Univ Access Inf Soc (2018) 17:1–3
https://doi.org/10.1007/s10209-016-0515-7

EDITORIAL

# A human–computer interaction approach for healthcare

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Published online: 31 December 2016


## 1 Introduction

*Interacción* is the International Conference promoted by the Spanish Human Computer Association (In Spanish: Asociación para la Interacción Persona-Ordenador, AIPO), whose main objective is to promote and disseminate the recent advances in the field of human–computer interaction [1]. This conference provides a forum for discussion and exchange of ideas on the design and application of techniques and methodologies with a multidisciplinary approach (from engineering to human factors, human–robot interaction, accessibility, interface design, usability, natural interaction, etc.).

The 16th International Conference *Interacción* 2015 was organized by the Technical School of Vilanova I la Geltrú (Universitat Politècnica Catalunya Barcelona Tech) with the support of the Accessibility Chair, the Interactive Systems Design Lab and the Technical Research Center of Dependency Care and Autonomous Living [2]. This edition has received 105 contributions: 94 scientific contributions from 22 countries, 9 papers into the AIPO Challenge best final project (degree, master) and 2 papers into the Student Design Challenge. Of the 94 scientific contributions, 66 papers were accepted in the following categories: 41 full papers, 21 short papers and 4 papers for the Doctoral Colloquium. The conference sessions were classified in: natural user interfaces, methodologies and models, EnGendering Technology, child–computer interaction, interface design, interaction devices, interaction for people with disability, games, usability and user experience, software-architecture and interaction, accessibility and semantic web.

The conference structure comprises a set of sessions and a set of social and scientific activities including the plenaries of Panos Markopoulos (Interaction Design for Rehabilitation), Els Rommes (Including Gender in the Interaction) and José Antonio Plaza (Towards Intracellular Computer-Human Interaction: a microelectronic perspective), the Spanish Conference of Manel Garrido (Sensitive Robots and the Spanish tutorial of Antonio Miguel Baena (Developing Augmented Reality Applications for tablets and smartphones) and a discussion about the present and future of HCI, with José Antonio Macias (AIPO) and Marina Talavera (Hewlett Packard) [3], [4], [5].

## 2 Interaction design for healthcare

There is a growing demand for healthcare, and this necessitates the development of healthcare technology [6], [7], [8]. Furthermore, technologies constitute only one part of the system and it is necessary to improve the relationship between industry and academia with the aim to improve the acceptance of technology, ensure compliance, good ergonomics, high performance, design for all users and contexts of use.

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Original research contributions in interaction design are solicited, focusing on the use of new interfaces, new methodologies and models with a view to improving technology accessibility of healthcare technologies for all users in all contexts of use. Authors of accepted full papers at Interacción 2015 were invited to submit substantially extended and enhanced versions of their conference papers to be peer-reviewed and considered for publication in this special section.

### 2.1 Aims and scope of this special section

The thematic scope of this special section includes scientific issues addressing software implementation, or the utility and usability of novel interfaces, provided that they contribute to improving and widening the apparatus for universal access.

### 2.2 Main topics

This special section focuses on research work on the design, development, evaluation and use of new interfaces, technologies and interaction design scenarios and their combinations in the domain of healthcare. The authors carefully explain how the work and results presented contribute to facilitating and promoting universal access. Contributions are solicited in, but not limited to natural user interfaces, child–computer interaction, interaction for people with disability, interaction devices, Ergonomics and human factors for healthcare and finally methods, techniques and instruments to assess the utility, accessibility and usability of user-centered approaches.

## 3 In this special section

Morrison et al., in the paper entitled *Vibrotactile and Vibroacoustic Interventions into Health and Well-Being*, present a vibrotactile vest with physiological monitoring that interacts with a vibroacoustic urban environment, the so-called Humming Wall. In this work, the authors describe the experience of 39 participants interacting with the vest and the responsive environment and their engagement with the system. The work with the vest and vibrotactile patterns demonstrates the potential for health and well-being solutions with multiple use cases by providing vibrotactile sensations in a soft wearable garment that suggest movements for navigation or activation and/or elicit responses (calming or activating) in the wearers.

Arellano et al., in the paper entitled *Interactive testbed for research in autism - The SARA project*, present different studies and experiments, and they entitle *Stylized Animations for Research on Autism*. The aim is to better understand the cognitive processes behind emotional categorization in children and adolescents with high-functioning autism (ASD) in comparison with their neurotypically developed (NTD) peers. SARA combines the fields of clinical psychology, real-time non-photorealistic Rendering (NPR) and Dynamic Emotional Categorization Test (DECT). The former results serve as a guideline for future research in the area, in particular, the outcome from the NPR-DECT study, which could be seen as ground truth for the use of stylization in autism research.

Carvalho et al., in their paper *Performance evaluation of different age groups for gestural interaction*, compare two gesture-sensing devices (Microsoft Kinect and Leap Motion) using the Fitts' law model to evaluate target acquisition performances, with relation to three user groups: children, young adults and older adults. This case study involved 60 participants that were asked to perform a simple continuous selection task as quickly and accurately as possible, using one of the devices for gestural recognition. In terms of performance index, the groups displayed statistically different results: The group of older adults held the best gestural performance results, while children the worst, when the three groups were compared; both devices behave in a similar manner for selection tasks and there are no statistically significant differences concerning their accuracy when comparing each of the three groups individually. However, in terms of user preferences, some participants felt that the Leap Motion sensor was easier to use and less demanding in terms of concentration than the Kinect.

Durango et al., in their paper *Interactive Fruit Panel (IFP): A Tangible Serious Game for Children with special Needs to Learn an Alternative Communication System*, describe a way to digitize a game commonly used by therapists to help children associate real objects (fruits in this case) with their graphical representation (pictogram) in a therapeutic activity using real objects as the interactive basis. Research conducted in the Asprodiq Childhood Development and Early Intervention Centre of Toledo (Spain) to study the benefits of the alternative communication system is presented. The experimental research results show how the interactive panel helps 10 children with special needs to achieve learning goals more quickly and the way it enhances their attention.

Cardona et al., in their paper *Occupational Therapy for People with Physical Disability using Interactive Environments*, address the use of interactive environments as an accessible and inexpensive solution that allows supporting the recovery process of people receiving occupational therapy rehabilitation. A method for designing interactive environments is proposed in order to identify the interaction capabilities. The main objective is to understand the needs of patients and rehabilitation experts needs in order

to establish a design guide that allows the production of adaptable and reusable interactive environments on the right platform according to the needs and achievements of the patient (from the Physical Therapy Unit, DIF Aguascalientes, México). A case study shows a new approach to physical therapists and practitioners, how the available technologies can offer assistance, evaluation, and monitoring of rehabilitation, and incorporate technological tools that allow the best use of the best practices available in rehabilitation for feedback to make better tracing and decisions over the patient's therapeutic process.

Cano et al., in the paper entitled *Applying the Information Search Process model to analyse Aspects in the Design of Serious Games for Children with Hearing Impaired*, oriented this process model as a process of searching for information about children with a hearing impairment. The deaf children in this case were aged from 12 to 15 and have learning literacy problems (from USAER school in Aguascalientes, México). Eight children from 7 to 11 years of aged were also evaluated in the Institute for Deaf and Blind Children in Cali, Colombia. The ISP model is thus considered useful for identifying the relevant needs both of support teachers and deaf children. The participation of the children and their support teachers has enabled the identification of important pedagogical aspects, such as learning curve, clear objectives, a clear progression, assessment, and support, which are all important aspects to consider in designing a game.

**Acknowledgements** The authors would like to thank for all their support the conference participants, local committee, chairs, entities (CHISPA, Spanish local Chapter of ACM SIGCHI), (AIPO Spanish Human Computer Interaction Association) and sponsors: KUKA Robots Ibérica, UPF Barcelona School of Management, Tobii, research group Automation and Advanced Control Systems ASAC UAB, Hewlett Packard and Llunàtics UPC Vilanova (Human Towers).

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