ISSN 0342-5282

# International Journal of Rehabilitation Research

*The Official Journal of the European Federation for Research in Rehabilitation*

VOLUME 32 SUPPLEMENT 1 AUGUST 2009 ISSN 0342-5282

The papers published in the *International Journal of Rehabilitation Research* are listed in *Current Contents, Index Medicus/MEDLINE, Excerpta Medica/EM Base* and *Engineering Information*

The *International Journal of Rehabilitation Research* is published by Lippincott Williams & Wilkins, 250 Waterloo Road, London SE1 8RD, UK

Online submissions: www.editorialmanager.com/ijrr

INTERNATIONAL JOURNAL OF REHABILITATION RESEARCH VOLUME 32 SUPPLEMENT 1 AUGUST 2009 Lippincott Williams & Wilkins

VOLUME 32
SUPPLEMENT 1
AUGUST 2009

*Editor:*
**ČRT MARINČEK**

# International Journal of Rehabilitation Research

*The Official Journal of the European Federation for Research in Rehabilitation*

## Proceedings of the 10th Congress of the European Federation for Research in Rehabilitation

**Riga, Latvia**
**09-12 September 2009**

**Editors:**
Gabor Fazekas
Helena Burger
Angela Harth
Andris Vilks

Wolters Kluwer Health | Lippincott Williams & Wilkins

# ROBOTICS AND OTHER NEW TECHNOLOGIES

## User Acceptance and Technology Supporting Rehabilitation at Home

Tuula Petäkoski-Hult [a], Juho Merilahti [a], Harri Kailanto [b], Mari Zakrzewski [b], Heidi Lahti [c]

a Technical Research Centre of Finland, City of Tampere, Finland
b Tampere University of Technology, City of Tampere, Finland
c Tampere University Hospital, City of Tampere, Finland

This abstract presents the results and findings achieved in UUTE project (Smart Home in a Suitcase, new technologies supporting telemedicine, home care, rehabilitation and safety at home) carried out 2006 – 2008.

The aim of the project was to build up new service models and service concepts. The project consortium consisted of different kind of actors representing research institutes, private companies and public sector. Main actors from the public sector were Tampere University Hospital and Lempäälä Health Care Center.

During the project different kind of research methods were used. The aim was to find out the opinions of different kind of focus groups and based on that, it was decided to use scenario method, interviews and questionnaires and different kind of technology (a blood pressure sensor, a bed sensor, a floor localization sensor, custom made infrared heat sensor, diary, health monitoring devices and a video call environment, a commercial weight scale).

Based on scarce resources only two field trials were carried out. These were quite different from each others. The person in the first trial was a 70-year old woman living alone in a newly built up sheltered housing apartment. The living environment is meant for elderly people and it offers different kind of nursing and assisted living services. The second field trial was carried out in close co-operation with a physiotherapist supporting a hip-surgery patient during his rehabilitation. The person was a 72-year old man living at home together with his wife.

The results based on the survey carried out with health care personnel show that 19 of 23 were interested in new technology if it would be helpful at work and would support rehabilitation at home and also the follow-up of rehabilitation. New devices and solutions should be simple, solid, easy to use and easy to learn also from the patients' point of view. According to the personnel, lack of time is the most important obstacle when learning the use of new technology.

During the first trial one usability drawback was exclusion of the bed sensor due to the anxiety caused by the technology. These fears may be common when introducing new technology. This needs to be taken into account by service providers of such systems. During the second trial, similar accidents were not met. Both patient and physiotherapist said that the trial was beneficial and interesting. They saw the concept as one alternative to support rehabilitation and living at home

**KEYWORDS**
user acceptance, technology

## Service Robots as Helpers of Reintegration

Gabor Fazekas [a], Vincent Dupourque [b], Damien Salle [b], Joseph Canou [b], Consuelo Granata [b], Zoltan Denes [c]

a Szent Janos Hospital and National Institute for Medical Rehabilitation, Budapest, Hungary
b Robososft, Biarritz, France
c National Institute for Medical Rehabilitation, Budapest, Hungary

### INTRODUCTION

Rehabilitation strategies can aim the body level, the functional skills or the environment. Application of service robots offers new opportunities on environment level. These robots can facilitate the autonomy of elderly or also younger people with disabilities.

## OBJECTIVE
An overview of existing robots and ongoing research in this domain focusing on the services provided by these devices and limitations.

## METHOD
Overview of state of the art based on literature.

## RESULTS
Robots for domestic use can provide emergency alarm, fall detection, motion assistance (mobility and grasping), cognitive support and stimulation, household duties, as well as entertainment. The need for assistance to simply walk from one room to another and to remember the daily appointments is very disempowering. Many projects are orientated to verbal robot-human communication. Few projects are interested in physical interaction: it requires more difficult solutions, but makes possible a wider range of services. Multifunctionality is important for such devices. Integration of services, such as providing assistance to verticalisation and walking, controlling physiological state with management of medical alarm, memory assistance etc. seems to be reasonable. Capacity to react voluntary motions of the human being, following the patient in its actions, controlling the posture during verticalisation and walking are still challenges on this field.

## CONCLUSION
Application of robotic devices is a promising opportunity to improve the autonomy of people with disabilities and facilitate their social integration. Nevertheless, existing domestic robots still have some weaknesses, which decrease their usefulness in everyday life.

## KEYWORDS
robotics, rehabilitation, smart home

## REFERENCES
1. Torrey C, Fussell SR, Kiesler S. Trying to be helpful: Social challenges for smart robots. In: Workshop-Proceedings of ACM/IEEE Human-Robot Interaction Conference (HRI2008), Amsterdam, 2008; pp. 23-26.
2. Demiris G, Rantz M, Aud M, Marek K, Tyrer H, Skubic M, Hussam A. Older adults' attitudes towards and perceptions of "smart home" technologies: a pilot study. Med Inform Internet Med, 2004;29:87-94.

# Effectivity of Functional Electrostimulation in restoring Motor Function in the Upper Extremity after Stroke

Evita Kiukucane, Dace Stirane, Inga Tanenberga, Anita Vetra
National Rehabilitation Centre „Vaivari", Jurmala, Latvia

## OBJECTIVE
After stroke many individuals have chronic unilateral motor dysfunction of the upper extremity with impact on functioning in daily activities.
Recent scientific papers in clinical medicine and biomedical engineering show that functional neuromuscular stimulation (FNS) can be useful in stroke rehabilitation to decrease the effects of upper motor neuron syndrom.
Aim of study was to investigate the effectivity of functional electrical stimulation with a portable and commercialy available surface electromiostimulation device**„STIWELL med 4"** in the recovery of motor function of upper extremity after stroke.

## METHODS
40 patients with hemiparesis and upper-limb motor impairment 3- 6 month after stroke (Brunstromm stage for motor recovery ≥4; some voluntary movement in the arm) were enrolled in the investigation and randomized in study and control group. All participants received conventional stroke rehabilitation 5 days a week, 2 to 4 hours per day for 4 weeks. During rehabilitation study group patients recieved bipolar stimulation (portable and commercialy available surface electromiostimulation device **„STIWELL med 4"**) on m.extensor digitorum communis, m. extensor carpi radialis, m.extensor carpi ulnaris in the parethic side as a part of conventional stroke rehabilitation (30 minutes daily 5 days a week 4 weeks).
Outcome measures: Fugl-Meyer Assessment (FMA), Modified Ashworth Scale (MAS), Functional Independence Measurement (FIM), The Box and Blocks Test (BBT), active and passive range of movements (ROM).

## RESULTS
The mean change score and 95% confidence interval of the Fugl-Meyer Assessment as well as the FIM motor score, fine motor coordination and finger dexterity (BBT) and active ROM showed significantly more improvement in study group compared with control group. Neither MAS nor passive ROM in wrist joints showed a significant difference between the groups.

## CONCLUSION
Functional Electrostimulation of Muscles combined with a conventional rehabilitation programme enhances motor recovery and motor functioning of upper-extremity after stroke.

## KEYWORDS
stroke, functional electrostimulation