USING BLUETOOTH TECHNOLOGY FOR PERSONALISED VISITOR INFORMATION

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USING BLUETOOTH TECHNOLOGY FOR PERSONALISED VISITOR INFORMATION

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ABSTRACT

The proposed technology intends to use museum visitors' mobile phones, in order to decrease the cost of technology for museum use and also to avoid cognitive overload of visitors, by allowing them to use a device they own and know how to use. The use of Bluetooth technology within the museum environment can provide an efficient and easy way to provide visitors with personalised information on site. After distinguishing between four types of visitors, we propose brief scenarios of use, in order to cover each type's needs.

KEYWORDS

Bluetooth, Museum Learning, Personalisation, Mobile Learning

1. INTRODUCTION

Current research demonstrates the changing role of museums. Many researchers claim that nowadays, museums are learning institutions (Falk & Dierking, 2000). In the attempt to accommodate different learning needs of their visitors, museums have employed a variety of mobile devices. Mobile, hand-held devices are popular among museums around the world, since they support the visitor while moving around a museum. Such devices can provide information on the spot and allow visitors to move at their own pace.

Furthermore, it is a common fact that the prevalence of mobile phones among individuals in the western societies is very high and still increasing. This observation implies that museum visitors are very likely to own a mobile phone. In the same way, the development of Bluetooth technology (Bluetooth consortium) suggests that in the near future, most mobile phones will be able to communicate through Bluetooth with a variety of devices. Currently, some mobile phones also use infrared technology. However, there are a number of limitations following the use of such technology. The most important is the need for a line of sight between the devices. For this reason, we argue for the use of Bluetooth, since only the physical proximity is adequate for the establishment of communication. Location aware services using Bluetooth for museum are proposed by different companies and researchers (Mannar, 2004). Wishing to explore the potentials of such technology further, we experiment with mobile phones.

In addition, the use of visitors' mobile phones within the museum environment has three major advantages compared to other mobile devices. Using visitors' mobile phones, a museum decreases the resources necessary to implement and maintain the solution. In any other case, the museum would have to provide the handheld device (i.e. headphones, PDAs, palmtops, etc). The museum would also minimise maintenance expenses. We believe that this is a major advantage, since the cost of technology is often a prohibiting factor for its implementation and use. Another main advantage is that the user-owner of the phone is familiar with the phone's functions. This prior knowledge solves many usability problems. The visitor, during the time- restricted visit, does not have to learn how to use a new device and can therefore,

concentrate on the learning material. The use of a familiar device implies that the cognitive demands on the individual are reduced. Finally, information delivered to the visitor's mobile phone is something that can be taken along when the visitor leaves the museum. At a later time, the visitor is still able to go through the collected information and recapture the experience.

2. BLUETOOTH ENABLED PERSONALISED VISITOR INFORMATION

According to Mannar (2004) Bluetooth technology is ideal for use in confined spaces and it also allows the transmission of data up to the speed of 721 Kbps. This implies the possibility for delivery of rich content to the visitors. The museum needs to use a registration terminal and a server. At the registration terminal, located at the museum reception, visitor specific information will be collected and registered to formulate a visitor's profile. This information could include the age of the visitor, gender, the type of visitor (to be explained below) and optionally, other information such as special interests, past experience in museums, etc. By the term 'type of visitor', we refer to whether the person is alone during the visit or not. We have identified four types of visitors, among others: individuals that visit alone, groups of peers, families, and schools. All the above types have unique learning needs and their behaviour in a museum differs significantly (Falk & Dierking, 2000). Information should be adapted to their specific learning demands. The information gathered from the registration terminal is then transferred to the server.

In addition, Bluetooth transmitters are located near important exhibits (representatives of selected categories), allowing at least 10 meters from one transmitter to the next. As the visitor approaches these exhibits information will be available at her phone. Based on further visitor actions the user model in the server will be updated. For example, specific user actions and choices can show a specific interest in a certain historical period. The user will be therefore, provided with more information about the period of interest.

The server uses three models in order to provide the information: a user model, a content model and an interaction model. In the user model, there is information from the registration terminal, as well as the information gathered from the visitor's actions during the visit (Visiting Style). Veron and Levasseur (1991) identified four types of visiting style, based on the visitors' movement in the physical space of the museum. Knowing the visiting style of individuals, we can also assume a specific presentation style in the information that will be given to them. Personalised information based on the visiting style was also provided by HIPS (Hyper – Interaction within Physical Space). HIPS was a hypermedia systems supporting mobile presentation of museum and historical information. The results of studies (using HIPS) supported the researchers' hypothesis of correspondence between visiting styles and specific information (Gabrielli, Marti & Petroni, 1999). Briefly, an 'ant' visitor moves in a line and views all the exhibits. Such visitors prefer linear information and a good option is the use of stories. A 'fish' visitor is not interested in details and moves in the centre of rooms, looking for the main idea. It is important that such visitors know the main theme first and have the options for more additional information, if they wish. The 'grasshopper' visitor only sees exhibits of interest. Such visitors have a specific personal agenda for the visit, know exactly what they want to find and they are usually experienced visitors. Appropriate information for them is only very specific information for the objects of interest and options for further research about those objects. Finally, a 'butterfly' visitor sees almost all the exhibits but does not follow a line. The direction of the visit is frequently changed. Such visitors show a preference for non-linearity. Hypermedia and hypertext support needs for non-linear information and allow an increased user control in regards to navigation. Applications that have used visiting style and personalization of information are described by Chittaro & Ieronutti (2004) and Oppermann & Specht (2000) with very interesting conclusions. The factor of visiting style will be only active in the case that a visitor is alone during the visit, since visiting style is influenced by the presence of others and behaviour then is not predictable.

The content model contains a variety of information, like educational games (for individual, for 2 players, for 3, 4, and 5), stories (for the ant users, relevant to different profiles), basic- general information (for the fish users, relevant to their profiles), detailed information for certain exhibits (for grasshopper users), hypermedia option and hypertext (for butterfly users), material for collaborative learning (different for families, peers, schools), instructions for parents, information about museum navigation, information about museum facilities, etc. The interaction model is responsible for the communication of the user model and the content model and the presentation of the relevant information to the user. For example, if through the

registration terminal is known that a person is visiting alone and the person chooses to play a game, only the games for individuals will be available to her. In the same way, only families receive instructions for parents and so on.

Four brief scenarios of use are provided here, in order to demonstrate the potentials of such technology. 1)Individuals, visiting alone (specified from the registration terminal) – their movement within the museum premises is recorded through their mobile phones and the Bluetooth devices that attempt communication. Visiting style is determined. The visitor has the options of personal information according to her visiting style and the option of edutainment, through games designed for one player. 2) Peers receive material for collective learning and options for games, depending in the number of people they visit with. 3) Families can access instructions for parents, family specific learning material and options for games. 4) Schools receive learning material based on their age and level. There are options for educational games that students can play in teams. In addition, all visitors can access information about museum navigation and museum facilities. Finally, on their way out, all users can get information for further learning and information about future user specific activities (i.e. activities for families, schools, etc). The way-out information comes in a form that the museum has decided in advance. For example, the visitor gets a CD with further information, or a printout with information and web links, or later receives an e-mail, etc. In this way, the visitor is given the possibility of continuing the learning process away from the museum.

The scenarios presented here are possibilities of the technology proposed. Visitors' mobile phones could be viewed as valuable devices for museum learning. Following the proposed architecture, one has many options. For example, the content model could change with the advice of educators and museum curators. However, the principles of cheap and easy adaptation remain and need to be further explored.

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REFERENCES

Bluetooth official web site. Available On line: http://www.bluetooth.com Last accessed May 2005

Chittaro, L., & Ieronutti, L. (2004) A Visual Tool for Tracing Users' Behavior in Virtual Environments. *Proceedings of the working conference on Advanced visual interfaces.* May 25-28, 2004, Gallipoli, Italy, pp. 40-47

Falk, J. H., & Dierking, L.D. (2000) *Learning from Museums.* Altamira Press. Walnut Creek, CA

Gabrielli, F., P. Marti, P., & Petroni, L. (1999) The environment as interface. *Proceedings of the i3 Annual Conference: Community of the Future,* October 20-22, Siena, pp. 44-47

Mannar, S. (2004) Location aware services using Bluetooth. *Tata Consultancy Services.* Available On-line: http://www.tcs.com/0_whitepapers/htdocs/Bluetooth.pdf Last accessed May 2005

Oppermann, R., & Specht, M. (2000) A Context-sensitive Nomadic Information System as an Exhibition Guide. *Proc. Ubicomp '00* , Springer Verlag, Berlin, pp. 127-142

Veron, E., & Levasseur, M. (1991) *Ethnographie de l'exposition: L'espace, le corps et le sens.* (1. re-edition ed.). Centre George Pompidou Bibliotheque Publique d'Information. Paris