i-CREATe 2011

Bangkok, Thailand • July 21-23, 2011

International Convention on Rehabilitation Engineering & Assistive Technology

Venue: Swissotel Nai Lert Park
Bangkok, Thailand.

Organized by:

Sponsor:

www.icreateasia.org

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Technical Sponsors:

Sponsors:

i-CREATe 2011

*i*nternational **C**onvention on **R**ehabilitation **E**ngineering & **A**ssistive **Te**chnology

21 - 23 July 2011
Swissotel Nai Lert Park Bangkok
Bangkok, Thailand

Jointly Organized by:

The Singapore Therapeutic, Assistive & Rehabilitative Technologies (START) Centre

The Thailand's National Electronics and Computer Technology Center (NECTEC)

Shanghai Jiao Tong University

Supporting Organizations:

The Hong Kong Polytechnic University
Jockey Club Rehabilitation Engineering Centre and Clinic

CONTENTS

Welcome

In 2011, i-CREATe will be focusing on using Assistive Technology for children with disabilities. We believed that AT for early intervention will make it possible for children with disabilities to be more independent at home, schools and in the community. A child with speech problems can communicate using augmentative and alternative communications. A child with learning disabilities can use accessible learning tools in the classroom and a child who cannot use his hands can use on-screen keyboard, switches or eyegaze system to access the computer. Assistive technology can mean anything from simple, homemade devices to highly sophisticated environmental control systems. It can be adapted toys, computers access, powered mobility, augmentative and alternative communication devices, special switches and other adapted tools to assist a child with learning and interacting socially.

The 5th i-CREATe will be held in Bangkok, Thailand for the 2nd time. In 2008, i-CREATe Thailand drew a crowd of closed to 400 delegates during the 3 days convention where the participants were from a vast background which includes allied health professionals, special education teachers, rehabilitation engineers, researchers, practitioners, non-governmental organizations and more. In 2011, we are very honored to have the presence of **Her Royal Highness Princess Maha Chakri Sirindhorn** who will be gracing the opening of the convention for the 5th consecutive year.

Prof. Pairash THAJCHAYAPONG
General Co-Chair

Prof. ANG Wei Tech
General Co-Chair

General Information

Conference Date:	21 - 23 July 2011
Conference Venue:	Swissotel Nai Lert Park Bangkok, 2 Wireless Road, Pathumwan, 10330 Bangkok, Thailand. Tel: +66 2 253 0123 Fax: +66 2 253 6509 Email: bangkok-nailertpark@swissotel.com www.swissotel.com/bangkok-nailertpark
Opening Hours:	09:00hr to 17:00hr daily
Admission:	Open to registered delegates only.
Registration:	Gallery Foyer, Level 1
Opening Ceremony:	Grand Ballroom Lert Wanalai, Ground Level
Keynote & Plenary Sessions:	Grand Ballroom Lert Wanalai, Ground Level
Workshops & Paper Presentations:	Park Room A, Ground Level Park Room B, Ground Level Park Room C, Ground Level Ballroom A, Ground Level Ballroom B, Ground Level
Exhibition:	Gallery Foyer, Level 1. Open to trade and public.
Lunch and Tea Break:	Gallery Foyer, Level 1
Gala Dinner:	Grand Ballroom Lert Wanalai, Ground Level
Student Design Presentations:	Grand Ballroom Lert Wanalai, Ground Level
Student Design Prototype Exhibition:	Foyer, Ground Level
Conference Contact	**i-CREATe 2011 Conference Secretariat** **Kamolpun PUNPUNG, Thailand** National Electronics and Computer Technology Center (NECTEC), Thailand kamolpun.punpuing@nectec.or.th **Vera YANG, Singapore** Program & Operation Manager, START Centre, Singapore vera_yang@start-centre.com

Session Information

All Chairpersons and Speakers are requested to be in their respective session rooms at least 10 minutes prior to the commencement of each session.

A total of 15 minutes has been allocated for each oral presentation, including time for questions (12 minutes presentation + 3 minutes question and answer.) Session chairpersons will strictly enforce this limit. Presenters are requested to keep their presentations within the time limits stated.

Presentations must be carried out using **Microsoft PowerPoint**. No OHP or slide projector will be provided.

For presenters using Microsoft PowerPoint, they are encouraged to bring their files on a CD ROM or USB flash drive (thumb drive) and upload their files from **10:00 – 16:00 hrs on 21 July 2011 at the Secretariat Room**. Presenters may also use their own laptops if their presentations require special software or codec but please inform the Conference Secretariat in advance of the arrangement.

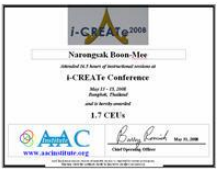
Continuing Education Unit (CEU)

Continuing education may be a requirement for maintenance of professional licensure, professional credentials or certification, or employment. The standard measure of continuing education is the **CEU** (**Continuing Education Unit**). One CEU is the equivalent of 10 hours of instruction. The minimum measure generally recognized is 0.1 CEU (one hour of instruction) and amounts are rounded to the nearest tenth. CEUs are available for participation in approved activities.

Professionals working in the area of rehabilitation engineering and assistive technology desire to maintain the most current knowledge and skills in providing services to people with disabilities. In some cases, professionals working in the fields of rehabilitation and health care must produce evidence of continuing professional development to maintain licensure or certification.

CEUs will be offered in partnership with the AAC Institute, for all workshops and paper presentation sessions attended. The AAC Institute has been reviewed and approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET). RESNA and ASHA accept the AAC Institute IACET CEUs for maintenance of the ATP/ATS/RET credential.

Many international organizations, such as RESNA, accepts AAC Institute IACET CEUs for maintenance of the ATP/ATS credential.



Travel Information

Thailand

Thailand lies in the heart of Southeast Asia, making it a gateway to Indochina, Myanmar and Southern China. Its shape and geography divide into four natural regions: the mountains and forests of the North; the vast rice fields of the Central Plains; the semi-arid farm lands of the Northeast plateau; and the tropical islands and long coastline of the peninsula South.

Thailand is a constitutional monarchy with His Majesty King Bhumibol Adulyadej, or King Rama IX, the ninth king of the Chakri Dynasty, the present king. Thailand embraces a rich diversity of cultures and traditions. With its proud history, tropical climate and renowned hospitality, the Kingdom is a never-ending source of fascination and pleasures for international visitors. For more information on Thailand, visit http://www.tourismthailand.org

Bangkok

Bangkok is the capital, largest urban area and primary city of Thailand. Known in Thai as Krung Thep Maha Nakhon, meaning "city of angels" for short, it was a small trading post at the mouth of the Chao Phraya River during the Ayutthaya Kingdom. It came to the forefront of Siam when it was given the status as the capital city in 1768 after the burning of Ayutthaya. However, the current Rattanakosin Kingdom did not begin until 1782 when the capital was moved across the river by Rama I after the death of King Taksin. The Rattanakosin capital is now more formally called "Phra Nakhon" (Thai: **พระนคร**), pertaining to the ancient boundaries in the metropolis' core and the name Bangkok now incorporates the urban build-up since the 18th century which has its own.

For tourists, Bangkok has a feast of attractions to offer. The city is dotted with 400 glittering Buddhist temples of great beauty and fascination, magnificent palaces, classical dance extravaganzas, numerous shopping centres and traditional ways of life, especially along the "Venice of the East" timeless canals and the Chao Phraya River of the "River of Kings" winding through the city. It is worth taking a trip along its waters before exploring further into different canals to take a glimpse of old Bangkok.

Airport Information

Suvarnabhumi Airport is located in Racha Thewa in the Bang Phli district of Samut Prakan province, 30 kilometers east of Bangkok. It has 2 parallel runways (60 m. wide, 4,000 m. and 3700 m. long) and 2 parallel taxiways to accommodate simultaneous departures and arrivals. Please check your desired airlines of arrival and departure terminal.

After clearing customs and immigration, several modes of transportation may be found at the exits. Prices may range from Baht 700 to 1,500 on private limos or Baht 350 – 400 for regular taxis (not including Toll or express way for another Baht 60).

1 USD ≈ 30.63 Baht, 1 SGD ≈ 24.74 Baht, 1 USD ≈ 1.24 SGD.

Population

The population of Thailand comprises of roughly 65 million citizens, the majority of whom are ethnically Thai, though peoples of Chinese, Indian, Malay, Mon, Khmer, Burmese, and Lao origin are also represented to varying degrees. Approximately 7 million citizens live in the capital city, Bangkok, though this number varies seasonally and is otherwise difficult to accurately count.

People

The vast majority (roughly 80%) of Thailand's nearly 65 million citizens are ethnically Thai. The remainder consists primarily of peoples of Chinese, Indian, Malay, Mon, Khmer, Burmese, and Lao decent. Of the 7 million citizens who live in the capital city, Bangkok, there is a greater diversity of ethnicities, including a large number of expatriate residents from across the globe. Other geographic distinctions of the population include a Muslim majority in the south near the Malaysian border, and hill tribe ethnic groups, such as the Hmong and Karen, who live in the northern mountains.

Language

More than 92% of the population speaks Thai or one of its regional dialects. While the Thai language is the official language of Thailand, as a result of its cosmopolitan capital city and established tourism infrastructure, English is spoken and understood throughout much of Thailand.

Climate

The weather in Thailand is generally hot and humid: typical of its location within the tropics. Generally speaking, Thailand can be divided into three seasons: "hot" season, rainy season, and "cool" season, though Thailand's geography allows visitors to find suitable weather somewhere in the country throughout the year.

Swissotel Nai Lert Park Bangkok, Thailand

A 5 star luxury hotel in Bangkok, Swissôtel Nai Lert Park offers a unique city retreat in Thailand's bustling capital with award-winning restaurants and a beautiful eight-acre lush tropical garden.

A few minutes' walk from the Skytrain station and all main shopping malls, with easy access to the business districts and Bangkok's famous nightlife, the hotel is the perfect choice for both business and leisure.

338 luxurious guest rooms feature private balconies overlooking the pool and gardens, while the Executive Club and exclusive suites serve the demands of even the most discerning traveller. Additional facilities include spa and fitness centre, 5 dining venues, 2 bars, 10 meeting rooms, a grand ballroom, a free-form swimming pool.

Conference Organization

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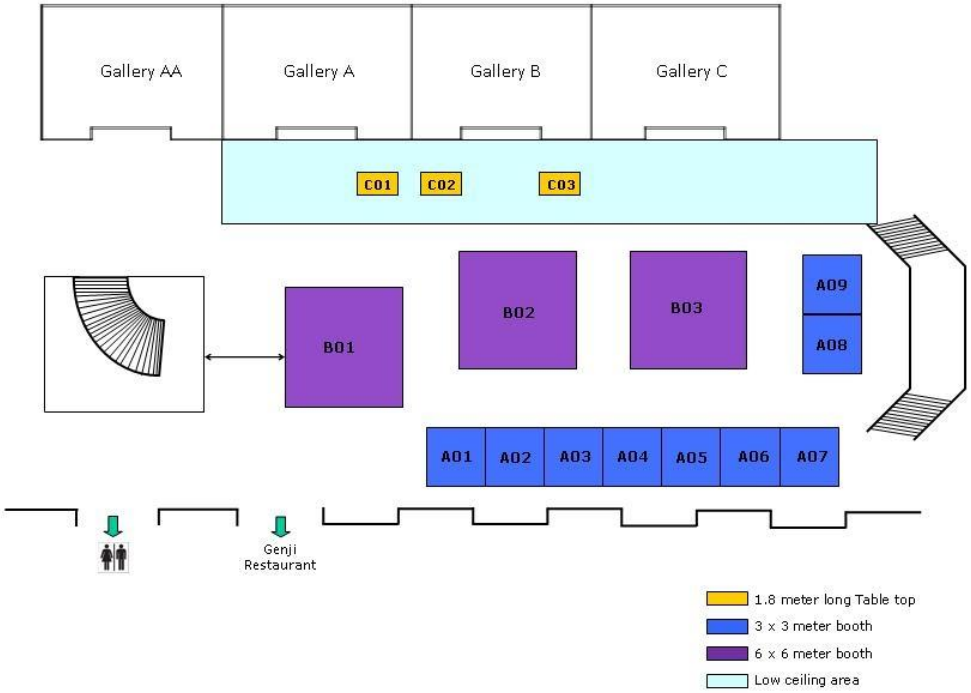
Exhibition


Gallery AA
Gallery A
Gallery B
Gallery C
C01
C02
C03
B01
B02
B03
A09
A08
A01
A02
A03
A04
A05
A06
A07
Genji
Restaurant
1.8 meter long Table top
3 x 3 meter booth
6 x 6 meter booth
Low ceiling area

Exhibitors	Booth
Her Royal Highness Princess Maha Chakri Sirindhorn Pavilion *Her Royal Highness Princess Maha Chakri Sirindhorn's interests and knowledge in several disciplines have led her to initiate many projects for the benefit of her subjects. Some of them are integrated programmes, and some are of particular scopes. Among her numerous initiatives, one that also ranks itself at the forefront is science and technology development programme. The pavilion will showcase some of the Royal Initiative Projects*	B01
Thai Telecommunication Relay Service: TTRS *An operator service that allows people who are deaf, hearing impairment, speech impairment, and blind could be able to communicate with other people via an assistive device and technology.* Universal Foundation for Persons with Disabilities 27/5 Soi 39 Arun Amarin Road, Arun Amarin. Arun Amarin Road. Bangkoknoi. Bangkok 10700. Siriraj Post Office, Siriraj Bangkok-noi Bangkok Thailand 10702 Tel. +66 2886 1188, Fax. +66 2886 0956 Contact name: Sirilak Luxsameevanich Mobile. +668 6988 4366 E-mail: sirilak.luxsameevanich@nectec.or.th	B02
Otto Bock South East Asia Co., Ltd. *Worldwide, the name stands for high-quality and technologically outstanding products and services in Orthobionic® and Bionicmobility®.* 1741 Phaholyothin Rd., Chatuchark, Chatuchark, Bangkok, 10900 Thailand Tel. +66 2930 3030 Fax: +66 2930 3311 Website: http://www.ottobock.co.th Contact name: Suppanart Wongwannon Mobile. +668 9919 7632 E-mail: suppanart@ottobock.co.th	B03

Exhibitors	Booth
National Electronics and Computer Technology Center (NECTEC) *Aims to undertake, support and promote the development of electronics and computer technologies through research and development activities.* 112 Thailand Science Park, Phahonyothin Rd., Klong 1, Klong Luang, Pathumthani 12120,Thailand Tel. +66 2564 6900 Fax: +66 2564 6901-3 Website: http://www.nectec.or.th Contact name: Kanokvate Tungpimolrut, Ph.D. E-mail: kanokvate.tungpimolrut@nectec.or.th	A01
National Metal and Materials Technology Center (MTEC) *Aims to support research and development in metals and materials, which are instrumental in the growth of the industrial sector and the overall development of the country.* 114 Thailand Science Park, Phahonyothin Rd., Klong 1, Klong Luang, Pathumthani 12120,Thailand Tel. +66 2564 6900 Fax: +66 2564 6901-3 Website: http://www.mtec.or.th Contact name: Pasu Sirisalee, Ph.D. E-mail: pasus@mtec.or.th	A02
Mahidol University (MU) *Excel in health, sciences, arts, and innovation with integrity for the betterment of Thai society and the benefit of mankind.* 999 Phuttamonthon 4 Road, Salaya, Nakhon Pathom 73170, Thailand Tel. +66 2849 6230 Website: http://www.mu.ac.th Contact name: Yodchanan Wongsawat, Ph.D. E-mail: egyws@mahidol.ac.th	A03
Telecommunication Services and Devices Showcase for Persons with Disabilities and the Elderly (TEDE) *Promote and advocate the PWDs and the elderly to have the opportunity to recognize the right of access to telecommunication services and information as well as trial the telecommunication devices that is appropriates their physical problems including training the users especially in rural communities to understand the telecommunication services proactively.*	A04

Exhibitors	Booth
73/1 Rama 6 Road, Phayathai, Rajdhevee, Bangkok, 10400 Tel. +66 2625 3907-8 Fax: +66 2625 3909 Website: http://www.tede.or.th Contact name: Nalinee Reungrit E-mail: nuffy90@hotmail.com	
Asia-Pacific Development Center on Disability (APCD) *A regional center on disability established in Bangkok, Thailand as a legacy of the Asia and Pacific Decade of Disabled Persons 1993-2002, under joint collaboration of the Government of Japan and the Royal Thai Government. APCD has been endorsed by the United Nations Economic and Social Commission of Asia and the Pacific as a regional cooperative base for its Biwako Millennium Framework for Action towards an Inclusive, Barrier-free and Rigths-based Society for Persons with Disabilities in the Asian and Pacific Decade of Disabled Persons,2003-2012.* *The APCD project was implemented in Bangkok on 1 August 2002 through the technical cooperation from the Japan International Cooperation Agency (JICA) with the Ministry of Social Development and Human Security,Thailand; the necessary infrastructure was provided by Japan's Grant Aid.* APCD Bldg., 255 Rajvithi Rd., Rajthevi, Bangkok 10400 Thailand Tel. +66 2354 7505 Fax: +66 2354 7507 Web Site: www.apcdfoundation.org Contact name: Duangnarumol Dokruk Mobile. +668 6733 8113 E-mail: duangnarumol@apcdfoundation.org	A05
Sirindhorn National Medical Rehabilitation Center (SNMRC) *The organization that leading global medical rehabilitation towards a better quality of life of population from all sectors participation.* Soi *Bumrad* Naradune, Tiwanon Rd., Taladkwan, Muang, Nonthaburi 11000 Tel . +66 2591 4242 Fax: +66 2591 4242 ext. 6720 Website: http://www.snmrc.go.th Contact name: Daranee Suvapan Mobile. +668 1803 2326 E-mail: nudaranee@yahoo.com	A06

Exhibitors	Booth
The Royal College of Physiatrists of Thailand *Production and development education and research in rehabilitation medicine to the international standards, serve people have a better quality of life and supporting the development of medical graduates.* 10th Floor, Royal Golden Jubilee Building, 2 Soi Soonvijai, New Petchburi Rd., Bangkok 10310, Thailand Tel. +66 2716 6808, +66 2716 6661-4 ext. 1048 Fax: +66 2716 6809 Website: http://www.rehabmed.or.th/royal/rc_thai/index.php Contact name: Sukajan Pongprapai Mobile. +668 1890 9011 E-mail: thairehab@yahoo.com E-mail: sukajan@hotmail.com	A07
V.S.Engineering Co.,Ltd. *Premier manufacturer of rehabilitation and mobility equipment in Thailand.* 7,9 Soi Charunsanitwong,Bang-Au, Bang Plad, Bangkok Thailand, 10700 Tel: +66 2885 3467-8, +66 2435 7659, +66 2880 5550 Fax: +66 2880 5551 Website: http://www.vsthailand.com Contact name: Sompong Vanishkorn (Mannaging Director) Mobile. +668 1753 2649	A08
Siamnissin Co.,Ltd. *Import and contribution of mobility equipment such as wheelchair, wheelchair with hand control driving including cushions.* 77/79 Moo 9 Soi. Bangkae 14, Sukhapibarn 1 Rd., Bangkae, Bangkae, Bangkok 10160 Tel. +66 2803 3058 , +668 1835 4206 Fax: +66 28032933 E-mail: siamnissin@hotmail.com Website: http://www.wheelchairnet.com Contact name: Thitirat T. +66 2454 1340 E-mail: thitirat_siamnissin@hotmail.com	A09

Exhibitors	Booth
Qualisys *Qualisys is global provider of products and services based on optical motion capture. The experienced Qualisys staff has created a unique platform for optical motion capture, built to medical and industrial standards.* Packhusgatan 6, S-411 13 Gothenburg, Sweden Tel: + 46 31 336 94 00 Website: www.qualisys.com Email: sales@qualisys.com	C01
U2 Innovation Pte Ltd *U2 Innovation provides solutions in the fields of Health, Rehabilitation, Wellness & Fitness, Sports.. U2 products include musculoskeletal testing to identify areas of muscular weakness or loss of motion due to injury or disease, developed, maintain and restoring physical function.* No.14 Robinson Road #13-00 Far East Finance Building Singapore 048545 Tel: +65-96578876 Website: www.u2innovation.com Email: u2innovation@gmail.com	C02
Khun Poom Foundation **Coordinating Center of KHUN POOM FOUNDATION, Autisticthai Foundation* 11, Moo 12, Wat kaew-Putthamonthon 1 Rd., Bangprom, Talingchan, Bangkok, 10170 Thailand Tel. +66 2866 7125 ext. 0 * *Coordinating Center of KHUN POOM FOUNDATION, Special Education Center Region, Din Daeng Rd., Din Daeng, Bangkok, 10400 Thailand* Tel. +66 2247 4685 Website: http://www.khunpoom.org	C03

Technical Program Overview

DAY 1 – 21 July 2011 (Thursday)

<table>
<tr><th>Time</th><th>Grand Ballroom
Lert Wanalai</th><th>Gallery Foyer
1st Floor /
Ground Level</th><th></th></tr>
<tr><td>0800hr</td><td rowspan="3"></td><td>Registration</td><td></td></tr>
<tr><td>0800
to
1200</td><td>Exhibition /
SDC move in</td><td rowspan="2">0830 - 1300
Site Tour to Sirindhorn National Medical Rehabilitation Centre (SNMRC)</td></tr>
<tr><td>1200
to
1300</td><td>Lunch</td></tr>
<tr><td>1300
to
1430</td><td>Student Design Challenge Presentations</td><td colspan="2" rowspan="3">Exhibition & SDC
Open to All</td></tr>
<tr><td>1430 - 1500</td><td>Tea Break</td></tr>
<tr><td>1500
to
1800</td><td>Student Design Challenge Presentations</td></tr>
</table>

DAY 2 – 22 July 2011 (Friday)

Time	Grand Ballroom Lert Wanalai	Gallery Foyer 1st Floor / Ground Level	Park A Ground Level	Park B Ground Level	Park C Ground Level	Ballroom A Ground Level	Ballroom B Ground Level
0715-0830		Registration					
0830-0900	Delegates be seated						
0900 to 1030	Plenary Sessions - Prof Katya Hill - Dr Ubonwon Wathanadilokul - Mr Daryl Lim	Exhibition & SDC Open to All					
1030-1100			Tea Break				
1100 to 1245			Augmentative & Alternative Communications 1A	Rehabilitation Technology 1C	Bio-Signal based Technology 1E	Pediatric Rehabilitation 1G	Mixed Reality Rehabilitation 1J
1245-1345			Lunch				
1345 to 1515			Computer & Web Access 1B	Aging & Technology 1D	Assistive Technology 1F	Rehabilitation Studies 1H	

Time	Grand Ballroom Lert Wanalai	Gallery Foyer 1st Floor / Ground Level	Park A Ground Level	Park B Ground Level	Park C Ground Level	Ballroom A Ground Level	Ballroom B Ground Level
1515-1545			Tea Break				
1545 to 1715		*1700 – 1830hr HRH Tour					
1715 to 1740	Gala Registration	Exhibition & SDC					
1740 to 1830	Guests be seated - video on "PETER"						
1830 to 1850	Gala Opening						
1850 to 1910	Plenary Session- Dr Wong Meng Ee						
1910 to 2030	Performance And Dinner Commence						

DAY 3 – 23 July 2011 (Saturday)

<table>
<tr><th>Time</th><th>Gallery Foyer
1st Floor</th><th>Park A
Ground Level</th><th>Park B
Ground Level</th><th>Park C
Ground Level</th><th>Ballroom A
Ground Level</th><th>Ballroom B
Ground Level</th></tr>
<tr><td>0800-0900</td><td>Registration</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>0900
to
1030</td><td rowspan="8">Exhibition &
SDC
Open to All</td><td>W1
Innovation &
Entrepreneurship</td><td>W3
Augmentative &
Alternative</td><td>W5
Assistive
Technology</td><td>W7
Language
Brain &</td><td>FW8
Neuro
Rehabilitation</td></tr>
<tr><td>1030-1100</td><td colspan="5">Tea Break</td></tr>
<tr><td>1100
to
1230</td><td>(Singapore)</td><td>Communications
(USA)</td><td>Fundamental
(Singapore)</td><td>Technology
(Thailand)</td><td>(Thailand)</td></tr>
<tr><td>1230-1330</td><td colspan="5">Lunch</td></tr>
<tr><td>1330
to
1500</td><td>W2
Pressure
Mapping</td><td>W4
Inclusive
Education
*lap top required</td><td></td><td>Technology
(Thailand)</td><td></td></tr>
<tr><td>1500-1530</td><td colspan="5">Tea Break</td></tr>
<tr><td>1530
to
1700</td><td>(Australia)</td><td>(Philippines)</td><td>W6 - Assistive
&
Rehab
Robotics
(Singapore)</td><td></td><td></td></tr>
</table>

Site Tour (Day 1 – 21 July 2011)

Study Visit to Sirindhorn National Medical Rehabilitation Center (SNMRC)
9:00hr -13:00hr
3rd Floor, Administrative Building, SNMRC

Sirindhorn National Medical Rehabilitation Center (SNMRC) is one of the biggest rehabilitation centers in Thailand, and it plays an important role not only in providing medical and rehabilitation services to the region, but also in improving the quality of medical and rehabilitation services provided throughout the whole country.

9:00-9:20	– Welcome Message
	- Introduction to Sirindhorn Medical Rehabilitation Center
	-Tea break
9:20 - 9:40	-Tour to the Physical Therapy Unit
9:40-10:00	-Tour to the Occupational Therapy Unit
10:00-10:20	-Tour to the Speech Therapy Unit
10:20-10:40	-Tour to Day Care
10:40-11:00	-Tour to Assistive Technology Unit
11:00-11:30	-Tour to Prosthetics and Orthotics Unit
11:30-12:00	-Tour to the Independent Living Unit and Independent Living House
12:00-13:00	-Lunch (VIP Room)

Coordinator

Mrs.Patcharin Kasibut
Sirindhorn National Medical Rehabilitation Centre (SNMRC)
Ministry of Public Health
Office : +66 2591 5455 ext. 6808 Fax : +66 2591 1766
E-mail : aeypatcha@gmail.com

All delegates are to register for the site tour at the **Registration Counter at the Gallery Foyer on 21 July 2011, from 07:45hr –08:15hr.** The tour bus will leave the hotel at 08:30hr.

Student Design Challenge (Day 1 – 21 July 2011)

The Student Design Challenge targets to give our next generation a better understanding on disabilities and on how the use of assistive and rehabilitative technologies can help improve the quality of life of persons with disabilities.

This year, the Student Design Challenge 2011 will focus on the creative, innovative and systematic application of technologies and engineering methodologies to meet the needs of people with disabilities and help improve their quality of life in areas which include education, rehabilitation, employment, transportation, independent living, and recreation.

Categories are, but not limited to the following:

- Communication aids
- Computer access aids
- Daily living aids
- Education and learning aids
- Environmental aids
- Hearing and listening aids
- Recreation and leisure aids
- Prosthetics and orthotics
- Seating and positioning aids
- Vision and reading aids

Presentation

All teams are required to do an oral presentation covering the key ideas of the project. The presentations are scheduled at 13:00hr, 21 July 2011 in Grand Ballroom - Lert Wanalai room. Each presentation is 5 minute.

Poster & Prototype Display

All teams are required to displays their poster and prototype at the Student Design Challenge Exhibition Area, from **21 July 2011, 10:00hr to 23 July 2011, 17.00hr.** At least one team member must be present at their booth during the above session.

Judging and Awards

A panel of international judges of different professional backgrounds will be invited to judges on the projects. All judges' score based on the judging criteria will carry equal weight and decision of the winners need not be unanimous. The panel will judge the project during the presentation session, followed by a tour to visit and assess the prototype.

The judges will select the top three teams as well as two teams that deserve merit.

- Champion – USD 1,400.00, a trophy and certificates for all members.
- 1st Runner-up – USD 700.00, a trophy and certificates for all members.
- 2nd Runner-up – USD 350.00, a trophy and certificates for all members.

- Peer's choice award- certificates for all members.
  The award is to be decided by the SDC participants. Each team is allowed to cast one vote on the most deserving team entry but cannot vote for their team. The votes have to be casted at the end of the presentation session.

- Delegate's choice award- certificates for all members.
  The award is to be decided by the public visiting the exhibition. Upon registering for the exhibition, each visitor will be given a voting sheet where they have to complete and drop into the voting box at the registration booth after visiting the SDC booths.

- Best presentation award- certificates for all members.
  The award will be decided by the panel of judges based on the presentation part of the judging criteria.

- Best poster award- certificates for all members.
  The award will be decided by the panel of judges based on the poster part of the judging criteria.

- Best prototype award- certificates for all members.
  The award will be decided by the panel of judges based on the prototype part of the judging criteria.

The top three teams will be invited to the Gala Dinner. The invitation will be made by the organizer at **22 July 2011, 5.30 pm**. The result will be announced at the Gala Dinner.

Student Design Challenge Entries

SDC-01 CPEeK-Up: Automatic Telecommunication Relay Service for People with Speech Disorders Phiradet Bangcharoensap, Khana Chindamaikul, Pitipong Pitavaranont Kasetsart University, Thailand	**SDC-02 Arm & Finger Rehabilitation Gadget** Low Jun Yan Adrian, Edwin Tan Hong Wei, Amir Hafriz B Jasman, Radin Indrasukma B Radin A, Ryan Tan Yong Kuan ITE College East, Singapore
SDC-03 Universal Standing Wheelchair for Children with Cerebral Palsy Maywalee Jirojananukun, Pakapan Panlaem, Tachanon Lawanitchanon, Supajed Thanakawinvanich, Kornnapat Yankoses Temasek Polytechnic, Thailand	**SDC-04 Solar Charging System for Electric Wheelchair** Lim Huey Li, Oh Man Chun Shermaine, Chiam Feng Rong Eugene Republic Polytechnic, Singapore
SDC-05 Hybrid EEG-HEG Based Neurofeedback Device Supassorn Rodrak, Supatcha Namtong Mahidol University, Thailand	**SDC-06 DIY Personal Rapid Transport** Khoo Kuok Yao Kelvin, A. Saravanan, Cong Jian Liang Singapore Polytechnic, Singapore
SDC-07 My Memories Chin Jia Yi Evelyn, Nur Nadiah Binte Zailani Nanyang Polytechnic, Singapore	**SDC-08 Game-Based EMG Biofeedback System for Muscle Training in the Elderly** Jindaporn Yaothak Prince of Songkla University, Thailand
SDC- 09 Constraint Induced Therapy intelligent Monitoring System (CITiHoMS) Teo Yong Chiang Eric, Lum Ruen Zi, Aw Yan Ying ITE College West, Singapore	**SDC-10 Shopping Assistant for the Old folks and People with Severe Visual Disorders** Zou Lei, Theint Moe Hnin Nanyang Polytechnic, Singapore

SDC-11 iGazeTracker
Vijay Kumar, Varun Joshi, Tharoon Earnarst
Anna University, India

SDC-12 LearnBudDy
Anawin Fuktongphan, Prachaya Prakobkan, Gunn Bhatrakarn, Supachart Tansutirapong
Kasetsart University, Thailand

SDC-13 Non-intrusive Gas Cooker Timing Device
Pang Ming Sen Vincent, Lim Ding Kun, Foo Zhan Ming, Dominic
ITE College East, Singapore

SDC-14 ActiveUs
Wu Jian Hua, Wong Jun Hao, Kwa Chu Sian
Nanyang Polytechnic, Singapore

SDC-15 Dif-monkey
Reza Kurniawan, Sunu Wicaksono, Rheza Adipratama, Helmi Kurniawan
University of Gadjah, Indonesia

SDC-16 iPhone-based Brain Controlled Wheelchair
Li Yue, Liu Shao Yang, Ong Gia Phu, Lin Ge, Denny Herman
Republic Polytechnic, Singapore

SDC-17 Sign Language Communication Translator
Jootharphim Pongschatmanee, Nantawat Sintagerd, Phophat YingThawornsuk, Thanyapat Sirisongkol
King Mongkut's University, Thailand

SDC-18 The Eye-Stop: Public Transportation Aid for the Visually-Impaired
Karthika d/o Ravichandran, Fuhairah Binte Abdul Karim, Kwek Rui Kiat, Kong Wen Da
Temasek Polytechnic, Singapore

SDC-19 Automatic Notification and Assist System for the Elderly
Chanvut Huatsri, Thunyasit Pholprasit, Jariya Manee, Onusa Luksaneeyanawin, Pornteap Jindawong
Dhurakij Pundit University, Thailand

SDC-20 Mobility Concept - Transcooter
Deng Hanwen, Quek Junsheng Gerald
Ngee Ann Polytechnic, Singapore

SDC-21 Haptic Surface Rendering Device
Wachiraphan Charoenwet, Tanut Treratanakulwong
Chulalongkorn University, Thailand

SDC-22 Bl-ink
Lin Lin, Yu Zhaoxin, Zhu Ying, Liu Qin
Nanyang Polytechnic, Singapore

SDC-23 Hybrid EEG-EOG Brain-Computer Interface System for Practical Wheelchair Control
Yunyong Punsawad, Jetsada Arnin, Sitthichai Iampetch, Khunawat Luangrat
Mahidol University, Thailand

SDC-24 Emergency Detection Device (EDD)
Gao Zhong, Zarool Azhar Bin Jumadi
ITE College Central (Tampine), Singapore

SDC-25 Step Climber
Tham Chee Mun Kenneth, Douglas Lim
Temasek Polytechnic, Singapore

SDC-26 AHA (Auto Hill-Assist) Wheelchair
Serene Tan, Teo Qi Shan, Chong Xin Yi
Temasek Polytechnic, Singapore

Plenary Speakers (Day 2 – 22 July 2011)

Professor Katya Hill

Associate Professor
Department of Communication Science and Disorders,
University of Pittsburgh, USA

Date : 22 July 2011 (Friday)
Time: 09:00 – 09:30hr
Grand Ballroom Lert Wanalai

Topic: Giving a Voice to Children with Disabilities: Creating the Best Life Experience!

Abstract

Children are our most precious resource for the future. How a society nurtures, educations and prepares children with disabilities to contribute to the future reflects a society's true values and principles. When a society values speech, but denies access to communication for a child with disabilities, they have effectively limited the quality of life for that child. Our life experience is influenced by our ability to communicate; by our ability to use oral and written language. If a society wishes to create the best life experience for all its members, then providing supports and services to build speech, language and communication competence is critical to ensuring that a child can be successful.

The judicious and conscientious use of evidence when applied to educational, social and health care programs indicates that we need to provide integrated special education and rehabilitation services early, consistently, involving parents and peers, and setting higher expectations for children with disabilities to achieve their potential. Building the knowledge and skills of our educators, clinicians, and health care providers to make evidence-based decisions is critical to achieving this goal. Respecting the values, beliefs, and dreams of a parent and child ensures that decisions are meaningful to the family. Monitoring performance and outcomes diligently will guide progress toward this goal. Only then can all of society enjoy the best life experience.

Biography

Professor Katya HILL, Associate Professor, University of Pittsburgh Department of Communication Science and Disorders, USA obtained a Ph.D. in Rehabilitation Sciences and Technology at the University of Pittsburgh. Prof. Hill teaches classes and lectures on Augmentative and Alternative Communication (AAC) assistive technology (AT) in the School of Health and Rehabilitation Sciences. As a Speech-Language Pathologist, she has over 30 years of AAC and AT clinical experience and her research has been in the area of AAC language activity monitoring, performance measurement, and evidence-based practice.

Prof Hill is an internationally recognized speaker and clinical consultant; her career reflects her mission of improving the quality of life for individuals who rely on AAC by advocating for the most effective communication possible. She is also the co-founder and Executive Director of Augmentative and Alternative Communication (AAC) Institute, which is an international not-for-profit charitable organization that provides education, scientific research, health care, resources and tools to support AAC intervention and services

Dr. Ubonwon Wathanadilokul

Medical Doctor at Thai Diplomate of Physical and Rehabilitation Medicine, Head of pediatric rehabilitation clinic, Department of Medical Services, Ministry of Public Health, Thailand.

Date : 22 July 2011 (Friday)
Time: 09: 30 – 10: 00hr
Grand Ballroom Lert Wanalai

Topic: Situation and Technology used for Medical Pediatric Rehabilitation in Thailand

Abstract

The number of children with disabilities is around 0.17 % of Thai population. The highest (around 30%) was intellectual and learning disabilities, the second was physical and movement, around 20 %. Multiple disabilities were 20%. The hearing with communication problem was 14 % while visual problem was 5%. The health insurance in Thailand covered around 99% of population which means that all children have the right to access medical rehabilitation and assistive devices free of charge according to health needs. Most of children with physical disabilities are taken care by multidisciplinary team comprised of general pediatrician/ developmental pediatrician/pediatric neurologist / physiatrist/ orthopedist. The personnel who run therapy program in provincial hospitals is usually occupational therapist but in some hospitals work together with physiotherapist. The prosthetic and orthotic can be provided in nearly every province. The appropriate technologies were chosen according to the local resources and the level of services. For example, the hardware used in the level of super tertiary care is robotic training for walking, 3D gait analysis laboratory, virtual reality for hand and reaction training. The presentation will show some tailored- made- assistive devices designed and made for children with special needs by the cooperation between therapists, caregivers, parents and NGOs.

Biography

Dr. Ubonwon Wathanadilokul is a physiatrist who works with Sirindhorn national medical rehabilitation centre (SNMRC), ministry of public health. She is interested in taking care children with movement disability especially cerebral palsy. Community based rehabilitation is another field with which she work by promoting the services in district hospitals and community health centres.

Mr Daryl Lim

Business Manager, Otto Bock South East Asia Co, Singapore

Date : 22 July 2011 (Friday)
Time: 10:00 – 10:30hr
Grand Ballroom Lert Wanalai

Topic: Advanced Prosthetics for Children and Teens

Abstract

The needs of a child or teen amputee can be very different from the needs of the majority of amputees that we attend to on a daily basis. In lower limb patients, for example, the child requires prosthesis not only for stability and ambulation but also needs it for playing with other children and through that attains growth and development. The prosthesis also needs to fulfil children's higher expectations otherwise it can be easily rejected. There is a wide range of prosthetic components available for children. However, in some cases, basic components are incapable meeting the child's needs and expectations. The use of C-legs to fit a teen with bilateral lower limb amputation (Right Transfemoral and Left Knee Disarticulation.) is an example of how advanced prosthetic technology can be used to enable independent ambulation for children.

Biography

Mr Daryl Lim is the Business Manager of Otto Bock South East Asia Co., Ltd since Nov 2006. Prior to this, he was working in the Artificial Limb Centre, Tan Tock Seng Hospital, Singapore as a Manager. Daryl graduated with a honors degree in Prosthetics and Orthotics at School of Prosthetics and Orthotics, University of Salford in 1999 and also completed his Master of Science in Biomedical Engineering at the Nanyang Technological University in 2002.

Otto Bock is a German prosthetics company situated in Duderstadt. It was founded in 1919 by its namesake prosthetist, Otto Bock. It was created in response to the large number of injured veterans from World War I. The Otto Bock Corporation has been responsible for several innovations in prosthetics, including the pyramid adapter (a highly adjustable linkage for prosthetic parts) and the C-Leg, a computerized knee that adaptively varies its passive resistance to suit the patients' different walking gaits.

Dr. Meng Ee WONG

Assistant Professor, Early Childhood and Special Needs Education
Academic Group, National Institute of Education,
Nanyang Technological University, Singapore

Date : 22 July 2011 (Friday)
Time: 18:50-19:10 hr (Gala Dinner)
Grand Ballroom Lert Wanalai

Topic: Assistive Technology Literacy: In Search Of The Missing Complementary Soft Skills Towards Achieving Assistive Technology Mastery

Abstract

Assistive technology includes a variety of technology, tools, and software that can be purchased or specially designed. These technologies are used to increase, maintain, or improve the functional capabilities of an individual with a disability (Wong & Cohen, 2011). This broad definition comprises a broad spectrum of devices-both high and low tech that can facilitate writing, computer access, reading, communication, and electronic aids for daily living, mobility, and leisure.

For many students with disabilities, assistive technology is a necessity for their learning, and cognitive, social, and emotional development. The use of assistive technology enables these students to participate in activities typical of their age group and provides the means by which these students can experience success academically, as well as, socially.

Biography

Dr Meng Ee WONG earned his PhD from the University of Cambridge and is currently the Assistant Professor at the Early Childhood and Special Needs Education Academic Group at the National Institute of Education, Nanyang Technological University in Singapore. His responsibilities include researching and teaching both undergraduate and post graduate courses in general and special education. His research interests include disability sociology; transition and post-school outcomes of persons with disabilities; issues relating to persons with visual impairments and their development; education of teachers of children with special needs; support groups and their place in supporting vulnerable groups; home visitations; family and community; resilience and its role and influence in lives of persons with disabilities; assistive technology for the visually impaired.

Dr Wong is presently involved in grant-funded research in assistive technology as well as inclusion of students with disabilities in secondary schools in Singapore. Beyond his academic pursuits, Dr Wong is a keen sportsman. From a national swimmer, to an active runner, he ran his forth marathon at the 28 May 2011 Sundown Marathon Singapore. He is also the President of the Retinitis Pigmentosa Society Singapore (RPSS).

Paper Presentations (Day 2 – 22 July 2011)

1A – Augmentative and Alternative Communication
11:00-12:45hr
Park A Room

1A-1 11:00- 11:15	**Do They Narrate in Same Vocabulary? The Result of Core Vocabulary Investigation from Children with/without Asperger Syndrome in Taiwan** *Ming-Chung Chen*, Shun-Chieh Hsu**, Pao-Hsiang Chi***, Chien-Chuan Ko*, Yun-Lung Lin****, Qiao-Yun Huang** **National Chiayi University, Taiwan* ***Taipei Yongle Elementary School, Taiwan* ****National Taipei University of Education, Taiwan* *****Mailiao Senior High School, Taiwan* In this study, we investigated the core vocabulary used by children with or without asperger syndrome. Ten children with asperger syndrome and their peers participated in this investigation. The language samples were collected from their story retelling after watching two cartoon films. The language sample was analyzed to report the total number of words, total number of different word (TND), and number of spoken words used to make up 50%, 60%, 70% and 80% of the sample for each group. The amount of core vocabulary was less than 200 for children with asperger syndrome and their peers as well. In addition, the commonality of the two groups was also high.
1A-2 11:15- 11:30	**Evaluating AAC Treatment Research: Lessons Learned from a Systematic Review in Taiwan** *Ya-Ping Wu*, Ming-Chung Chen**, Hwa-Pey Wang**** **National Taiwan Normal University, Taiwan* ***National Chiayi University, Taiwan* ****National Taiwan Normal University, Taiwan* This systematic review involved a multifaceted search for studies published between 1997 and March 2009 from 9 major the electronic database in Taiwan. Three hundred fifty five titles published in Mandarin Chinese were pulled out by various searching strategies. However, only 8 studies, resulted from abstract screen and full text review by two reviewers, were included for final analysis. The results of the survey showed that AAC intervention could facilitate the participants' expressive communication, but only limited in few communication settings. This paper also figured out some specific issues these AAC intervention studies raised.

1A-3 11:30- 11:45	**Reviewing the Effect of Aided Language Strategies for Individuals with Complex Communication Needs** *I-Chun Kuan*, Ming-Chung Chen*, Ya-Ping Wu**** **National Chiayi University, Taiwan* ***National Normal University, Taiwan* This paper reviewed the English literature from 1989 to 2010 systematically to investigate the effect of aided language strategies. Ninety five unrepeated titles were found from the three major electronic databases initially. Eleven papers were included and analyzed after scientifically locating and screening procedure finally. The preliminary results of analysis indicated that aided language strategies were effective for individuals with complex communication need to learn expressive communication skills.
1A-4 11:45- 12:00	**Thai People's Association with the Icons for Thai Picture-Based Communication System** *Sarinya Chompoobutr*, Monthika Boriboon*, Wantanee Phantachat*, Puttachart Potibal*** **National Electronics and Computer Technology Center, National Science and Technology Development Agency, Thailand* ***Kasetsart University, Thailand* The skill of association is one of crucial factors that individuals using an iconic encoding technique can use various aspects of a graphic representation like an icon to remind themselves of concepts and words coded by the specific icon or icon sequence (Beukelman and Mirenda, 1998). This paper aims to investigate the associations Thai people ranged 10-50 years old made with selected icons which will be used in Thai Picture-based Communication System program. The associations were elicited from 400 able-bodied people, using cueing questions. Words describing the associations were counted frequency to select the appropriateness of their associated meaning. The results indicate that the participants made different associations with varying degrees of commonality to the icons. However, an investigation of the commonality of associations reveals that one dominant association was elicited, and two or three associations with a lesser degree of commonality were found. A single significant association suggests that the icon's meaning might be familiar to most users in the context.
1A-5 12:00- 12:15	**Multilingual AAC on Android** *Atiwong Suchato, Variya Chetsiri, Vinita Skularеemit,, Pattra Thongprasert, Proadpran Punyabukkana* *Chulalongkorn University, Thailand* In this work, we report a design and development of an Augmentative and Alternative Communication (AAC) aids in the form of an Android mobile application, together with a web server, that lets users with linguistic impairments make verbal communication with others via graphical symbols organized in the application. Text-

	to-Speech units were used to generate both real-time voice outputs and sound files stored on external storage. Although pre-loaded symbols were prepared in Thai and English, the system was designed to support the addition of other languages. The work started from a survey of existing AAC products whose features and limitations were considered in our design. Functional, speech intelligibility, and user acceptance testing were performed to primarily evaluate our AAC.
1A-6 12:15- 12:30	**Polysemy Interpretation of Graphic Symbols for Thai Picture-Based Communication System** *Puttachart Potibal*, Wantanee Phantachat**, Sarinya Chompoobutr** Monthika Boriboon*** **Kasetsart University, Thailand,* ***National Electronics and Computer Technology Center, National Science and Technology Development Agency, Thailand* Graphic symbols can be ambiguous since a single one may contain various interpretations. But sometimes, two or more graphic symbols may share the same interpretations. For example, the word *walking* might share three different graphic symbols. This article aims to demonstrate the polysemy interpretation of graphic symbols which will be used in the Thai Picture-based Communication System. The sample graphic symbols are analyzed in syntactic and semantic aspects. The 5 categories of graphic symbols: AGENT, MATTER, EVENT, LOCATION and TIME are used to group the words obtained from the graphic symbols.
1A-7 12:30- 12:45	**Multimedia Sign Language Dictionary for The Deaf and Hard of Hearing** *Andreas W. Yanuardi, Johannes Adi P., Alfeus Christantyas W.* *PT. Telekomunikasi Indonesia, Tbk, Indonesia* Multimedia sign language dictionary for the deaf and hard of hearing is a computer based application which is designed to assist people, especially children with hearing impaired problem to master their sign language and speech reading. The main module of this application is word dictionary module. The words visualization in a form of photos or pictures will help users to easily understand the meaning of words they are studying. Afterwards the words are being transformed into videos of sign language and speech reading.

1B – Computer & Web Access
13:45-15:15hr
Park A Room

1B-1 13:45- 14:00	**Design of a Touch-screen Mathematics Input System for Children with Upper Extremity Disability** *Fong-Sang Lee*, Ming-Tak Choi*, Kup-Sze Choi*, Tak-Yin Chan*** **Hong Kong Polytechnic University, Hong kong* ***Hong Kong Red Cross Princess Alexandra School, Hongkong*

	Mathematics is an indispensable element of many disciplines and essential in daily life. While handwriting modality is conventionally used for learning mathematics, it is difficult for children with upper extremity disability. Although computer based editing software allows them to write mathematics using mouse and keyboard, the software is considered cumbersome to use, even to many physically-abled users. In this paper, we propose a touch-screen mathematics input system to assist the children in writing mathematics. It supports context-specific keyboard layouts to keep the number of keys per layout optimal, thus better tolerating position error caused by motor control deficiency in picking the desired keys. Favorable initial comments on the prototype system have been obtained from experienced school teachers. Experimental study will be conducted to assess system usability and user performance in a more rigorous way and to further improve system design.
1B-2 14:00- 14:15	**Desktop Access with Non-verbal Sound Input** *Supadaech Chanjaradwichai, Proadpran Punyabukkana, Atiwong Suchato* *Chulalongkorn University, Thailand* Most motor-handicapped computer users who cannot use their hands and arms rely on expensive or complicated alternative input devices to operate computers. In this paper, we proposed a sound based input scheme that helps users perform tasks regularly found on Windows operating systems. Non-verbal sounds, including humming and fricative sounds, are used in cooperation with menus in multiple modes as the replacement of the use of computer mice and keyboards. Our evaluation has suggested that the implementation of our proposed scheme is accurate and responds promptly. Still, further improvements on facilitating users to select the most appropriate modes for desired tasks should improve the overall performance of the users accomplishing those tasks.
1B-3 14:15- 14:30	**Vowel-Separated Layout: A Thai Touchscreen Keyboard for People with Hand Movement Disability** *Siwacha Janpinijrut*, Cholwich Nattee*, Prakasith Kayasith**, Manabu Okumura**** **Thammasat University, Thailand* *** National Science and Technology Development Agency (NSTDA), Thailand* ****Tokyo Institute of Technology, Japan* This paper introduces an approach to improve Thai text en- try on virtual keyboards. We propose a word completion on new keyboard layouts called vowel-separated keyboard layouts. Based on a Thai writing system, all vowels can locate only four positions i.e. top, bottom, left and right of a consonant. Thus, we design our keyboard layouts by grouping vowels with the same position together and place the vowel group buttons into four positions of keyboard area. This should reduce the searching time when typing vowels. While all consonants still contain in the middle area and the consonant's arrangement is based on standard Thai lay- out named Kedmanee layout. We design two type of the vowel-separated layouts i.e. distance-based layout and big-button layout. The first layout has a small key button and uses a distance-based candidate generation technique as the consonant selection system.

1B-4 14:30- 14:45	**A Keyboard Share for Assistive Mobility (AKSHARAM)** *V.M.Abinaya, M.S.Krishnapriya , S.Monisha Nikitha, Bama.S.* *Anna Univerisity, Chennai, India* In this work\A Keyboard Share For Assistive Mobility (AKSHARAM)", we focus on developing a Generic On-Screen Keyboard Interface that works with all Applications irrespective of the platform. There are many On-Screen Key- boards available nowadays. However the existing On-Screen Keyboards suffer from two major drawbacks. The existing On-Screen Keyboards are either inaccessible for persons with multiple disability or Platform dependent. We aim at developing an On-Screen Keyboard to resolve these problems. To overcome the first drawback we have proposed and implemented an alternate method, where the user can access the computer through a single left mouse-click. By using this Interface, people with limited mobility, people affected with Cerebral palsy can use the computer effectively. To overcome the second drawback, we designed this Interface using Java and made sure it is working in all Applications regardless of the platform. We have tested this Interface in both Windows as well as in Linux platforms1.
1B-5 14:45- 15:00	**Eliciting Mental Model of Blind People for Web Page** *Ahmad Hisham Zainal Abidin*, Hong Xie **, Kok Wai Wong *** **Universiti Utara Malaysia , Malaysia* ***Murdoch University, Australia* This paper highlights the need to investigate whether blind people can get two dimensional perspectives in their mental model using bi-modal interaction. The two dimensional perspectives are very important for effective navigation in the Internet. This paper proposed the novel protocol to elicit mental model from the blind people using diagrammatic representation.

1C- Rehabilitation Technology
11:00-12:45hr
Park B Room

1C-1 11:00- 11:15	**Assessment of Vibration Perception with the Robotic Sensory Trainer** *Olivier Lambercy, Yeongmi Kim, Roger Gassert* *ETH Zurich,Switzerland* Despite the fact that sensory perception is crucial for motor learning and fine manipulation of small objects, therapy after stroke still focuses strongly on motor skills. Sensory assessments are often left out or provide only very subjective data from poorly controlled stimuli. This paper presents a robotic device that focuses purely on the assessment and training of sensory function of the hand, with the aim of gaining insights into the prevalence and severity of sensory deficits after stroke, and to provide semi-objective data on absolute and difference perception thresholds in patients. The device is capable of presenting three kinds of physical stimuli, and collects feedback from the user through an intuitive touch panel with augmented

	reality feedback. An initial study investigating localization performance and reaction time during the discrimination of vibration stimuli was performed, showing the feasibility of using the device for such investigations and revealing no significant difference between the four different locations as well as between the dominant and non-dominant hand. These data will serve as baseline, and suggest that data from the non-impaired hand can be used to identify sensory deficits in stroke patients.
1C-2 11:15- 11:30	**Learning Handwriting with Interactive Assistive Forces** *Kup-Sze Choi* *The Hong Kong Polytechnic University, Hong Kong* This paper describes the development of a handwriting training system for users with upper extremity disability. A computer based system equipped with a haptic device is developed to produce both visual and haptic cues to assist trainees to write Chinese characters in proper ways. Forces are generated interactively to guide trainee's hand along the desired path. A pilot study involving three subjects with cerebral palsy has been conducted to evaluate the usability of the system. Comments from occupational therapists are also collected to improve the system.
1C-3 11:30- 11:45	**An Ergonomic Sound and Visual System for Hand Rehabilitation** *Chieh Yin*, Ya-Hsin Hsueh*,Chien-Cheng Lan*, Jing-Yan Luo*, Chun-Yu Yeh**, Yi-Ting Lan**, Hsin-Chang Lo**** **National Yunlin University of Science and Technology. Taiwan, ROC* ***Shan Medical University, Taiwan ,ROC* ****Ming Chuan University, Taiwan* For most patients, physiotherapy is a boring and prolonged process which is almost impossible to be performed independently. This paper presents an ergonomic system which, by using an LED cup, allows patients to perform their rehabilitation training independently at home. The proposed training system can not only help patients to control their grip strength, but also provides them sound and visual feedbacks concerning their training results, thus integrates hand rehabilitation training into patients' daily life.
1C-4 11:45- 12:00	**Ergonomic Design of a Wearable Orthosis with EMG Monitoring and FES System** *Hsin-Chang Lo*, Chun-Yu Yeh*, Yi-Ting Lan** ,Ya-Hsin Hsueh***, Chien-Cheng Lan*** , Chieh Yin**** **Ming Chuan University, Taiwan, ROC* ***Shan Medical University, Taiwan, ROC* ****National Yunlin University of Science and Technology, Taiwan, ROC* In this paper we presented a wearable orthosis for EMG monitoring and functional electrical stimulation. The orthosis design was based on human factors consideration. The entire system includes a micro-processor, an EMG sensing circuit, and a FES circuit.

1C-5 12:00- 12:15	**Constraint Induced movement Therapy intelligent MAT (CITiMAT)** *K.Sudheer Bhandary, Tan Seng Fong , Nancy Quek* *ITE College West, Singapore* This paper presents the development of low cost, portable and effective system called Constraint Induced Therapy intelligent Mat (CITiMAT), which is designed to carry out the wrist /finger rehabilitation of stroke patients affected arm. Objective of this paper is to touch on the design overview of CITiMAT. This paper also provides the comparison of existing Constraint Induced Movement Therapy with CITiMAT in terms of its usability as well as benefits.
1C-6 12:15- 12:30	**Development of a Puppetry Robotic Glove System for the Rehabilitation of Upper Limb Functions** *Tan Boon Wee William, Meng Weilin, Sim Yan Ling Cynthia* *ITE College West, Singapore* This paper presents a wearable light-weight, portable, and low cost puppetry robotic glove system (PRoGS), patent pending (2010), designed to facilitate the rehabilitation of the upper limb functions in post-stroke patients, mainly focusing on the grasp, clench and opening function of the hand for activities of daily living (ADLs). The objective of this project is to provide an overview of the novel design of the PRoGS, design considerations and challenges, its mechanical and software control system, and its suggested clinical applications.
1C-7 12:30- 12:45	**A Patients Monitoring System at Ward** *Kittipanya-ngam Panachit*, Ong Soh Guat*, Eng How-Lung*, Methasate Ithipan**, Kayasith Prakasith*** **Institute for Infocomm Research, Singapore* ***National Electronics and Computer Technology Center, National Science and Technology Development Agency, Thailand* One of the key problems at inpatient departments in hospitals is insufficient nursing staff. It is therefore difficult for nurses to continuously monitor every single patient efficiently, 24/7. In this project, cameras and accelerometer sensors are utilized together to help monitoring the patients' activities. Already, technologies in video surveillance system and computer vision are widely acknowledged to make monitoring tasks easier and more effective.. In this integrated system, alarming features will be provided for detecting falls, and risky movements or irregular actions of the patients in order to draw attractions from nurses, with information of the monitored activities also recorded for further studies.

1D-Aging & Technology
13:45-15:30 hr
Park B

1D-1 13:45-14:00	**The Designed Chinese Home-based Assessment Form of Disability Elder** *Wen-Dien Chang*, Ping-Tung Lai*** **Asia-Pacific Institute of Creativity, Taiwan, ROC* ***Da-Chien General Hospital, Taiwan, ROC* The local government plans to promote a long-term care via integrating the regional hospitals and establishing of long-term care center. The disability elders were referred to the local hospitals, and the assessment was needed for the treatment and retreatment criteria of physical therapy. The assessments and functional status are needed to be recorded, and we tried to design an assessment form and analyze the feasibility. We designed home-based assessment form 12 (items) for assessing the motor function of disability elders. The result of our study showed that total correlation coefficient (r) was 0.89 and Cronbach's _ of 0.91. After clinical test of 85 disability elders, the home-based assessment is suitable for assessment the improvement of motor function. As the amount of subjects was too less and the treatment time was too short, more investigation on this issue is still needed.
1D-2 14:00-14:15	**Can exercises using Virtual Reality Games reduce risk and fear of falls among Older Women?** *Devinder Kaur Ajit Singh*, Vimal A/L P. Raman*, Bong Pei Sien*, Vijayakumar Palaniswamy*, Hannah Pearson**, Bala S. Rajaratnam**** **Universiti Kebangsaan Malaysia, Malaysia* ***Pantai Integrated Rehab, Malaysia* ****Nanyang Polytechnic, Singapore* Background & Aim: The objective of this study was to compare the risk and fear of falls among older women pre and post intervention using virtual reality games. Conclusion: Practicing fun and interactive exercises using virtual reality games can focus on improving balance at home and reducing risk of falls in older adults.
1D-3 14:15-14:30	**A Study of colour identification in Thai people with young adult age 18-25 year old and elderly age 60 year and over** *Jagkapong Pipitpukdee*, Mullika Santayayon*, Wantanee Phantachat*** **National Science and Technology Development Agency, Thailand* ***National Electronic and Computer Technology Center, Thailand* The objective of this study was study colour identifications in Thai people with younger adult aged between 18-25 year old and Elderly aged 60 year old and over. The data collection by the participation identified 200 colour compared to 16 reference colour in room at luminance level 300-500 Lux. The result of study analyzed by Munsell colour system. The result showed that the elderly and younger adults were able to grouping red green and blue are similar. In the remaining colors in the younger adult could be identified and grouped with the yellow of brightness high level. The results of this experiment should be to develop the standards for selected

	color suitable for vision in the elderly, people with disabilities for example, designing the signs, accessible website and the contrast background colour.
1D-4 14:30-14:45	**A Study of the Legibility of Thai Letters in Thai Young Adults Aged 19-25 Years Old and Older Adults Aged 60 Years old and Over** *Mullika Santayayon, Jagkapong Pipitpukdee, Wantanee Phantachat* *National Electronics and Computer Technology Center (NECTEC) , National Science and Technology Development Agency (NSTDA) Thailand* This study intends to do experiment on legibility of different Thai letter sizes of 32 Thai young and older adults. Both groups do the same procedure. Legibility of Thai letters experiment consists of 2 measurements; visual acuity measurement and 120 trials for legibility test at viewing distances of 0.5 and 2.0 m. Results showed that the minimum legible font size estimated from correct response and legibility evaluation in young adults were less than older adults on both of viewing distances. Consequently, the present study provides the preliminary data of minimum legible font size for Thai characters that could be used as guidelines for developing the standardization of Thai font size for design fonts on products services and environments for younger and older adults.
1D-5 14:45-15:00	**Inclusive Pre-Departure Travel Service and Experience- Baby Boomers** *Lim Chee Koon*, Koh Wei Eng*** **Temasek Polytechnic* ***Orcadesign Consultants Pte Ltd* This research aims to understand the process and feelings of the baby boomers in Singapore, in order to discover design opportunities to help them plan and prepare for their holiday in a more convenient and enjoyable way. Two design research tools are used: contextual observations and 1-to-1 experience mapping, to gain a better understanding of the baby boomers' needs and issues encountered in their current pre-departure experience. The research findings led to three distinct baby boomers personas in Singapore and a framework of their pre-departure experience is distilled. The outcome presents fresh angles from which services could be enhanced to include baby boomer travellers and provide a enjoyable travel experience for them.
1D-6 15:00-15:15	**Teaching existing homes to be connected** Masi Mohammadi Technical University of Eindhoven, Netherlands The rapid aging and aging-in-place policies of the Dutch population has brought an increase in the demand for suitable dwellings. Literature reviews and qualitative and quantitative empirical studies carried out in a PhD-research (Mohammadi, 2010) have formed the basis of this paper. It seeks to provide information in regards to the development of domotic technology in the living environments of the senior citizens, provide an overview of the multiplicity of the needs and attitudes of the older citizens in regards to smart technology in the domestic environment, and develop recommendations to incorporate domotics in the architectural structure of the

	dwellings, since one of the basic human needs is a house.

1E- Bio-Signal Based Technology
Park C Room
11:00-12:45 hr

1E-1 11:00-11:15	**Electromyography analysis of the upper limb during virtual reality and court tennis serve.** *Rajaratnam B, S., Lim Audrey, Lee Moling M, Sow Kai Leng S, Thyng Keng Chye B, Chandran Chitra, Quek Mei Sing* *Nanyang Polytechnic, Singapore.* **AIM:** This is a pilot study investigating the muscle activation patterns of the upper limb muscles during tennis serve indoors with Virtual Reality games software and rackets (VR) versus outdoor Court Real Time practice (RT). **CONCLUSION:** The results of this pilot study indicate that indoor VR tennis is viable as an alternative for outdoor RT tennis particularly for rehabilitation.
1E-2 11:15-11:30	**Calibration Method for HEG Neurofeedback Device** *Supassorn Rodrak, Supatcha Namtong, Yodchanan Wongsawat* *Mahidol University, Thailand* Attention Deficit/Hyperactivity Disorder (ADHD) is one type of brain disorder suffered by 6.5% of children in Thailand. The well-known method for treating is by using the drugs. However, using drug might lead to some side effects, for example, vomit, dizziness and headache. To avoid these kinds of side effects, neuro feedback is an alternative way for treating ADHD. By maintaining the brain blood oxygenation or hemoencephalogram (HEG) in some specific levels, the patient can efficiently control the target devices. In this paper, we propose the framework for developing the home-made HEG neuro feedback device. The proposed calibration method leads to an alternative treatment. Racing car game is used as the visual and auditory feedbacks for controlling the HEG. Preliminary results illustrate the promising levels of HEG based on the proposed calibration methods.
1E-3 11:30-11:45	**Game-Based EMG Biofeedback System for Muscle Training in the Elderly** *Jindaporn Yaothak , Pornchai Phukpattaranont , Booncharoen Wongkittisuksa* *Hat Yai, Songkhla, Thailand,* This paper presents a game-based EMG biofeedback system for training the tibialis anterior muscle in elderly persons. The strong tibialis anterior muscle can reduce the risk of loss of balance, which causes fall in the elderly. Therefore, the volunteers do the exercise with the tipping toes up method to increase the strength of the muscle. Two biofeedback parameters calculated from EMG signals are a reaction time and an average power. While the reaction time determines the sensitivity of muscle response, the average power evaluates the strength of muscle. The system consists of an amplifier with gain 981, CMRR at 91 dB, and a band-pass filter at the cutoff

	frequency of 50-500 Hz. Sampling frequency was 1000 Hz. After training with the game-based EMG biofeedback system for three weeks, the average power improves approximately 50% in female and 100% in male. In addition, the reaction time reduces to less than 50% in female and to about 25% in male. The quantitative results confirm that the proposed system is capable of improving both muscle strength and muscle sensitivity.
1E-4 11:45-12:00	**Low frequency repetitive transcranial magnetic stimulation to the non-lesioned hemisphere improved paretic arm reach-to-grasp performance after chronic stroke** *Jarugool Tretriluxana*, Allan D.Wu **, Suradej Tretriluxana***, Beth E. Fisher**** Shailesh Kantak***** **Mahidol University, Thailand* ***University of California Los Angeles, USA* ****Institute of Technology Ladkrabang, Thailand* *****University of Southern California, USA* This study is designed as a phase I trial to determine the feasibility and efficacy of low frequency rTMS applied to the non-lesioned hemisphere for the recovery of reach-to-grasp actions in individuals with hemiparesis secondary to stroke. The results have important implications for the use of rTMS in parallel with complex paretic arm skill practice. Conclusions and implications: The findings demonstrate the feasibility and efficacy of low frequency rTMS applied to the non-lesioned hemisphere for the recovery of reach-to-grasp actions in individuals with hemiparesis secondary to stroke. The inhibitory effect of low frequency rTMS resulted in improved paretic hand reach-to-grasp performance with faster movement time and more coordinated reach-to-grasp pattern. These results have important implications for the use of rTMS for stroke rehabilitation.
1E-5 12:00-12:15	**Design and Evaluation of a Picture-Based P300 AAC System** *S. Jirayucharoensak, A. Hemakom, W. Chonnaparamutt, P. Israsena* *National Electronics and Computer Technology Center. Thailand* Brain Computer Interface (BCI) technology enables a new kind of communication that allows human beings to control devices or communicate with others through brain signals. P300 BCI speller [1] has been widely recognized as one of the most powerful applications for brain computer interface communication. However, for users with disabilities, spelling alphabets in P300 is a tedious and exhausting task. We propose a picture-based P300 AAC system that enhances communication speed by using pictures instead of alphabets. Collection of pictures represents regular activities, feelings and phrases in daily usages. In addition, frequently used questions and requests have been provided. All the pictures, represented by using meaningful symbols that users can easily understand, are organized into categories. Six volunteers participated in experiments to compare spelling accuracy and time spending between picture and alphabet-based P300 spellers. Experimental results show that time spent in the proposed picture-based P300 is less than that of the alphabetbased approach significantly but the average value of spelling accuracy in picture-based approach is slightly lower.

1E-6 12:15-12:30	**EMG-based rehabilitation device for upper and lower limb persons with disabilities via bicycle motion** *Kittichai Tharawadeepimuk, Panya Kaimuk, Yodchanan Wongsawat* *Mahidol University, Thailand* Rehabilitation is the significant way that helps stroke patients to regain their normal living by restoring the lost functionality to return to its normal functionality. Currently, there are many ways of rehabilitation. In this paper, the rehabilitation by using Electromyography signal (EMG) from patient to control rehabilitation device is proposed. The type of rehabilitation can be chosen either active assistive rehabilitation or passive rehabilitation. In addition, part of body for the rehabilitation can be chosen either upper limb, lower limb or four limbs simultaneously. The proposed system is easy for the patient to understand and execute. The rehabilitation follows normal physiology of human i.e. starts by developing sensory motor, motor neuron, muscle fiber and muscle respectively. Therefore, the proposed rehabilitation in this paper has advantage to the development of stroke patient.
1E-7 12:30-12:45	**BCI system for upper and lower limb rehabilitation** *Kittichai Tharawadeepimuk, Panya Kaimuk , Yodchanan Wongsawat* *Mahidol University, Thailand* Rehabilitation is important for stroke patients since it helps to regain normal functionality of organs and makes patients able to live normally. This paper emphasizes on the rehabilitation of upper limb and lower limb simultaneously by using the remaining ability of patient with brain computer interface (BCI). This paper proposes rehabilitation device to assist patient for four limb rehabilitation by using hybrid software that detects Electroencephalography signal (EEG) and Electromyography signal (EMG) from patient to control the rehabilitation device. The rehabilitation follows normal physiology of human, i.e. starts by developing sensory motor, motor neuron, muscle fiber and muscle successively. Therefore, the proposed rehabilitation in this paper has advantage to the development of stroke patient with the average accuracy of approximately 80%.

1F- Assistive Technology
13:45-15:15 hr
Park C Room

1F-1 13:45-14:00	**Design of Assistive Technology in Mexico** *Jorge E. Letechipia,, Jorge A. Martínez-Alarcón* . *Universidad Iberoamericana, Mexico* For children with disabilities, the proper recommendation and timely usage of assistive technology (AT) could result in significant improvement of their overall health condition. Two of the most disabling conditions that affect children result from inappropriate postures that they adopt and generally cannot correct by themselves and the lack of communication. In an effort to develop appropriate AT, Universidad

	Iberoamericana, Mexico City, through its Center for Rehabilitation Engineering and Technology (CITeR) embarked in the development of several AT projects. The initial projects included a system to fabricate contoured seating for children and a software based, augmentative and alternative communication (AAC) device. This report presents the development of these two technologies and their preliminary results.
1F-2 14:00- 14:15	**Study on Aural Message Service by Text Coding for Visually Impaired and Blind People** *Kazuo Kamata*, Shunichi Yonemura** **Utsunomiya University, Japan* ***NTT Cyber Solution Labs., Japan* In this paper, we focus on the structure of an aural messaging service system for visually impaired and blind people. The service system provides aural messages as an alternative of visual ones, and consists of certain text-coding software tool and special speech (decoding) device. In usual assistive technology study, we mainly focus upon certain technical device called an assistive device. This is not the case for our aural message service system. The effectiveness of the service system highly depends on the quality of text-coding scheme, and moreover on the recognition of persons who generate an alternative text. We show features of the service system and point out issues that make the system really effective from the viewpoint of use technology, or metatechnology.
1F-3 14:15- 14:30	**An Assessment Instrument to Evaluate Quality of Educational Multimedia for People with Hearing Impairment** *Bkom Limpiphiphatn , Benjaporn Saksiri* *Ratchasuda College Mahidol University, Thailand* The research aimed to design and develop the assessment instrument for evaluating the quality of educational multimedia for people with hearing impairment as the target group to make sure the educational multimedia developed for the target group would be full of quality and effectiveness. The developed assessment instrument was consisted of 10 evaluation frameworks with 66 questions each of questions was evaluated by 5 experts to gain the confidence that it can be measured precisely to the required contents. The questions were conducted through the Index of Item Objective Congruence: IOC then after the improvement process they were tested again and took to Try Out process with the student groups who have similar qualification to the target group.
1F-4 14:30- 14:45	**Head-mounted low vision aid** *Yin Chang, Yen-Gin Lee, Wei-Kung Chao* *National Yang-Ming University, Taiwan, ROC* The purpose of this study is to implement a portable low vision aid using single camera for image capture and with a speed of real time image enhancement processing that can display on a head mount device (HMD) for outdoor activity. We employed the technique of field-programmable gate array (FPGA) to achieve the aim. One of the advantages of FPGA, which is a semiconductor device that can be configured by the designer after manufacturing, is that the calculation for image

	processing is generally done by software in traditional CPU can be replaced by hardware and reduce the processing time. One of the algorithms used in this study is the measurement of one's contrast sensitivity function (CSF) which reflects one s contrast sensitivity with various spatial frequencies from low to high. CSFs of low vision subjects (n=10, VA<0.1) were measured and visual degradation transfer function (VDTF) were obtained while compared to normal (n=30). The subject's spatial frequency domain was divided into 5 bands according to VDTF=0.5, 0.366, 0.233 and 0.1. Gaussian filter with different sizes was applied to the input images which captured by a CCD camera. Gains for enhancement in mid-freq bands were preset with values of 2-10; 1 for high-frequency, and nonlinear compression for low-frequency bands. Enhanced images were simultaneously sent to a pair of HMD with proper image processing.
1F-5 14:45-15:00	**Discussion on the Curriculum of Assistive Technology toward Diploma** *Qilei Tu, Hua Long, Xin Fang, Gaofeng Li, Baolin Xiong* *Beijing Management College for Social Affairs, China* The program of Assistive technology is aiming to prepare students to be able to apply assistive device assessment and service for the physically disabled person, aging people and the person with chronicle illness to reduce dysfunction and improve the quality of life. This article conducts an analysis for current assistive technology provisions, put forward a preliminary plan providing practical reference and inspiration, and stimulates curriculum reform in accordance with future expectation in social needs, assistive technology industry, training, qualification criteria, and corresponding curriculum evaluation system.

1G- Pediatric Rehabilitation
Ballroom A
11:00-12:45 hr

1G-1 11:00-11:15	**Comparison of Body Segmental Kinematic Characteristics between Children with Cerebral Palsy Performing Sit-to-Stand With and Without a Walker** *Puthamaluk Thanapan, Saipin Prasertsukdee, Roongtiwa Vachalathiti* *Mahidol University, Thailand* The study investigated how the subjects, eighteen children with spastic diplegia aged 7 to14 years, attained sit-to-stand (STS). The children were divided into 3 groups: 1) those who could attain STS independently (I-STS), 2) those who could not attain STS independently (D-STS), and 3) subjects from the D-STS group who could successfully STS with the walker (W-STS). The results showed that I-STS had more mean maximum horizontal location of the upper body and knee than the hip. All body segments of D-STS followed the same model as the I-STS group, but they moved with less magnitude than I-STS. W-STS presented both pattern and magnitudes relatively similar to I-STS. Furthermore, I-STS showed the highest mean maximum horizontal velocities of body segments, when compared with the other STS conditions. W-STS performed the mean maximum horizontal velocities of all selected segments close to D-STS did.

1G-2 11:15- 11:30	**Effects of biaxial pencil on writing biomechanics among children in kindergarten and early elementary school years** *Yu-Chun Yu, Hsin-Yi Kathy Cheng, Yan-Ying Ju* *Chang Gung University, Taiwan, ROC* Children's writing posture has been a concern among parents and teachers [1, 2]. Poor writing posture often leads to arm, neck and back pain, scoliosis, kyphosis, fatigue, myopia, and other problems [2-4]. It also affects children's learning [5]. A two-factor repeated measures ANOVA (pencil × trial interval) was performed in this study.; comparing the effects of biaxial pencil and traditional pencil on writing posture and biomechanics. A total of 26 typically developed children participated in this study. The results revealed that, first, for the EMG data of upper extremity musculature, none of the muscles demonstrated statistical significance in pencils and intervals, except for extensor carpi radialis. Second, for the joint and postural angles measured via imaging, the significant differences were found on pencils in variables including shoulder horizontal inclination angle, head horizontal inclination angle, and trunk slant angle. Post-hoc analysis showed significant differences between the regular and biaxial pencils.
1G-3 11:30- 11:45	**Effect of Functional Electrical Stimulation (FES) when combined with gait training on treadmill in children with spastic diplegia** *Sakullertphasuk W., Prasertsukdee S., Suwanasri C., Lertmanorat Z.* *Mahidol University, Thailand* This study used the repeated measure design to investigate the effect of functional electrical stimulation (FES) when combined with gait training on treadmill in children with mildly to moderately spastic diplegia. ***Subjects & methods:*** Seven children with mildly to moderately spastic diplegia were four boys and three girls and aged between 6.12 and 11.46 years old (mean aged of 8.75±2.00 years). They could walk independently and having the gross motor function classification system (GMFCS) at I-II level. The children received 2 conditions of training (gait training on treadmill only and gait training on treadmill with FES). They were trained 2 sessions per week for 6 weeks in each condition and had a rest for a week before the 2nd condition. The ViconTM motion analysis laboratory was used to collect and evaluate the gait parameters before and after each gait training condition.
1G-4 11:45- 12:00	**Usability in Designing Assistive Technology for Children with Learning Disabilities** *Onintra Poobrasert, Alongkorn Wongteeratana* *National Electronics and Computer Technology Center, Thailand* The number of children with learning disabilities is increasing whereas the use of assistive technology is limit. Assistive technology will help increasing ability or adjusting proficiency of children with learning disabilities to learn effectively. Children with learning difficulties gain benefit and comprehend the material better from viewing the text and hearing it read aloud. Hence, it is very important for the researcher to have better understanding of this disability issues. Consequently, this paper obviously is considered on a study to integrate usability testing into the design

	and development of Thai Word Search program. Thai Word Search program assists children with learning disabilities to write any vocabulary that he/she cannot spell it correctly. Children with learning disabilities will just type part of word according to pronunciation or as guessed, the program will display the word approximation or the words for selection that most likely matches the one desired by the children including their pronunciation. Furthermore, the result shows that the program works well on the operating systems such as Windows XP and Windows 7. At present the system evaluation shows the correction's scores of 85% for word approximation search.
1G-5 12:00- 12:15	**Evaluation of a New Digital ALS System for Use in Classrooms of Children with Hearing Disabilities** *Setha Pan-ngum*, Pakawat Dubsok*, Pasin Israsena*** **Chulalongkorn University, Thailand* ***NECTEC, Thailand* The authors have studied and developed a proprietary digitally modulated Assistive Listening System (ALS)[1,2]. The system was designed to be used in a classroom for the hearing impaired students, as it was intended to be a low cost alternative to an existing FM system. It includes one transmitter and up to ten receivers, and operates in a broadcast mode. Frequency shift keying modulation is applied and transmission is via a 2.4GHz free ISM band. The project has progressed through concept and laboratory phase. Recently the first working prototype was completed and functional tests were carried out. The results were compared to a commercial system currently in used in our partner school. Our system is comparable to the commercial system in terms of sound quality, noise tolerance and operating range.
1G-6 12:15- 12:30	**The Study of the pet robot therapy in Thai Autistic children** *Jagkapong Pipitpukdee*, Wantanee Phantachat *** **National Science and Technology Development Agency, Thailand* ***National Electronic and Computer Technology Center1Thailand* The aim of study was feasibility of the pet robot therapy in Thai Autistic children to decreased behavior problem such as the eye contact, tactile defensive, low motivation and communication problem. The data collection pre-test and post-test in 34 autistic children on 10 weeks by CCTV recorder and behavior data sheet. Study in 3 phases, 1) the individual study on 4 week 2) the group study in 3-5 children on 4 week and 3) the study with ADL treatment on 2 week. The result of study found that the pet robot could be increased the communication, eye contact and motivation. Moreover, the result should be developed the pet robot therapy for autistic children.
1G-7 12:30- 12:45	**Comparing Acute Effects of Stretching and Whole Body Vibration in Children with Spastic Cerebral Palsy** *Yung-Wen Tang* *Chun Shan Medical University, Taiwan, ROC* Children with cerebral palsy have many clinical problems, such as muscle weakness, spasticity, and contracture. Has acute stretching or vibration benefits on muscle

	strength, spasticity, and contracture? The purpose of this study was to compare immediate effects on spasticity, muscle strength, flexibility, and range of motion in lower leg between stretching treatment and whole body vibration in children with spastic cerebral palsy. Eleven children with spastic cerebral palsy were randomly assigned to stretching group or whole body vibration group. Results showed that stretching improved contracture and spasticity, but resulted in muscle weakness. Contracture and muscle strength were improved after vibration, without negative effects on spasticity. Vibration is a better choice than stretching to enhance strength.

1H-Rehabilitation Studies
Ballroom A
13:45-14:45 hr

1H-1 13:45-14:00	**Estimation of Knee Joint Moment in Isokinetic Motion** *Yoonsu Nam, Seongnam Kim, Yohan La, Jung Hwan Kim, So-Ra Baek* *Kangwon National University, Korea* This paper provides a knee joint moment estimator using joint angle data and electromyography signals. This estimator will be used for the control of exoskeleton system. In order to accurately predict knee joint moments for the subject, it is necessary to know all muscle parameters, which is nearly impossible. An optimization process is used to determine one's characteristics. The designed algorithm is evaluated as comparison between experimental and estimated data.
1H-2 14:00-14:15	**The evaluation of Sirindhorn National Medical Rehabilitation Centre guideline for prosthetic knee testing** *Daranee Suvapun*, Piyavit Sorachaimetha*, Tawatchai Junsa-ard** *Decha Sittakornkovit*, Pornsuree Onmanee*, Pete Rimchala**, Soraj Sukhonthan**, Jagkapong Pipitpukdee**** **Sirindhorn National Medical Rehabilitation Centre, Thailand* ***Halcyon Metal Ltd., Thailand* ****National Science and Technology Development Agency, Thailand* This study aims to evaluate Sirindhorn National Medical Rehabilitation Centre (SNMRC) guideline. It consists of 5 steps for prosthetic knee test including (1)design and(2) manufacture of the knee, (3)initial mechanical test, (4)clinical tests: a case study and preliminary study in 5 amputees, and (5)submission to the completed tests abroad. This guideline was used to ensure strength and function of the prototypes of the prosthetic polycentric knee joint (X) and its endoskeletal components which were developed in Thailand.. According to the result, the knee version which passed mechanical tests was strong enough to tolerate the forces and moments occurred in the amputees during stance phase. However the test did not reveal the problems occurred during use in swing phase. These are loosening screws, loud terminal impacts, limited range of knee friction and knee extension assist adjustment, and unsteadiness of the joint after a few weeks use. Moreover, there was ceiling effect in LCI measured the prosthetic outcomes.

1H-3 14:15- 14:30	**The Validity of Maximal Oxygen Consumption Measurement for Self-made Wheelchair-driven Exercise Testing System** *Chang Yun-Chi, Lin Chuan-Chao ,Wang Chun-Hou, Chang Hsiao-Yun, Bih Liu-Ing, Yeh Chun-Yu* *Chung Shan Medical University, Taiwan* Maximal oxygen consumption is the most effective index in cardiopulmonary endurance when performed exercise test. The purpose of this study was assessed the validity in maximal oxygen consumption of self-made wheelchair-driven exercise testing system. A crossover design was applied in this study. Eight healthy collegiate males were recruited to join this study (mean height: 171.5±4.8 cm; mean weight: 70.6±8.7 kg; mean age: 20.1±0.8 y/o) and received the measurement of maximal oxygen consumption in exercise test by traditional bicycle ergo meter and self-made wheelchair-driven exercise testing system. The result was showed that the correlation coefficient between two equipments is 0.718 ($p<.05$) and it reflected highly correlation between 2 exercise test system.
1H-4 14:30- 14:45	**The effect of screw fixation type on a modular hemi-pelvic prosthesis: a 3-D Finite Element Model** *Zhixiu Hao*, Chao Wan* , Xiangfei Gao* ,Tao Ji**, Haosen Wang ** **Tsinghua University, China* ***Peking University, China* In this paper, a 3-D finite element (FE) model of human pelvic with a modular hemi-pelvic prosthesis was constructed to study the effect of screw fixation type on the biomechanics of the prosthesis. The results showed that the elimination of the screw far away from the pelvic arcuate line did not induce the instability and stress increase in the prosthesis. On the contrary, some stress in the sustain and acetabular parts decreased by 26.4% and 11.4%, respectively. In conclusion, the optimization of screw fixation can maintain the prosthesis stability and reduced stress concentration on some prosthesis parts. It was deduced that the optimization of the prosthesis could help surgeon reconstruct the pelvic joint function better and diminish the clinical time and cost.

1J- Mixed Reality Rehabilitation
11:00-12:45 hr
Ballroom B

1J-1 11:00- 11:15	**A Convenient Home-based Rehabilitation System for Patients with Paretic Upper-Limb** *Wei Shao, Le Xie, Hailong Yu* *Shanghai Jiao Tong University, China* This paper proposes a convenient home-based rehabilitation training system for upper-limb of paretic patients based on customized computer games. The system has no complex mechanical structure but a single draw wire position transducers, and it is safe and effective for stroke patients doing upper-limb multiple-motion rehabilitation

	due to the unilateral upper extremity spiral-diagonal patterns in PNF. In addition, it is also a candidate for training healthy subjects to perform skillful movements, such as movement control training.
1J-2 11:15- 11:30	**Augmented Reality Based Reaching Exercise for shoulder Rehabilitation** *Yee Mon Aung, Adel Al-Jumaily* *University of Technology, Sydney, Australia* Stroke or cerebrovascular accident (CVA) causes disability and affected the person's quality of life. The rehabilitation therapies are normally conducted for post stroke patients to promote their quality of life and daily living standard. Among rehabilitation exercises, shoulder range of motion (ROM) exercise and muscle strengthening exercise are the most important rehabilitation therapies for post stroke patients as this can improve their activities of daily life. Among the shoulder ROM exercises, the reaching exercise is normally conducted with checkerboard in rehabilitation centre as a traditional therapy which becomes boring after trained for few times. To overcome this problem, same exercise with augmented reality (AR) based game like style incorporate with motivated visual and audio feedbacks has developed and details of the system is presented in this paper. The AR based reaching exercise has developed within the normal average range of motion. The system includes personal computer or laptop, webcam, marker and BioGraph Infiniti system.
1J-3 11:30- 11:45	**Development of Augmented Reality Rehabilitation Games Integrated with Biofeedback for Upper Limb** *Yee Mon Aung, Adel Al-Jumaily* *University of Technology, Sydney, Australia* This paper presents the development of low –cost motivating webcam colour based visual tracking augmented reality (AR) system with biofeedback for upper-limb post stroke rehabilitation therapy. Augmented Reality is a novel form of human-computer interface which overlay the computer-generated information on the real world environment rather than replaces it. In the developed AR system, two games; Ping Pong Rehab (PPR) and Balloon Collection Rehab (BCR) are created based on game design principle. Both games have been built and integrated with Biograph Infiniti software to monitor the muscles' performance. The integrated system will obtain the biofeedback EMG signals from patients that will be utilised for future developments. It allows the patients to monitor their arms and muscles movements in real time on the display screen via low-cost webcam.
1J-4 11:45- 12:00	**Self-Rehabilitation based on User Interactive Environment** *Chethasi Kaluarachchi, Adel Al-Jumaily* *University of Technology, Sydney, Australia* This paper aims to provide effective and active rehabilitation for patients suffering from upper limb that a slight or partial paralysis, using gaming based a therapy technique. By disguising the tasks into more entertaining, patients are motivated to train for longer and more frequently. The advantage of this system can be a self-

	managed, at-home therapy system; reducing fatigue for physical therapists, and the time required for therapist patient sessions. The system incorporates a virtual reality (VR) environment displaying both the games and a human model as feedback of the patients' actions whilst playing the games. Two games were developed; Whack-a-Mouse, and Rolly games, each targeting improvement of muscle strength, control, accuracy and speed. The difficulty of the games can be varied to suit a number of impairments and patient progress is monitored. The games are played using a Nintendo Wii controller.
1J-5 12:00- 12:15	**Wii-Rehab to enhance balance among patients with stroke.** *Rajaratnam B, S., Tim Xu TianMa, Su Yunfeng , Wilson Woo Ying Howe, Elsa Ang Yi Hsia, Teo Siao Ting Sharlene , Ng Keat Hwee* *Nanyang Polytechnic, Singapore* Background & Aim: The aim of this study was to determine effects of incorporation of the Wii Fit with conventional stroke rehabilitation (Wii-Rehab) on the dynamic balance of sub-acute stroke patients than with conventional rehabilitation alone. Conclusion: Wii Rehab to improve dynamic balance of sub-acute stroke patients is feasible and provides patient and therapist with an alternative treatment option.
1J-6 12:15- 12:30	**Effects of Virtual Reality Games with Physiotherapy on Balance of Children with Cerebral Palsy** *Chung Hai Yong*, Roxanne Foo Miao Wei*, Michelle Koh Aimei*, Poh Yanting*, Chua Pei Shan*, Michelle Ng Yoke Leng*, D. Senthil Kumar*** **Nanyang Polytechnic, Singapore* **Cerebral Palsy Centre, Singapore Background & Aim: Studies on virtual reality (VR) rehabilitation on children with cerebral palsy (CP) showed improvements in upper extremity skills and functions. However, VR's effects on the balance have not been well studied. The aim of the project was to investigate the additional effects of VR to conventional physiotherapy. Conclusion: VR may be utilised to improve balance in CP children. It is fun to use, interactive and encourages participation from the children. A larger trial with higher dosage of Wii games is needed before a definitive conclusion can be reached.
1J-7 12:30- 12:45	**Augmented Reality Gaming for Rehab@Home** *Alex Toh, Li Jiang, Eng Keong Lua* *Nanyang Polytechnic* Augmented reality (AR) has been the topic of intensive research in the last decades. Beside the gaming and entertainment industry, medical engineering determined the potential of AR for being applied to preoperative diagnoses, intraoperative navigation and interactive rehabilitation. AR has the potential to improve the quality of rehabilitation by providing patients with interactive three-dimensional visualization in all phases of recovery exercise. We proposed the design and development of entertaining, engaging and fun AR games in our Rehab@Home system to challenge and motivate stroke patients to practice functional movement anytime and anywhere while under the supervision of a Virtual Therapist.

Workshops (Day 3- 23 July 2011)

W-1: Innovation and Entrepreneurship in Rehabilitation Workshop

09:00-12:30hr
Park A Room, Ground Level

Dr Bala S RAJARATNAM has extensive teaching and presentation experiences. He conducted a workshop at iCreate 2007 in Singapore. He is the inventor of a novel and patent product that has been commercialized and he has successfully secured numerous grants. As Manager/Projects at Nanyang Polytechnic, he is actively involved in innovation development, protection and licensing of intellectual property.

Mr Dinesh VERMA, PT, MBA has successfully established companies in the field of rehabilitation products and clinical services under V 2 U Healthcare Pte Ltd. He was awarded the Leading Indian Entrepreneur of the Year 2009. Dinesh has spoken at various professional congresses on Entrepneurship in Physiotherapy and motivated many professionals.

Synopsis

Disability requires a new way of thinking - developing novel and innovative products. Do you know that AT-related professional have invented a detachable seat that can be attached to any walking aid for patients with mobility and cardiac dysfunction to be community safe, inventions to measure the quantify of touch sensitivity in the hand? This workshop is targeted at budding inventors to understand the intellectual protection process to patents, trademarks, design and copyright their inventions, how to secure funds to develop a market ready prototype and commercialise their inventions to benefit the masses.

W-2 - A Hands-on Experience with Interface Pressure Mapping

13:30-17:00hr
Park A Room, Ground Level

Professor Stacey is a vascular surgeon. He established a unique research group for wounds at Fremantle Hospital. He is the inaugural President of the Australian Wound Management Association and the founding President of the International Union of Wound Healing Societies. He is the lead chief investigator on a 1.6 million dollar grant awarded by the National Health and Medical Research Council in Australia with the goal of developing a risk assessment for sitting-acquired pressure ulcers following spinal cord injury. This study incorporates the use of interface pressure mapping.

Associate Professor Jillian Swaine is an occupational therapist who worked in Canada for 25 years. She immigrated to Australia in 2006 where she is an Associate Professor in the School of Surgery at University of Western Australia. Her research interests are in the factors associated with the development of sitting-acquired pressure ulcers in individuals with spinal cord injuries and their prevention. She is a chief investigator on a 1.6 million dollar grant awarded by the National Health and Medical Research Council in Australia. This study incorporates interface pressure mapping. In addition, she is a chief investigator on a study using interface pressure mapping as an education tool for pressure ulcer prevention.

Synopsis

Interface pressure mapping (IPM) has been used clinically in some countries as part of the wheelchair seating assessment. This presentation will provide the evidence for using IPM, briefly describe the international clinical protocol and provide case examples of using interface pressure mapping. This is a hands-on workshop where a portable IPM system will be demonstrated for a number of applications: (1) to compare wheelchair cushions and sleep surfaces for a specific individual; (2) to confirm pressure relief techniques such as leaning forward/side to side, tilt and recline; (3) to provide compensatory visual feedback to clients who lack sensation; (4) to monitor interface pressure after muscle flap surgical repair of a pressure ulcer; and (5) to confirm the proper inflation of an air-filled wheelchair cushion. Interface pressure mapping is a useful tool in high risk populations such as spina bifida, spinal cord injuries and for individuals who are in ICU, during surgery and on palliative hospital units.

W-3: Establishing an Early Augmentative and Alternative Communication Vocabulary Workshop

09:00-12:30hr
Park B Room, Ground Level

Professor Katya HILL, Associate Professor, University of Pittsburgh Department of Communication Science and Disorders, USA obtained a Ph.D. in Rehabilitation Sciences and Technology at the University of Pittsburgh. Prof. Hill teaches classes and lectures on Augmentative and Alternative Communication (AAC) assistive technology (AT) in the School of Health and Rehabilitation Sciences. As a Speech-Language Pathologist, she has over 30 years of AAC and AT clinical experience and her research has been in the area of AAC language activity monitoring, performance measurement, and evidence-based practice.

Synopsis

Vocabulary selection and organization has been central to making AAC educational and clinical decisions. Research evidence points to the importance of introducing children early to a "core" vocabulary. Although several AAC systems have been marketed as supporting core vocabulary, examination of the software shows a wide range of how the displays have been organized to provide access to pre-stored vocabularies. A principled approach to evaluating the potential effectiveness of pre-stored vocabularies and displays (the user interface) can be used to guide decision making. AAC teams targeting vocabulary based on the three (3) transitions of language acquisition have a systematic procedure for building language and literacy competence. By applying evidence-based interventions that correspond to each transition children are able to achieve the greatest gains in overall communication competence and school success.

W-4: Developing Stimulus Fading Strategy Materials for Children with Reading Difficulty

13:30-17:00hr
Park B Room, Ground Level

Dr Felina P. Espique is involve in training regular, special education and student teachers in integrating ICT in their pedagogy through the Intel Teach and WorldLinks program. She handles professional education subjects that are research and ICT-based. She teaches special education subjects since she is a graduate of MASPED and PhD in Language Education. She has been serving as a research adviser of thesis and dissertation writers in the field of Language and Special Education. At present, she is the Department Head of the Professional Education Department of the School of Teacher Education, Saint Louis University, Baguio City, Philippines.

Synopsis

Participants in this workshop will be led to a series of computer hands-on activities and intellectual exercises that seek to develop stimulus fading strategy (SFS) materials that will be utilized in teaching word recognition to children who have reading difficulty. To develop SFS materials, digital photographs and texts will be manipulated by the participants using Adobe Photoshop. To employ stimulus fading strategy, the images will be loaded into a morphing program, Squirlz, from open source downloadable software. From creating presentations with CVC words to creating presentations with CVCC words, this workshop is non-stop engaging.

*Note: Please bring your own laptop

W-5: Assistive Technology Fundamental Workshop

09:00-15:00hr
Park C Room, Ground Level

Mr. Ronny THAM, Senior Manager of Singapore Polytechnic Centre for Applications in Rehabilitation (SP CARE), He manages the Singapore Polytechnic Centre for Applications in Rehabilitation (SP CARE) since 2004 and started the Assistive Technology (AT) Centre in 2006. In 2004, SP CARE was awarded the Samsung DigitAll Hope Award for the development of assistive devices for people with special needs. He has been conducting lectures, training in assistive technology and rehabilitation for students as well as for therapist, engineers and practitioners of AT. His area of specialty is in mobility training and assessment. He brings with him many years of working experience with clients of different disabilities.

Synopsis

This workshop is designed to cover the basic principles for assistive technology (AT) application including needs identification, characteristics of technologies (for mobility and seating, computer access, environment control, and recreation etc.) available to meet client needs, AT service delivery process, and evidence-based practice in AT provision. Throughout the workshop, case studies will be used to illustrate applications of principles and theories in assistive technology provision. Attendees will also be divided into groups to work on a case project where they will be asked to complete AT assessments and present recommended AT solutions.

W-6: Rehabilitation and Assistive Robotics Workshop

15:30-17:00hr
Park C Room, Ground Level

Assistant Professor ANG Wei Tech, PhD (Robotics, CMU) School of Mechanical & Aerospace Engineering, Nanyang Technological University, Singapore. Prof Ang teaches Rehabilitation Engineering at the postgraduate level and performs research in assistive and rehabilitation technology. He is an active advocate for using technological solutions for people with special needs.

Synopsis

This workshop introduces the state of the art robotics research in rehabilitation and assistive applications. The content is designed for robotics technology researchers, healthcare professionals, end users, and anyone interested in the field.

W-7: Workshop on Language, Brain, and Technology

09:00-17:00hr
Ballroom A, Ground Level

Dr Puttachart Potibal has got a Ph.D.in Linguistics, specialized in Phonetics, Phonology, and Comparative and Historical Linguistics. At present she is the chair person of Linguistic Department, Kasetsart University, Bangkok Thailand. Her working experience includes lecturer in Prince of Songkla University, Pattani, and Silpakorn University, Nakorn Pathom, Thailand, and Hankuk University of Foreign Studies, Seoul, Republic of Korea. In last few years, she has spent her interest in dyslexia and does researches in linguistics applied to support the research and development of assistive technology for people with learning disabilities.

Ms Wantanee Phantachat is a well-known researcher in assistive technology and AAC in Thailand. Her background in linguistics and language technology brings to her the deep understanding in research and development of technology for augmentative and alternative communication.

Dr Montri Phothisonothai, has got a Ph.D. in Information and Control Engineering from Nagaoka University of Technology, Japan in 2008. Currently, he has been working as lecturer at the College of Research Methodology and Cognitive Science (RMCS), and also as the director of the Centre of Excellence in Cognitive Science (CECoS) Burapha University, Chonburi, Thailand. His research interests are Cognitive science, EEG signal processing, Brain-machine interface, and Neuro-education.

Synopsis

This workshop recruits various persons involved with cases of autism, cerebral palsy, and learning disabilities in Thailand. The objectives of this workshop focus on sharing experience in case study of symptoms as mentioned. The presenters will provide us their valuable knowledge relevant to assessment, treatment, therapy, teaching, linguistic analysis, and integration of technology. Moreover, the workshop aims to offer opportunities to build up the collaboration among the researchers.

W-8: Non-invasive Brain Stimulation: Fundamental Method and Practice

09:00-17:00hr
Ballroom B, Ground Level

Dr. Jarugool TRETRILUXANA is a full time assistant professor at Faculty of Physical Therapy, Mahidol University, Thailand. She completed a certification for the Transcranial Magnetic Stimulation course from Neuroplasticity and Imaging Laboratory, University of Southern California, Los Angeles, USA. She is a director of Motor Control and Neural Plasticity Laboratory.Her expertise is in motor control and learning and neurological physical therapy and measuring brain plasticity using TMS.

Dr. Thawatchi KRISANAPRAKORNKIT currently works at the Mind Brain Clinic, Bangkok, Thailand. He was a full time associate professor and psychiatrist at the Department of Psychiatry, Faculty of Medicine, Khon Kaen University, Thailand. He finished an intensive course in Transcranial Magnetic Stimulation from Berenson-Allen Center for Noninvasive Brain Stimulation, Boston, USA. He is a founder of Depression Clinic using Transcranial Magnetic Stimulation and Transcranial direct current stimulation and a co-founder of Non-invasive Brain Stimulation research group at Khon Kaen University.

Synopsis

This hands-on workshop will provide participants with in-depth exposure of how to use non-invasive technologies to measure and stimulate brain activities. Technologies that participants will be exposed include Transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS). Area of exposure in this workshop will be (1) physiology of TMS and tDCS, (2) various TMS measures, (3) an application of repetitiveTMS and tDCS for neuropsychiatry and neurorehabilitation and (4) the preparation of equipments and TMS techniques. The session will start with lectures in the morning, hands-on experience in the afternoon, and finish with discussion.

Authors Index

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Bangkok, Thailand • July 21-23, 2011

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