A Museum Guide Application for Deployment on User-Owned Mobile Devices

George Kapnas[1], Asterios Leonidis[1], Maria Korozi[1], Stavroula Ntoa[1], George Margetis[1], and Constantine Stephanidis[1,2]

[1] Foundation for Research and Technology - Hellas (FORTH)
Institute of Computer Science,
N. Plastira 100, Vassilika Vouton, GR-700 13 Heraklion, Crete, Greece,
[2] University of Crete, Department of Computer Science
P.O. Box 2208, GR-714 09, Heraklion, Crete, Greece
{gkapnas,leonidis,korozi,stant,gmarget,cs}@ics.forth.gr

Abstract. This poster describes the design and development of a comprehensive Museum Tour Guide mobile application that can be installed on user-owned devices. The purpose of the application is to provide museum visitors with a device that can improve their experience through optimised planning of their visit and an always-available stream of information regarding the museum and its exhibits. The main goals, the design, as well as the implementation of the application are described and the main functions of the application are presented. Finally, conclusions are drawn and further development ideas are discussed.

Keywords: Mobile Device, Museum, Guide, Guided Tour.

1 Introduction

Although the use of mobile devices in museums was introduced over 60 years ago [1] and has been the norm -mostly in the form of audio guides- for decades, only recently has the advancement of technology allowed to have devices with full multimedia capabilities and adequate processing capacity and stamina resting at the palm of a hand. As a result of this advancement, combined with the widespread adoption of smartphones and tablets in the past few years, a large portion of the population nowadays always carries with them at least one smart mobile device with an impressive array of sensors and significant computing power. The work described here aims to take advantage of the near-ubiquity of such devices to create a rich mobile museum touring guide that can be installed on an average smartphone or tablet and escort the user during their visit to a museum, offering guidance and information whenever desired.

2 General Goals

The purpose of this application is to create a comprehensive, stand-alone mobile guide tool for the visitors of museums. The guide should offer services similar to

C. Stephanidis (Ed.): Posters, Part II, HCII 2013, CCIS 374, pp. 253–257, 2013.

those one would receive if they had a qualified guide constantly but unobtrusively escorting them around the museum during their visit. The major tasks the application should perform are:

- Area Information and Guidance: Offer location information for all exhibition areas, as well as any other places of interest; let visitors know with relative precision where they are located within the museum and enable them to easily find their way around it, whether they wish to visit a specific exhibition room or a utility area of the building.
- Thematic Information: Offer users detailed information with regard to the museum's permanent as well as any temporary exhibitions, its collections and its exhibits individually. Visitors should be able to use the mobile guide in order to access any information they may require, from simple descriptions to audio and video content.
- Tour Creation: The most prominent aspect of a tour guide is perhaps its ability to efficiently navigate and show the user around the museum according to their wishes. Options include tours focusing on specific collections or exhibits, choices based on how much time the visitor is willing to spend, but also extend to planning custom routes based on individual preferences and interests.

In addition to the application's key tasks, the following goals had to be achieved:

- Platform independence: As the application is intended to be installed on smart handheld devices owned by the users rather than provided by the museum itself, it was important that the application would be available for most major platforms and could perform well under different hardware specifications, from small mobile phones to large tablets.
- Accessibility: While this is a goal towards which all applications should strive, catering for users' potential disabilities has been part of the design process from the very beginning. Museums by their nature are institutions that should be fully accessible to everyone and a mobile museum tour guide can be an excellent tool towards improving overall accessibility. Currently, the implemented version offers a set of alternative colour themes that improve usability [2], while the future versions will integrate features such as UI resizing and scanning to facilitate mobility-impairments [3], TTS, etc.

3 Implementation

3.1 The National Archaeological Museum of Athens

The aim of the project is to create an application that can be integrated in almost any type of museum; this particular version has been tailored around the offerings of the National Archaeological Museum of Athens [4].

The museum building comprises three floors; all exhibition rooms are on the ground and first floors, whereas the basement only has some of the utility areas. There are several permanent collections, as well as a temporary collection available. For the

optimal integration of the application with the museum's other online and interactive offerings, the museum's own segmentation and categorisation of exhibits and collections was followed; exhibition rooms were also grouped in accordance with the definitions of the museum map. Additional information regarding the exhibitions and exhibits has been collected from the Odysseus Portal, provided by the Hellenic Ministry of Education [5].

3.2 Features

The developed application can be deployed in three major mobile platforms (iOS, Android, Blackberry Tablet OS) and can escort users during their visit to a museum offering guidance and information. The implemented features of the current version can be found below:

Free Navigation. A fully interactive map that supports touch-enabled zooming and panning functions through pinching and dragging gestures is provided. Users have the option to select any particular Point of Interest (e.g., room, exhibit) on the map and gain access to more details concerning it. If they wish to ask for a route to a different location within the museum, they can simply state the starting and the ending point, and the application will calculate the most convenient path and display it on the map, including appropriate instructions where the floor level may need to change.

Guided Tours. The application's touring feature currently allows visitors to select from a set of predefined tours, from short to extensive, depending on how much time they wish to spend. A tour is passively location aware; by asking the user to confirm their location in a room, it paces itself and displays the correct information for every step. In more detail, when a user states their location, the map centers to the respective room and virtual pins that correspond to the exhibits that belong to the selected tour are displayed to facilitate their detection in the physical room.

If the user decides to deviate from the predefined route either physically or just on the device, the application will comply, supplying any requested content along the way; in addition, it offers the options to either return the user and pick up from the last visited point, or simply continue from the nearest not yet visited one that belongs to the tour.

Exhibit View. Offering information on the museum's exhibits is one of the most essential functions of a guide. Aside from the description of each artefact, the application also offers additional multimedia content for a richer experience semantically segmented to facilitate comprehension (e.g., material, date found, origin, periodisation, etc.)

QR Code Identification. In order to satisfy a set of identification requirements within the museum, the use of QR Codes [6] was adopted. Each accessible building area has been assigned its own code, as has each individual exhibit within the museum. Through the use of their device's built-in camera, a user can inform the application of their current location or identify an exhibit they may be interested in finding more about. Using the same method, the guided tour can be updated as to which steps have already been completed or whether the user has decided to stray from the tour's path.

Search and Save. A search function and the ability to select and save exhibits as favourites are also among the implemented features. The search function enables users to query the application for information in different ways and create their own custom tours; they can search for a specific artefact, a utility or exhibition room, and add it to their favourites from where they can later create a new tour tailored to their preferences.

Fig. 1. Screenshots of different pages of the Museum Guide (from left to right): The main menu, a short tour of the main exhibits, confirmation of a completed step and the assistant indicating the omission of two steps in a in a preset tour

3.3 Implementation Issues

Regarding the application's internals, given that every archaeological site uses its own proprietary catalogue format, an extensible content categorization scheme was implemented to facilitate classification and discovery, where the application uses the appropriate query functions to discover relevant material.

In terms of storage needs, given that devices' capacity is limited and that free space is invaluable for smartphone owners, the application minimizes space requirements through caching. Whenever, a room is accessed, its exhibits and those of the surrounding rooms are dynamically loaded, while using an LRU policy [7] any past content is discarded. The selected approach apart from minimizing storage requirements also facilitates automatic content update without requiring from the users to update the application itself to get the latest content. However, to pre-empt network failures or unavailability, the guide also includes an "offline" mode where, if the user chooses to, content is permanently stored on the device which then periodically checks for updates.

Finally, to support content management and classification, an auxiliary editor was implemented to support developers in defining building maps and adding exhibits in the site's rooms.

4 Future Work

Although the application has already reached a satisfactory level of maturity, there are plans for the addition of more features. In particular, one of the current development

priorities is the addition of background information collection from the application. In that way, data can be gathered relating to how each person uses the application and how they tend to interact with the museum's offerings and the museum itself. The collection of such data will enable a better understanding of users' needs and the corresponding improvement of the application. This could potentially be honed even further by categorising visitors according to information collected by the users in advance; age, nationality, professional background and other characteristics could be utilised to tailor a near-optimal tour for every individual.

5 Conclusions

This paper has introduced and described an application designed to act as a museum tour guide, which can be installed on a user's own mobile device. The current release of the application enables users to easily navigate themselves around the museum as well as follow predefined or custom tours. With always-available information and multimedia regarding all exhibits and other points of interest and the ability to tailor their experience to their needs, visitors are essentially accompanied by a comprehensive, intelligent guide that makes their museum experience not only richer, but also more efficient.

References

1. Tallon, L.: (May 19, 2009), http://musematic.net/2009/05/19/about-that-1952-sedelijk-museum-audio-guide-and-a-certain-willem-sandburg/
2. Doulgeraki, C., et al.: Methods and Tools for the Development of Unified Web-Based User Interfaces. In: Stephanidis, C. (ed.) The Universal Access Handbook. CRC PressI Llc (2009)
3. Ntoa, S., Savidis, A., Stephanidis, C.: Automatic Hierarchical Scanning for Windows Applications. In: Stephanidis, C. (ed.) The Universal Access Handbook. CRC PressI Llc (2009)
4. http://www.namuseum.gr/
5. http://odysseus.culture.gr/h/1/gh154.jsp?obj_id=3249
6. QR code. Wikipedia, The Free Encyclopedia (April 17, 2013), http://en.wikipedia.org/w/index.php?title=QR_code&oldid=550751789 (retrieved March 12-April 18, 2013)
7. Smith, A.J.: Cache memories. ACM Computing Surveys (CSUR) 14(3), 473–530 (1982)