



# REHAB 2015

3rd Workshop on ICTs for improving  
Patients Rehabilitation Research Techniques

Lisbon, Portugal, 01-02 October 2015



## Proceedings of the 3rd Workshop on ICTs for improving Patients Rehabilitation Research Techniques

01st-02nd of October 2015

University Lusófona de Humanidades e Tecnologías

Lisbon, Portugal

**Editors:**

**Habib M. Fardoun, Pedro Gamito,**

**Víctor M. R. Penichet, Daniyal M. Alghazzawi**

**The Association for Computing Machinery  
2 Penn Plaza, Suite 701  
New York New York 10121-0701**

**ACM COPYRIGHT NOTICE. Copyright © 2007 by the Association for Computing Machinery, Inc. Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Publications Dept., ACM, Inc., fax +1 (212) 869-0481, or [permissions@acm.org](mailto:permissions@acm.org).**

For other copying of articles that carry a code at the bottom of the first or last page, copying is permitted provided that the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, +1-978-750-8400, +1-978-750-4470 (fax).

**Notice to Past Authors of ACM-Published Articles**

ACM intends to create a complete electronic archive of all articles and/or other material previously published by ACM. If you have written a work that was previously published by ACM in any journal or conference proceedings prior to 1978, or any SIG Newsletter at any time, and you do NOT want this work to appear in the ACM Digital Library, please inform [permissions@acm.org](mailto:permissions@acm.org), stating the title of the work, the author(s), and where and when published.

**ACM ISBN: 978-1-4503-3898-1**

## ORGANIZATION COMMITTEE

### **Pedro Gamito**

EPCV, Lusophone University  
COPELABS, Lusophone University  
Lisbon, Portugal  
[pedro.gamito@ulusofona.pt](mailto:pedro.gamito@ulusofona.pt)

### **Sergio Albiol Pérez**

University of Zaragoza  
Spain  
[sergio.albiol@unizar.es](mailto:sergio.albiol@unizar.es)

## PROGRAM CO-CHAIRS

### **Habib M. Fardoun**

King Abdulaziz University (KAU)  
Saudi Arabia  
[hfordoun@kau.edu.sa](mailto:hfordoun@kau.edu.sa)

### **Víctor Ruiz Penichet**

University of Castilla-La Mancha  
Spain  
[victor.penichet@uclm.es](mailto:victor.penichet@uclm.es)

### **Daniyal M. Alghazzawi**

King Abdulaziz University (KAU)  
Saudi Arabia  
[dghazzawi@kau.edu.sa](mailto:dghazzawi@kau.edu.sa)

## TECHNICAL COORDINATION

### **M<sup>a</sup> Elena de la Guia**

University of Castilla-La Mancha  
Spain  
[mariaelena.guia@uclm.es](mailto:mariaelena.guia@uclm.es)

## WORKSHOP PROGRAMME COMMITTEE

Belinda Lange. Institute for Creative Technologies, University of Southern California

Willem-Paul Brinkman. Delft University of Technology

Mariano Luis Alcañiz. Instituto Interuniversitario de Investigación en Bioingeniería

Beatriz Rey. Universidad Politécnica de Valencia

Christos Bouras. University of Patras

Imre Cikajlo. Univerzitetni rehabilitacijski inštitut Republike Slovenije

Roberto Lloréns. Instituto Interuniversitario de Investigación en Bioingeniería

José Antonio Gil. Universidad Politécnica de Valencia

Mónica Cameirão. University of Madeira

Sergi Bermudez. University of Madeira

Emily Keshner. Temple University

Hermenegildo Gil. Universidad Politécnica de Valencia

Kjartan Halvorsen. Uppsala University

Thalmann Daniel. University of Paul Sabatier

Rosa Maria E. Moreira. Universidade do Estado do Rio de Janeiro

Georgina Cárdenas-López. Universidad Nacional Autónoma de México

Evelyne Klinger. French National Research Agency

Ben Challis. Cardiff School of Creative & Cultural Industries

Guillermo Palacios. University of Zaragoza

Iosif Mporas. University of Patras

Jose Eduardo Pompeu. Universidade de São Paulo

Gregor Wolbring. University of Calgary

Ala Khalifeh. German Jordanian University

Rachel Proffitt. University of Southern California

Juan Enrique Garrido Navarro. University of Castilla La Mancha

Jaime Sánchez. University of Chile

Félix Albertos Marco. ISE Research Group

Maria Dolores Lozano. University of Castilla La Mancha

Maria Elisa Pimentel Piemonte. University of Sao Paulo

## ORGANIZERS



King Abdulaziz University



Faculty of  
Computing and  
Information  
Technology



## TABLE OF CONTENTS

Development and evaluation of a web-based cognitive task generator for personalized cognitive training: a proof of concept study with stroke patients.....	1
Ana Lúcia Faria and Sergi Bermudez I Badia	
Computer-assisted therapy: cognitive training of heroin abusers .....	5
Pedro Gamito, Jorge Oliveira, Diogo Morais, Rodrigo Brito and Paulo Lopes	
IntegraGame: a real-life inspired serious game for social and professional training of people with intellectual disability .....	10
Nuria Bonet-Codina, Ariel von Barnekow and Dani Tost	
Cognitive stimulation of alcoholics through VR-based Instrumental Activities of Daily Living ..	14
Jorge Oliveira, Bruno Bento, Pedro Gamito, Paulo Lopes, Rodrigo Brito, Diogo Morais and Fátima Gameiro	
Improving walking ability of children with acquired brain injuries by means of an immersive virtual reality platform .....	18
Emilia Biffi, Elena Beretta, Morena Delle Fave, Fabio Brunati, Ambra Cesareo, Cristina Maghini, Anna Carla Turconi, Sandra Strazzer and Gianluigi Reni	
Training with Phonak: Serious Game as support in Auditory – Verbal Therapy for Children with Cochlear .....	22
Sandra Cano, Victor Peñeñory, César A. Collazos, Habib M. Fardoun and Daniyal Alghazzawi	
Mirrorcle: Enhanced Visual Feedback to support Motor Learning in Low Back Pain .....	26
Anne Wil Burghoorn, Emma R. Dhaeze, Jasper S. Faber, Jelle W.H. Worries, Loe M.G. Feijs and Annick A.A. Timmermans	
An Auditory Feedback based system for treating Autism Spectrum Disorder .....	30
Massimo Magrini, Andrea Carboni, Ovidio Salvetti and Olivia Curzio	
Proposed Design Approach for an Interactive Feedback Technology Support in Rehabilitation .....	34
Oonagh Giggins and Brian Caulfield	

Augmented Reality for Rehabilitation Using Multimodal Feedback.....	38
João Vieira, Maurício Sousa, Artur Arsenio and Joaquim Jorge	
Multi-material design and 3D printing method of lower limb prosthetic sockets .....	42
Claudio Comotti, Daniele Regazzoni, Caterina Rizzi and Andrea Vitali	
An Interactive Rehabilitation Framework for Assisting People with Cerebral Palsy .....	46
Mohammd Daoud, Talal Qadoummi and Dhiah El Diehn I. Abou-Tair	
Comparing Kinect2 based Balance Measurement Software to Wii Balance Board.....	50
Zhihan Lv, Vicente Penades, Sonia Blasco, Javier Chirivella and Pablo Gagliardo	
Effect of Kinect games on postural control of patients with Parkinson´s disease.....	54
Jose Eduardo Pompeu, Flávia Doná, Keyte G. Da Silva, Camila Torriani-Pasin, Fernando F. Ganaçaand Henrique B. Ferraz	
Virtual Web Environment to Design Rehabilitation Exercises through Movement-Based Interaction.....	58
José Antonio Fernández Valls, Victor M. R. Penichet and Maria-Dolores Lozano	
Intuitive Evaluation of Kinect2 based Balance Measurement Software.....	62
Zhihan Lv, Vicente Penades, Sonia Blasco, Javier Chirivella and Pablo Gagliardo	
Development of an EMG controlled hand exoskeleton for post-stroke rehabilitation .....	66
Ana Rita Moital, Sanja Dogramadzi and Hugo Alexandre Ferreira	
Static Weight Transferences in Patients with Parkinson's Disease using the Nintendo jWii Balance Board .....	73
Sergio Albiol-Pérez, José-Antonio Gil-Gómez, José-Antonio Lozano Quilis, Hermenegildo Gil-Gómez, Maria Teresa Muñoz Tomás, Mercedes Forcano García, Raquel Vial Escolano and Janeth Segovia-Chávez	

A virtual system for postural stability assessment based on a TOF camera and a mirror.....	77
Giuseppe Placidi, Naixia Pagnani, Andrea Petracca, Matteo Spezialetti and Daniela Iacoviello	
A Low-cost Virtual Reality Game for Amblyopia Rehabilitation .....	81
Angelo Gargantini, Fabio Terzi, Matteo Zambelli and Silvia Bonfanti	
Upper limb training using virtual reality in patients with chronic sequels of stroke.....	85
Joyce Gouvêa, Danielle Perez, Camila Miranda, Tatiana Oliveira and Maria Elisa Piemonte	
Improving Postures Design in Virtual Rehabilitation Environments.....	89
Félix Albertos Marco, José Fernández Valls, Victor M. R. Penichet, María Dolores Lozano and Jose A. Gallud	
Self hand-rehabilitation system based on wearable technology.....	93
Rastislav Lipovský and Hugo Ferreira	
Balance training in virtual reality in patients with chronic sequels of stroke: effects on ICF domains.....	96
Tatiana de Paula Oliveira, Camila Souza Miranda, Joyce Xavier Muzzi de Gouvêa, Danielle Borrego Perez, Amélia Pasqual Marques and Maria Elisa Pimentel	
Lack to transfer/generalize the improvements obtained in Virtual Reality environment to the balance control in real environment in patients with chronic sequels of Stroke .....	100
Camila Souza Miranda, Tatiana de Paula Oliveira, Joyce Xavier Muzzi de Gouvêa, Danielle Borrego Perez, Amelia Pasqual Marques and Maria Elisa Pimentel Piemonte	
Ontology-based Design Model of Virtual Environments for Upper Limb Motor Rehabilitation of Stroke Patients .....	105
Cristina Ramírez-Fernández, Eloisa Garcia-Canseco, Alberto L. Morán and Jorge R. Gómez-Montalvo	
Development of a telemedicine service that enables functional training for stroke patients in the home environment .....	109
Marit Dekker-Van Weering and Miriam Vollenborek-Hutten	
From telemedicine technology to telemedicine services .....	113
Miriam Vollenbroek, Monique Tabak, Stephanie Jansen-Kosterink and Marit Dekker	



Designing Configurable and Adaptive Systems in eHealth .....	118
Sara Balderas-Díaz, Kawtar Benghazi, Germán Prados and Elena Miró	
Easy Smart Home Environment to Assist Patients with Mobility Impairment .....	122
Elena de La Guía, Vicente López, Teresa Olivares, Maria-Dolores Lozano, Victor M. R. Penichet and Luis Orozco	
Development of a Non-invasive Brain Computer Interface for Neurorehabilitation .....	126
Rui Pinto and Hugo Ferreira	
Combined Language and Motor Therapy for Brain Injury Patients .....	131
Maitreyee Wairagkar, Rachel McCrindle, Holly Robson, Lotte Meteyard, Malcolm Sperrin, Andy Smith and Moyra Pugh	
Show me your eyes! The combined use of eye tracking and virtual reality applications for cognitive assessment .....	135
Pedro Joel Rosa, Pedro Gamito, Jorge Oliveira, Diogo Morais, Matthew Pavlovic and Olivia Smyth	
Neglect App. Usability of a new application for assessment and rehabilitation of neglect. ....	139
Elisa Pedroli, Silvia Serino, Pietro Cipresso, Federica Pallavicini, Irene Alice Chicchi Giglioli, Erika Guastafierro, Andrea Gaggioli and Giuseppe Riva	
Evaluating Performance of the Single Leg Squat Exercise with a Single Inertial Measurement Unit.....	144
Darragh Whelan, Martin O'Reilly, Tomas Ward, Eamonn Delahunt and Brian Caulfield	
Healthy Aging through Pervasive Predictive Analytics for Prevention and Rehabilitation of Chronic Conditions .....	148
Maria Claudia Buzzi, Marina Buzzi and Amaury Trujillo	
Therapy Monitoring and Patient Evaluation with Social Robots .....	152
Alejandro Martín, José Carlos González, José Carlos Pulido, Ángel García, Fernando Fernández and Cristina Suárez	

Bringing immersive enjoyment to hyperbaric oxygen chamber users using virtual reality glasses .....	156
Zhihan Lv.	
Social Robots: Views of special education teachers .....	160
Lucy Diep, John-John Cabibihan and Gregor Wolbring	
A Stationary Bike in Augmented Audio Reality .....	164
Justyna Maculewicz and Stefania Serafin	