way to spend free time in the future. For instance individual sightseeing tours will be available, i.e. the user can compose his tour with the provided information

before or during the sightseeing. At the sights, the tourist can access more detailed information presented by multimedia and/or 3D data. The projects shown at the CeBIT fair focus on specific technologies in terms of outdoor Augmented Reality, mobile 3D visualization and Multimedia LBS – and their combinations. Demonstrations of the results and current development status of all projects described below will be shown at CeBIT 2003.

LoVEUS – Multimedia LBS

The LoVEUS (Location-aware Visually Enhanced Ubiquitous Services) project develops a mobile service that will provide personalized, tourist-oriented multimedia information enriched with relevant advertisement. The aim of LoVEUS is to create a new paradigm for promoting tourism, cultural heritage as well as commercial services. The intention of the project is to provide exciting extra information



Figure 1: Image shows the LBS scenario under development in LoVEUS



Figure 2: Screenshot of the TellMaris Guide with 3D navigation

about the actual location of the user in order to guide him to points of interests and to present visually enhanced information about significant details. Thereby, the service will include active maps with city navigation, active panoramic views and visually enhanced content about specific subjects. Additionally, pre-defined guided tours will also be offered in areas of important historical sites, so that the tourist can choose between tours of different topics and length. This complex service will support next-generation mobile terminals (phone, PDA, wearable computer) that are enhanced with a Global Positioning System (GPS) and a digital compass.

In the scope of the project, a so-called Multimedia GIS is designed which combines a location server, a map server and a multimedia data server in one system. It can handle navigation and map requests as well as the manage multimedia content about freely defined spatial objects or areas. Based on a content filtering tool, the provided content will be adjusted to the user's interests and to the used mobile terminal. An authoring tool is developed in order to integrate the provided representations and composed guided tours as well as the data import tool into the LoVEUS system. A main aspect within the project is to test the developed service in the real world with the involvement of real actors. Athens and the area around the National Garden comprising part of the historical centre and part of the modern city was chosen as the test region.

TellMaris – Mobile 3D

The aim of TellMaris is the development of a tourist information system for mobile clients which is able to display 3D maps. 3D citymodels are more difficult to handle, but surveys have shown that they can offer a better guidance in unfamiliar environments than conventional 2D maps. In order to achieve this, state-of-the-art technologies in the fields of telecommunication, geometric modelling, 3D databases, and computer graphics are included. The display on mobile devices like PDAs or »smart phones« and the limited network bandwidth requires resource-adaptive metaphors for geodata management and visualization. As a target group, boat tourists in the Baltic Sea have been chosen who would be provided with adequate LBS. In the planning phase of the boat trip, TellMaris can be used to retrieve harbour information, coastline visualizations, etc. On board, the TellMarisOnBoard application running on a laptop, offers services like weather forecasts, hotel reservations or navigation guidance in ports. It is based on Java3D and combines a high resolution textured terrain model with 3D GIS data. For the terrain, a special streaming technology is used which is refined automatically when the user approaches. The Graphical User Interface is thus able to present a very realistic and dynamic visualization for every scale.

The TellMaris guide is developed for PDAs or cell phones with graphics display and assists the users when they disembark and explores the city. It can be used to request information about sights or good restaurants,

find the closest facilities, or find out where to get specific boating equipment. It is connected with a GPS device so that the current position can be tracked and the view can be adjusted accordingly. New geodata from the surrounding area is downloaded only when the user moves forward and can actually see it. As the limited performance and bandwidth of mobile devices have to be taken into account, resource adaptive solutions are being implemented that can find the balance between detail-rich models and fluent navigation.

As platforms, PocketPC for Ipaq and the NOKIA Communicator based on Symbian Operating System 9210 are used. As the emphasis lies on 3D representations, problems of real 3D databases, integration of building and surface models and the navigation through 3D models have to be solved. The system comprises of distributed components that communicate over protocols like HTTP or SOAP. The Institute for Computer Graphics (IGD) mainly develops a 3D feature server which is based on a 3D database. As database, a relational database management system like Oracle9i is used that is configured to store seamless 3D models created with modeling tools and exported to the VRML internet standard. Other components include the provision of elevation models and tourist information, routing and the transmission and visualization of 3D maps on mobile devices. All these developed components and other free services are integrated in the TellMaris system.

GEIST – Outdoor Augmented Reality

In the GEIST project (The term »Geist« is the German expression for the English word »ghost«) a system is developed to inform students and adults about the history of a place by offering a personalized and lively tour without a personal guide. They walk around the area and as soon as they approach a scene within the story (unnoticed by themselves) which consists of historical facts and fictional elements, the interaction is continued. Using see-through glasses, the user makes contact with the world created by the story. This world consists



Figure 3: User of the GEIST system at Heidelberg Castle

of real and virtual objects (buildings). The ghosts the user meets here are fictional or historical persons who lead him through his story. When the story raises the user's interest in history, historical persons or facts, the PDA can be used to get access to these data. The historical facts (managed in the History Base), fictional elements (Fiction Base), 3D models (Architecture Base), and geographic information (GIS (Geographic Information System)) are the data the system deals with. So the goal of GEIST is the Augmented Reality visualization of the story. To make the real and virtual objects overlap, a tracking component has to calculate the user's movement through his real environment and transform it to a movement of the user's representation in the virtual 3D world. The relation between the two environments is managed in a GIS. Main research part in GEIST is the development of a video based tracking delivering position and view direction with an accuracy useful for AR systems. Today, tracking systems usually use GPS and gyros to track the position and the view direction. The accuracy of these sensors are limited. Neither the accuracy of the position nor the accuracy of the view direction is good enough

to be used in Augmented Reality environment. Therefore, indoor AR systems use optical tracking to calculate position and view direction. The position of the cameras used in these systems are usually known. The position of one or more markers the tracked object carries are determined. In outdoor environment this kind of tracking is not possible. The user has to carry the camera and it is not possible to put markers all over a city. So the idea of the video based Tracking in GEIST is to compare the picture taken by the camera with the 3D city model stored in a database.

Darmstadt Mobil – Integrated LBS

The project »MobileGIS-LS« demonstrates a mobile City Information Service for Darmstadt that mainly contains the functionalities of map representations, textual and visual routing services, provision of video sequences depending on the location as well as the visualisation of significant areas or buildings in 3D. The idea of this project is to provide an enhanced LBS with media integration between accessible media, so that the user gets a realistic impression of inquired locations before he visits the area. The user connects to the service via

web browser and Internet, using a common PC or a PDA, whereby the different application environments require the implementation of different user interfaces in order to satisfy the user's handling and media capacities at these platforms. The providing of video and 3D visualisation content was a special focus of the service implementation.

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Further Information:

<http://loveus.intranet.gr/>

<http://www.tellmaris.com>

<http://www.tourgeist.de>

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