

ISVR

# NEWSLETTER

NUMBER 9 | DECEMBER 2016

## Editorial

December 2016 Newsletter 9

In this last edition of the ISVR newsletter for 2016, we are featuring research profiles from the iMoVE research group at the University of Portsmouth's Virtual Reality Lab and the Augmented Human Assistance project from the Technical University of Lisbon's VisLab. We have also provided a summary of the Best Student Paper award and the Best Student Short Paper award winners from the recent International Conference Series on Disability, Virtual Reality and Associated Technologies (ICDVRAT).

Our ISVR news includes the call for nominations for the second ISVR Early Career Investigator Award and the call for papers for the 11th International Conference on Virtual Rehabilitation. The purpose of the ISVR Early Career Investigator Award is to recognize and acknowledge outstanding contributions by early career scientists whose research relates to virtual rehabilitation. The recipient will be awarded a certificate, free registration at an upcoming ICDVRAT or ICVR conference and be asked to present their research as a platform paper at that conference. A runner-up will also be awarded a certificate. Paper, poster and workshop submissions for the 11th International Conference on Virtual Rehabilitation are due on January 11th 2017.

We wish you safe and happy Holidays and all the best for 2017!

*Belinda Lange, Kynan Eng and Sergi Bermudez i Badia, ISVR*

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## UPCOMING EVENTS

**11th World Congress on Controversies in Neurology (CONy)**  
March 23-26, 2017, Athens, Greece  
<http://www.comtecmec.com/cony/>

**12th World Congress on Brain Injury**  
March 29-April 126, 2017, New Orleans, USA  
<http://www.ibia2017.org>

**11th International Society of Physical and Rehabilitation Medicine (ISPRM) World Congress**  
April 30-May 4, 2017, Buenos Aires, Argentina  
<http://www.isprm2017.com/>

**3rd European Stroke Organisation Conference**  
May 16-18, 2017, Prague, Czech Republic  
<http://www.eso-stroke.org>

**2nd Congress on Neurorehabilitation and Neural Repair**  
May 22-24, 2017, Maastricht, The Netherlands  
<http://www.neurorehabrepair.eu>

**International Conference on Virtual Rehabilitation 2017**  
June 19-22, 2017, Montreal, Canada  
<https://virtual-rehab.org/2017/>

**2017 ISPGR World Congress**  
June 25-29, 2017, Fort Lauderdale, FL, USA  
<http://www.ispgr.org/cpages/2017-congress>

**RehabWeek 2017**  
July 17-20, 2017, London, UK  
<http://www.rehabweek.org>

**AOCNR 2017**  
August 8-10, 2017, Tagaytay City, Philippines  
<http://www.aocnr2017.org/>

# RESEARCH PROJECT PROFILE

## iMoVE - Interactive Motion in Virtual Environments

### University of Portsmouth Virtual Reality Lab

Portsmouth, UK

<http://www.vr.port.ac.uk>

### Where is your lab located?

Our iMoVE (Interactive Motion in Virtual Environments) research group is located in Portsmouth, UK, and is hosted by the School of Creative Technologies at the University of Portsmouth. We're embedded in a faculty which has expertise in 3D modelling, game design and animation, as well as computational sound and human-computer interaction, and so we are able to draw on a range of expertise to support the development of specific applications.

### How did it start, how long has it been around?

We have been actively conducting research in Virtual Rehabilitation since 2006, and I established the iMoVE group in 2012. I have qualifications and experience in both rehabilitation and software engineering, and the group combines knowledge from both these areas in order to better understand the interplay between technology and behaviour. I co-direct the group with Dr Vaughan Powell, who has many years' experience in Sports Therapy as well as a PhD in Creative Technologies. We currently have around 12 members, including Post-Doctoral Research Fellows, Research Assistants, Early Career Researchers, PhD students and MSc students. Every year we also have a number of undergraduate students working on related projects.

### What research interests does your lab have?

The iMoVE group crosses a number of disciplines and incorporates several specialist research clusters. We are primarily concerned with



Virtual Orchard – investigating the effect of visual properties on reaching behaviour

understanding how altering the virtual environment can influence movement and perception of movement, and how the hardware and software mediate these interactive experiences. For example, we have explored how visual and audio properties can influence walking speeds, reaching tasks and perceived self-motion. We also work on applied projects, tackling a variety of healthcare challenges. For example, we are currently working on virtual mirror therapy for phantom limb pain, immersive virtual environments for paediatric trauma therapy, and the design of emotionally expressive avatars for use in elderly care.

### What problem does/do your system(s) solve?

As the group has numerous research strands, we are currently looking at several research problems all within, or relevant to, VR rehabilitation. The core work of the iMoVE group seeks to improve our understanding of the interplay between VR system design

and user behaviour, facilitating the creation of research and rehabilitation applications which support, rather than undermine, the rehabilitation goals. For example, it has been observed that Treadmill-VR systems feel “more natural” when the visual flow rate is increased, but our work indicates that this would actually lead to an involuntary reduction of walking speed, which may be in direct opposition to the therapeutic goal. In contrast, we have demonstrated that reducing visual flow rate can lead to an increase in walking speeds in patients with slowed movement. Integrating this knowledge into the design of walking rehabilitation applications could optimise therapeutic outcomes.

### What makes it unique?

Where the iMoVE group stands out most significantly is in our overall approach. It is commonplace for VR rehabilitation research to focus on the application in relative isolation without accounting for the broader confounding

(continued from page 2)



RITA – an emotionally expressive conversational avatar for supporting elderly people

elements, such as the effects of VR itself when translating a physical therapy into a virtual environment. iMOVE utilises a more holistic approach, examining what VR is, how it fundamentally affects us, and how we need to account for these factors in VR rehabilitation design. We focus upon building collaborative partnerships across academia, technology enterprises, the healthcare industry and the end-users themselves, all as part of research that is generating and analysing data to paint a more comprehensive picture of rehabilitation so that interactive technologies can be more effectively integrated, ultimately helping such products and services to work better. Our intention is not to create applications ourselves, but rather to develop design and knowledge frameworks that will better inform those that are developing applications, helping them to better understand the realities of virtual realities.

### How is it better than other existing approaches?

It's a common complaint that we don't know which components of VR contribute to the therapeutic outcomes, or how we can start to build a "VR pharmacy". We don't have all the answers, but we are starting to

ask some of the right questions. By incrementally building a knowledge base which can be applied to a wide variety of end applications, we hope to contribute to improved outcomes across the discipline.

### Tell us about the development process.

As mentioned earlier, the underlying ethos of the iMOVE group is to bridge the rather sizeable gap that exists between researchers working to develop virtual reality technologies and those working in rehabilitation. Stemming from this, our development process across all of the iMOVE projects

is to build a comprehensive information set that includes aspects relevant to the VR system (hardware and software), the patient (including their target condition, multiple/complex health problems, general physiology, emotional state and also cognitive effects such as prior experience and expectation), the practitioner (how the therapy is delivered, what action/support is needed) and the local environment (home treatment, hospital, GP surgery, etc.). Our work has consistently revealed that these factors interconnect in multiple, complex ways and these relationships need to be understood for significant progress to be made. Overall, the iMOVE development process would be best described as identification of these relationships followed by structured and systematic testing to uncover the details of precisely how these factors impact upon one another.

### Is it available to the community? How to have access to it?

We are regularly publishing our findings, and from time to time will be collating these into design guideline documents for specific areas. We will also be contributing some of our virtual environments and research software to the Open Rehab Initiative in the near future.

[\(http://neurorehabilitation.m-iti.org/openrehab/\)](http://neurorehabilitation.m-iti.org/openrehab/).



Virtual meeting space – a co-designed safe space for at-risk children in care to meet with parents or other adults

# RESEARCH PROJECT PROFILE

## AHA - Augmented Human Assistance

### Alexandre Bernardino, project coordinator

VisLab, Technical University of Lisbon

<http://aha.isr.tecnico.ulisboa.pt/>

<https://www.facebook.com/ahaproj>

The AHA Project (Augmented Human Assistance) aims at the application of ICT and robotics assistive technologies for the promotion and monitoring of exercise and rehabilitation programs. It is a Portuguese project on the Carnegie Mellon Portugal (CMU-PT) initiative of the Portuguese Foundation for Science and Technology (FCT) and it is based both in Portugal (Lisbon and Funchal) and the USA (Pittsburgh).

### How did the project start?

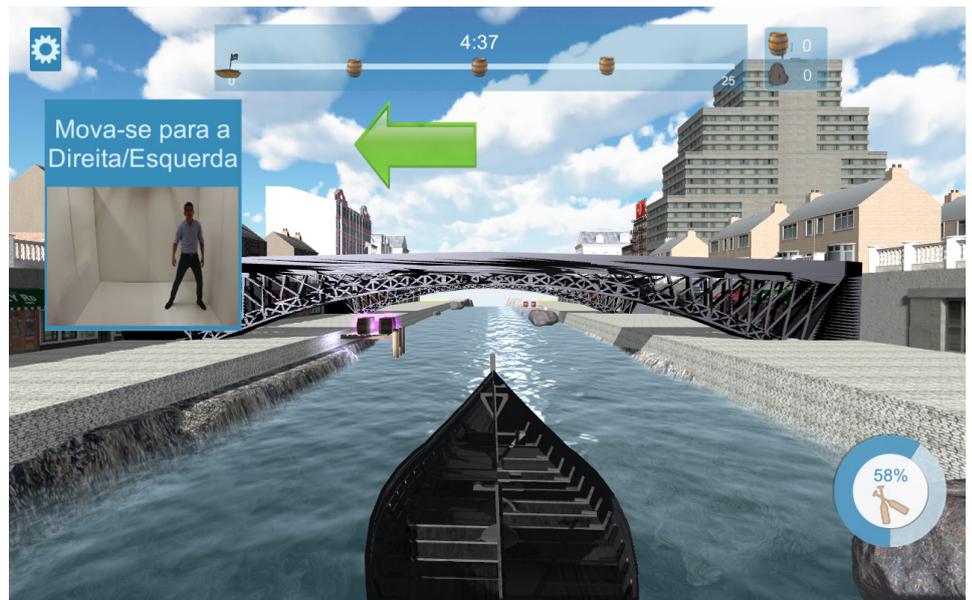
The project started from joint research interests of the partners in applications of robotics assistive platforms to healthcare, advanced human-robot interfaces and interactive technologies. There were previous collaborations among some partners on virtual reality tools and intelligent virtual coaches for stroke rehabilitation and diagnosis that facilitated the definition of the project's concept.

### Who are the partners?

The partners are Portuguese research groups at [ISR/IST/UL](#) (Lisboa), [M-ITI/UMa](#) (Funchal), [FCT/UNL](#) (Lisboa) and [FMH/UL](#) (Lisboa), the north american [Quality of Life Technologies Center](#) at CMU, and two Portuguese companies: [PLUX](#) and [Ydreams Robotics](#), working in the fields of physiological computing and robotics, respectively.

### What research interests does your the project have?

The project aims at the research and development technology with two main goals: 1) for promoting and



Rabelos Exergame

monitoring physical exercise for the elder population, and 2) deploying a novel approaches for the rehabilitation of stroke. We target mainly users with special needs (such as elderly or with motor disabilities) that demand a high degree of customization in their physical exercises. The challenge is to make technology more appealing, personalized, reliable and engaging, therefore more effective in the accomplishment of the exercise objectives. This is achieved through research and developments on natural human-machine interface, serious games, socially assistive robots, multimodal sensing, augmented reality and virtual coach technologies. Together these technologies will facilitate the interaction between the user and the system, will provide more timely and effective feedback to the user, and will help clinicians to monitor the progress of their patients.

### What problems does your systems solve?

The benefits of exercise are manifold, both at the physical, physiological and mental levels. However, most of the world's population embraces a sedentary lifestyle. This increases the risk of diseases such as diabetes, obesity and stroke, that carry great societal and economic impacts. In this context the AHA project is trying to "solve" the risks of sedentary life and minimize their impact in patient's life quality through technological advances that can be used at clinical sites, care centers or at patients homes. In one hand the AHA project is developing technology to increase the levels of adherence of maintenance on exercise programs by the elderly population. On the other hand, for the unfortunate that suffered stroke limiting their motor ability, the AHA project proposes custom rehabilitation systems to enhance the therapy benefits.

(continued from page 4)

## What makes it unique?

Despite many new technologies are being researched to promote exercise (mobile apps, video games, fitness trackers, smart watches, wrist bands, etc.), these have been successful mostly for the young and healthy population. However, seniors and patients with motor or cognitive deficits may encounter difficulty in using autonomously these technologies, require more personalized assistance to configure their exercise programs or simply the exercises are not well suited. These users are very prone to quit exercise programs due to lack of motivation, forgetfulness or appropriate support. Loss of interest in the exercise program is not only due to lack of excitement but also to inadequate difficulty and intensity levels of the exercises. These must be carefully chosen according to the current fitness levels of the user, in order to maximize the exercise benefits and keep the user engagement and safety. Further, the AHA project proposes the use of social robots to engage its users on highly personalized exercise programs through virtual and augmented reality technologies.

## How is it better than other existing systems?

The project combines unique technological advances in the areas of socially assistive robots, artificial intelligence, physiological sensing, augmented reality, gamification techniques and sports science, developed by top research and development teams both in Europe and the US. The robotic assistive platform is a social robot with unique physical and behavioral traits that promote emotional bonds with the users. Virtual coach technology implements monitoring, dialogue, exercise scoring, and goal adjustment techniques to maximize rehabilitation programs. Truly immersive augmented reality exergames with state-of-the-art gamification techniques are enriched with biofeedback from

physiological sensing. Sport scientists monitor the development process and define protocols for training and fitness assessment. Together these technologies will create new levels of interaction and engagement clearly beyond the current state-of-the-art, which will lead to increase the adherence and maintenance of users in the exercise program.

## Tell us about the development process?

The consortium has a multidisciplinary expertise, from sport scientists, biomedical engineers, roboticists to human computer interaction experts. The development is organized in 4 main modules: 1) a monitoring module that is able to record and analyze physiological and kinematic data; 2) an augmented reality gaming module, that implements personalized exercise programs as serious games; 3) a virtual coach system, that provides assistance and guidance to stroke rehabilitation exercises; and a 4) robotic module, which integrates all previous components on a mobile platform. Each of these modules is developed collaboratively in the project, by a multidisciplinary team, with a user-centered approach. However, the integration is a challenging aspect of the project since, typically, different partners develop their components using distinct technologies, what requires a high coordination effort for a successful integration. Beyond the individual modules, the project also benefits from two CMU-Portugal dual-degree PhD students, that are co-supervised among some partners. These PhD students help in the coordination and integration of the work done at the different sites.

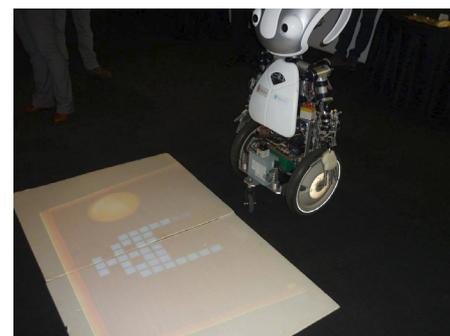
## What level of readiness is the technology now?

The project has entered its third year now where most of its components are gaining maturity and demanding for greater integration. The technology

developed until now has been tested in lab settings with promising results. Some end user tests have been made to evaluate some dimensions of the system but larger scale tests are only planned for this and the next year. Some partial implementations of the systems are already mature and could be deployed in the short term at the end user sites, but the full system will only be ready on the end of the third year and only then a complete evaluation of end-user acceptance, usability and impact will be made. This goes in line with the planned work.

## Is it available to the community? How to have access to it?

Not at the moment. However, the developments of the project are frequently demonstrated at public exhibitions and shows. Several dissemination actions have resulted in press releases and news in the media. Soon, as the project progresses, we will be able to take the system to end-users sites and perform evaluation experiments.



Robot projecting Exergame



Douro - Grapes Stomping Exergame



## Open Rehab Initiative

The ORI is an international independent initiative that connects and supports clinicians, scientists, engineers, game developers and end-users to interact with and share virtual rehabilitation tools. As such, we aim to attract both developers and virtual rehabilitation users, for research as well as for clinical practice. The scope of the simulations encompasses sensorimotor and cognitive rehabilitation.

The ORI portal is planned as a hub where the community who build and use software tools for virtual rehabilitation can easily communicate, interact with and share these tools. The ORI portal currently offers software, drivers, and documentation of evidence and application, with support for discussion boards, and blogs. Although ORI originates from academic institutions, it is designed to grow through community driven content, incorporating inputs from all the relevant communities.

At this moment we are looking for researchers and clinicians willing to contribute as beta testers. Beta testers will have the opportunity to have early access to the ORI platform (with all its features, including applications, forums and support) and contribute towards improving its usability.

If you are interested, please contact us at [openrehabinitiative@gmail.com](mailto:openrehabinitiative@gmail.com)



The website at <http://www.isvr.org> acts as a portal for information about the society. We are keen to enhance the community aspects of the site as well as to make it the first port of call for people wanting to know what is going on in the field of virtual rehabilitation and its associated technologies and disciplines. Please do visit the site and let us know details of any upcoming events or conferences or news items you would like us to feature on the site. We intend to add further features in the coming year including member profiles; a directory of journals who publish virtual rehabilitation related work; and a list of Masters and PhD level theses completed or currently being undertaken in the field. As well as sending us details of events and news for display, we would welcome suggestions from members about what else they would like to see on the site, or ideas for how we can further develop the virtual rehabilitation community through it.

Please mail [webdec@isvr.org](mailto:webdec@isvr.org) with any information/ideas using ISVR INFO in the subject header.

## Membership information

Membership of ISVR is open to all qualified individual persons, organizations, or other entities interested in the field of virtual rehabilitation and/or tele-rehabilitation. Membership (regular, student or clinician) entitles the member to receive reduced registrations at ISVR sponsored conferences and affiliated meetings (see webpages for more details). There is also an active ISVR facebook page, which is another source of useful information, currently with 1108 members.

## Call for Contributed Articles

- If you are a technology expert in virtual rehabilitation or you have experience in the clinical use of virtual rehabilitation technologies, and would like to be featured in an upcoming ISVR newsletter issue
- If you would like to submit a contributed article relevant to the ISVR community
- If you have any news, summaries of recent conferences or events, announcements, upcoming events or publications

We are looking forward to your contribution! Please contact us at [newsletter@isvr.org](mailto:newsletter@isvr.org).



Join our mailing list: <http://isvr.org/join-our-mailing-list/>

## ICDVRAT prize winners

**Best Paper Award:** Clinical interviewing by a virtual human agent with automatic behavior analysis, A A Rizzo, G Lucas, J Gratch, G Stratou, L-P Morency, R Shilling, A Hartholt, S Scherer

**Best Student Paper Award:** Usability and performance of Leap Motion and Oculus Rift for upper arm virtual reality stroke rehabilitation, D E Holmes, D K Charles, P J Morrow, S McClean, S M McDonough

**Best Short Paper Award:** Pirate adventure autism assessment app: a new tool to aid clinical assessment of children with possible autistic spectrum disorder, E Jordan, W J Farr, S Fager, I Male

**Best Student Short Paper Award:** Gaming for health: an updated systematic review and meta-analysis of the physical, cognitive and psychosocial effects of active computer gaming in older adults, S C Howes, D K Charles, K Pedlow, J Marley, A Matcovic, P Diehl, S M McDonough

# ICDVRAT Best Student Paper award

## Usability and Performance of Leap Motion and Oculus Rift for Upper Arm Virtual Reality Stroke Rehabilitation

Dominic E Holmes<sup>1</sup>, Darryl K Charles<sup>1</sup>, Philip J Morrow<sup>1</sup>, Sally McClean<sup>1</sup>, Suzanne M McDonough<sup>2</sup>

<sup>1</sup>Computer Science Research Institute, <sup>2</sup>Institute of Nursing and Health Research, Ulster University UK

### Introduction

We present a multi-sensory VR system, Target Acquiring Exercise (TAGER), and evaluate its usability and performance for upper limb rehabilitation. We evaluate Fitts's Law and variants as the basis of an adaptive system to model movement performance for reach and touch tasks in a 3D virtual space. TAGER evolved from previous VR and augmented reality (AR) testbeds developed by our research group and particularly from initial research undertaken with the Leap Motion controller. We focused on testing with healthy users to help us evaluate the user interface ahead of planned experiments with impaired users, helping us refine the user profiling system.

### TAGER

TAGER is designed based on requirements from research and clinician involvement. TAGER utilizes a number of technologies that work together to monitor and provide feedback to users while completing upper arm rehabilitation tasks. The Leap Motion controller is a small desktop NUI which contains an infrared camera to track fingers, hands and arms. Microsoft's Kinect V2 is similar to the Leap Motion, sensing motion of the human skeleton. We collect data of all joints in the upper body in motion with the goal in a future version providing guidance on suitable functional task movements and other factors. The Oculus Rift DK1 (VR Headset) is investigated in this experiment to determine if it is acceptable for use and could potentially be used to increase spatial awareness. The Myo armband slides on to the forearm, and uses electromyography (EMG) technology to read electrical signals from the muscles. The use of the Myo armband here is to collect data to be stored for future studies helping identify changes

in muscles, which could highlight factors such as fatigue and correctness of exercise.

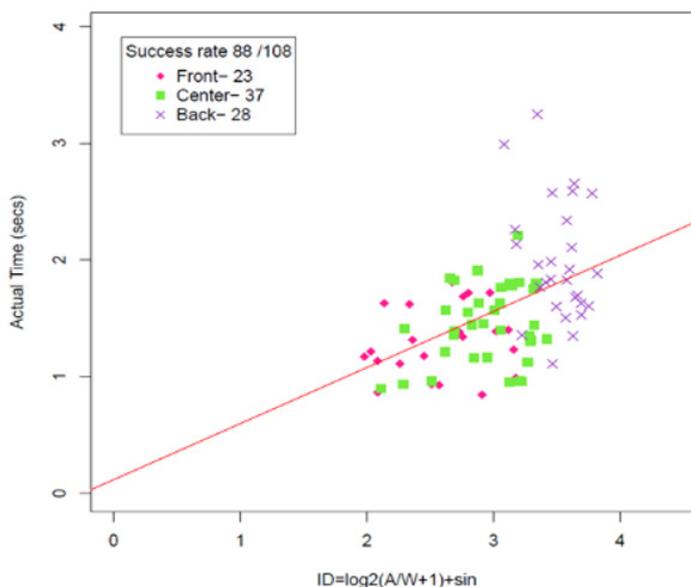
### Results (User modelling)

We have defined a user model based on the user's motion from our Fitts's Law data over time. User model Data from 7 of the 23 participants provided a poor fit to the model based on start task motion data. To understand the user profiling it is necessary to analysis individual user profiles. User 1019, appears to have become more conservative, and by moving slower improved their hit score by 12.82%. This considered approach by user 1019 and other participants seems to improve the likelihood that the user motion data corresponds to Fitts's law (and variants). User 1002 had the weakest start having the lowest number of hits in the initial task but improved hit performance by 50% and mean MT by 31.59%. However, even by the end task this user's motion could not be applied to Fitts's law reliably and they had less than a 50% hit success rate in the final task. User 1023 exhibited arguably the most sustained success, having the

highest overall hit success and start and end scores of 90 and 91 respectively and overall an improved profile (based on regression values).

### Conclusion

Most users enjoyed using the Leap Motion device and perceived tasks to be easier with the VR headset on. No motion sickness or other negative health related effects were reported. In some cases linear regression of user motion was unreliable showing the need for a more complex user profile alongside Fitts's Laws linear model. Most of these users required more training than we expected but in some cases users appeared to become tired or bored. A more complex profiling system helps to identify training requirements and distinguish between loss of interest and mental or physical fatigue. We recommend that Fitts's Law, could be used as part of an intelligent system to profile users. We intend to develop the profiling system with further experiments and subsequently investigate the system with impaired users.



Sample Fitts's Law Linear regression plot (user 1019)

# ICDVRAT Best Student Short Paper award

## Gaming for health: an updated systematic review and meta-analysis of the physical, cognitive and psychosocial effects of active computer gaming in older adults

S C Howes, D Charles, K Pedlow, J Marley, A Matcovic, P Diehl, S McDonough

### Background

In older adults, physical activity promotes physical function and independence, as well as reduced cognitive decline and falls prevention. Active computer gaming (ACG) is a method of enabling physical activity in older adults. Research in this area indicates that ACG may contribute to slowing the deterioration of health and function associated with ageing, with favourable results in outcomes such as balance, confidence, functional mobility, and quality of life.

### Objective

The purpose of this review was to update and extend a systematic review of the evidence for the physical, psychosocial and cognitive effects of ACG in older adults, and to explore ACG design and intervention delivery, in terms of adherence, dose, setting and supervision.

### Methods

Four electronic databases (MEDLINE, EMBASE, Cochrane Register of Controlled Trials, and PsycInfo) were searched using predefined search strategies. Eligible studies were randomised or quasi-randomised controlled trials of interventions that used ACG as all or part of the delivery, aimed at improving physical and cognitive function in older adults (>65 years), and published in English. Primary outcomes of interest were related to physical and cognitive function. Secondary outcomes of interest included psychosocial outcomes, such as fear of falling and health-related quality of life. Data extraction and assessment of risk of bias using the Cochrane risk of bias tool were undertaken independently by two authors. Meta-analyses were

conducted. Sub-group analyses were performed according to control group and intervention dose. Sensitivity analyses were carried out to assess the impact of excluding trials with higher risk of bias in the meta-analysis.

### Results

24 studies have been included in this review, with 1049 participants. The mean sample size was 44 participants. 72.2% of participants were female. The mean age of included participants was 78±5 years. The majority of studies included healthy older adults and were conducted in a clinical setting under supervision. Where reported, adherence rates and incidence of adverse events were comparable between intervention and control groups. Risk of bias in included studies was assessed as of low (n=9), high (n=9), or unclear (n=6) risk of bias. Meta-analyses indicated that ACG had a moderate significant on balance, a small significant effect on functional mobility, and a large significant effect on cognitive function. There was no significant effect indicated for fear of falling, quality of life and functional exercise capacity. Sub-group analysis suggested a dose response for only functional exercise capacity and cognitive function.

### Conclusions

This review identified, graded and synthesised the available literature for ACG in older adults. Overall findings suggest that ACG is feasible for older people and may provide positive physical and cognitive health benefits greater than those observed following traditional exercise or rehabilitation interventions, with a potential dose response for some outcomes. This review highlights that ACG is a growing area of research; however, trials

with small sample size and limited methodological may overestimate the effect of the intervention.

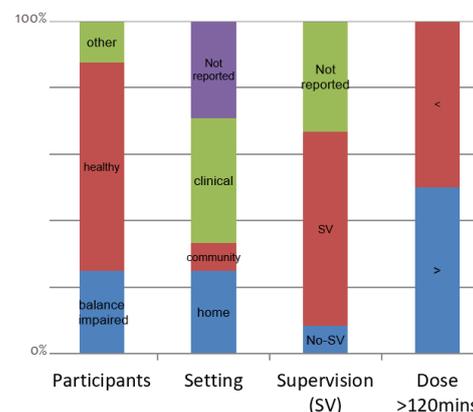
### References

Bleakley, C.M., Charles, D., Porter-Armstrong, A., McNeill, M.D., McDonough, S.M. and McCormack, B., 2015. Gaming for Health A Systematic Review of the Physical and Cognitive Effects of Interactive Computer Games in Older Adults. *Journal of Applied Gerontology*, 34(3), pp.NP166-NP189.

Outcome	Effect of ACG
<b>Balance</b> n=12 RCTs, n=326	Moderate significant effect [SMD 0.52, 95% CI 0.14, 0.911]
<b>Functional mobility</b> n=11 RCTs, n=314	Small effect size (sensitivity analysis only) [SMD -0.31, 95% CI -0.57, -0.05]
<b>Functional exercise capacity</b> n=6 RCTs, n=218	Small significant effect [SMD 0.30, 95% CI 0.03, 0.57]
<b>Cognitive function</b> n=4 RCTs, n=160	Large significant effect [SMD -0.82, 95% CI -1.15, -0.50]
<b>Fear of falling</b> 12 RCTs, n=470	No significant effect
<b>Quality of life</b> 6 RCTs, n=161	No significant effect

ACG – Active computer gaming; RCT – randomized controlled trial; SMD – standardised mean difference; CI – confidence interval

Effects of ACG on outcomes



Intervention delivery summary

## Call for Nominations – Deadline: January 27, 2017

We are pleased to announce the second ISVR Early Career Investigator Award. The purpose of this award is to recognize and acknowledge outstanding contributions by early career scientists whose research relates to virtual rehabilitation. The recipient will be awarded a certificate, free registration at an upcoming ICDVRAT or ICVR conference and be asked to present their research as a platform paper at that conference. A runner-up will also be awarded a certificate.

## Eligibility criteria

- Have completed doctoral level studies no more than seven years prior to nomination
- Be a member in good standing of the ISVR
- Be engaged in and have published peer reviewed innovative research in the field of virtual rehabilitation
- Have not previously received an ISVR Early Career Investigator Award

## Evaluation criteria

- Number and quality of publications
- Type and amount of research community service (committees, panels, reviewing, etc.)
- Type and amount of public outreach activities, including knowledge translation activities  
evidence of clinical impact: teaching, standards setting, technology transfer

Individuals may be nominated by an ISVR member or be self-nominated. A full application must include the following:

- Short biography (maximum 500 words)
- Full CV
- Description of key research innovation and impact on the field of virtual rehabilitation (maximum 2 pages)

**Application materials must be emailed to: [awards@isvr.org](mailto:awards@isvr.org), before the deadline of January 27, 2017, 5PM EST.**

All procedures related to the award will be handled by the Chair of the ISVR Awards Committee who will set the deadlines for nominations and selection mechanism. The award will be given yearly at ICDVRAT and ICVR conferences. The award will be presented at the ICVR meeting in Montreal in June 2017.

# 11<sup>th</sup> INTERNATIONAL CONFERENCE ON VIRTUAL REHABILITATION

<http://www.virtual-rehab.org>

**Montreal, Canada – June 19-22, 2017**

**Affiliated with the International Society for Virtual Rehabilitation - [www.isvr.org](http://www.isvr.org)**

ICVR is an international conference series that provides an in-depth presentation of novel technologies and clinical developments in the field of virtual reality and associated topics applied to rehabilitation. Researchers, clinicians and technology experts meet, share experiences, and plan for the future. We invite submissions for papers, posters, demonstrations and workshops related to:

- Motor and/or cognitive rehab
- Sensory rehabilitation
- Gaming / low cost systems
- Haptic interfaces
- Tele-rehabilitation
- Knowledge translation
- Brain computer interfaces
- Vestibular and balance rehab
- Rehabilitation robotics
- Virtual / Mixed / Augmented reality
- Psychological and environmental rehabilitation
- Communication / Language
- Regulatory, educational, sociological, demographic, legal aspects of VR

## Timelines

- Paper, Poster and Workshop submission deadline: **January 6, 2017**
- Notification of the review decision: **March 17, 2017**
- Final camera-ready paper due and deadline for registration of at least one author: **April 14, 2017**

## Paper Format Guidelines

- Papers should describe original and unpublished work with substantial results or novel methods or techniques.
- Papers should be 6-8 pages long including images, figures, tables and references, double column, formatted according to IEEE conference proceedings template (see below). Papers should include the title, abstract, 4-6 keywords, author names, affiliations, postal & e-mail addresses and contact author.
- Submissions not accepted as papers will be considered as a poster & must adhere to poster format guidelines.

## Poster Format Guidelines

- Posters should describe original, unpublished work, or describe work in progress.
- Poster abstracts should be 1-2 pages, including images, figures, tables and references, double column and formatted according to IEEE poster template (see below).
- Posters should include the title, abstract, author names, affiliations, postal & e-mail addresses and contact author.

## Submission Guidelines for Papers and Posters

- Authors must use the IEEE conference proceedings format obtainable at: [http://www.ieee.org/conferences\\_events/conferences/publishing/templates.html](http://www.ieee.org/conferences_events/conferences/publishing/templates.html)
- Papers and posters should be submitted on the conference web site: [www.virtual-rehab.org/](http://www.virtual-rehab.org/)

## Publications

- Proceedings will be made available to conference attendees. Papers and posters will become part of the IEEE Online Library, carrying the IEEE © notice, provided that at least one author has registered for the conference by April 14, 2017. We aim to organize one or more special issues in relevant journal (s).

## Workshop submissions

- Submit via email in pdf format to [icvr2017workshops@gmail.com](mailto:icvr2017workshops@gmail.com)
- Workshop sessions (either 3 or 6 hours) will be held on June 19th, 2017.
- Workshop outlines should be a maximum of 2 pages in length including title, names and contact information of the workshop organizer(s), name and short biography of each workshop presenter, description of intended participants, description of workshop goals, and format and timeline of the workshop content: a template is available at: <http://virtual-rehab.org/2017/wp-content/uploads/2014/08/Workshop-Website-Template.docx>

# ICVR 2017 KEYNOTE SPEAKERS



**Tiiu Poldma, PhD**

Tiiu Poldma is full professor at the School of Design in the Faculty of Environmental Design at the Université de Montréal. Dr. Poldma's research expertise lies in the creation of spaces in flexible and temporal environments using light, color and design elements through changing human user experiences of interior space, and adapting the environment for various populations.

**Mel Slater, DSc**

Mel Slater is an ICREA Research Professor at the University of Barcelona in the Faculty of Psychology. He has been Professor of Virtual Environments at University College London since 1997 in the Department of Computer Science. He has been involved in research in virtual reality since the early 1990s. He has contributed to the scientific study of virtual reality and to technical development of this field. He has also contributed to the use of virtual reality in other fields, notably psychology (in relation to clinical psychology - studies of paranoia - and also social psychology) and the cognitive neuroscience of how the brain represents the body.



**Judith E. Deutsch, PT, PhD, FAPTA**

Judith E. Deutsch is a professor of physical therapy in the Department of Rehabilitation & Movement Sciences at Rutgers University. She is also the director of the Research in Virtual Environments and Rehabilitation Sciences Lab. Her research has focused on the development and testing of virtual reality technologies to improve mobility, balance and fitness of individuals with neurologic conditions. More recently she has worked on knowledge translation related to adoption of video games in clinical practice.

