International Society for Virtual Rehabilitation

ISVR

# NEWSLETTER

NUMBER 19 | DEC 2020

## Editorial

**December 2020 Newsletter 19**

In this issue, we present VR4REHAB, a European project on VR and AR which aims to create innovative VR and AR technologies for rehabilitation clinics with a particular focus on children affected by chronic diseases and disability, page 3. We also introduce XRHealth, a company that provides VR health services for motor, cognitive and psychological treatment exclusively via telerehabilitation. Their concept is outlined on page 4.

This year, the World Congress for Neurorehabilitation was held digitally, from October 7-11th, and included several VR related sessions. Anne-Laure Guinet gave a talk on ARRoW CP, a project to develop a serious game to enhance gait rehabilitation for children with motor disabilities, particularly with cerebral palsy. Melanie Cogné presented research on how cues in virtual environments can help people with topographic orientation deficits, such as Alzheimers and neglect. We present summaries on pages 5 and 6.

We would like to remind our readers of the ISVR online initiatives we established recently, the ISVR Online Seminar Series and the ISVR Journal Club Series, which are taking place regularly on alternating months. In the first ISVR Online seminar, attended by 71 people, we had great talks on virtual reality terminology by Mindy Levin, McGill University and Judy Deutsch, Rutgers University; virtual rehabilitation for coping with pandemic by Marika Demers, University of Southern California and Roberto Llorens, Universitat Politecnica de Valencia; and human-avatar interactions in virtual environments by Anouk Lamontagne, McGill University and Sean D. Lynch, McGill University & Université Laval. You can find short summaries of the presentations on pages 7-8. More information about these events and receive announcements by joining our mailing list at www.isvr.org.

Finally, during January 2021, elections for the Board of Directors of ISVR will take place. I encourage those of you that believe that can contribute to the Virtual Rehabilitation field to put forward your application, and all ISVR members to contribute shaping the field through their votes.

We are always looking for interesting contributions to the newsletter. If you would like to share your news, upcoming events or an overview of your research, lab, clinic or company, please contact us at newsletter@isvr.org. I hope all our readers stay healthy in these difficult times.

*Sergi Bermúdez i Badia, ISVR president*

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## UPCOMING EVENTS

**13th International Conference on Disability, Virtual Reality & Associated Technologies**
**Postponed to September 8-10, 2021**
**Serpa, Portugal**
http://icdvrat2020.ulusofona.pt/

**ECNR & DGNR 2021 — 6th European Congress of NeuroRehabilitation**
**8-11th December 2021**
**Berlin, Germany**
https://www.efnr-congress.org/

**Editors:**
**Iris Brunner**
**Amir Tal**
**Gerard Fluet**
newsletter@isvr.org

# ISVR OPPORTUNITIES

## Current opportunities to get involved in the ISVR are listed below

### Nominations are now open for:

1. Executive Positions, effective Jan 1, 2021 – Dec. 31, 2023
    a. President
    b. Vice-President
2. Board Members (2 positions available for Website Chair and Social Media Chair), effective Jan 1, 2021 – Dec. 31, 2023

### Volunteering Opportunities for students and early career researchers:

The ISVR is looking to extend its experience in a few areas as part of its innovation programme including web development, social media, and management of web content. We are particularly looking for individuals to fill the current available positions:

- Web Manager: will be responsible for updating content on the ISVR website. Expectations include pushing new content to the website twice monthly (content to be developed by others) and updating/removing out of date content. Some experience in web editing is required.

- Social Media Manager: will be responsible for coordinating and maintaining content on the ISVR social media platforms (Facebook, Twitter and Linkedin). Expectations include pushing new content to these sites (using software that facilitates cross-posting) once weekly and searching for relevant external content (e.g. by having a google alert for 'virtual rehabilitation') to share.

Should you be interested in applying, please send your CV and an expressions of Interest (300-word maximum) as to why you consider yourself suited for this opportunity to Al-AmriM@cardiff.ac.uk

### ISVR Journal Club:

We were very excited to announce that our regular virtual programme has now been launched. This includes the ISVR Journal Club that is led by Dr Mohammad Al-Amri. The purpose of the ISVR journal club is to create an active education friendly
environment and an established informal discussion forum for individuals across multidisciplinary. In addition to discussing a related article it will also be a place to get some technical or non-technical discussions around the applications of virtual reality in clinical practice.
Our next Journal Club will be held on Wednesday **January 27th, 2012 at 4:00 pm GMT** and Dr Belén Rubio Ballester will be presenting an article about "Sensorimotor manipulations for the evaluation of motor impairments". Dr Ballester is a senior researcher at the Synthetic Perceptive Emotive Cognitive Systems Lab (SPECS) of the Institute for Bioengineering of Catalonia (IBEC), team leader of the Neuro-rehabilitation area. She has a background in computational science, development of VR- based solutions for value-based healthcare, clinical validation, computational modelling of recovery, and a track-record in neuro-rehabilitation.

# REHABILITATION EU PROJECT

## VR4REHAB

**Beatrice Palacco, VR4REHAB**
communication@eurovr-association.org
Official website: http://www.nweurope.eu/VR4REHAB
Youtube video: https://www.youtube.com/watch?v=XhfscqDMZUY

### How VR and AR can improve rehabilitation therapy

In recent years the use of Virtual Reality and Augmented Reality for rehabilitation has recorded considerable advancements to the technology. The most advancements are expected to be seen in the healthcare industry, currently booming, the revenue is projected to reach $5B by 2025.

VR and AR technologies are revolutionizing the entire healthcare industry, currently adopted in different areas, such as virtual training for healthcare professionals, mental health treatment, and chronic pain management. Virtual and Augmented Reality technologies can support the process of clinical rehabilitation by making therapy more engaging, challenging, and measurable.

The European Project VR4REHAB offers a solution for better and personalized healthcare, through the co-creation of Virtual Reality-based rehabilitation tools.
The project, a collaboration between seven European partners (Sint Maartenskliniek, European Association of Virtual Reality and Augmented Reality (EUROVR), St. Mauritius Therapieklinik, Teesside University, Royal Free London NHS Trust, Universite de Lille 1 - Sciences et Technologies and Games for Health Europe), aims to create innovative VR and AR technologies for rehabilitation clinics.
VR4Rehab particularly addresses the rehabilitation of children affected by chronic diseases and disability, as well as adults stricken with fatigue and pain, providing them with challenging VR interventions.

The project follows the ensuing structure: five hackathons had been organized in different countries (one per participating country), which connected entrepreneurs, students, patients, rehabilitation experts, and technical specialists, to define the main themes of the competition concerning rehabilitation with VR. The most favourable ideas were then taken to the Game jams, where pilots have been developed and accompanied with strategic recommendations for implementation.

Participants during the Hackathon in France

At the moment, the project is in the challenges phase, this represents a moment of technical development, a combination of business, scientific studies, and user confrontation. Together with SMEs, the prototypes developed during the game jams undergo a phase of technical development and trial with clinical partners, who provide medical requirements. Eight teams, that include experts in computer sciences and digital technologies, researchers, and health professionals, are collaborating to develop meaningful and motivating environments for rehabilitation. The VR4REHAB teams (respectively: Adherence, Crystal Ball, Hands Around the World, Move VRee, Moving Reality, Pain Toolkit, Trunky XL, and VR Traveller) are focused on different themes: pain management, engagement, and immersion to promote treatment adherence, behavioral and cognitive training in children with brain injury, lower limbs mobility, and training of upper limb movements. The researchers are engrossed in the prototype's construction phase, which is currently in progress, the VR and AR prototypes are being tested with patients and clinical personnel before the final products can be finally developed and introduced to the VR market.

Virtual and Augmented Reality is helping optimizing rehabilitation protocols, accelerating patients' recovery, and easing reintegration into daily life. The patients can even recover from the comfort of their homes, with or without their therapists, by following virtual instructions while being monitored by a set of sensors. Additionally, the virtual and augmented applications can calibrate the difficulty of the tasks, according to the patient's ability, helping them to remain motivated and reducing boredom associated with too-easy tasks.

At the end of the project, VR4REHAB aims to represent excellence and to be able to provide an Innovation Blueprint to facilitate future innovation processes and support creators, researchers, and healthcare professionals, from how to move from idea to working VR-prototypes. The VR4REHAB consortium is also committed to the creation of an Online Library, in which the ideas and relevant information about the current state of the art on VR and AR for rehabilitation will be stored and available for interested parties to use. The results of this process will finally lead to novel patient treatment protocols.

# REHABILITATION STARTUP

## XRHealth

**Adam Raz, Adam@xr.health**
Founded 2016
Boston (Headquarters), Israel, Australia
www.xr.health

### What service are you offering?

XRHealth is the first virtual reality (VR) telehealth clinic in the world. Patients are treated at home with medical VR, while they're remotely monitored by a licensed XRHealth therapist. Our virtual clinic combines medical VR applications with advanced data analytics to provide a comprehensive solution for clinicians and patients. The VR applications focus on motor, cognitive, physical, and psychological treatment. The applications are a mix of real and virtual environments, games, and exercises for physical therapy, stress management, pain management, ADHD (age 8+), memory decline, hot flashes, respiratory recovery, and support groups.

### What is unique about your service?

We strongly believe that effective, quality healthcare should be accessible to everyone and that the care experience should be engaging and interactive. Our telehealth clinic allows for completely remote healthcare, so patients and clinicians can use XRHealth at home and on their own schedule. The VR applications are highly engaging and immersive, helping to increase compliance and willingness to complete treatment. XRHealth guides patients in a practical, but fun way, while collecting valuable data and measuring outcomes. Both therapists and patients can see their progress, for transparency that doesn't exist in conventional treatment methods. Lastly, 96% of patients enjoy their XRHealth VR treatments and they are experiencing relief and recovery faster compared to conventional methods. All these factors result in better patient-centered outcomes.

### How does your service help patients and therapists?

XRHealth was created with the main goal to help people feel better faster. For patients, it's convenient, engaging, and 77% agree that XRHealth made a positive difference to their symptoms after only two weeks. And it's easy to get started, a doctor referral isn't required, and anyone can sign up online. Once registered, individuals are matched with a therapist, evaluated via video call, prescribed a plan of care, and sent an XRHealth VR kit to their home. For therapists, it provides a more convenient way to provide care to patients. Especially during the COVID-19 pandemic, when in-person care is happening less frequently, therapists are happy to have the option to perform telehealth and bill for remote patient monitoring.

### How can one obtain your service and how much does it cost?

XRHealth services are covered by most health insurance plans. However, if a patient's health plan doesn't cover it, there is friendly out-of-pocket pricing available.

## ARRoW CP

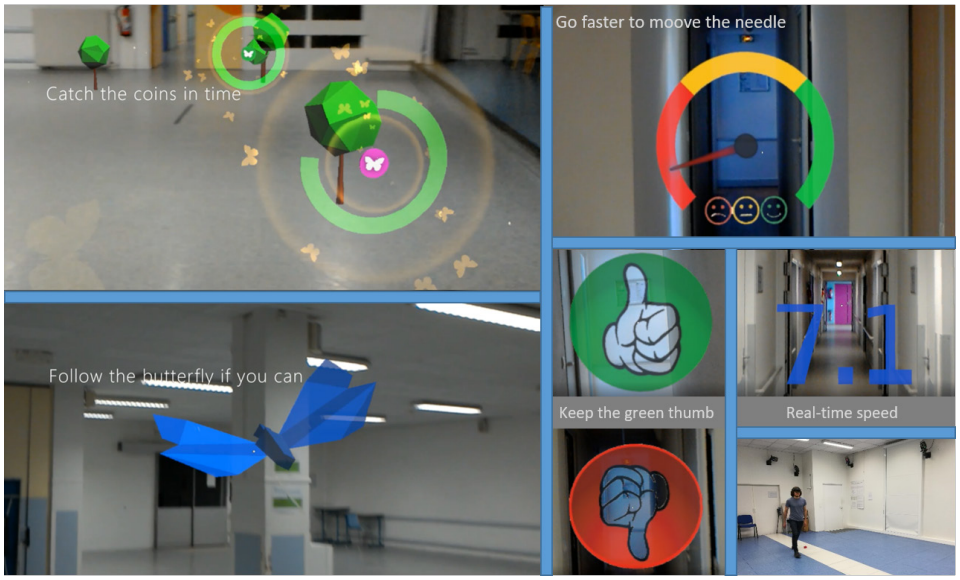
**Guinet A.-L.**[1,2], Bouyer G.[2], Biddiss E.[3], Khan A.[3], Hodge A.[3], Otmane S. 2, Desailly E. [1]
[1]Fondation Ellen Poidatz, Research & Innovation, Saint Fargeau Ponthierry, France
[2]Université Paris-Saclay, Univ Evry, IBISC, Evry-Courcouronnes, France
[3]PEARL Lab, Holland Bloorview Hospital, Toronto, Canada
anne-laure.guinet@fondationpoidatz.com

### ARRoW CP: Serious Game in Augmented Reality exploring visual feedback modalities to control the walking speed. Experimental study.

Cerebral Palsy (CP) is the most common cause of childhood disability, affecting 17 million people worldwide. Gait in children with CP is characterized by a slower walking speed, a shorter-stride length, a lower cadence, and more time spent in double support. Recently, the systematic review by Novak et al. highlighted the importance of context focused therapy and goal-directed training to improve the clinical picture of the patients with CP.

Augmented Reality (AR) appears to be a promising field of development for serious games, especially for gait rehabilitation application. AR technology not fully immerses the user in a simulated environment but includes virtual elements that are superimposed on his view of the real-world. The added value of using augmented environment as a therapeutic medium is that it potentially promotes patients' engagement in the therapy and potentiates therapeutic gains by limiting boredom and lack of motivation. Motor learning can also be facilitated using augmented environment thanks to the ability to personalize visual and auditory augmented feedbacks.

The goal of the ARRoW CP project is to develop a serious game in order to enhance gait rehabilitation for children with motor disabilities and particularly cerebral palsy. The serious game must include the principles of motor learning, which are task-specific practice, variable practice, high practice intensity, augmented feedback and adaptability to user abilities. Furthermore, the serious game should allow the inclusion of motivational elements to increase engagement.
The first step of the ARRoW CP project was to compare the effect of three visual feedback modalities on reaching and exceeding a target walking speed. We would like to answer the question: What is the impact of the different feedback modalities on the control of walking speed?




The five mini games that were tested in the ARRoW CP project.

First feedback modality that we have tested is focus of attention that could be knowledge of results presenting feedback in relation to the outcome of a movement (for example does the player scores? Yes, or no) or knowledge of performance addressing qualities of the movement itself (for example direct angle between forearm and tennis racket). Second feedback modality is spatial representation that is specific to AR application: feedback is attached to the world (the hologram is superimposed to the real object in the world) or to the player (the hologram follows the gaze player). Third feedback is the challenge: feedback is given through a game or not.

ARRoW CP serious game has been developed for Microsoft Hololens AR headset. The target speed (mean maximum walking velocity on 20 meters) of fifteen participants was recorded during a calibration trial. Each participant then tested randomly five mini games. Displacement of the participant was recorded (100 Hz) with the Hololens. Time spent above the target speed and mean speed were compared between feedback modalities.

Results show that the combination of certain feedback modalities, Knowledge of Result, World-locked content, and challenging game, makes it easier to achieve gait goals. The visual feedback modalities in AR do have a real time effect on the controllability of the walking speed. This result will be reinvested in the next steps of the ARRoW CP project.

Currently, we are testing a new version of ARRoW CP serious game in a clinical study in order to test what are the best feedback modalities to help children with CP to walk at their maximal and intermediate speed.

The next step will be to develop and to test a gait rehabilitation protocol over 4-weeks for children with CP using ARRoW CP serious game.

## Virtual Reality and topographic orientation deficits

**Mélanie Cogné, MD, PhD**
University and University Hospital of Rennes, France
Inria Rennes, France
Melanie.COGNE@chu-rennes.fr

Virtual Reality has many advantages for the assessment of spatial cognition and its disorders. It allows a large-scale evaluation of an activity, which is particularly useful when assessing behaviour in space. It allows the reproduction of safe ecological environments. A virtual environment is not necessarily a reproduction in the real world, but can move away from it: this type of environment is called an augmented virtual environment.

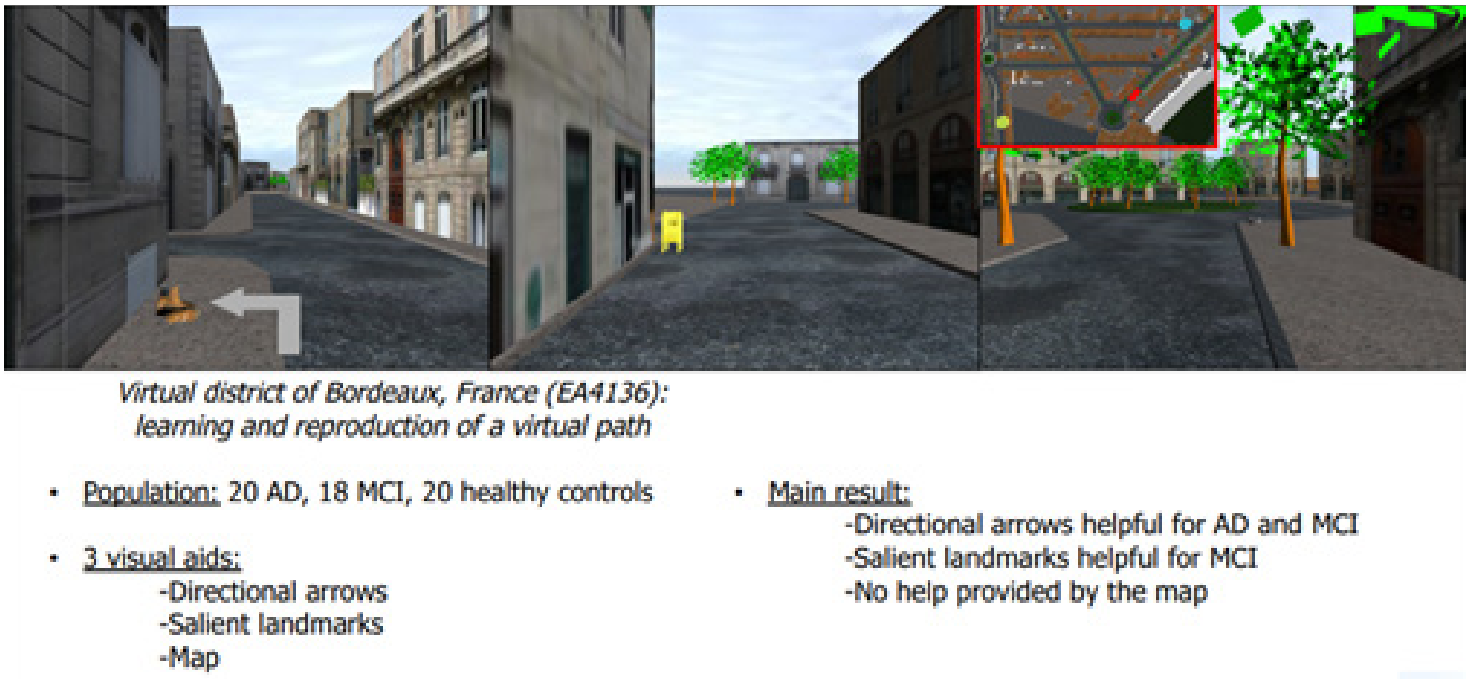
More precisely, augmented virtual reality has been defined as the augmentation of a virtual environment by added stimuli which can be of two types: contextual stimuli related to the navigational attachment to be performed, such as the directional arrow indicating the direction in the virtual neighbourhood presented, or non-contextual stimuli, i.e. unrelated to the task to be performed in the virtual environment. But the virtual environment shouldn't always be augmented. The impact of these stimuli seems to depend on their duration, the time of their appearance and the population they are applied to. Their perception and processing involve several cognitive functions, notably executive and attentional. Virtual reality tools make it possible to test these stimuli with a view to using them in patients with topographical orientation problems.

VR has been widely used for assessing spatial cognition in elderly. In the context of Mild Cognitive Impairment and in patients with Alzheimer's disease, spatial cognition disorders occur at an early stage in the disease. Patients with brain injury present also frequently topographical orientation deficits. We tested some navigational aids in these populations and healthy controls. These included visual and auditory aids, and visual aids in combination with prism adaptation for patients with neglect.

Some added visual and auditory stimuli seem to facilitate spatial navigation in patients with brain injury or with a neurodegenerative disease. A combination of visual and auditory stimuli did not increase spatial navigation in patients with TBI. One of the main goals is their use in neurorehabilitation in an errorless way to train patients to navigate without errors to their goal. Another main objective of this field is to test them in real life using augmented reality.

Other added stimuli decrease spatial navigation performance of patients with brain injury, particularly those with dysexecutive troubles. Their interest for training patients to inhibit in the presence of distractors during navigation could be assessed.

Some cues or combination of cues did not show any benefit for patients with topographical disorders, which proved the importance of the right selection of the characteristics of the used cues.




A virtual district of Bordeaux where different visual aids for orientation were assessed. AD=Alzheimers, MCI= mild cognitive impairment

# ISVR ONLINE SEMINAR SERIES

On October 28, 2020, the International Society of Virtual Rehabilitation presented its first online symposium. The symposium consisted of three 30 minute presentations on topics of current interest to the virtual rehabilitation community. In one of the presentations, Mindy Levin from McGill University and Judy Deutsch from Rutgers University made a presentation entitled "From video games to interactive software applications – cutting through the virtual reality terminology". The presentation described the evolution and definitions of virtual reality, videogames and exergames for rehabilitation with the ultimate goal of embarking on the road of consensus on the use of this terminology in the field and provided definitions summarized in the boxes below. Building consensus in terms of definitions and terminology is important to facilitate communication within the interdisciplinary field of virtual rehabilitation. After a brief historical perspective of the development of virtual rehabilitation and exergames was illustrated, Dr. Levin discussed the concepts of immersion and presence and how they are applied in VR while Dr. Deutsch shared a brief history of video games and exergames and how their terminology is intertwined with virtual reality. The terms defined in Dr. Deutsch's section included video games, commercial off-the-shelf video game (COTS), interactive video game, serious games, serious digital health games and active games and exergames. In the discussion that ensured, it was agreed that further efforts are needed to reach consensus in the terminology used in virtual rehabilitation and exergame applications.

## Virtual rehabilitation for coping with pandemic: success stories and clinical implications

Marika Demers, University of Southern California, USA
Roberto Llorens, Universitat Politecnica de Valencia, Spain

In their talk, Marika Demers and Roberto Llorens described their experiences with telerehabilitation during the past months as a response to the global pandemic. The past months taught us that people around the world could develop creative solutions to adapt to the COVID-19 pandemic. Their presentation focused on how virtual rehabilitation could be one creative and evidence-based solution to deliver rehabilitation interventions and drive a positive impact for people with disabilities. Specifically, they described the unique benefits of virtual rehabilitation offered synchronously or asynchronously with telerehabilitation to implement home-delivered rehabilitative interventions. We also presented two success stories for coping with the pandemic: 1) Virtual-reality based telerehabilitation initiative to improve balance recovery after stroke and 2) Remote assessment of posture and gait characteristics. The results suggest that a virtual rehabilitation with telerehabilitation is well-accepted by stroke survivors and was not inferior to in-person treatment to address balance impairments. Open-source assessment tools using commercial gaming accessories also show promise for remote assessment of posture and gait in stroke survivors. The presentation concluded with resources to support clinicians, as they play a crucial role in the selection of appropriate platform and games to meet individual rehabilitation needs.

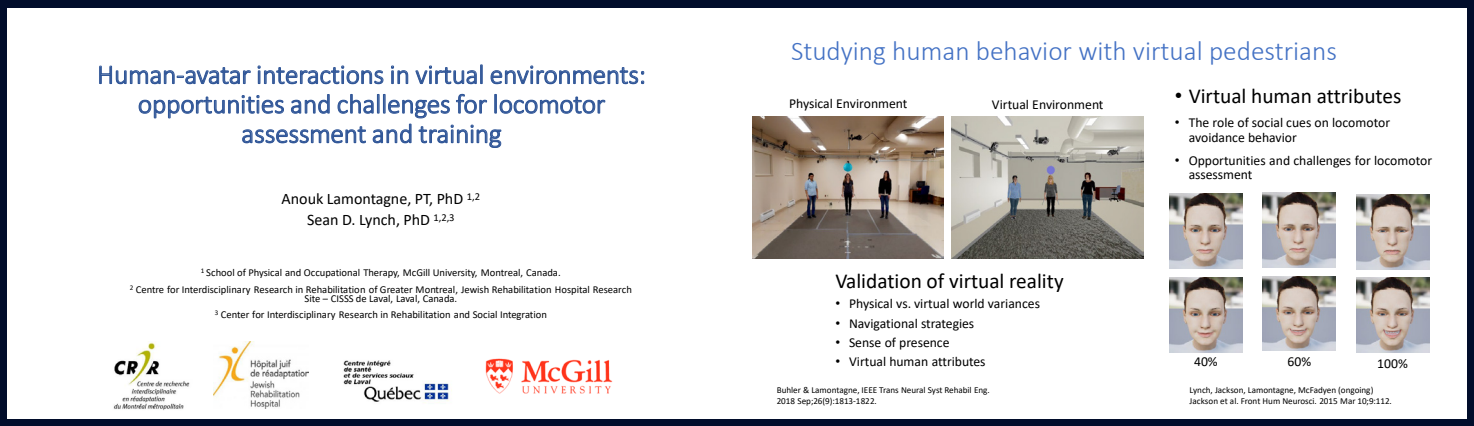
# ISVR ONLINE SEMINAR SERIES

## Human-avatar interactions in virtual environments: opportunities and challenges for locomotor assessment and training

**Anouk Lamontagne and Sean D. Lynch**

**McGill University, Montreal, Canad and Jewish Rehabilitation Hospital Research Site – CISSS de Laval, Laval, Canada**

Virtual reality is an increasingly validated approach for the study of human interactions in controlled but ecological environments, and for the clinical assessment and training of locomotor disorders for those that would otherwise be at risk in a real-world setting. The presentation focussed on two types of interaction, namely the interactions with avatars and those with virtual pedestrians. Avatars are a representation of one's self, which can be presented to a participant in real-time that in turn allows for feedback of one's own performance. Potential challenges of self-representation training can include the different viewing perspectives of an avatar and the contribution of different sensory modalities. Initial findings collected in stoke survivors with post-stroke gait asymmetry suggest that certain participant profiles benefit from a visual avatar presented in the side view to enhance their symmetry of gait. In addition, most participants appear to experience further benefit in gait symmetry when exposed to multimodal sensory feedback (avatars presented in the combined visual and auditory modality) compared to avatars presented in the auditory or visual modality in isolation. With this knowledge pertaining to the quality of feedback and its benefits, future directions can consider the potential benefits of repeated exposure. The second type of interaction concerns virtual humans that represent other pedestrians from a typical community setting. Current work has shown how behaviours of navigation are preserved within virtual reality and lead to similar adaptations to those observed in the physical world. Such validation has presented new horizons to investigate more complex community settings that include the avoidance of collisions with pedestrians, the effects of additional cognitive tasks, and the role of agent-specific gait characteristics during collision avoidance tasks. We reflect on the potential opportunities and challenges from the addition of integrated eye-tracking technology with virtual reality headsets to how virtual pedestrian can aid locomotor assessment and training for populations with gait disorders.




## ISVR journal club

We were very excited to announce that our regular virtual programme has now been launched. This includes the ISVR Journal Club that is led by Dr Mohammad Al-Amri. The purpose of the ISVR journal club is to create an active education friendly environment and an established informal discussion forum for individuals across multidisciplinary. In addition to discussing a related article it will also be a place to get some technical or non-technical discussions around the applications of virtual reality in clinical practice.

Volunteering Opportunities for students and early career researchers:
The ISVR is looking to extend its experience in a few areas as part of its innovation programme including web development, social media, and management of web content. Should you be interested in applying, please send your CV and an expressions of Interest (300-word maximum) as to why you consider yourself suited for this opportunity to Al-AmriM@cardiff.ac.uk

# ISVR Society News

The website at http://www.isvr.org acts as a portal for information about the society. We are keen to to enhance the community aspects of the site as well as to 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 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 1197 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.


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

# ISVR: Call for Nominations - Elections 2020 - ACTION NOW NEEDED

**Dear reader,**

The ISVR invited nominations for the following:
1. Executive Positions, effective Jan 1, 2021 – Dec. 31, 2023
    a. President
    b. Vice-President
2. Board Members (2 positions available for Website Chair and Social Media Chair), effective Jan 1, 2021 – Dec. 31, 2023

The term of office for Directors who are in their first term of office can be extended for a further three years by agreement of the Board. Thereafter continuation must be through re-election.

## Roles and Responsibilities

• Please see the ISVR Website for further details.

## Nomination Process

• Nominations for President and Vice-President positions can only be made by current or previous Board Members
• Nominations for Board Members can be made by any Regular Member of the Society, with the agreement of the nominee. Members may nominate themselves. A seconder is not required.
• We particularly welcome nominations from expertise in managing and updating content on websites or coordinating and maintaining content social media platforms (e.g. Facebook, Twitter and Linkedin).
• We particularly welcome nominations from disabled and Black, Asian and Minority Ethnic (BAME) backgrounds.
• Nominations, to include the full name, affiliations and email address of the nominee, must be emailed to the Chair of Nominations (Dr Mohammad Al-Amri) via email Al-AmriM@cardiff.ac.uk of no later than January 2nd, 2021.
• Nominees must email a short bio-sketch and paragraph describing what they wish to bring to the post they are being nominated for. The bio-sketch and paragraph will be distributed to the electorate. They should be emailed to the Chair of Nominations (Dr Mohammad Al-Amri) with at Al-AmriM@cardiff.ac.uk with a deadline of no later than January 2nd, 2021.

## Election Process

• The ISVR will hold a ballot of all Regular and Clinical Members between January 8th - 22nd, 2021 overseen by the Election Committee (see below).
• The electorate will be provided with bio-sketches of all candidates. The ballot will be conducted anonymously, under the scrutiny of two Election Officers to ensure eligibility to vote.
• After the ballot closes on January 22nd, 2021, the results will be compiled by the Election Officers and presented to the Election Committee for scrutiny and validation. The results will be announced by January 30th, 2021.

## Election Committee

Dr Mohammad Al-Amri (Chair)
Dr Evelyne Klinger (ISVR Board member)
Professor Emily Keshner (ISVR member)
Mr Shayan Bahadori (Independent member)

## Election Officer

Dr Mohammad Al-Amri (Chair)
Dr Evelyne Klinger (ISVR Board member)

## Notes

• The Election Officers will verify eligibility of voters at the time votes are made, but will not access voting records of voters.
• The results will be compiled to maintain anonymity of voting of members.
• To maintain impartiality, the Election Officers will not be entitled to vote.


## 13th International Conference on Disability, Virtual Reality & Associated Technologies

**Serpa, Portugal ~ September 8-10, 2021**

**Submissions:** https://easychair.org/conferences/?conf=icdvrat2021

# Deadline: February 27th, 2021

**Researchers that have already submitted in 2020 are not required to resubmit in 2021.**

**We specifically welcome papers that contain original and mature research to address applications of Virtual Reality (VR) for therapy, and physical and cognitive rehabilitation; championing end user involvement in research, and which contain a rigorous evaluation of their approach. The guest editors encourage the submission of studies on Technologies for Rehabilitation including both physical and cognitive (eg, Stroke), Healthcare Design and Applications, Visual Impairment, Elderly Studies/Dementia, Movement Disorders, Communication, Social Interaction, and Brain Injury. Research focused on wellness enhancement and treatment for persons with anxiety disorders, PTSD, depression, and addiction are also welcome. Augmented Reality, Affective Computing, Synthetic Agents, Privacy and Ethics, Brain Computer Interfaces, Rehabilitation Robotics, AI and Machine Learning, and Digital Game Making, are expected to be major upcoming themes when used to augment long standing VR approach and may be suitable topics for submitted papers but must be clearly located in the context of VR. Each paper should include a rigorous evaluation of the approach used.**

**For more details, please check ICDVRAT 2021 website:**

http://icdvrat2020.ulusofona.pt

## See you in Portugal in September 8-10, 2021!