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DENMARK

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## **International Society of Virtual Rehabilitation newsletter**

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# NEWSLETTER

## Editorial

April 2016 Newsletter 7

We hope you have had a great start to 2016. As part of our ongoing features to highlight recent work in the advancement of virtual reality technologies for rehabilitation, we have included three profiles in this edition of the newsletter. The Technology Profile features the work of Anthony Brooks' Lab at Aalborg University in Denmark. The Sensorama Lab has recently undergone a number of changes but they are continuing to develop a range of different interactive VR and mobile technologies with a focus on health and education. The Clinical Profile highlights work at Gabriel Costa's clinics at Centro Médico da Murtosa in Portugal. Three virtual reality systems are being used in 12 clinics providing interventions aimed a range of different populations. In the last edition of the newsletter, we added a Rehabilitation Startup profile to support and highlight the emerging interest in commercialization of virtual reality and mobile technologies for rehabilitation. Our featured startup in this edition of the ISVR newsletter is NeuroAtHome. The system uses several interactive devices such as touchscreens and the Microsoft Kinect sensor to provide physical and cognitive exercises for people with neurological impairments in the hospital, clinical and home settings. In 2015, NeuroAtHome received a Microsoft Health Innovation Award for innovation in care delivery.

In the last newsletter, we announced the inauguration of the 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 call for nominations for the award closed on April 1, 2016. The nominations have been received and the winner and runner up will be announced at the International Conference on Disability Virtual Reality and Associated Technologies in Los Angeles, California in September this year.

We have listed three new books that might be of interest to you and four upcoming conferences. We are always looking for interesting news from our membership, so if you have something exciting to share, such as a meeting announcement or news from your clinic or lab, please pass it on to our newsletter team (see the email address on the bottom right of this page). If you are interested in writing a Technology, Clinical or Rehabilitation startup profile, please contact the newsletter team.

Finally, in our ISVR Society News section, you will notice that we have added a new category of membership for clinicians. We are reaching out to rehabilitation clinicians who have been using or want to use VR technology in their clinical practice. We encourage clinicians to join the society (membership is free for the first year!) and to enter into a dialog with researchers and technology developers to share experiences and work together to facilitate technology uptake in the clinical milieu, through our ISVR forums, Facebook and Twitter.

Happy reading and hope to see you all this fall at the 11th ICDVRAT in September!

Mindy Levin President, ISVR

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## Sensorama Lab

### Anthony Lewis Brooks

Associate Professor at Aalborg University

<http://goo.gl/YMuPHQ>



The Magic Carpet - An immersive simulation where you fly a magic carpet

### Where is your lab located?

The lab is located close to the harbor city of Esbjerg on the south west coast of Denmark. We are about one hour from Northern Germany. The newly extended campus location is central to the University Park, a wooded area adjoining lakes approximately 10 minutes by bike to the center of the city, which is Denmark's fifth highest in population.

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

The SensoramaLab was started in February 2005 with co-funding from Esbjerg City Municipality and Aalborg University. The lab started as a result of my broad experiences in transdisciplinary R&D and prior experience investigating VR as the first resident artist at Denmark's Advanced Visualization and Interaction (CAVI) facility, a researcher at RE-FLEX multi-disciplinary center in Lund University in Sweden, and as invited artist for the DR Koncerthuset in Copenhagen..

The lab has recently moved location and is now under the Centre for Design, Learning and Innovation (DLInnovation) where external projects are sourced, coordinated and administered.

### Who are the members?

Associate Professor Anthony Brooks (UK) is the Director of the Lab. The core members of the Lab are Assistant Professor Bruno Herbelin (France), Assistant Professor Jan Ciger (SI) and Professor Eva Petersson (Sweden).

### What research interests does your lab have?

The lab has broad interests in developing 3D software used for research in rehabilitation and non-formal learning. We have an adaptive approach toward impacting intervention strategies and transfer of contemporary assistive technologies supporting activities of daily living (ADL).

The Lab uses a range of hardware devices including mobile devices. A goal is to get the research out into the real world to support a wide variety of user populations and end users (Institutes, Organizations and / or independent rehabilitation or teaching professionals).

### What problem does your system solve?

A goal of the work that we do is to support future service industries in the healthcare and learning fields by offering consultation on methods and technologies that supplement traditional strategies. In both fields, a major problem is the) transfer from the research to professional practices to improve services and motivation to participate (both client and therapist / teacher and student). In healthcare, the approach is to design systems that are considered more as fun, social, and more playful than existing therapies in order to motivate people to participate in rehabilitation.



# TECHNOLOGY PROFILE

(continued from page 2)

Similarly, in learning, the approach not only focuses on the we design and use of innovative technologies in education but also in teacher training and practices. Both research streams cover formal / informal / non-formal strategies by actively collaborating with regional / national / international healthcare organizations / institutions / establishments and schools / colleges / universities in education.

## What makes it unique?

Our work involves creating sensing, adaptable, tailorable, customizable media systems that promote human afferent-efferent neural loop closure. Creativity, play, and learning are catalysts where intervention is fun, playful and innovative, thus engaging, efficient and effective. Aligned with in-action experiences, subject(s) consideration/wellbeing post-research is central. In line with this, the SensoramaLab partners with the Center for Design, Learning and Innovation (DLI) in targeting the intervention process, longevity / sustainability and outcomes rather than solely producing a product.

We have a focus on communication and transfer of our systems to professional practice to facilitators, teachers, and therapists. Aligned with this focus, the lab is developing a new mobile system to target transfer for training to activities of daily living.

## How is it better than other existing systems?

Rather than “better” than other existing systems, we anticipate that the lab will be considered as a desirable collaboration partner in projects exploring human behaviors when a person is confronted with ICT. Our experiences and investigations include technical and human needs and requirements towards realizing meaningful and simple authoring / application / evaluation tools for use by professionals (teachers / facilitators / physiotherapists / occupational therapists / designers etc.) as well as non-professionals (clients). Bespoke, customized and tailored solutions are targeted vs generic.

## Tell us about the development process?

The team has extensive experience in studying human behavior, exploring new hardware options and developing software for unique populations.

## At what level of readiness is the technology now?

Ongoing development is happening with a total refurbishment from the original laboratory and a move towards a new mobile solutions with comfortable HMDs, transportable visual, auditory and robotic device systems.

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

We have projects with local communities, both regional and national such as <http://lucasproject.eu>. We are happy to provide information to interested parties.



Penguin Racer - Serious gaming for rehabilitation using the open-source game PPRacer

## CMM - Centro Médico da Murtosa

### Gabriel Costa

Founder, Chief Executive Officer at CMM - Centro Médico da Murtosa

<http://www.cmm.com.pt/>

### Where is your lab located?

We have multiple outpatient rehab clinics (12), spread throughout the center and center-coast of Portugal.

### What patient populations do you serve? How many per year?

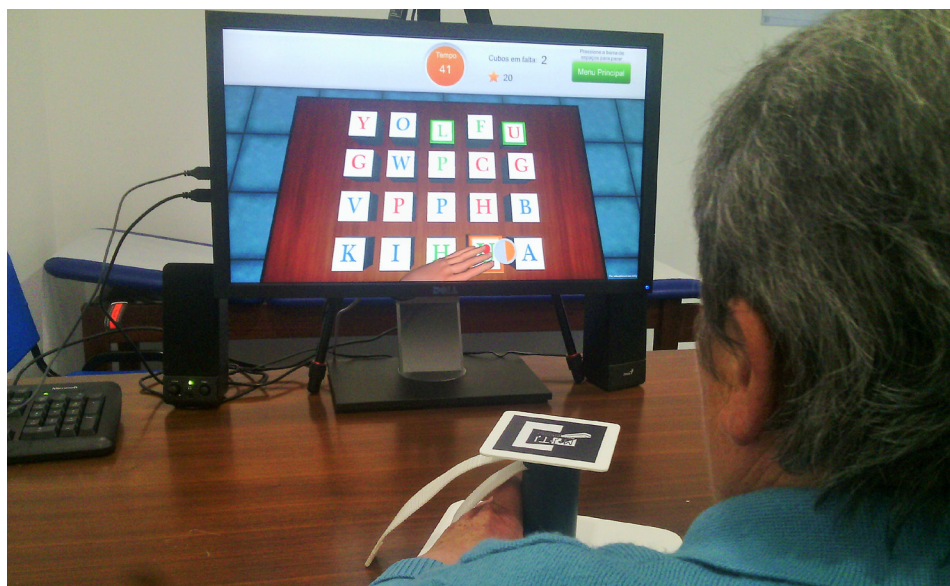
We serve every kind of outpatient population, but obviously the focus (by volume) is patients over the age of 60 (>50%; degenerative disorders) and the second highest group is sports/work traumatic injuries (~30%).

The total number of outpatient rehab sessions in a year (in all CMM outpatient clinics) are approximately 375.000 and raising each year.

### What VR rehab system(s) do you have installed?

We've installed RehabNet® of NeurorehabLab®, in partnership with the Madeira Interactive Technologies Institute (University of Madeira), as well as SWORD Phoenix® by SwordHealth® a Portuguese Start-Up that was selected by the European Commission (EC) as one of the most innovative companies in Europe.

In parallel, we internally developed in CMM an automobile simulator prototype, in order to train the in and out activity of the vehicle (physically), and the simulation of real like driving feeling with serious games and not so serious. It is a fun and motivating project for our clinical rehab team, and patients love it. We are not still doing clinical tests, but it is our goal to do them on the short term.



Patient using RehabNet prototype

### What benefits do you gain from using this VR rehab system?

One of the most interesting challenge in rehabilitating a long term patient (i.e. a stroke patient) is maintaining the patient motivation high.

Another important and essential part is a systematic evaluation and accountability of the progress of the rehab plan.

The non-fulltime presence of the therapist (occupational or physical therapist) when the patient is using the VR system is also a valuable feature. These items are largely fulfilled with VR systems like RehabNet® and SwordHealth®.

### What problems did/do you have with using these systems?

As all new systems, there's always improvements to be made, and first

movers like CMM and M-ITI are likely to encounter some light issues that were dealt with immediately.

Some of the problems were technical and simple to resolve, others were the clinical validation aspects like the session time in the early stages of the validation.

### Are you involved in clinical research using VR rehab systems? If so, please describe briefly.

CMM as one of leading companies in Portugal for outpatient rehab is always seeking new forms to improve our patients' satisfaction and clinical effectiveness. VR Systems cannot replace the human (therapist) intervention, but it will (already can) enhance and potentiate the human touch and command given by the therapist. As so, when the NeurorehabLab® and SwordHealth® team wanted a real world clinical study, with various subjects in an outpatient scenario we did not hesitate. It's our



# CLINICAL PROFILE

(continued from page 4)

duty, as members of (health) science to help and be helped with new technologies that can change the world of the physical/cognitive impaired.

CMM is also involved in other VR studies, always in the clinical validations in real world outpatient scenarios.

## What do you see as the most important challenge for VR rehab research and development?

The continuous clinical evaluation and accountability necessity will

force the health services throughout the civilized world to evolve in a technological sense. It's mandatory as most health providers work in a financed health system.

We are currently highly dependent on specialized human resources with systematic growth of the elderly population, so it's a priority to maintain highly effective and perfectly accountable rehab protocols. This is where VR systems in Rehab can gain its space and effectively translate in a competitive edge.

In summary, VR Research and Development must continue its journey focusing in solving real problems, both in the patient's rehab view as well as the healthcare financing view.



Car simulator

## RECENT BOOKS ON VIRTUAL REHABILITATION

### Virtual Reality Enhanced Robotic Systems for Disability Rehabilitation

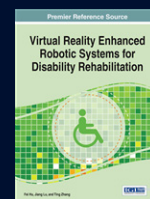
Fei Hu, Jiang Lu and Ting Zhang

IGI Global, Pennsylvania, January, 2016

<http://www.igi-global.com/book/virtual-reality-enhanced-robotic-systems/139321>

The study of technology and its implications in the medical field has become an increasingly crucial area of research. By integrating technological innovations into clinical practices, patients can receive improved diagnoses and treatments, as well as faster and safer recoveries.

Virtual Reality Enhanced Robotic Systems for Disability Rehabilitation is an authoritative reference source for the latest scholarly research on the use of computer-assisted rehabilitation methods for disabled patients. Highlighting the application of robots, sensors, and virtual environments, this book is ideally designed for graduate students, engineers, technicians, and company administrators interested in the incorporation of auto-training methods in patient recovery.



### Recent advances on using virtual reality technologies for rehabilitation

Paul Sharkey and Joav Merrick

Nova Science Publishers, New York, 2015

<http://bit.ly/1Tvyu7p>

In recent years there has been a blossoming use of advanced technologies across a wide range of applications in the general area of health care and clinical practice, one such genre being the use of virtual reality technologies for rehabilitation and to support people with disabilities. This development has been driven by a combination of factors related to increasing clinical need, technological advancements, and developing communities of excellence in the virtual rehabilitation field. In this book we demonstrate recent advances and technological development in the area of virtual rehabilitation and highlight the importance of a multidisciplinary and holistic approach to developing virtual rehabilitation systems that meet the needs of patients, therapists and other care givers.



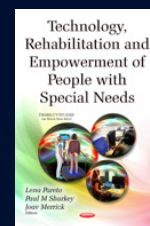
### Technology, rehabilitation and empowerment of people with special needs

Lena Pareto, Paul Sharkey and Joav Merrick

Nova Science Publishers, New York, 2015

<http://bit.ly/1ln1FAz>

The digitalization of society is spreading around the world, and technology has become part of many people's daily life as a mean for communication, work, education and/or leisure. For populations with special needs due to some kind of disability or disorder, technology can play an essential role as a way to enhance their rehabilitation and treatments as well as a means to empower the individuals themselves. To explore, develop and evaluate innovative and useful technology for this purpose has been the aim of the multi-disciplinary research community of disabilities and virtual reality and associated technologies for decades. The field engages researchers from the health sector, from engineering and from education to collaborate in order to take on a holistic approach to meet these challenges.



# REHABILITATION STARTUPS

## NeuroAtHome

**Pablo Gagliardo**

CEO

[pgagliardo@neuroathome.com](mailto:pgagliardo@neuroathome.com)

[www.neuroathome.com](http://www.neuroathome.com)



### What are you offering?

NeuroAtHome is a software platform that allows healthcare professionals to deliver physical and cognitive therapy regardless of patient or therapist location. NeuroAtHome's more than 60 exercises use virtual reality, real-time motion capture and gamification to improve outcomes and increase patient engagement. Similarly, while patients complete therapist-prescribed sessions, NeuroAtHome collects motion analysis and session performance data to facilitate the tracking of patient evolution objectively.

procedures or the need of keyboards and joysticks to complete exercises. Anyone suffering from health conditions that require monitored physical or cognitive therapy can benefit from NeuroAtHome. All exercises focus on recovering impaired function, regardless of the condition that caused the impairment. Also, NeuroAtHome is currently been used in hospitals, clinics, care homes or within community settings as a way to deliver therapist-prescribed therapy across care settings. As a result, NeuroAtHome has received a 2015 Microsoft Health Innovation Award for innovation in care delivery.

-locally or remotely- changing the exercise mix, exercise duration, modifying personalization options or increasing or reducing exercise difficulty according to the evolution and the rehabilitation goals of each patient. Data collected during sessions can be used by clinicians to analyze patient evolution objectively, improving rehabilitation outcomes and treatment efficiency. Similarly, NeuroAtHome uses virtual reality and gamification to create engaging exercises to increase patient motivation to stick to their treatment plans, resulting in improved outcomes and patient satisfaction.

### What is unique about your product?

NeuroAtHome has more than 60 exercises for physical and cognitive therapy which can be personalized to match each patient's goals and capabilities. Through the use of devices like the Kinect sensor or touchscreen interfaces, NeuroAtHome allows patients to quickly start completing prescribed sessions: eliminating complex set-up

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

Using NeuroAtHome, healthcare professionals can design comprehensive rehabilitation plans for their patients. During a therapy session, NeuroAtHome will run scheduled exercises, quantifying session performance and collecting and storing session data. Therapists can also modify prescribed sessions

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

To find out how to start using NeuroAtHome, in clinical or in home settings, please contact us at [info@neuroathome.com](mailto:info@neuroathome.com) or visit our web site. There are several packages available to ensure that our solution meets the needs of your patients and your budget.



Patients using NeuroAtHome physical and cognitive therapy systems

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 1023 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).



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## UPCOMING EVENTS

### 20th European Congress of Physical and Rehabilitation Medicine

April 23 - 28, 2016, Estoril, Portugal  
<http://www.esprm2016.com/en/>

### World Congresses For Neurorehabilitation

May 10 - 13, 2016, Philadelphia, Pennsylvania, USA  
<http://10times.com/world-congresses-for-neurorehabilitation>

### 10th EAI International Conference on Pervasive Computing Technologies for Healthcare

May 16-19, 2016, Cancun, Mexico  
<http://pervasivehealth.org/2016/show/home>

### 11th International Conference on Disability, Virtual Reality & Associated Technologies

September 20 - 22, 2016, Los Angeles, California, USA

### Pre-Conference Workshop on Pain Management - September 19, 2016

<http://www.icdvrat.org/>

### Maintien des personnes à domicile : Télééducation, Téléadaptation et e-Santé

September 29, 2016, Paris - France  
<http://ifr-handicap.inserm.fr/>