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## Mobile access to cultural heritage - Mobile-CH 2016

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# Mobile Access to Cultural Heritage – Mobile-CH 2016

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<http://dx.doi.org/10.1145/2957265.2965001>**Abstract**

The Mobile-CH workshop, held in conjunction with the MOBILE HCI Conference, will be the meeting point between cultural heritage research and personalization – using any kind of technology, especially mobile and ubiquitous ones, to enhance the personal experience in cultural heritage sites. The workshop is aimed at bringing together researchers and practitioners who are working on various aspects of CH and are interested in exploring the potential of state of the art technology to enhance the CH visit experience. The result of the workshop is a multidisciplinary research agenda that will inform future research directions and hopefully, forge some research collaborations.

**Author Keywords**

Cultural Heritage; Mobile User Interfaces;  
Personalization; Mobile Guides; Tangible User  
Interfaces; Pervasive Systems

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation:  
Miscellaneous. H.3.m Information Storage and  
Retrieval: Miscellaneous. I.2.m Artificial Intelligence:  
Miscellaneous.

## **Introduction**

Cultural heritage (CH) has traditionally been a privileged area for personalization research. Visitors come to cultural heritage sites willing to experience and learn new things, usually without a clear idea of what to expect. CH sites are typically rich in objects and information, much more than the visitor can absorb during the limited time of a visit.

The evolution and convergence of technologies for managing and integrating Open Data, and for delivering mobile services, as well as the effort of leveraging Internet of Things (IoT) technology to assist users in different context (also including museum experience) open new opportunities for personalization research, which has the potential to improve the presentation of information, the exploration of content and the discovery of events interesting for the specific user/group, the collaboration among users having similar interests, as well as the adaptation to heterogeneous user contexts and devices and intelligent objects. It could improve the interaction and experience of visitors both on CH websites and with CH guide systems. Visitors to CH sites differ and their visit experience involves a combination of the physical, the personal, and the socio-cultural context and identity-related aspects. Hence they may benefit from individualized support that takes into account contextual and personal attributes.

Personalization can also be related to collaboration in the preservation, enrichment and access to cultural heritage by considering crowdsourcing techniques, based on active involvement of a broad range of people to enhance the management of cultural heritage information. Several projects developed data collection tools, museum or city visitor guides as a means of demonstrating various concepts including location and

context awareness and smart building environments. Together, these represent two ends of the “production” process of bringing cultural and natural heritage from the research environment to its consumers. A key ingredient is to address many classes of ambience: tourist routes, cities, parks, archaeological sites, ancient buildings and museums, as well as spontaneous sources of artwork such as street art. We propose to address the issue of extending the users’ perception level, their learning abilities or their productivity: the user is not only the information consumer but also the producer. For example, citizens can flag points of historical-artistic interest, their state of repair and any problems to provide tourists with promotional information and Public Administrations with monitoring information. Methodologies and technological utilities for online communities to become actively engaged in the publishing process, contribute their knowledge, and partake in a dynamic creation and conceptualization of the cultural resources will be presented.

The workshop aims at creating a research agenda for personalized and ubiquitous access to CH where the more general goal is to make the individual CH experience a link in a chain of a lifelong CH experience, linked to daily life experience and that provides the foundation for future experiences.

## **Submissions**

The 9 submissions that were accepted for presentation at this workshop spanned a large variety of topics combining advanced visual interfaces and cultural heritage. In the remainder of this paper, we outline the main contributions brought by these papers.

Papangelis et al. [7] discuss the potential of mobile technologies as a mechanism to explore intangible

heritage for preserving culture. The paper outlines three distinct areas necessary for the design, development and application of mobile technologies within this domain: a) The documentation of traditions in their unique context, as articulated by the represented community; b) The translation of traditions and their expressions into emerging technology-based design; c) Co-design and ethnography as approaches to build meaningful experiences.

Shrestha and Chakraborty [8] propose to synthesize and transform real world physical environments (PE) into a CAVE automatic Virtual Reality system (CAVE) by using three-dimensional (3D) models of cultural and historical artefacts. Several applications use 3D models, including visualization and digital preservation. Virtual Reality is used to improve perception and to better understand products and environments for studying human factors and behaviour. As a pilot study, the authors developed and prototyped a customizable 3D physical environment using historical data and archives into an interactive CAVE virtual reality (VR) system. Then they conducted a study of user preferences using pre-test and post-test questionnaires of the CAVE versus paper-based artefacts.

Wecker, Kuflik and Stock [9] propose a framework to monitor visitor behaviour "on the go", something that is mildly volatile, to determine personality traits, something that is more stable. This knowledge can be then used along with context to give tailored advice. Methods of monitoring visitor behaviour, converting that to traits and to personality types are described in the paper. Different dimensions of how to give tailored advice based on personality are described and examined.

Mokatren and Kuflik [6] try to develop a novel technique for location awareness, interest detection and focus of attention using computer vision techniques and mobile eye-tracking technology. Their focus is on museum visit and on optimizing positioning by exploiting the visit style to choose the appropriate algorithm.

Ardissono, et al. [2] focus on the search for information in a Geographical Information System (GIS). They propose to support textual search, jointly with standard category selection, as the basic interaction model for retrieving geographic data. Specifically, they propose to enrich the conceptual representation of domain knowledge with linguistic information for supporting flexible query interpretation and expansion. They applied their model in the OnToMap Participatory GIS, which supports geographical information sharing in participatory decision-making processes.

Dierna and Machi [4] present an accurate indoor localization methodology relying on Bluetooth Low Energy technology that can be used to gently suggest the user evidence of contextually coherent areas of interest around him/her. A localization accuracy as low as two meters has been measured and one meter limit evaluated during experimentation of a mobile guide in the Archeological Museum of Camarina, in province of Ragusa (Italy).

Ardito et al. [3] focus on the goal of fostering a wider appreciation of archaeology by offering tools able to engage the general public and to increase awareness of the importance of CH. In their paper, they discuss how a generic mashup platform can be used to support the work of professional guides of CH sites, enabling them

to create personalized and engaging visit experiences by integrating in the user interface heterogeneous services and knowledge sources.

Georgiadi et al. [5] present on-going work on the design and prototyping of a pervasive, role-playing game for elementary school students. The game takes place in a designated space presented as an excavation site, in which students become acquainted with a number of main roles and tasks taking place in archaeological fieldwork. The educational goals are to introduce students to fundamental archaeology concepts and to inform them about the historical background of a specific site and the discovered artifacts. The game apparatus consists of a mobile application, a number of small wireless sensors (beacons), tangible models of the antiquities and simplified prop tools of the archaeological equipment (3D printed). The paper outlines the main design concepts, technologies used and gameplay and reports on a preliminary evaluation.

Anagnostakis et al. [1] describe an affordable approach and prototype system that can enhance the accessibility of museum exhibits to visually impaired users. Their approach supports the navigation in exhibition halls and the tactual exploration of exhibit replicas using touch-sensitive audio descriptions and touch gestures on a mobile device. The required technology includes 3D printed exhibits, attached touch sensors, Arduino boards, and a respective mobile app. A preliminary usability evaluation with ten users (blind, visually impaired and blindfolded) revealed a positive user experience with satisfactory and similar performance.

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