

NEWSLETTER

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Editorial

July 2022 Newsletter 24

Dear reader

In this issue, we present the Spatial Attention, Awareness, and Ability Laboratory, led by Peii Chen at Kessler Foundation in New Jersey, USA. Their research focuses on spatial neglect and the opportunities VR offers for treatment and diagnosis of this frequent and debilitating condition after acquired brain injuries. Read more on page 2. On page 4, we introduce you to the German start-up Cureosity and their immersive VR system for motor and cognitive rehabilitation. It comprises functions such as mirror therapy, sonification of movements, embodiment via an avatar, relaxation, and breathing training.

One more time, we want to draw your attention to the upcoming RehabWeek in Rotterdam, 25-29 July. RehabWeek is bringing together 8 different societies and is shaping to be a great conference with an outstanding program. This is a fantastic opportunity to gain exposure for your work in the global rehabilitation technology community and take your career to the next level. More information on <https://www.rehabweek.org/> and page 5. We hope to see many of you in Rotterdam.

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.

Have a nice summer!

Sergi Bermúdez i Badia, ISVR President

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UPCOMING EVENTS

REHAB WEEK 2022
July 25-29, 2022
Rotterdam, The Netherlands
<https://2022.rehabweek.org/>

EAI ArtsIT 2022 - 11th EAI International Conference: ArtsIT, Interactivity & Game Creation
November 21-22, 2022
Faro, Portugal
<https://artsit.eai-conferences.org/2022/>

12th World Congress for Neurorehabilitation
December 14-17, 2022
Vienna, Austria
<https://www.wfnr-congress.org/>



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RESEARCH PROFILE

Spatial Attention, Awareness, and Ability Laboratory

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<https://kesslerfoundation.org/aboutus/Peii%20Chen>

Where is your lab located

I am the director of the Spatial Attention, Awareness, and Ability Laboratory in the Center for Stroke Rehabilitation Research of Kessler Foundation. It is located in West Orange, New Jersey, USA.

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

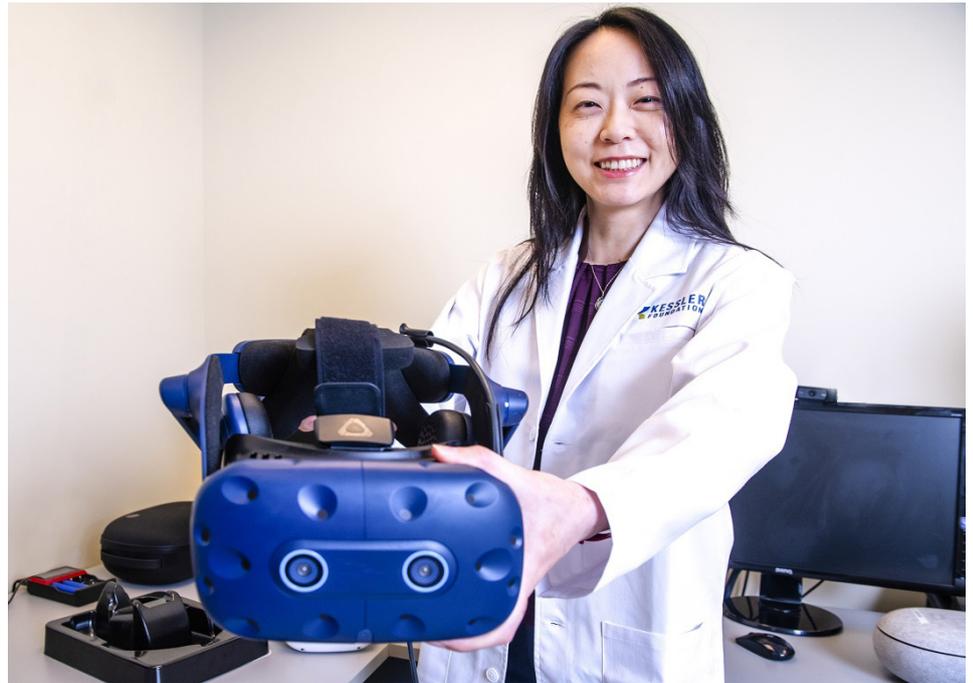
I have worked at Kessler Foundation since 2007 and started running my own lab since 2009.

Who are the members?

Currently, the members of my lab include one postdoctoral fellow Timothy Rich, PhD, OTR/L, one research coordinator, and three research assistants.

What research interests does your lab have ?

We study spatial neglect, its related disorders, and its real-life impacts. Research studies conducted in my lab include neural mechanisms of spatial neglect and its multi-modal, multi-domain symptoms, treatment development for spatial neglect, neural mechanisms of spatial neglect treatment effects, assessment development for spatial neglect, clinical implementation of spatial neglect assessment and treatment, and person-centered outcomes. Specific topics include prism adaptation treatment, virtual reality treatment, mixed reality intervention, functional assessment for spatial neglect, anosognosia of spatial neglect, neglect dyslexia, knowledge translation for clinicians, and family caregiver burden and stress.



Dr. Peii Chen

What problem does your system(s) solve?

We have developed two treatment programs using immersive virtual reality (VR) technology to address spatial neglect. The Kessler Foundation Spatial Re-training Therapy (KF-SRT) includes four treatment modules based on different treatment principles. The Kessler Foundation Eye Movement Exercise (KF-EME) is based on the smooth pursuit eye movement training that has been used clinically. The KF-SRT was made possible because of the initial funding from the National Institute on Disability, Independent Living and Rehabilitation Research (NIDILRR). The KF-EME development is supported by the U.S. Department of Defense.

What makes it unique?

The KF-SRT is currently operated using a standalone, all-in-one device,

making it feasible to be used anywhere including patients' home. Patients interact with virtual stimuli using their own hands. The KF-EME leverages VR and eye tracking technology with the goal of reducing therapists' burden in comparison to the labor-intensive procedures in the conventional smooth pursuit eye movement training program. Both VR treatment programs use game-like activities to encourage patients' participation in treatment activities.

How is it better than other existing systems ?

Both VR treatment programs are designed specifically for spatial neglect. During the development phase, patients with spatial neglect were involved in the process, helping us make sure that the programs can be used by the target population. There are very few VR treatment programs, existing in

RESEARCH PROFILE

(continued from page 3)

research settings or commercial space, designed specifically for spatial neglect. Those that claim to be beneficial are rarely supported by empirical evidence from a multi-session treatment course. My lab is collecting data systematically through clinical trials. We expect to share our findings in the near future.

Tell us about the development process.

As published in the *Annals of Physical Rehabilitation and Medicine* (Chen & Krch, 2021), we use an agile, user-centered development process. The following quotation is extracted from the published article about the KF-SRT and applicable to the KF-EME: “The present project started with a set of conceptual requirements generated by researchers, which were translated into detailed tasks that were implemented by software programmers and graphic designers and validated by end users through user testing. User experience

and feedback then led to revision or refinement of design requirements. These steps were repeated until the software was deemed satisfactory by both researchers (content providers) and patients (users) with respect to content accuracy, difficulty level, and performance feedback.”

What level of readiness is the technology now?

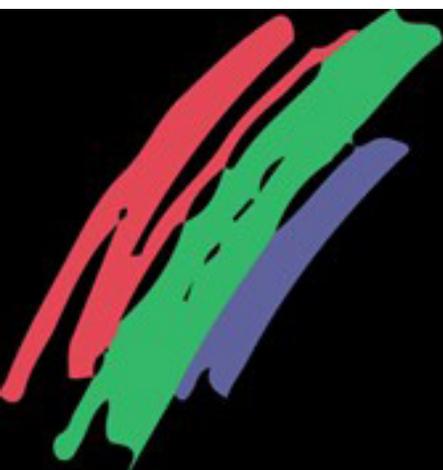
We are conducting a one-arm clinical trial using the KF-SRT in patients' homes. The KF-EME is under the proof-of-concept user testing.

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

No, it is not available yet. More resources are needed before the KF-SRT can be commercialized and thus available to the community.

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Arts and Technology

The 11th International Conference **Arts & Technology, Interactivity, and Game Creation** (ArtsIT2022), will be held at The University of the Algarve, Faro, Portugal November 21-22.

Keynotes are **Monika Fleischmann & Wolfgang Strauss**

Title: **From Home of the Brain to Semantic Map – Performative interfaces for networked knowledge**

<https://artsit.eai-conferences.org/2022/keynotes/>

Impact factor published proceedings book by Springer as a volume in the Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering book series (LNICST): see <https://link.springer.com/conference/artsit>

Any questions contact:

General Chair - Jorge Carrega <jorgecarrega@hotmail.com> or General co-chair Tony Brooks <tb@create.aau.dk>

CUREosity GmbH

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What product are you offering?

CUREO® is the virtual reality (VR) therapy system of the Düsseldorf-based med-tech company CUREosity, which is used in the rehabilitation of neurological and musculoskeletal disorders. Our innovative approach has already received several awards, including the recent German Innovation Award in the category "Start-ups". Thanks to immersion in virtual worlds, multisensory feedback and gamification, both patient motivation and willingness to undergo therapy are promoted. The workload of therapists is reduced thanks to efficient tools such as automated training plans.

What is unique about your product?

CUREO® combines the advantages from the use of VR technology with neuroplastic findings and years of research. Together with a team of clinicians, doctors, therapists, and patients, a mature product has been created. CUREO® focuses on the needs of patients and equally understands the economic requirements of treatment providers. CUREO® can be used throughout the continuum of care from early rehabilitation to the chronic phase across sectors. In addition, increased development focus has been placed on low latency - an essential feature in the use of VR, which avoids motion sickness. Our unique calibration tool enables precise representation of motion in space, even for patients with severe limitations. This is the basis for our motion guidance system developed specifically for CUREO®, as well as the mapping of a biomechanical avatar in the virtual environment. With this technology, CUREO® is able to provide



Patient performing an exercise through hand-tracking.

precise, individualized and immersive therapy sessions.

How do your product help patients and therapists?

CUREO® offers a wide range of applications and can be used, e.g. for rehabilitation after central nervous system injury, pain, and mobility restrictions after operations. Primarily, we address motor skills of the upper extremities and fine motor skills of the hands and fingers through our programs. Modular training units in a VR environment playfully support cognitive and sensorimotor rehabilitation. In addition, CUREO® can be used both in the hospital bed during clinical rehabilitation, but also in outpatient therapy. This results in a sustainable quality of care. Gamification promotes the patients' motivation and accordingly their willingness to participate in therapy. Unique therapy functions such as mirror therapy, sonification, embodiment via an avatar, relaxation, breathing training, and color

therapy promote neuroregulation. Pain reduction is supported through immersive VR worlds. With CUREO, the following cognitive skills can be trained: Spatial perception e.g. arrangement of objects, perception of shape and colour, attention and perception, memory and learning, planning and executive functions, memory (e.g. working and word-finding memory) and orientation, motivation and concentration. The different modules can be adapted to the patient's motor and sensory abilities and flexibly adjusted in terms of difficulty.

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

Currently, CUREO® is already in use in many clinics and practices, both throughout Germany and internationally, and can be used by patients here. Clinics and institutions interested in CUREO® are welcome to contact our sales team. Prices vary depending on the model selected.

REHABWEEK 2022 SPEAKERS



Jane Burridge is Emerita Professor of Restorative Neuroscience at the University of Southampton. Her research is about using technologies to improve recovery of movement following acquired brain damage.
Keynote lecture:

"Upper Limb Assessment in Neurorehabilitation"

Her keynote lecture presents the argument for using a core set of reliable, valid and accessible outcome measures in neurorehabilitation. Such measures are needed to define underlying mechanisms of impairment and functional limitation, direct therapy and assess outcomes of upper limb neurorehabilitation.



Dario Farina is Professor and Chair in Neurorehabilitation Engineering, Department of Bioengineering, Imperial College London. His research focuses on biomedical signal processing, neurorehabilitation technology, and neural control of movement.
Keynote lecture:

"Human Interfacing in Rehabilitation Technologies"



David Reinkensmeyer is Professor in the Departments of Mechanical and Aerospace Engineering, Anatomy and Neurobiology, Biomedical Engineering, and Physical Medicine and Rehabilitation at the University of California at Irvine
Keynote lecture:

"Robots and Sensors for Stroke Rehabilitation: What Have We Learned and What Comes Next?"



J.S. (Hans) Rietman is Psychiatrist and professor in Rehabilitation Medicine & Technology at the faculty of Engineering Technology University of Twente
Keynote lecture:

"Rehabilitation Technology, a mission driven change of action"

His keynote lecture is about rehabilitation technologies and the interaction between the adaptive capabilities of a person and the adaptive capacities of the devices, which will define the level of functional capability. The number of medical technologies used in home situations will increase significantly as more care will be organised in people's own environment.



Corry van der Sluis is Professor and Consultant in Rehabilitation Medicine at the University Medical Center Groningen.
Keynote lecture:

"Technological advancements to improve upper limb function: pros and cons"

Professor Corry van der Sluis will discuss the pros and cons related to implementation of new technology in clinical practice or in the patients' home situation, using her own research results as illustrative examples.



John Quarles, PhD, University of Texas at San Antonio has the unique experience of being both a XR researcher and an end user with disabilities.
Keynote lecture:

"Life, the Metaverse, and Everything: Can the Metaverse Rehabilitate Telerehabilitation?"

His lecture is about telerehabilitation its potential to make rehabilitation more accessible, cost efficient, and effective. He describes the numerous technical and social barriers that hinder its application, making it less accepted and practiced than in-person rehabilitation.

**REHAB
WEEK
2022**

25-29 JULY, 2022
ROTTERDAM, THE NETHERLANDS





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 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 1.3K 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.



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