

EDITORIAL

Theme issue on mobile and pervasive games

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Published online: 24 May 2015
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1 Introduction and motivation

Recent developments in the areas of information technology, mobile computing and telecommunications shape a favorable landscape which generates massive opportunities for the game industry. Pervasive technologies harness the potential of the increased wireless bandwidth availability, the wide adoption of powerful mobile device platforms and the advent of networked sensor technologies. Emerging from the fast-paced growth of pervasive computing, pervasive games represent an exciting development in gaming which leverages the use of sensor, visualization and networking technologies to provide immerse game experiences. Pervasive games extend the gaming experience out into the real world, be it on city streets or living rooms. Players equipped with mobile devices move through the game world, while sensors (either on board or weaved into the game space) capture contextual information used to adapt game activities that vary depending on where users are, what they do or even how they feel. The inherent social and community-building aspects of networked games are widening the sector's influence on other markets, thereby boosting their worldwide potential growth.

Pervasive games appear in several genres, including mobile, location-based and augmented/mixed/trans-reality games, often utilizing novel system and network architectures (e.g., P2P, cloud gaming). Interestingly, significant efforts are put into leveraging networked games beyond entertainment, toward educational, cultural, social, environmental and training directions, thus highlighting a new potential for generating revenue. However, before such game applications can be widely deployed and used, several fundamental technical, social and business challenges need to be addressed.

The motivation behind this special issue is to solicit high-quality articles on all aspects of mobile and pervasive games and outline the state of the art in this exciting area of research.

2 Submissions, review process and summary of contributions

This theme issue of the Springer's Personal and Ubiquitous Computing on "Mobile and Pervasive Games" attracted 16 submissions, representing three continents (Europe, Asia and America). The authors of submitted papers are affiliated with institutions in Brazil, Canada, China, Germany, Greece, Japan, Mexico, the Netherlands, Portugal, Saudi Arabia, Spain, Sweden, Turkey, UK and USA. Following a rigorous review process, five outstanding papers (acceptance rate 31 %) have been finally selected for inclusion in the special issue. Each paper received three reviews from independent experts. The accepted papers cover a wide spectrum of mobile and pervasive game research.

The first paper, entitled "Expanding Social Mobile Games beyond the Device Screen" (by Misha Sra and Chris Schmandt), introduces Spellbound, a physical mobile

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team-based game. Spellbound has been designed utilizing custom haptic hardware as player equipment. It relies on user knowledge of the real world and face-to-face communication to enhance the sense of collective experience, showcasing that playing together can lead to increased engagement and fun and serve as a facilitator for socializing. A user study verified that designing games which take into account player interactions in the real world can increase social interaction and enjoyment; it also proved that receiving information through a non-visual channel (haptics) may be useful for maintaining game flow as it reduces context switching between the real world and the screen.

The second article, titled “Head-mounted Mixed Reality Projection Display for Games Production and Entertainment” (co-authored by Daniel Kade, Kaan Aksit, Hakan Ürey and Oguzhan Özcan), presents a mixed reality (MR) application, designed to enable exploring a digital environment without occluding the user’s field of vision. The equipment consists of a retroreflective screen covering surrounding walls and a headband integrating a laser-scanning projector with a smartphone. To explore the potential use case of their system into pervasive gaming, the authors have created a MR game prototype and tested it with 45 participants. The user trials revealed high levels of engagement and willingness of the players to use the device, providing evidence for the suitability of the system in private entertainment and gaming.

The third paper, entitled “Pervasive Games Field Trials: Recruitment of Eligible Participants through Preliminary Game Phases” (contributed by Vlasios Kasapakis, Damianos Gavalas and Nikos Bubaris), introduces a novel method for recruiting participants in pervasive game user trials. In particular, the authors propose the execution of cost-effective preparatory game phases as a means for recruiting highly qualified evaluators for pervasive game prototypes, thereby increasing the reliability and quality of evaluation results. A pervasive game prototype entitled “Barbarossa” has been developed to validate the appropriateness of the above method. The evaluation results confirmed that the execution of a preparatory game mode, when applicable, can help developers to recruit highly qualified participants. It may also serve as a useful instrument for developers to train evaluators on any technological equipment used in the game and enhance their awareness on the overall game goal, scenario and gameplay.

The fourth paper, entitled “RouteMe—A Multilevel Pervasive Game on Mobile Ad hoc Routing” (co-authored by Stefanie Lemcke, Kora Haedge, Raphael Zender and Ulrike Lucke), introduces the pervasive educational game RouteMe that brings the rather abstract topic of routing in mobile ad hoc networks (MANETs) to real-world environments. RouteMe has been designed for university-level courses and supports these courses through engaging students in a motivating manner to deepen their learning experience. RouteMe divides players (students) into two groups. The players of the first group act as mobile nodes of the MANET. The players of the second group are enrolled in sending messages via this MANET. RouteMe evaluation revealed a successful case study on how pervasive educational games can support immersive learning experiences of students when dealing with complex and abstract educational topics.

The last paper, entitled “Touch-less Interactive Augmented Reality Game on Vision Based Wearable Device” (by Zhihan Lv, Alaa Halawani, Shengzhong Feng, Shafiq ur Réhman and Haibo Li), presents a touch-less interaction framework, consisting of a wearable device and a gesture recognition algorithm able to execute on both smartphones and Google Glass. The framework allows the development of augmented reality games wherein the players can interact with the in-game content by performing dynamic hands/feet gestures in front of the device camera, triggering interaction events. A user study on the framework revealed that Google Glass was the preferable platform for touch-less interaction and also that touch-less interfaces can serve as valid substitutes for present touch-based mobile devices.

Acknowledgments We would like to thank the authors of all the submitted papers for considering our theme issue and the Personal and Ubiquitous Computing journal as a potential publication venue for their research results. We would like to especially thank the authors of the accepted papers for their effort in revising and improving their work—occasionally several times—in response to reviewer comments. Many thanks also go to the PUC Editor-in-Chief Professor Peter Thomas for his trust, guidance and support. Finally, we would like to thank the following colleagues for doing an excellent job in reviewing the submitted papers and making this special issue possible: Jon Back, Yin Bi, George Caridakis, Luca Chittaro, Paul Coulton, Joel Fischer, Gwo-Jen Hwang, Flammer Ivo, Stan Kurkovsky, Silvia Wen-Yu Lee, Tatsuo Nakajima, Rob Nadolski, Eunil Park, Ignazio Passero, Carsten Röcker, Joel Ross, Wenyao Xu, Yan Xu, Zhiyong Yu.