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Pervasive Computing Technologies for Healthcare

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ABSTRACT

The conference series on Pervasive Computing Technologies for Healthcare is one of the leading fora for research dissemination in this space. In May 2011, the most recent event took place in Ireland. A brief overview of the conference is now presented.

Keywords

Health information systems, conference review, research themes

1. Introduction

The inaugural Pervasive Health conference was held in Innsbruck, Austria, 2006, followed by Tampere, Finland in 2008, London, UK, 2009 and Munchen, Germany in 2010. For 2011 it was held in University College Dublin, Ireland. The overall goal of the conference remained tightly coupled with the original aims of the field, to address a set of related technologies and concepts that help integrate healthcare more seamlessly into everyday life, regardless of space and time.

The aim of the 2011 Pervasive Healthcare conference was to gather technology experts, practitioners, industry and international authorities contributing towards the assessment, development and deployment of pervasive medical based technologies, standards and procedures. The theme of the 2011 conference was: *Coping with the Challenges and Opportunities within Pervasive E-Healthcare (COPE)*, with a special focus on pervasive healthcare management and its ability to deliver timely, quality based information to medical practitioners in providing high levels of patient care.

The challenges and opportunities within e-Healthcare are immense. A multidisciplinary and coordinated approach is needed from 1) user requirements, 2) technology development and 3) application integration, to help deliver a successful pervasive healthcare management system. Traditional healthcare environments are extremely complex and challenging to manage, as they are required to cope with an assortment of patient conditions under various circumstances with a number of resource constraints. Pervasive healthcare technologies seek to respond to a variety of these pressures by successfully integrating them within existing health care environments. Technologies, standards and procedures on their own provide little and or no meaningful service. It is essential that pervasive healthcare environments, through a combined approach of data collection, data correlation and data presentation, assist health care professionals in delivering high levels of patient care, and empower individuals and their families for self-care and health management.

2. Description

Pervasive Health 2011 ran over 4 days - 23rd to the 26th of May and was held at University College Dublin. A full program of workshops, posters, demonstrations was supported in addition to the main event. A social event was also incorporated into the program. Over 150 attendees registered for the event, representing diverse geographic backgrounds and expertise.

On the first day, a total of 10 workshops were held covering a wide spectrum of research and development topics in the IT/IS health sphere. The themes ranged from sensor networks to integration of systems within healthcare services. A detailed description and reflection on the workshops may be found elsewhere [1].

For the remaining three days, the main conference proceeded as a single track event. Eight technical sessions consisting of 25 full paper presentations were run. These papers covered a wide range of topics pertinent to the pervasive health domain with a focus on the home and clinical settings. A poster session consisting of 19 posters supplemented the main conference and reflected the themes presented there. For early researchers, a Doctorial Consortium was held which proved to create a stimulating environment to encourage and support researchers with their dissertation topics.

To make the Pervasive Health theme more realistic and practical oriented, a demo session was arranged which provided researchers and industry members an opportunity to present their prototypes or products as they were of relevance to the Pervasive Health community. Eight demonstrations were given during the event ranging from The NOCTURNAL Ambient Assisted Living System (University of Ulster) to REFRESH: Recommendations and Feedback for Realising and Stabilising Health (University of Erlangen-Nuremberg).

3. Guest Speakers

Two keynote speakers presented an overview of their research and highlight some of obstacles and success stories as part of their work. Prof. Stephen Intille of Northeastern University presented on the opening day of the main conference. Stephen's talk revolved around the usage of Body Area Network (BAN) devices, video analytics and the role they can play with "Just-in-Time" motivation of behavior change. A number of engaging videos were played which highlighted the behavioral impact of "Just-in-Time" interaction. The presentation was very well received and provided an excellent platform to initiate the main conference presentations.

Dr. Geraldine Boylan is a Senior Lecturer in the School of Medicine and a Clinical Scientist in the Department of Paediatrics & Child Health, University College Cork (UCC), she is also the director of the Neonatal Brain Research Group in UCC. Geraldine's presentation provided an overview of her research over the last few years with particular emphasis on how the Neonatal Brain Research Group investigates brain injury in newborn babies. The group specialises in the analysis of the electroencephalogram (EEG) and other physiological signals. The work presented was based on a number of mature case studies and large datasets. The findings presented provided a great source of interest which created an excellent atmosphere for debate.

As the quality of the papers submitted to the Pervasive Health 2011 conference were of a very high standard, two special issues of international journals have been commissioned:

1. The Journal of Ambient Intelligence and Smart Environments (published by IOS Press indexed in Scopus and) will publish a focus issue on home-based health and wellness measurement & monitoring.
2. The Journal of Ambient Intelligence and Humanized Computing (published by Springer) will publish a focus issue on Pervasive Health.

It is envisaged that both issues will be in print early in 2012.

4. Awards

There were awards for best paper and best poster. 5 papers were nominated with the paper by Stone & Skubic winning the overall award. In this paper [2], the authors compare the efficacy of the MS Kinect platform with that of a basic webcam system for passive in-home fall risk assessment. In the case of the runners-up, Marcu et al [3] describe a framework for persuasive monitoring systems for those with mental illness. Chaudry et al [4] consider the issue of assessing portion size for nutritional monitoring applications, and present some guidelines for designing interfaces for such systems for a low literacy population. Vathsangam et al [5] propose the potential of hierarchical modeling for generalized prediction of energy expenditure. Finally, Ye et al [6] consider the diversity of publically available datasets and propose a single API to provide uniform access to diverse smart home data sets.

Of the 19 interactive posters presented, 3 candidates for the best poster were identified. The winning poster by Liu et al [7], proposed Doppler radar as a means of detecting falls. In the case of the two runners-up, Päßler and Fischer [8] explore the use of wearable microphones for determining food intake activities. Finally, Patterson and Caulfield [9] harness foot-mounted accelerometers as a basis for gait analysis.

5. Pervasive Health 2012

Pervasive Health 2012 will be held in San Diego, California. Further details will be available on the Pervasive Health WWW site (<http://www.pervasivehealth.org/>)

6. ACKNOWLEDGMENTS

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