

2019 International Conference on Virtual Rehabilitation (ICVR 2019)

**Tel Aviv, Israel
21 – 24 July 2019**



**IEEE Catalog Number: CFP1955A-POD
ISBN: 978-1-7281-1286-2**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1955A-POD
ISBN (Print-On-Demand):	978-1-7281-1286-2
ISBN (Online):	978-1-7281-1285-5
ISSN:	2331-9542

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Table of Contents

	Page #
How reaching kinematics differ between a low-cost 2D virtual environment and the real world <i>Marika Demers and Mindy F. Levin</i>	1
Multidisciplinary Teamwork in the Design of DailyCog for Evaluating Mild Cognitive Impairment (MCI) in Parkinson's Disease <i>Ariella Richardson, Sara Rosenblum and Sharon Hassin-Baer</i>	6
Virtual reality training to improve upper limb motor function in multiple sclerosis: A feasibility study <i>Omer Weissberger and Michael Levy</i>	8
Head Mounted Display Application for Contextual Sensory Integration Training: Design, Implementation, Challenges and Patient Outcomes <i>Anat Lubetzky, Jennifer Kelly, Zhu Wang, Makan Taghavidilamani, Marta Gospodarek, Gene Fu, Erin Kuchlewski and Bryan Hujsak</i>	10
Motor learning by cross education in Hemi-Parkinson: a neuroimaging feasibility study of the effects of virtual mirrored sensory feedback <i>Ori Ossmy, Lihi Mansano, Silvi Frenkel-Toledo, Evgeny Kagan, Shiri Koren, Roe Gilron, Daniel Reznik, Nachum Soroker and Roy Mukamel</i>	17
Is the room moving? - Muscle responses following visual perturbations <i>Desiderio Cano Porras, Jesse V. Jacobs, Rivka Inzelberg, Ofer Keren, Gabriel Zeilig and Meir Plotnik</i>	26
Influence of virtual environment complexity on motor learning in typically developing children and children with cerebral palsy <i>Danielle Levac, Morgan Taylor, Brennan Payne and Nathan Ward</i>	35
The Modification and Development of a Simulator for Powered Mobility for Children <i>Naomi Gefen, Philippe Archambault and Patrice Weiss</i>	42
Programming Robotic Behavior by High-Functioning Autistic Children <i>Orly Lahav, Vadim Talis and Ravit Shekovitz</i>	44
Crossing iVRoad: A VR application for detecting unilateral visuospatial neglect in poststroke patients <i>Sebastian Wagner, Julia Belger, Bernhard Preim and Patrick Saalfeld</i>	50
Post-stroke upper limb rehabilitation using virtual reality interventions: Do outcome measures assess extent or type of motor improvement? <i>Sandeep Subramanian, Mackenzie Cross, Cole Hirschhauser, Vineet Johnson and Timothy Reistetter</i>	52
Immersive Virtual Reality for the Assessment and Training of Spatial Memory: Feasibility in Individuals with Brain Injury <i>Julia Belger, Stephan Krohn, Carsten Finke, Johanne Tromp, Felix Klotzsche, Arno Villringer, Michael Gaebler, Paul Chojecki, Eva Quinque and Angelika Thöne-Otto</i>	58
Memory Evaluation Through 360 Technologies: Preliminary Study with Spanish Population. <i>Sara Ventura, Eleonora Brivio, Giuseppe Riva and Rosa Baños</i>	60

Exergaming for stroke rehabilitation: Lessons learned for future implementation strategies <i>Marika Demers, Ai-Vi Nguyen, Yau-Lok Austin Ong, Cindy Xin Luo, Thiviya Thuraisingam, Michael Rubino, Mindy F. Levin, Franceen Kaizer and Philippe Archambault</i>	62
Objective but not subjective effect of height in a virtual slack-rope balance task <i>Orit Elion, Sharon Amster and Ayelet Werthimer</i>	65
Virtual Self-Training of a Sensory Substitution Device for Blind Individuals <i>Galit Buchs, Benedetta Heimler, Menachem Kerem, Shachar Maidenbaum, Liraz Braun and Amir Amedi</i>	67
Observation of an expert model induces a coarticulated drawing movement pattern in a single session <i>Maria Korman and Jason Friedman</i>	69
Virtual reality therapy as adjunct to traditional physical therapy for a TBI patient who suffered a gunshot wound to the head: Case report <i>Lei Ma, Frank Tornetta Jr, William Egan and W. Geoffrey Wright</i>	72
Usability of an Immersive Virtual Playground: Enjoyment, Authenticity, Effort and Cybersickness <i>Adina Houldin, Sarina Goldstand, Eynat Gal, Patrice L Tamar Weiss, Yotam Bahat, Doron Weiss, Adva Moran and Noa Yigal</i>	77
Developing and Validating Virtual Reality Tool for the Evaluation of Cognitive and Physical Performance During Simulated lengthy field March <i>Shani Kimel Naor, Itay Ketko, Ran Yanovich, Amihai Gottlieb, Yotam Bahat, Oran Ben-Gal, Yuval Heled and Meir Plotnik</i>	79
Technology on-the-go: understanding the risks of mobile phone use during walking <i>Tal Krasovsky, Yasmin Felberbaum, Joel Lanir and Rachel Kizony</i>	86
Evaluation of Touch Technology for the Aging Population <i>Michal Elboim Gabyzon, Lorenzo Chiari, Shlomi Laufer, Mattia Corzani and Alexandra Danial-Saad</i>	88
A cognitive remediation using virtual reality and an electrophysiological marker of attention for promotion of cognition and everyday functioning among people with psychotic disorder: A case study <i>Hana Taubneblatt, Reut Komemi, Ethar Welly and Lena Lipskaya-Velikovskya</i>	94
Improving wheelchair driving performance in a virtual reality simulator <i>Philippe S. Archambault and Catherine Bigras</i>	96
Inter- and Intra-Hemispheric EEG Connectivity in Healthy Subjects and Chronic Stroke Survivors <i>Diego Andrés Blanco Mora, Sergi Bermúdez i Badia, Yuri Almeida and Carolina Jorge Vieira</i>	98
Upper extremity intervention for stroke combining virtual reality, robotics and electrical stimulation <i>Philippe S. Archambault, Nahid Gheidari Norouzi, Dahlia Kairy, Mindy F. Levin, Marie-Hélène Milot, Katia Monte-Silva, Heidi Sveistrup and Michael Trivino</i>	104

Impact of Game Mode on Engagement and Social Involvement in Multi-User Serious Games with Stroke Patients <i>Fábio Pereira, Sergi Bermúdez i Badia, Carolina Jorge and Mónica da Silva Cameirão</i>	111
The Topo-Speech Algorithm: An intuitive Sensory Substitution for Spatial Information <i>Benedetta Heimler, Amir Shur, Ophir Netzer, Tomer Behor and Amir Amedi</i>	117
Remote rehabilitation training using the combination of an exergame and telerehabilitation application: A case report of an elderly chronic stroke survivor <i>Dorra Rakia Allegue, Dahlia Kairy, Johanne Higgins, Philippe Archambault, Francois Michaud, William Miller, Shane Norman Sweet and Michel Tousignant</i>	119
OpenVirtualObjects: An open set of standardized and validated 3D household objects for virtual reality-based research, diagnostics, and therapy. <i>Johanne Tromp, Mert Akbal, Leonardo Poll, Stephan Krohn, Eva Quinque, Felix Klotzsche, Arno Villringer and Michael Gaebler</i>	121
Assessment of the condition of balance under the influence of training in a virtual environment: the analysis of own observations <i>Iryna Maryenko, Maryia Mozheiko, Sergey Likhachev, Mikhail Yurchenko, Nikita Susha, Artem Kachanovsky and Eugeni Ivanitsky</i>	123
Spatial Memory Rehabilitation in Virtual Reality: Generalizing from Epilepsy Patients to the General Population <i>Shachar Maidenbaum, Ansh Patel, Elisabeth Stein and Joshua Jacobs</i>	125
The feasibility of TECH: Tablet Enhancement of Cognition and Health, a novel cognitive intervention for people with Mild Cognitive Impairment <i>Noa Givon Schaham, Inbal Elbo-Golan, Zvi Buckman, Shelley Sternberg and Debbie Rand</i>	132
A systematic computerized training program for using Sensory Substitution Devices in real-life <i>Ophir Netzer, Galit Buchs, Benedetta Heimler and Amir Amedi</i>	134
Multidimensional assessment of Virtual Reality applications in clinical neuropsychology: the "VR-Check" protocol <i>Stephan Krohn, Johanne Tromp, Eva Quinque, Julia Belger, Felix Klotzsche, Michael Gaebler, Angelika Thöne-Otto and Carsten Finke</i>	136
Novel Gamified System for Post-Stroke Upper-Limb Rehabilitation using a Social Robot: Focus Groups of Expert Clinicians <i>Ronit Feingold Polak, Ariel Bistritsky, Yair Gozlan and Shelly Levy-Tzedek</i>	138
Cognitive-motor interaction during virtual reality trail making <i>Oran Ben-Gal, Glen M. Doniger, Maya Cohen, Yotam Bahat, Gabi Zeilig, Michal Schnaider Beeri and Meir Plotnik</i>	145
Intentional, accurate and natural object placement in virtual reality based neuropsychological assessment <i>Mykyta Kovalenko, Detlef Runde, Paul Chojecki, David Przewozny and Oliver Schreer</i>	151
Fully portable low-cost motion capture system with real-time feedback for rehabilitation treatment <i>Jacob Kritikos, Anxhelino Mehmeti, George Nikolaou and Dimitris Koutsouris</i>	154

Validation of a novel personalized therapeutic virtual gaming system <i>Sarit Tresser, Tamar Weiss, Tsvi Kuflik and Irina Levin</i>	162
A comparison of virtual reality and active video game usage, attitudes and learning needs among therapists in Canada and the US <i>Danielle Levac, Stephanie Glegg, Sujata Pradhan, Emily J. Fox, Debbie Espy, Emily Chicklis and Judith E. Deutsch</i>	168
Virtual City system for cognitive training in elderly <i>Iveta Fajnerová, Adéla Plechatá, Václav Sahula, Jan Hrdlička and Jiří Wild</i>	175
Multimodal brain-computer interface based on artificial intelligence for Rehabilitation of People with Motor Disorders <i>Konstantin Sonkin, Yoav Zamir and Jason Friedman</i>	177
Two case studies of virtual reality therapy effect on CRPS patients in Occupational Therapy outpatient clinic <i>Uty H. Ostrei, Revital Uzan, Omer Weissberger and Ettie Rozenberg-Rothschild</i>	179
Comparing adaptive cognitive training in virtual reality and paper-and-pencil in a sample of stroke patients <i>Ana Lúcia Faria, Teresa Paulino and Sergi Bermúdez i Badia</i>	181
Integration between virtual-reality and video-based systems to deliver cognitive tele-rehabilitation; three case studies <i>Sharon Harel, Rachel Kizony, Hadas Kfir, Yoram Feldman and Mordechai Shani</i>	188
Brain Rehabilitation Assessment and Intervention (BRAIN): Delivering Efficacious Training at Home <i>Harry Hallock, Amit Lampit, Joseph Kuchling and Carsten Finke</i>	190
Exercise intensity is increased during upper limb movement training using a virtual rehabilitation system <i>Melanie C. Banina, Roni Molad, John Solomon, Nachum Soroker, Sigal Berman, Dario G. Liebermann, Silvi Frenkel-Toledo and Mindy F. Levin</i>	192
Development of a virtual reality toolkit to enhance community walking after stroke <i>Anouk Lamontagne, Andréanne Blanchette, Joyce Fung, Bradford James McFadyen, Samir Sangani, Nicolas Robitaille, Anne Deblock-Bellamy, Marco Antonio Buhler, Claire Perez and Anita Menon</i>	198
An innovative visuolocomotor training program for people on waiting list for vestibular rehabilitation <i>Elizabeth Dannenbaum, Joyce Fung, Catherine Loo, Romina Perrotti, Ruth Posthuma, Aselin Jiunn Weng and Xia Ting Yang</i>	201
Virtual Reality Exposure Therapy in Patients with Obsessive-Compulsive Disorder <i>Anna Francová, Barbora Darmová, Pavla Stopková, Jiřina Kosová and Iveta Fajnerová</i>	208
Multi-touch-based assessment of hand mobility, dexterity and function. Preliminary study of validity, reliability and sensitivity to upper limb impairment severity in individuals with stroke. <i>Jorge Latorre Grau, Sara Mollà Casanova, Bárbara Salinas Martínez, Adrián Borrego González, Mariano Alcañiz Raya, Carolina Colomer and Roberto Llorens</i>	210
Assessing spatial navigation in seniors and clinical settings: Stepwise progression from real-world to VR <i>Sophia Rekers and Carsten Finke</i>	216

Reliability of the Empatica E4 wristband to measure electrodermal activity to emotional stimuli. <i>Adrian Borrego Gonzalez, Jorge Latorre, Mariano Alcañiz Raya and Roberto Llorens</i>	218
Standardized experimental estimation of the maximum unnoticeable environmental displacement during eye blinks for redirect walking in virtual reality. <i>Adrian Borrego Gonzalez, Roberto Llorens, Belen Masia and Diego Gutierrez</i>	220
Standardizing Visual Rehabilitation using Simple Virtual Tests <i>Shachar Maidenbaum and Amir Amedi</i>	222
Processing words in the real world: A protocol for investigating the dual-task costs of making lexicality judgements while walking in young and older adults <i>Nancy Azevedo, Gianluca U. Sorrento, Eva Kehayia, Gonia Jarema, Racheli Kizony and Joyce Fung</i>	230
Novel Therapeutic Game Controller for Telerehabilitation of Spastic Hands: Two Case Studies <i>Grigore Burdea Phd, Kevin Polistico, Nam-Hun Kim Phd, Ashwin Kadaru, Doru Roll, Namrata Grampurohit Ot Phd, Am Barrett Md, Jenny Masmela, Emma Kaplan, Phalgun Nori Md, Simcha Pollack Phd and Mooyeon Oh-Park Md</i>	232
Coproducing Virtual Reality Technologies for Rehabilitation <i>Dido Green, Shana Boltin, Aimee Ward, Francesca Gowing and Betty Hutcheon</i>	241
Adaptive VR-based rehabilitation to prevent deterioration in adults with cerebral palsy <i>Belen R. Ballester, Anna Mura, Martina Maier, Laura Tobella-Pareja, Daniel Alfayate-Domingo, María Francisca Gimeno-Esteve, Angel Aguilar and Paul Verschure</i>	243
Using Nintendo Wii Fit U to Enhance Balance Control of Community-dwelling Seniors <i>Alexandre Monte Campelo, Jawad Ali Hashim and Larry Katz</i>	250
Experience with head-mounted virtual reality (HMD-VR) predicts transfer of HMD-VR motor skills <i>Julia Juliano, David Saldana, Allie Schmiesing and Sook-Lei Liew</i>	252
Effects of real-time visual feedback in the form of a virtual avatar on symmetry and other parameters of gait post stroke <i>Le Yu Liu, Samir Sangani, Kara Patterson, Joyce Fung and Anouk Lamontagne</i>	254
The Effects of a Virtual Environment and Robot-Generated Haptic Forces on the Coordination of the Lower Limb During Gait in Chronic Stroke Using Planar and 3D Phase Diagrams <i>Gianluca Sorrento, Philippe Archambault and Joyce Fung</i>	256
Is the Downs and Black scale a better tool to appraise the quality of the studies using virtual rehabilitation for post-stroke upper limb rehabilitation? <i>Sandeep Subramanian, Sheena Caramba, Oscar Hernandez, Quenton Morgan, Mackenzie Cross and Cole Hirschhauser</i>	263
The Impact of a Hand Training Programme in Chronic Stroke Survivors: A Qualitative Analysis of Participant Perceived Benefits <i>Bronte Vollebregt, Kirsti Reinikka, Daniel Vasiliu, Andrea Pepe, Shreya S. Prasanna, Anshul Jain, Jane Lawrence-Dewar and Vineet B.K. Johnson</i>	265

Use of virtual reality in musculoskeletal conditions – Examining the evidence <i>Shreya Prasanna, Christopher Pate, Christopher Goodart and Sandeep Subramanian</i>	267
Dissemination of research in virtual reality-based rehabilitation: Journal publication profiles <i>Patrice Tamar Weiss, Daphne Raban, Dorit Geifman and Emily Keshner</i>	269
A virtual reality-based training system for error-augmented treatment in patients with stroke <i>Lily Srur, Michal Vered, Iuly Treger, Shelly Levy-Tzedek, Mindy F. Levin and Sigal Berman</i>	275
Playing self-paced video games requires the same energy expenditure but is more enjoyable and less effortful than standard of care activities. <i>Aurora James-Palmer, Urska Puh, Harish Damodaran, Essie Kim, Phyllis Bowlby and Judith E Deutsch</i>	277
Custom game paced video games played by persons post-stroke have comparable exercise intensity but higher accuracy, greater enjoyment and less effort than off-the-shelf game <i>Judith Deutsch, Brittany Hoehlein, Marisa Priolo, Joshua Pacifico, Harish Damodaran and Urska Puh</i>	284