



the 13th

International Convention on Rehabilitation Engineering and Assistive Technology

Convention Handbook

26-29 August 2019 | National Convention Centre | Canberra, Australia

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Welcome address from the conference Co-Convenors

On behalf of CREATE Asia, Assistive Technology Australia and the New Zealand Federation of Disability Information Centres, we welcome delegates to Canberra, Australia and to Ngunawal Country for i-Create 2019, the 13th International Convention on Rehabilitation Engineering and Assistive Technology.

Assistive Technology Australia and the New Zealand Federation of Disability Information Centres are extremely proud to be co-hosting i-CREATE 2019 as a trans-Tasman collaboration. We hope you all benefit greatly from the knowledge shared and the opportunity to meet with colleagues from around the world. We believe there is something for everyone within the conference programme which encompasses the five objectives of the World Health Organisation Global Assistive Technology Collaboration (GATE).

We are especially delighted to welcome the Global Student Innovation Challenge (gSIC) teams, our colleagues and talent bank of the future, and invite them to participate fully in the conference.

CREATE Asia is once again honoured to be welcoming HRH Princess Maha Chakri Sirindhorn, Kingdom of Thailand, and is very grateful for her time, effort and continued support.

A special thanks to our wonderful team of volunteers and our conference organisers, Kaigi Conferencing and Events.



Robyn Chapman



Karen Beard-Greer

Welcome from CREATE Asia President, Hongliu Yu



Welcome to the 13th International Convention on Rehabilitation Engineering and Technology (i-CREATE 2019). Despite a chill of August in Canberra, i-CREATE 2019 will be a warm gathering. As the current president of CREATE Asia, on behalf of our council, I would like to express our heartfelt thanks to all the experts and colleagues attending i-CREATE 2019. I also want to thank the conference co-chairs Ms Robyn Chapman, Assistive Technology Australia and Karen Beard-Greer, NZ Federation of Disability Information Centres for their hard and fruitful work for i-CREATE 2019. We would also like to thank H.R.H. Princess Maha Chakri Sirindhorn of Thailand for her continued support to CREATE Asia and i-CREATE.

In 2015, in Singapore, the Coalition of Rehabilitation Engineering and Technology, Asia (CREATE Asia) was formally established by the signing of a Memorandum of Agreement in the presence of H.R.H. Princess Maha Chakri Sirindhorn. It is expected that CREATE Asia will lead the industry of assistive products to a new historic era and stage through the efforts made by all the members of CREATE Asia.

The year of 2019 will be the fourth year after the founding of CREATE Asia, and the 13th year after the first i-CREATE being successfully held in 2007. In the past few years, CREATE Asia and its members have experienced a significant and praiseworthy development. We welcome our friends and colleagues to join this glorious event again in Canberra, and to share the information and knowledge about the most recent developments of assistive technology in Australia and all over the world. Let's work together to make i-CREATE 2019 one of the unforgettable conferences.

Prof. Hongliu YU

- President of Coalition of Rehabilitation Engineering and Technology, Asia (CREATE Asia)
- Director of Institute of Rehabilitation Engineering and Technology, University of Shanghai for Science and Technology (USST)
- President of Shanghai Engineering Research Center of Assistive Devices

Acknowledgement of Ngunawal Traditional Custodians

We pay respect to the Ngunawal traditional custodians and their ancestors, and to the continuing cultural, spiritual and religious practices of Aboriginal and Torres Strait Islander people.

An accepted customary cultural practice for thousands of years, it is protocol to make welcome visitors whom are gathering on the Ngunawal peoples' traditional Country.

We wish to acknowledge and respect their continuing culture.

About i-CREAtE 2019

Into its 13th year, i-CREAtE continues to provide an International platform of conference, Global Student Innovation Challenge, and exhibition featuring innovative technology, equipment, applications, techniques and materials applied in the field of Assistive & Rehabilitative Technology. It is also a stage for technical exchanges to share ideas and best practices in the disabilities field from around the world.

About CREAtEAsia

The **Coalition on Rehabilitation Engineering and Assistive Technology, Asia** (CREAtEAsia) is an alliance of agencies across Asia, interested in promoting the development, provision and use of assistive technologies across the Asia Pacific region.

Through initiating and leading the i-CREAtE Conferences since 2007, Singapore and Thailand, with other Asian organisations, were able to identify a regional need for communication and collaboration within the broader AT delivery system. An alliance was loosely formed at i-CREAtE 2013 in Korea and the work commenced: creating the aims and objectives of a formal alliance.

The alliance was formalised by the signing of a Memorandum of Agreement in the presence of HRH Princess Maha Chakri Sirindhorn of the Kingdom of Thailand during the i-Create conference in Singapore in 2015.

During 2018, the alliance became a registered entity in Australia, and this is proudly sponsored by Assistive Technology Australia. Members of the alliance are diverse and come from the states of Singapore, Thailand, Malaysia, China, Taiwan, Hong Kong, South Korea, Japan, Papua New Guinea, New Zealand and Australia.

Special Guest of Honour

i-CREAtE 2019 is excited to welcome
Special Guest of Honour, Her Royal Highness,
Princess Maha Chakri Sirindhorn,
Kingdom of Thailand to i-CREAtE 2019.



i-CRETe International Organising Committees

Host Organisers

- Coalition of Rehabilitation Engineering and Assistive Technology, Asia (CREATE Asia)
- Assistive Technology Australia
- NZ Federation of Disability Information Centres

Local Organising Committee

- Karen Beard Greer (NZ Federation of Disability Information Centres)
- Karen Frost (Independent Living Centre Tasmania)
- Carol Wood (NZ Federation of Disability Information Centres)
- Scott Ambridge (NZ Federation of Disability Information Centres)
- Prof Andrew McDaid (Auckland University, NZ)

General Chairs

- Robyn Chapman (Chief Executive Officer, Assistive Technology Australia)
- Karen Beard-Greer (Executive, NZ Federation of Disability Information Centres)

General Co-Chair

- Hongliu Yu (University of Shanghai for Science and Technology, China)

Advisory Committee

- Chapal Khasnabis (World Health Organization, WHO)
- Friedbert Kohler (HammondCare, Australia)
- Guoen Fang (Chinese Science and Technology Development Agency in Thailand, Thailand)
- Robert Reiner (ETH Zurich, Switzerland)
- Wei Tech Ang (Nanyang Technological University, Singapore)

Scientific Program and Editorial Committee Chairs

- Michael Nilsson (University of Newcastle, Australia)
- Wei Tech Ang (Nanyang Technological University, Singapore)

Scientific Program and Editorial Co-Chairs

- Takenobu Inoue (National Rehabilitation Center for Persons with Disabilities, Japan)
- Wen-Ming Chen (University of Shanghai for Science and Technology, China)
- Nur Azah Binti Hamzaid (University of Malaya, Malaysia)

Workshop Chairs

- Karen Beard-Greer (NZ Federation of Disability Information Centres)
- Shih-Ching Chen (Taipei Medical University, Taiwan, China)
- Wantanee Phantachat (National Electronics and Computer Technology Center, Thailand)

SIC Chairs

- Duojin Wang (University of Shanghai for Science and Technology, China)
- Simon Wong (Hong Kong Occupational Therapy Association, Hong Kong, China)
- Jawn Lim Tze-Hin (Singapore Institute of Technology, Singapore)
- Olivier Lambercy (ETH Zurich, Switzerland)

Publicity Chairs

- Carol Wood (NZ Federation of Disability Information Centres)
- Jung Kim (Korea Advanced Institute of Science and Technology, South Korea)
- Shih-Ching Chen (Taiwan Rehabilitation Engineering & Assistive Technology Society, Taiwan, China)
- Wantanee Phantachat (National Electronics and Computer Technology Center, Thailand)

Scientific Program Committee

- Andrew McDaid, (Auckland University, NZ)
- Chih-Wei Peng (Taipei Medical University, Taiwan, China)

- Dohyung Lim (Sejong University, Taiwan, China)
- Ettien Burdet (Imperial College London, UK)
- Jasmy Yunus (Universiti Teknologi Malaysia, Malaysia)
- Jiro Sagara (Kobe Design University, Japan)
- Jue Wang (Xi'an Jiaotong University, China)
- Kaspar Althoefer (Queen Mary University of London, UK)
- Ming Zhang (The Hong Kong Polytechnic University, Hong Kong, China)
- Olivier Lamberg (ETH Zuerich, Switzerland)
- Peter Vee-Sin Lee (University of Melbourne, Australia)
- Ping Shi (University of Shanghai for Science and Technology, China)
- Rachel MacDonald (Swinburne University, Australia)
- Renzo Andrich (Centre for Innovation and Technology Transfer/IRCCS Fondazione Don Carlo Gnocci, Italy)
- Sarun Sumriddetchkajorn (National Electronics and Computer Technology Center, Thailand)
- Shih-Ching Chen (Taiwan Rehabilitation Engineering & Assistive Technology Society, Taiwan, China)
- Takenobu Inoue (Research Institute of National Rehabilitation Center for Persons with Disabilities, Japan)
- Wen-Ming Chen (University of Shanghai for Science and Technology Center, Thailand)
- Yodchanan Wongsawat (Mahidol University, Thailand)
- Bong-Keun (Andrew) Jung (Seoul National University, Korea)

Student Innovation Challenge (SIC) Judges

Chief Judge:

- Simon Wong (Hong Kong Occupational Therapy Association, Hong Kong, China)

Judges:

- Kavin Karunratanakul (National Electronics and Computer Technology Center, Thailand)
- Piyawut Srichaikul (National Electronics and Computer Technology Center, Thailand)
- Ta Chieh (Jerry) Hsu (Taiwan Rehabilitation Engineering & Assistive Technology Society, Taiwan, China)
- Russell Hayes (Independent Living Charitable Trust, New Zealand)
- Fiona Given (Assistive Technology Australia)
- Dennis Lo (Independent Living Centre Tasmania, Australia)
- Mitsura Iri (Japan)

Secretariat:

- Vera Yang (Singapore Therapeutic, Assistive & Rehabilitative Technology (START) Centre, Singapore)
- Sarinya Chompoobutr (National Electronics and Computer Technology Center, Thailand)

Supported by the members of CREATE Asia:

- Assistive Technology Australia (AT Aust)
- Australian Rehabilitation Assistive Technology Association (ARATA)
- China Association of Assistive Products (CAAP)
- Hong Kong Occupational Therapy Association (HKOTA)
- Hyogo Institute of Assistive Technology (HIAT) / Hyogo Rehabilitation Center (HRC)
- Independent Living Centre Tasmania (ILC Tas)
- Korean Association of Assistive Technology Professionals (KAATP)
- National Department of Health, Papua New Guinea
- National Science and Technology Development Agency, Thailand (NSTDA)
- NZ Federation of Disability Information Centres
- START Centre, Singapore (START)
- Taiwan Rehabilitation Engineering and Assistive Technology Society (TREATS)
- Technological University of Malaysia (UTM)
- University of Shanghai for Science and Technology (USST)
- Rehabilitation Engineering Society of Japan (RESJA)

General Information



About Canberra

Canberra is a city full of brilliant possibilities. Ranked as the world's most liveable city and region, Canberra offers a quality of life incomparable to anywhere else.

While this evolving capital city may be better known as Australia's political hub, it's also the place to discover Australia's stories through an array of national attractions that hold and tell the nation's story. Canberra's food scene is red hot and its people laid back. Discover a thriving local arts scene, a city with an abundance of outdoor activities, emerging precincts and plenty of family friendly attractions that both entertain and educate.

Getting around Canberra

By Bus

Canberra's public bus service, ACTION Buses, covers the major sights and most suburbs. Pick up a bus map and timetable from bus interchanges in the City, Belconnen, Woden and Tuggeranong. For more information, call 13 17 10 or visit action.act.gov.au

Free Culture Loop bus

Ride the free Culture Loop bus to 10 attractions. Operating daily from 9am to 5pm, you can park once and ride all day for free. The Culture Loop stops include Parliament House, Museum of Australian Democracy, National Library of Australia, Questacon, National Museum of Australia, National Capital Exhibition and the Canberra and Region Visitors Centre, National Film and Sound Archive, Canberra Museum and Gallery and the Canberra Centre.

From the airport

Catch the Airport Express bus from the airport to the City, stopping at the National Convention Centre (\$12 one way). For more information, call 1300 368 897 or visit royalecoach.com.au

By Taxi

- **Canberra Elite Taxis:** Call 02 6126 1600 or 13 22 27 to book. Alternatively SMS your name, pickup address and time to be collected to 0417 672 773
- **Cabxpress:** Call 1300 222 977 or 02 6181 2700 to book.
- **Accessible taxi service:** 02 6126 1596

By Light Rail

Canberra's Light Rail Network, including stops and vehicles, is fully accessible and complies with the Disability Standards for Accessible Public Transport 2002. Services run every 6 minutes during peak times, and every 10-15 minutes outside peak times. Tickets can be purchased (and MyWay cards recharged) at the vending machines available on every platform.

Emergency information

For all emergencies, call 000 immediately

Local Hospitals and GPs

- Canberra Hospital, Yamba Drive, Garran ACT 2605 (02) 6244 2222
- Calvary Hospital Corner Belconnen Way and Haydon Drive, Bruce, 2617, (02) 6201 6111
- [After hours GP](#): Home visits from 6pm weeknights 13 SICK (13 74 25)

Police Stations Police attendance number: 13 14 44

Nearby Pharmacies

- City Market Chemist, 1 Bunda St (in the Canberra Centre) Open 08:00–19:00 weekdays
- Chemist on Northbourne, Cnr Northbourne and Alinga St Open 08:00–23:00 every day

i-CREAtE 2019 Gala Dinner



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The i-CREAtE Gala Dinner is included for Full Registration types and will be held in the spectacular Great Hall at Australian Parliament House. This is one of Australia's premier and exclusive venues. Graced with grand artwork and striking architecture the Great Hall is sure to enhance the i-CREAtE delegate experience.

Special Guest of Honour, Her Royal Highness, Princess Maha Chakri Sirindhorn, Kingdom of Thailand will present the Gold, Silver and Bronze Global Student Innovation Challenge (gSIC) awards to the successful teams.

Dress Code: Smart business attire

Dinner Tickets: Individual tickets to the Gala Dinner are available for purchase for delegates and gSIC students and teams that do not have a full delegate registration.

Individual ticket cost is AUD\$150.

Conference Venue



National Convention Centre Canberra (NCCC)

31 Constitution Avenue, Canberra

Registration and Information Desk

All attendees to i-CREATe 2019 must collect a name badge and conference materials from the Registration and Information Desk, located in the Ground Floor foyer at the NCCC.

Opening Hours

Monday 26 August 08:00-18:00 | Tuesday 27 August 08:00-17:00 | Wednesday 28 August 08:00-15:30
Thursday 29 August 0700-1500

Contact

Please do not hesitate to contact us if there is any way we can assist you; 0488 445 029

Meals and Catering

Morning tea, lunch and afternoon tea (as designated in the conference program) is provided in the Ballroom on Level 1. Meal coupons are required. Attendees with full or day registration categories will be provided with meal coupons at the registration and information desk.

Special dietary requirements are catered for at a designated catering station. Please contact us if you need assistance.

Presenters at i-CREATe 2019

The Speakers Preparation Room is located behind the Registration and Information Desk in the ground floor foyer. All presentation slides must be uploaded in this room at least one hour prior to your session. A technical staff member is available to assist you. Please note that powerpoint slides must be 16:9 orientation.

Speaker preparation room opening hours

Monday 26 August 08:00-17:00 | Tuesday 27 August 08:30-17:00 | Wednesday 28 August 08:30-15:30
Thursday 29 August 08:30-15:00

Wi-Fi

NCCC offers complimentary Wi-Fi for all i-cREATe 2019 attendees.

About our sponsors

Principal Sponsor



For more than 40 years, Assistive Technology Australia (AT Aust) has been a leading provider of impartial information and advice and referral on assistive technology and the built environment. Our clients are people with disability, seniors, carers, service providers, allied health professionals and the community.

We provide our information services directly, or indirectly through the data base, @Magic, and advisory publications on the website www.at-aust.org.

AT Aust is also a Registered Training Organization providing competencies related to AT and the built environment: Cert IV in Assistive Technology Mentoring, Diploma in Access Consulting and competencies related to Home Modifications. AT Aust also provides non-competency based training areas of AT.

AT Aust is the only non-EU full partner of the Global Assistive Technology Information Network, providing one of 7 databases to this search global portal www.eastin.eu

AT Aust is also a member of the Coalition of Rehabilitation Engineering and Assistive Technology, Asia.

AT Australia is registered as a charity with the ACNC and receives funding from the NSW Department of Family and Community Services and the Australian Department of Health and Ageing.

All Plenary Sessions of i-CREAtE 2019 have been proudly sponsored by:

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Independent Living Charitable Trust distributes both these products in New Zealand and Australia, you can find out more at the Hubscrub stand or email Justin Williams at justin@ilsnz.org

Conference Program at a glance

Monday 26 August

08:30 - 10:00	gSIC Teams registration and briefing	
10:00 - 10:30	Morning tea	Ballroom Gallery Foyer
10:30 - 13:00	gSIC Oral Presentations	
	Technology Oral Presentation	Fitzroy/Derwent Rooms
	Design Oral Presentation	Murray Room
13:00 - 13:30	Lunch	Ballroom Gallery Foyer
13:30 - 17:00	gSIC Oral Presentations	
	Technology Oral Presentation	Fitzroy/Derwent Rooms
	Design Oral Presentation	Murray Room

Tuesday 27 August

09:00 - 10:30	Conference Opening & Plenary Session One	Royal Theatre
10:30 - 11:00	Morning tea	Ballroom
11:00 - 13:00	Plenary Session Two	Royal Theatre
13:00 - 13:30	Lunch	Ballroom
13:30 - 15:00	Concurrent Sessions One	
15:00 - 15:30	Afternoon tea	Ballroom
15:30 - 17:00	Concurrent Sessions Two	

Wednesday 28 August

09:00 - 10:30	Plenary Session Three	Royal Theatre
10:30 - 11:00	Morning tea	Ballroom
11:00 - 13:00	Plenary Session Four	Royal Theatre
13:00 - 13:30	Lunch	Ballroom
13:30 - 15:00	Concurrent Sessions Three	
17:30 - 22:00	i-CREAtE 2019 Conference Gala Dinner	Great Hall, Australian Parliament House

Thursday 29 August

07:30 - 17:00	Technical Tour - Sydney	
08:00 - 13:30	Technical Tour - Canberra	
09:00 - 10:30	Plenary Session Five	Royal Theatre
10:30 - 11:00	Morning tea	Ballroom
11:00 - 13:00	Concurrent Sessions Four	
13:00 - 13:30	Lunch	Ballroom
13:30 - 15:00	Concurrent Sessions Five	
15:00 - 15:30	Afternoon tea	Ballroom
15:30 - 16:00	Plenary Session Five	Royal Theatre

Conference Program

Monday 26 August 2019		
08:00-08:30	gSIC registration	National Convention Centre registration desk
08:30-09:00	gSIC teams briefing	Bradman Theatre
09:30-13:00	Judges Meeting	Executive Room
10:00-10:30	Morning tea	Ballroom Gallery foyer
10:30-13:00	gSIC Presentations	
	gSIC Technology Oral Presentations Chair: Karen Frost; Felix Lin Fitzroy / Derwent Rooms	gSIC Design Oral Presentations Chair: Cath Crispin Murray Room
10:30-10:45	 Dylan Chua Yue Heng, Ang Guo Zheng Frederick Temasek Polytechnic T01 - Smart ulcer prevention system for wheelchair users	 Kwok Ka Wing, Cheung Yuen Wah, Lau Alan, Lo Hiu Hung The Hong Kong Polytechnic University D01 - PALnel
10:45-11:00	 Hu Jiajun, Zhang Zhiyao, Quek Yee Shuan Angela Nanyang Polytechnic in Singapore T02 - AvTant - Development of assistant auditory - verbal therapy based speech recognition and graphic feedback correction with gamification	 Chamus Chew Yat Weng, Thaddeus Tang Rui En, Ethan Lim Zeng Hao Nanyang Polytechnic Singapore D02 - Hemiplegic Shoulder Rehabilitation Station
11:00-11:15	 Yuen Chik Hang, Wong Shing Fung, Chan Long Yin, Chan Tsz Hin, Choi Wing Yee City University Hong Kong T03 - Low-cost central timing system for rehabilitation centres	 Jaomai Tungsiripat, Korn Hemrungronj, Kullanat Tovikkai, Marjimar Suvivhasopon, Supitchaya Hemrungronj Chulalongkorn University Demonstration Elementary School D03 - Esi bag: Emergency safety intelligence bag
11:15-11:30	 Yannawat Wiriyakangsanon, Thanatat Pronpraserd, Teerameth Rassameecharoenchai, Warachaya Veranonchai, Wisanu Jutharee King Mongkut's University of Technology Thonburi (KMUTT) T04 - Bliss robot assisting Autism therapy at home	 Guan-Jie Huang, Hsin-Yu Fan, Hsin-Yen Yu, Guan-Zhen Chen Chang Gung University D04 - "Fun Circuit"

<p>11:30-11:45</p>	 <p>Nur, Ikmal B Rosman, Villaluz, Joshua Carl Labajo, Nur, Isyreen Bte Muhamad, Rabeeah, Al-Adawiyah Binte Mohd Amin</p> <p>ITE College Central T05 - Smart rehabilitation knee brace</p>	 <p>Poon Shun Lam Johnathan, Wong Hin Nang, Lee Chung Hon, Pang Long Yin, Liu Cheuk Nam</p> <p>The Hong Kong Polytechnic University D05 - Remember-Med</p>
<p>11:45-12:00</p>	 <p>Muireann Hickey, Kevin Hayes, Cian O'Leary, Jonathan Mullane</p> <p>Cork Institute of Technology T06 - StrydeTech - Design and development of a novel mobility enablement device providing independence and confidence to those who cannot get from sitting to standing position on their own</p>	 <p>Nutnicha Phensresirikun, Kanin Kiataramgul</p> <p>Chulalongkorn University Demonstration Secondary School D06 - The i-ExC game: Enhance cognitive performance, physical fitness and interaction in the normal elderly</p>
<p>12:00-12:15</p>	 <p>Adama Hoppy Natalusfi, Regita Nurina Salsabila, Muhammad Fauzy Maulana Akbar, Hasan Syamil, Mu'amar Haedar Hanif</p> <p>Universitas Brawijaya T07 - Deafriend for total deafness with integrated application as an assistive technology breakthrough for inclusive living</p>	 <p>Raissa Chrizel Rivera Cabel, Siti Syarah Bte Suparman, Irsyad Jazli Bin Ramil, Nurdini Binte Jumain</p> <p>ITE College East D07 - EasyPull</p>
<p>12:15-12:30</p>	 <p>Alexander Tan Yong, Lim Shu, Joshua Goh Yong Sheng, Eugene Pang Yuan Jing, Kester Chew</p> <p>National University of Singapore T08 - Ramp design</p>	 <p>Thipok Tungsiripat, Chiratchaya Hemrungronj, Nara Sthapitanonda, Nattam Osornprasop, Siranat Tovikkai</p> <p>Chulalongkorn University Demonstration Elementary School D08 - Brain box: Brain exercise for 2 generations</p>
<p>12:30-12:45</p>	 <p>Li Xinwei, Luo Shengli, Deng Zhipeng, Xiao Yixuan</p> <p>University of Shanghai for Science and Technology T09 - Active hip disarticulation prosthesis using RCM mechanism</p>	 <p>Mohd Fairuz Izwan Bin Abdul Lait, Danielson Peter, Md As Ahza Iqmal, Sofianshahzaini Bin Md Yosof, Sirhajwan Idek</p> <p>Keningau Vocational College D09 - Automatic light shelf</p>
<p>12:45-13:00</p>	 <p>Poh Hui Ying, Tan Yi Qi Peggy, Tey Yik Fen, Michelle, Seri Ayuni Bte Rdzaff, Ahmad Fuad Ziqry</p> <p>Institute of Technical Education College East T10 - Sesistove</p>	 <p>Supitchaya Hemrungronj, Korn Hemrungronj, Jaomai Tungsiripat, Kullanat Tovikkai, Marjimar Suvivhasopon</p> <p>Chulalongkorn University Demonstration Elementary School D10 - Able walker: Automatic balanced level easy walker</p>

13:00-13:30	Lunch Gallery Foyer	
13:30-17:30	gSIC Presentations (continued)	
	gSIC Technology Oral Presentations Chair: Karen Frost; Felix Lin Fitzroy / Derwent Rooms	gSIC Design Oral Presentations Chair: Kath Crispin Murray Room
13:30-13:45	 Owen Kwong Hau Shing, Olive Chung Wing Lam, Chloe Lam Nga Wai City University of Hong Kong T11 - Help visually impaired persons (VIPs) and the elderly to identify objects with audio reminders	 Mo Hoi Yi, Wong Hiu Yan, Chan Mung Ni Monica, Lau Wai Man, Chui Tsz Kwan The Hong Kong Polytechnics University D11 - Nailed it!
13:45-14:00	 Ilias Hilsann Yong Singapore Institute of Technology T12 - Troll-E: Mobility enabled	 Desiree Riny Royal Melbourne Institute of Technology D12 - Reclaiming Accessibility: To lower-limb prosthetics within rural communities, in developing countries
14:00-14:15	 Chih-Chao Hsu, Ke, Yu-Sheng, Chen, Chien-Ping, Huang, Kai-Ling, Lin, Yu-Kai National Taiwan University T13 - Ideal training ankle foot orthosis (IT-AFO)	 Chen Shih-Yu, Tanaka-Shiho Kobe Design University D13 - Liberty of walker
14:15-14:30	 Kakamu Kosei, Nagae Yuma Aichi High School of Technology and Engineering Advanced Course T14 - CAHT for habilitation of children with disorders	 Regita Nurina Salsabila, Adama Hoppy Natalusfi, Alfa Fadlilah, Hasan Syamil, Arifandis Winata Universitas Brawijaya D14 - Doctor-Do: Learning-based game application
14:30-14:45	 Rom Parnichkun, Anas Suphakphaisarn, Sirapob Charoenpinoying, Khakhanan Ngamdencharoensri Thammasat University T15 - ReArm	 Akanksh K, Karil Garg, Sudarsan M S Indian Institute of Technology Madras D15 - StrideX – Ergonomic new-age crutches
14:45-15:00	 Kitchanan Asavatamrat, Pisitpong Wonggtha, Nattadet Chinthanathatset, Parisa Wu, Ariya Suthisophaarporn, Natapat Tanjariyapor Mahidol University T16 - Wireless wearable EMG-measuring device for rehabilitation monitoring	 Karen Sie, Andy Yu Ka Hei, Cherry Lo Cheuk Wing, Yuko Ma Wan Ting The Hong Kong Polytechnic University D16 - Effects of a task-specific virtual reality training for hemiparetic extremity on stroke: A pilot study

15:00-15:15	 Guan-Yi Hong, Li-Ting Wang, Bo-Wen Wang, Hong-Yi Wu, Shu-Ling Wu National Yang-Ming University T17 - eElectric Intelligent Stretching Board (EISB)	 Tsz Ching Fung, Wai Dik Chan, Ho Yan Lo, Hiu Fung To, Oi Wai Yan The Hong Kong Polytechnic University D17 - Snaker Spoon
15:15-15:30	 Xin-Ting Liu, Bo-Yan Zeng, Chung-Hau Lee Chang Gung University T18 - Mr Augmen – A portable health management solution	 Ling-Yang Lao, Chung-Ken Wong, Hao-Wei Huang Ming Chuan University, MCU D18 - Prosthetic amphibian
15:30:15:45	 Warapong Narongrit, Satthanat Ongapibool, Chatchawan Malithong, Kamonchanok Wichutarach, Duangkamon Leelasrisiri Thammasat University T19 - Active balance and mobility	 Thipok Tungsiripat, Chiratchaya Hemrungrojn, Nara Sthapitanonda, Nattam Osornprasop, Siranat Tovikkai Chulalongkorn University Demonstration Elementary School D19 - Movtivet: Movement stimulation versatility tool - for elderly
15:45-16:00	 Donghyug, Kim, Juwon, Lee, Hwajin, Lee, Jinwoo, Lee, Geon Min, Park Korea University T20 - Audi-met: The alarm device for people with hearing loss	 Pathid Liamtrakoolpanich Luamrudee International School D20 - Gerimo add-on
16:00-16:15	 Chonnapha Phattanaphirom, Wanida Akkarachotisakul, Tanaporn Neelakan, Sulawan Waewsanga Khon Kaen University T21 - Design and development of nasal creator device for cleft lip and palate patient	 Sarasit Sirawattanakul, Suphicha Sirawattanakul Chulalongkorn University Demonstration Secondary School D21 - Active exo-spine (AES)
16:15-16:30		 Yu-Hua Cheng, Ching-Heng Hung, Gong-Chen Chang, Yu Pei Taipei Medical University D22 - revosplint
16:30-16:45		 Phongsathon Tabonglek, Sukunya Phomkawong Sakannokhon Polytechnic College D23 - Journey electric wheel chair
16:45-17:00		 Archna Jain, Aditi Jain, Abhiviyakti Mishra Vishwa Bharati Public School D24 - Saksham

Tuesday 27 August 2019

08:00-09:00	i-CREAtE 2019 conference registration National Convention Centre registration desk		
09:00-10:30	Plenary Session One (Chairs: Robyn Chapman; Karen Beard-Greer)		Royal Theatre
	<p>Conference Opening and Welcome Addresses:</p> <p>Welcome to Country: Uncle Wally Bell, Ngunawal Traditional Custodian</p> <p>Keynote Presentation: Paula Tesoriero MNZM, Disability Rights Commissioner, New Zealand</p> <p>Welcome Address: Professor Hongliu Yu, President CREAtE Asia, University of Shanghai for Science and Technology</p>		
10:30-11:00	Morning Tea		Ballroom
11:00-13:00	Plenary Session Two (Chair: Jonathon Ladd)		Royal Theatre
	<p>Professor Wei Tech Ang Rehabilitation Research Institute of Singapore, Nanyang Technological University</p> <p>Data driven rehabilitation and assistive technology</p>		
	<p>Associate Professor Rachael McDonald Chair, Department of Health & Medical Science, Swinburne University of Technology</p> <p>Where are we going with wheeled technology?</p>		
	<p>Dr Renzo Andrich (video presentation) President, EASTIN</p> <p>Towards a global information network on assistive technology</p>		
13:00-13:30	Lunch		Ballroom
13:30-15:00	Concurrent Sessions One		
Pres. Times	Location	Session	Presentation
13:30-14:00	Bradman Theatre	1A - Oral Presentations Chair: Sue Robson	 Kamolpun Punpuing National Science and Technology Development Agency Empowering from the bottom-up: ICT for enhancing service accessibility
14:00-14:30			 Jesús Campo Dohrmann Consulting Mechanical optimization of a prosthetic knee for low-income venezuelan amputees
14:30-15:00			 Yixuan Xiao University of Shanghai for Science & Technology Training equipment for hand function rehabilitation driven by flexible chain

Pres. Times	Location	Session	Presentation
13:30-14:00	Menzies Theatre	1B – Oral Presentations Chair: Felix Lin	 Dr Jiro Sagara Kobe Design University Auto-cue system for the person with mild cognitive impairment
14:00-14:30			 Dr Kenneth N. Fong The Hong Kong Polytechnical University Intelligent bright lighting for people with dementia
14:30-15:00			 Dr DuoJin Wang University of Shanghai for Science & Technology Wearable pre-impact fall detection: A systematic review
13:30-15:00	Nicholls Theatre	1C - Create Asia Industry Symposium	At this symposium you will hear from one speaker from some of the CREATE Asia “member states”: <ul style="list-style-type: none"> - Hong Kong- Mr (Simon) Kam Man Wong - China - Dr Wang DuoJing - Singapore - Prof Ang Wei Tech - Thailand - Ms Wantanee Phantachat - Taiwan - Prof Shih-Ching Chen - Australia - Ms Robyn Chapman - New Zealand - Ms Karen Beard-Greer Each will present on a development in the broad AT system and industry in their own “member state”.
13:30-15:00	Fitzroy/Derwent Rooms	1D - Workshop	 Ben Dalton Lusio A movement based gaming workshop with LusioMATE
13:30-15:00	Murray Room	1E - Workshop	 Dr Graeme Smith Ability Technology New developments in home control technology
13:30-17:00	Ballroom	gSIC Judges walk through	
15:00-15:30	Afternoon Tea		Ballroom
15:30-17:00	Concurrent Sessions Two		
Pres. Times	Location	Session	Presentation
15:30-16:00	Bradman Theatre	2A – Oral Presentations Chair: David Andrews	 Aibek Niyetkaliyev University of Wollongong Avoiding joint axes misalignments in robotic shoulder rehabilitation exoskeleton

16:00-16:30	Bradman Theatre	2A – Oral Presentations) (cont.) Chair: David Andrews	 Dr Sujiao Li University of Shanghai for Science & Technology Research on joint torque estimation control strategy for elbow exoskeleton
15:30-16:00	Menzies Theatre	2B – Oral Presentations Chair: Esther Huber	 Dr Chia-Hsin Chen Kaohsiung Medical University 3D printing, dynamic ankle-foot orthosis, stroke
16:00-16:30			 Associate Professor Ryoji Onodera National Institute of Technology, Tsuruoka College Relationship between assistance force and walking motion in wheelchair operation
15:30-17:00	Nicholls Theatre	2C - Create Asia Industry Symposium (continued)	At this symposium you will hear from one speaker from some of the CREATE Asia “member states”: <ul style="list-style-type: none"> - Hong Kong- Mr (Simon) Kam Man Wong - China - Dr Wang DuoJing - Singapore - Prof Ang Wei Tech - Thailand - Ms Wantanee Phantachat - Taiwan - Prof Shih-Ching Chen - Australia - Ms Robyn Chapman - New Zealand - Ms Karen Beard-Greer Each will present on a development in the broad AT system and industry in their own “member state”.
15:30-17:00	Fitzroy/Derwent Rooms	2D - Workshop	 Jim Sprialis Sonocent Digitising notetaking accommodations: Revolutionising how students work with spoken information
15:30-17:00	Murray Room	2E - WORK-SHOP	 Dennis Lo ILC Tas An overview on assistive technology for eye gaze access
17:00	Close of Conference Day 1		

Wednesday 28 August 2019

08:00-09:00	i-CRETe 2019 conference registration National Convention Centre registration desk		
09:00-10:30	Plenary Session Three (Chair: John Pollaers OAM)		Royal Theatre
	<p>Maureen Linden, Senior Research Engineer, Georgia Institute of Technology, President-elect RESNA</p> <p>Ensuring quality services: Credentialling and ducation of RE/AT service providers</p> <p>Panel discussion: Credentialling</p> <p>Panelists: Judy Gregurke, COTA; Claire Hewat, AHPA; David Sinclair, ATSA; David Andrews, Enable NZ; Robyn Chapman, AT Aust.</p>		
10:30-11:00	Morning Tea		Ballroom
11:00-13:00	Plenary Session Four (Chair: Professor Wei Tech Ang)		Royal Theatre
	<p>Fiona Given Director, Assistive Technology Australia AT and me</p>		
	<p>Professor John Pollaers OAM Chair, Australian Industry Skills Committee; Chancellor, Swinburne University of Technology Australian aged care workforce strategy</p>		
	<p>Professor Hongliu Yu President CREATE Asia, University of Shanghai for Science and Technology Development of the Assistive Device Industry & Rehabilitation Robot Technology in China</p>		
	Presentation of minor gSIC prizes		
13:00-13:30	Lunch		Ballroom
13:30-15:30	Concurrent Sessions 3		
Pres. Times	Location	Session	Presentation
13:30-14:00	Bradman Theatre	3A - Oral Presentations Chair: Karen Frost	 Jackie Hiller EnableNSW Affordable AT in the New South Wales Health System
14:00-14:30			 David Andrews and Karen Beard-Greer NZ Federation of Disability Information Centres AT in the New Zealand context
14:30-15:00			 Dr Graeme Smith Ability Technology The impact of the NDIS on specialized AT services
15:00-15:30			 Dr Lloyd Walker National Disability Insurance Agency Developing a participant centric approach to AT funding and support

13:30-14:00	Menzies Theatre	3B – Oral Presentations Chair: Noel Matthews	 Elizabeth Nade Cerebral Palsy Alliance Kicking goals and having fun! How gaming assists goal achievement
14:00-14:30			 Professor Bong-Kuen (Andrew) Jung Seoul National University New robotic mechanism for daily living assistance of people with disabilities
14:30-15:00			 Dr Puttchart Potibal Kasetsart University Classification of reading disability degree: Using non-word reading assessment
15:00-15:30			 Prue Golland Cerebral Palsy Alliance Ready to run – establishing RaceRunning for fun and fitness
13:30-14:00	Nicholls Theatre	3C – Oral Presentations Chair: Debbie Roe	 Pete Horsley Remarkable Accelerator Cerebral Palsy Alliance 3 Lessons Silicon Valley can teach the assistive tech industry
14:00-14:30			 Articha Naravorawat Thailand Research Institute for Empowerment of Persons with Disabilities Foundation Participating people with disabilities in AT research and policy
14:30-15:00			 Maureen Linden Georgia Institute of Technology Technology use by workers with disabilities in the gig economy
15:00-15:30			 Patricia Bahr University of Iowa, Bahr Assistive Technology Consulting Why Telepresence Robots and not FaceTime, Hangout, Skype, or Zoom?
13:30-15:30	Fitzroy/Derwent Rooms	3D Workshop	 Dennis Lo ILC Tas Collaborative approach in delivery of AT for clients with MND
13:30-15:30	Murray Room	3E Workshop	 Bill Georges and Tom Eley PME Autoconversions Licensing, assessment and vehicle modification process in Australia
15:30	Close of Conference Day 2		
17:30-22:00	i-CREAtE Gala Dinner 2019 - Australian Parliament House		

Thursday 29 August 2019

07:30-15:00	Technical Tour - Sydney Depart from National Convention Centre at 07:30	
08:00-13:30	Technical Tour - Canberra Depart from National Convention Centre at 08:00	
09:00-10:30	Plenary Session Five (Chair: Nicola Cooper)	Royal Theatre
	Poster Presentations	
	1. Dr Kenneth N Fong The Hong Kong Polytechnical University Application of brain-computer interface on hemiplegic arm functions: a meta-analysis	
	2. Dr Hyeon-Cheol Kim Chung-Ang University Fostering online customer engagement for disabled moviegoers: a preliminary research	
	3. Professor Hsin-Yi Kathy Cheng TREATS (Taiwan Rehabilitation Engineering and Assistive Technology Society) Trunk inclination positioning angle on swallowing and respiratory function	
	4. Dr Solaphat Hemrungronj Chulalongkorn University Brain computer interface-neurofeedback improve cognition in MCI and elderly	
	5. Chonnapha Pharranaphirom Khon Kaen University Design and development of nasal creator device for CLP patient	
	6. Professor Wann-Yun Shieh TREATS (Taiwan Rehabilitation Engineering and Assistive Technology Society) Locomotor and cognitive ability evaluation by a smart ball	
	7. Pei-Fen Wu Chang Gung University Development of a kinect-based health assessment system for the elderly	
	8. Dr Solaphat Hemrungronj Chulalongkorn University i-ExC game: enhance cognitive, physical fitness and interaction in elderly	
	9. Cameron Woo Bergen County Academies Emergency inflate and call belt not registered	
	10. Shigeto Moriwaki Shimane University Examination of head mobility with an eye-gaze input system	

10:00-10:30	Morning Tea		Ballroom
Concurrent Sessions 4			
Pres. Times	Location	Session	Presentation
10:30-11:00	Bradman Theatre	4A - Oral Presentations Chair: Karen Frost	 Helen Jeisman Summer Foundation Rapid interim housing prototype by the Summer Foundation
11:00-11:30			 Dr Benjamas Kutintara King Mongkut's Institute of Technology Ladkrabang Designing a learning strategy to develop a universally-designed restaurant project
11:30-12:00			 Dennis Lo ILC Tas Assistive Technology in the first Tasmanian universal access display home
10:30-11:00	Menzies Theatre	4B – Oral Presentations Chair: Robyn Chapman	 Adama Hoppy Natalusfi University of Brawijaya A Smart tech necklace as a breakthrough for deaf
11:00-11:30			 Dr Watcharakon Noothong National Science and Technology Development Agency Preventative care with disease risk prediction on health tracking application
11:30-12:00			 Afsal Abdul Sathar International Centre for Free & Open Source Software Free software & digital fabrication in creating affordable assistive devices
10:30-12:00	Fitzroy/ Derwent/ Murray Rooms	4C - gSIC Program	Remarkable Student Program (gSIC attendees only)
12:00-12:30	Lunch		Ballroom

Concurrent Sessions 5			
Pres. Times	Location	Session	Presentation
13:00-13:30	Bradman Theatre	5A – Oral Presentations Chair: Dennis Lo	 Professor Ya-Ping Wu National Chiayi University Using iPad-AAC to facilitate communication participation in science curriculum
13:30-14:00			 Chao-Wen Tan National Chiayi University Using iPad-AAC during functional communication training for students with CAS
14:00-14:30			 Zih-Yun Lin National Chiayi University Incorporating AAC usage in class for children with a tracheostomy
13:30-15:00	Menzies Theatre	5B - Workshop	 Joshua Selvadurai Assistive Technology Australia "What's new in the Zoo": A cross-sectional study on latest and emerging technology solutions
13:30-15:00	Fitzroy/ Derwent/ Murray Rooms	5C - gSIC Program	Remarkable Student Program (continued) gSIC attendees only
15:00-15:30	Afternoon Tea		Ballroom
15:30-16:00	Plenary Session Six		Royal Theatre
16:00	Conference Close		

Keynote Speakers at i-CREAtE 2019

We are pleased to welcome to following Keynote Presenters at i-CREAtE 2019

Paula Tesoriero MNZM

Disability Rights Commissioner, New Zealand



Paula Tesoriero is New Zealand's Disability Rights Commissioner. It is her role to protect and promote the rights of disabled New Zealanders.

She is also a Paralympian cycling gold medallist, a former lawyer, was a general manager at Stats NZ and at the Ministry of Justice, has held a range of governance roles on various Boards and is a mum.

Plenary Session 1, Royal Theatre, August 27, 2019, 9:00 - 10:30

Associate Professor Wei Tech Ang

Rehabilitation Research Institute of Singapore (RRIS), Nanyang Technological University



Prof Ang Wei Tech graduated with a PhD degree in Robotics from the Robotics Institute, Carnegie Mellon University, USA in 2004, and M.Eng. and B.Eng. degrees in Mechanical Engineering from NTU in 1999 and 1997 respectively. He is currently an Associate Professor at the School of Mechanical & Aerospace Engineering, NTU, LKC Medicine and concurrently as the Executive Director of the Rehabilitation Research Institute of Singapore, a joint collaboration by NTU, A*STAR and National Healthcare Group. Prof Ang's research focuses on robotics technology for biomedical applications, which include surgery, cell micromanipulation, rehabilitation and assistive technology. His work has been well funded, published and cited, and also resulted in several inventions licensed to the industry and spin-off companies.

Data driven rehabilitation and assistive technology

Plenary Session 2, Royal Theatre, August 27, 2019, 11:00 - 13:00 (*video presentation*)

Associate Professor Rachael McDonald

Department Chair, Department of Health and Medical Sciences; Disability Theme Lead, Iverson Health Innovation Research Institute, Swinburne University of Technology



Rachael McDonald is a clinical, research and teaching health professional, who has worked in the area of assistive technology and enabling access to health and participation with people with disabilities throughout the lifespan for nearly 30 years. She is currently the research lead in Disability at the Iverson Health Innovation Research Institute and the Department Chair, Health and Medical Science at Swinburne University of Technology, which enables her to extend her traditional interest in Assistive Technologies to encompass the development and evaluation of emerging technologies to enable participation such as Virtual Reality and Machine Learning. She is also actively engaged in projects to address

health inequity experienced by people living with disabilities. She currently has 8 PhD students and co-supervises with a number of multidisciplinary colleagues from Design, Computer Science, Psychology, Statistics and Physiology.

In addition to her PhD, Rachael has qualifications in occupational therapy, biomechanics and higher education. Her PhD investigated the acceptability and effectiveness of an adaptive seating system for cerebral palsy, attained at the UCL Institute of Child Health. Since returning to Australia, Rachael has continued and extended this research, through her previous roles at Monash University and the Centre for Developmental Disability and Child Health.

Where are we going with wheeled technology?

Plenary Session 2, Royal Theatre, August 27, 2019, 11:00 - 13:00

The number of people using wheeled mobility and seating is steadily increasing; yet, the equipment, make up, form and function is not developing at the same rate. Since Phillip the 2nd of Spain used a chair on wheels in 1595, to Stephen Farffler's self-propelling chair in 1655, major developments include Everest's folding wheelchair in 1922 and Klein's electric wheelchair in 1953, further developments have included materials, weight, versatility and endurance. The history of wheeled mobility and seating as a priority area often mimics the civil rights of people living with mobility issues – as rights and priorities have changed from an impairment-based view to one of support to enable full participation in life, so too have the priorities of the equipment itself. Wheelchairs can enable people to engage in daily life, facilitate participation and enable access to social, cultural and physical environments. Issues that remain however include accurate assessment and outcome measurement, the agreement of 'fit for purpose' or whose priority is given most attention, health and wellbeing of wheelchair users, injury due to wheeling, wheelchair use or positioning to name a few. Above all, access to the built environment remains an issue of international importance. In order to take this field forward, wheelchair users, designers, practitioners, manufacturers and service providers need to work together in order to make best use of emerging technologies to improve this field. Technology is only innovative if there is effective integration and application. This talk will discuss the implications of emerging technologies such as virtual reality, GPS and IPS systems, AI and machine learning as well as new materials that can be used as a basis to co-design the systems of the future.

Renzo Andrich (video presentation)

Head, Assistive Technology Research

Don Carlo Gnocchi Fondazione's Centre for Innovation and Technology Transfer (CITT)



Renzo Andrich is the head of the Assistive Technology Research at the Don Carlo Gnocchi Fondazione's Centre for Innovation and Technology Transfer (CITT), Milano, Italy. In this role Renzo is also responsible for the Italian national assistive technology portal (www.portale.siva.it).

Renzo is a researcher and project leader in several EU-funded and national R&D projects. Renzo is also the President of the European Assistive Technology Information Network, more commonly referred to as EASTIN.

Towards a global information network on assistive technology

Plenary Session 2, Royal Theatre, August 27, 2019, 11:00 - 13:00 (video presentation)

Information plays a key role in Assistive Technology (AT) service delivery systems. It helps empower people with disabilities and their families to make informed and responsible choices of AT devices; it is needed by health care professionals when assessing their clients' needs, recommending AT solutions, training clients in their use, and designing rehabilitation, education or social participation programmes; it is vital for AT suppliers and manufacturers to better know the market, discover opportunities, find out ideas for development, disseminate awareness on their products; it is useful to policy makers and officers involved in public service delivery systems (insurances, Health Authorities etc.) to efficiently allocate resources in AT provision; people working in research and development also need access to qualified information that helps know what already exists, what users' needs are still unmet, what areas in the AT domain are admitting of significant developments.

In many Countries, national information systems have been created to respond to these information needs. Since over ten years the international EASTIN network has been working at joining the efforts of experts on AT information provision - initially in Europe and now worldwide - in order to improve information quality, coverage and reliability for all citizens, in the light of the UN Convention. The core of this network is the multilingual EASTIN webportal (www.eastin.eu) which aggregates the contents of several AT databases from various countries. The presentation will offer a quick survey of the main information systems available today worldwide; it will present the latest achievement of the EASTIN and describe the future perspectives along the lines of the GATE initiative of the World Health Organization; finally, based on some experiences of good practice, it will discuss how information provision can contribute to improve the quality AT service delivery systems.

Maureen Linden

Senior Research Engineer
Georgia Institute of Technology, USA



Maureen Linden, MS, is a Senior Research Engineer at the Georgia Institute of Technology, holding dual appointments with the Center for Inclusive Design and Innovation and the Center for Advanced Communications Policy. She has more than 25 years' experience in rehabilitation and assistive technology research, product development, service delivery and technical assistance. Her clinical work has focused on seating and wheeled mobility, workplace accommodations, and home modifications; having experience providing services in the United States medical and vocational rehabilitation models. Ms. Linden's current research

interests focus on the development of new and emerging wireless technologies and their adoption by people with disabilities, workplace accommodations and employment for people in traditional and contingent work scenarios, and accessible education for students in Science, Technology, Engineering, and Math (STEM) fields. Past research efforts include support surface characterization, pressure sore prevention, and transportation safety. Maureen has been active in standards development activities for the Society of Automotive Engineers (SAE), American National Standards Institute (ANSI)/RESNA, and International Standards Organization (ISO) for over 15 years. Presently, Maureen serves on the Executive Committee of RESNA's Board of Directors as President-Elect. She holds degrees in electrical and biomedical engineering from the University of Virginia.

Ensuring quality services: credentialing and education of RE / AT Service Providers

Plenary Session 3, Panel Discussion, Royal Theatre, August 28, 2019, 09:00-10:30

Fiona Given

Director
Assistive Technology Australia



Fiona Given is a person with cerebral palsy and complex communication needs and uses various forms of AAC and various forms of assistive technologies. Fiona has worked in a range of legal settings.

Currently she is a part time general member of Guardianship and Administrative and Equal Opportunity Divisions of the NSW Civil and Administrative Tribunal and runs her own consultancy business doing various research projects in the disability sector.

AT and me

Plenary Session 4, Royal Theatre, August 28, 2019, 11:00 -13:00

Professor John Pollaers, OAM

Chancellor of Swinburne University and Founder of Leef Independent Living Solutions



John is the founding Chairman of the Australian Advanced Manufacturing Council and Chairman of the Australian Industry and Skills Committee. In 2017, he was appointed as Chair of the Aged Care Workforce Strategy Taskforce for the Federal Government. A noted leader and proven international chief executive, Chairman and Non-Executive Director, John has a distinguished international career. As Chairman of the Australian Advanced Manufacturing Council, John has been instrumental in building close engagement with the Government and media on the dynamics and potential for advanced manufacturing in Australia. He speaks widely on the issues

of skills development, the imperatives of 21st Century global business, and the necessity of building meaningful collaboration between research and industry. He was CEO and Managing Director at Pacific Brands, and prior to that was the CEO of Foster's Group Limited, from May 2011, after joining the company as Managing Director of Carlton & United Breweries in 2010. Before Foster's, John had a distinguished career in consumer products including numerous senior roles at Diageo plc including President Asia Pacific and Managing Director, Australasia where he was also a member of the Diageo Group Executive Committee.

Australian aged care workforce strategy

Plenary Session 4, Royal Theatre, August 28, 2019, 11:00 - 13:00

Professor Hongliu Yu

Director of Institute of Rehabilitation Engineering and Technology, University of Shanghai for Science and Technology (USST), China



Professor Hongliu Yu is the director of Institute of Rehabilitation Engineering and Technology, University of Shanghai for Science and Technology (USST), and the President of Shanghai Engineering Research Center of Assistive Devices. He obtained Ph.D. from University of Shanghai for Science and Technology (USST) with doctoral thesis "Dynamic Modeling and Control of Human Above-knee Intelligent Artificial Leg based on Ergonomics" in 2009. The research areas of him are human bionic mechanics and intelligent control, rehabilitation robotics and human-machine intelligent interaction. He has held a variety of academic posts, including president

of the Coalition of Rehabilitation Engineering and Technology of Asia (CREATE Asia), editor in chief of the Journal of World Rehabilitation Engineering and Devices, director of Committee of Technology and Industry Development, Chinese Association of Rehabilitation Medicine (CTID-CARM), president of Rehabilitation Robotics Alliance, Chinese Association of Rehabilitation Medicine, chairman and secretary general of Committee of Rehabilitation Devices, China Association of Assistive Products (CRD-CAAP), executive council member of Chinese Association of Rehabilitation Medicine (CARM), chairman of Committee of Rehabilitation Engineering, Shanghai Society of Biomedical Engineering, and etc.

Development of the Assistive Device Industry and Rehabilitation Robot Technology in China

Plenary Session 4, Royal Theatre, August 28, 2019, 11:00 - 13:00

With the aging in China, many innovative rehabilitation robot products and technologies have emerged. The rehabilitation robot industry is gradually rising and booming in recent years. By introducing the development of assistive devices and rehabilitation robot industry, this report will focus on the analysis of the current development of rehabilitation robot technology in China. Based on the classification of rehabilitation robots in four categories of function substitution, function assistance, function training and compound function, the report will state the technical research and industry trend of these types of rehabilitation robots in China.

Global Student Innovation Challenge (gSIC)

proudly sponsored by  Assistive Technology Australia™

The Global Student Innovation Challenge (gSIC) is an annual event held at each International Convention on Rehabilitation Engineering and Assistive Technology (i-CREATe). It provides a platform to encourage students from all over the world to compete one in developing creative and innovative devices or solutions to improve the quality of living of the elderly and people with disability. It showcases the talents and abilities of these students while providing an opportunity to work with clients and clinicians to develop these innovative ideas. It also facilitates cooperation and networking among the students and gives them an opportunity to listen to speakers from across the world and region.

gSIC teams at i-CREATe 2019

All gSIC Team displays will be available for viewing in the Ballroom (level 1) at the National Convention Centre. Please take time to view the displays and discuss the project with team members.

Technology Category

T01 - Smart ulcer prevention system for wheelchair users

Dylan Chua Yue Heng, Ang Guo Zheng Frederick

Temasek Polytechnic

Our project encourages the wheelchair bound user to shift body regularly when he is on the wheelchair and to allow caregivers to intervene when long period of inactivity is detected. This helps to prevent pressure ulcers. The system can be used when the wheelchair user is at home or away. The prevention of pressure ulcers while sitting in the wheelchair is achieved by performing pressure relief exercises (body leaning forward, backward and side way). A motivating game reminds the user to do fun exercises every 30 minutes. These exercises can be customized to suit the elderly's physical condition. These can include pushing up to lift buttocks, leaning to the left and right, leaning forward and backward to reduce long skin contact with the seat. Our proposed solution consists of a smart cushion for wheelchair embedded with pressure and temperature sensors. In addition, a foot-tapping pad for avoiding heel ulcers is placed on the foot rest. The cushion and the foot-tapping pad are connected to a controller. The system will prompt the wheelchair user or his caregiver after every 30 minutes to perform body movements.

T02 - AvTant - Development of assistant auditory-verbal therapy based speech recognition and graphic feedback correction with gamification

Hu Jiajun, Zhang Zhiyao, Quek Yee Shuan Angela,

Nanyang Polytechnic in Singapore

AvTant is a product that integrates self-studying and gaming to improve the education of the hearing impaired children (HIC). Our AvTant encourages them to learn and practice in improving their pronunciation and speaking. With AvTant, Auditory Verbal Therapist (AVT) can track the HIC's learning progress, prescribe for them the exercises as homework for them. On the other hand, Cube- Hub is a physical game for children to arrange the digital and interactive letter cubes to form a word, improving their vocabulary. These helps reduce the number of their visits to therapist thereby lessening their financial burden. Our Phonetics speech recognition, Graphic feedback, 3D animation, Voice control game based app idea is also supported by Ms. Oliva (AVT in Singapore General hospital), Ms. Charlene Wong (Deaf Community Ambassador from Touch Community Centre), etc. Through six months of development and testing, we have finally produced a fully functional product ready for the HIC and AVT's use. Our project has prestigious achievement records of Institute of Engineers Singapore (IES) Innovation Challenge Gold Award and Tan Kah Kee (TKK) Young Inventor.

T03 - Low-cost central timing system for rehabilitation centres

Yuen Chik Hang, Wong Shing Fung, Chan Long Yin, Chan Tsz Hin, Choi Wing Yee
City University Hong Kong

After visiting the local rehabilitation center, we found that the traditional timing method of their training and exercises has been causing trouble for the staff and the users. Therefore, we decided to design a whole new system that could be more centralized, quiet and user-friendly. Our timing system can count and display the trainees' training time. It helps the staff in rehabilitation centers manage the training schedules of the patients in an easy and efficient way. It includes an NFC-capable remote control and a database/server powered by a Raspberry Pi. We are very confident that our design could improve the quality in the center and provide a better environment for the users.

T04 - Bliss robot assisting Autism therapy at home

Yannawat Wiriyakangsanon, Thanatat Pronpraserd, Teerameth Rassameecharoenchai, Warachaya Veranonchai, Wisanu Jutharee
King Mongkut's University of Technology Thonburi (KMUTT)

One of the challenges in autism community is that the number of autism specialists is not enough to support the growing number of autistic children. Previously, our team developed the BLISS robot to assist the parents and therapists in autism therapy. We have an idea to implement the interaction detection system in the BLISS robot so that it could detect how the child attention status is and could exhibit appropriate actions to promote better child development. We have recently developed an interaction detection system so the BLISS robot can now detect the child's interest based on behaviors and emotions. In this project, we propose to implement the personalized action system that would generate a personalized set of actions to suit each autistic child's needs and dynamically change if the needs change. We will utilise a reinforcement learning algorithm with a probabilistic model. When this project is done, the BLISS robot will be able to provide great support and help children keep attention on their learning development. The BLISS robot will lighten the inexperienced parent's burden in providing therapy to their children with autism.

T05 - Smart rehabilitation knee brace

Nur, Ikmal B Rosman, Villaluz, Joshua Carl Labajo, Nur, Isyreen Bte Muhamad, Rabeeah, Al-Adawiyah Binte Mohd Amin
ITE College Central

Today, people who undergo knee replacement operation are required to complete a lengthy rehabilitation exercise for full recovery. The set of exercises cover flexibility and strengthening. And the patient is often not motivated, and unable to measure his/her own progress accurately.

The project is a smart assistive knee exerciser that is safe and easy to use for people after undergoing knee replacement operation. It is capable of tracking the rehabilitation progress through accurate measurement of the bend angle during the knee bend exercise which will send information through the phone app and internet cloud storage for local and remote monitoring by doctors and physiotherapists.

T06 - StrydeTech: Design and development of a novel mobility enablement device providing independence and confidence to those who cannot get from sitting to standing position on their own

Muireann Hickey, Kevin Hayes, Cian O'Leary, Jonathan Mullane
Cork Institute of Technology

Conventional walking frames do not assist people to stand up. Walking frame users require everyday assistance when standing up from seated position in order to even use their frame. Based on this global societal need, the conception, research, design, development, experimentation, validation, prototype production and proof of concept testing of this self-conceived enablement device was undertaken. StrydeTech is an innovative and life changing mobility enablement device allowing

people to stand up independently by considerably reducing the stand-up effort. This reduction is achieved by lowering device handles to users seated waist height and as the frame rises, the user is assisted to standing position. A universal design approach is adopted ensuring that the developed StrydeTech device is both practical and useful irrespective of who is using it. A full scale power driven prototype was manufactured. Biomechanical gait analysis/experimentation was conducted to test real world suitability. Incorporation of smart technologies, including fingerprint/proximity sensors, are planned enabling StrydeTech to learn from the user to help the user.

These benefits offer significant enhancements to rehabilitation efforts and everyday mobility and promotes independence, addressing an international societal un-met need. The StrydeTech product core function is to enable everyday activities, prolonging life, which is effectively priceless.

T07 - Deafriend for total deafness with integrated application as an assistive technology breakthrough for inclusive living

Adama Hoppy Natalusfi, Regita Nurina Salsabila, Muhammad Fauzy Maulana Akbar, Hasan Syamil, Mu'amar Haedar Hanif

Universitas Brawijaya

The hearing problems experienced by deaf disabled people are an obstacle for them to do everything they can actually do, especially total deaf disabled people.

With total deafness, diffables cannot hear even with aids. Based on these problems, the author offers a simple but quite innovative solution by creating a smart necklace that works by converting sound into micro vibrations in the direction of sound.

This tool serves to give sensitivity to total deaf diffables to the direction of sound coming up, not to help diffables to hear sounds. Besides that, the smart necklace is also integrated with the application (Harmony Inclusion), is an application with 7 main features to support the needs of the disabled, deaf, mute, and disabled in their daily activities.

T08 - Ramp design

Alexander Tan Yong, Lim Shu, Joshua Goh Yong Sheng, Eugene Pang Yuan Jing, Kester Chew

National University of Singapore

Our team has developed a water-resistant, fire-retardant, recycled cardboard ramp able to configure to 1-5 steps and curve a radius of beyond 90 degrees for deployment in constrained areas. The prototype ramp has been constructed such that it is made up of stages joined together to form the entirety of the ramp. The stages are held together by detachable yet reliable fasteners that allow for easy repair and replacement of the parts of ramp. These stages cater for different stair configurations and also for compact stowage. Additionally for stowage, the prototype ramp is collapsible due to the way the cardboard is interlaced and can be compressed about 70-80% of its original length. The prototype ramp has an incline of about 10 degrees and a textured surface to provide friction for rolling of the wheelchair going up and assists with grooves when the wheelchair is going downwards. The current first prototype was deliberately over-designed for safety as proof of concept and has a safety factor of about 3-5 times the required amount. The current recycled cardboard used is in collaboration with a cardboard manufacturer in Singapore which produces its own recycled cardboard from pulp. Water-resistant and fire-retardant chemicals allow the cardboard to withstand certain weathering conditions and is safe for keeping in public housing while the material remains eco-friendly. The total material cost of the entire ramp is about SGD \$420-\$450, comparatively cheaper for commercially available aluminum ramps at SGD \$600-800. We hope to lower this cost substantially through re-design and bulk production. Further development of the project includes experimental usage of recycled plastics and other materials. As well as lightening the overall weight of the ramp and increasing ergonomics and aesthetics for potential commercialisation. Integration of smart devices into the ramp is also an additional potential aim of the product.

T09 - Active hip disarticulation prosthesis using RCM mechanism

Li Xinwei, Luo Shengli, Deng Zhipeng, Xiao Yixuan

University of Shanghai for Science and Technology

The design of a single rotation remote center of motion (1R-RCM) mechanism for a hip disarticulation prosthesis (HDP) is presented in this paper. While the existing HDPs bring the asymmetric troubles between the prosthetic hip joint and intact side, such as inconsistencies length of prosthetic thigh and integral one and the non-coaxial problem of hip joints. The 1R-RCM is designed with a double parallelogram linkage (DPL) and optimized by GA algorithm with multiple targets of DHP.

T10 – Sesistove

Poh Hui Ying, Tan Yi Qi Peggy, Tey Yik Fen, Michelle, Seri Ayuni Bte Rdzaff, Ahmad Fuad Ziqry

Institute of Technical Education College East

Our project are design cater to everyone but mostly elderly who might be forgetful or dementia which either living alone or was home alone while the caregiver went for work. Our target is to reduce the number of unattended cooking fire incident happen in Singapore and of course, we take into consideration of some possible scenarios and problem that will arise which are mainly, Cost, Function and acceptance from the elderly.

our project are designed to be able to detect the switching on and off of stove, the temperature of stove and most importantly, trigger a notification to caregiver or nearest help available when the switch had been switch on at a certain timing. Our team understand that some elderly might not be accepting and might intend to remove it, hence our project is small and compact to prevent elderly to tamper and can be install in any type of gas stoves.

Our project is cost effective in view of the cost of living is high and elderly might not be able to purchase it.

T11 - Help visually impaired persons (VIPs) and the elderly to identify objects with audio reminders

Owen Kwong Hau Shing, Olive Chung Wing Lam, Chloe Lam Nga Wai

City University of Hong Kong

Our device is a low-cost NFC reader/writer designed for visually impaired persons (VIPs) to be used for audio reminders/identifying everyday objects. It allows VIPs to associate NFC stickers, which are cheap and can be stuck to many surfaces, with audio reminders set by the VIPs themselves. The reminder set will be played back when the device is simply placed in near proximity of the NFC sticker. This has a wide variety of applications including assisting in the identification of sensitive personal items, especially those with similar shapes, such as cards in a wallet, to everyday items including but not limited to books, CDs, and even medicine. This independent device is developed with feedback from VIPs and thus includes accessibility features designed specifically for VIPs, but it's ease-of-use, low-cost and reliability may make it useful to other groups including the elderly who may be suffering from age-related memory loss.

T12 - Troll-E: Mobility enabled

Ilias Hilsann Yong

Singapore Institute of Technology

As Singapore's ageing population grows, the capability of the elderly to perform Instrumental Activities of Daily Living (IADLs) competently, becomes a cause of concern. Such activities include general mobility, personal transportation and shopping for groceries or necessities. To come to grips with this concern, Troll-E was devised as a means of a Personal Mobility Vehicle (PMV) to better facilitate the grocery shopping experience of the elderly.

This Land Transport Authority (LTA) compliant three-wheeled vehicle has two different modes: 'Mobility Mode' and 'Trolley Mode' which are activated through an easy 3-step process: Lock, Slide and Kick.

Despite other Personal Mobility Aids (PMA) in the market targeted for the elderly, Troll-E considers 3 important factors that the former fail to; the high selling price (affordability), the negative stigma accompanying the usage of these PMAs (Society) and the versatility & user-friendliness of the product (Usability).

T13 - Ideal training ankle foot orthosis (IT-AFO)

Chih-Chao Hsu, Ke, Yu-Sheng, Chen, Chien-Ping, Huang, Kai-Ling, Lin, Yu-Kai

National Taiwan University

The incidence of stroke in Taiwan is about 19.3%. In the United States, there are 793,500 new stroke patients each year, and most of the surviving patients are affected by the sequela of stroke. Due to the global population aging trend, the incidence of stroke will increase, and rehabilitation and care for patients with stroke have become a worldwide social and economic issue. Traditional ankle orthosis is designed to control or limit abnormal ankle movements. Users need to wear them for a long time, which can compensate for the affected functions, avoid joint contracture, improve walking function, etc., but rarely have training functions. Since the ankle orthosis is widely used and needs to be worn for a long time, if it can be worn while having the effect of training, it can help the stroke patient's own walking ability to improve. We developed an ankle-foot orthosis with training capabilities through three -dimensional printing and scanning technology. The customized ankle orthosis can be close to the user's physiological motion axis, allowing for more precise movement control and increased comfort. The specially designed dynamic kit mechanism can give feedback to the user during walking to achieve the training effect.

T14 - CAHT for habilitation of children with disorders

Kakamu Kosei, Nagae Yuma

Aichi High School of Technology and Engineering Advanced Course

Children with congenital disabilities, such as cerebral palsy, have difficulty moving their bodies with their own intentions and stress may build up. However, there is no tool in the world to release the stress that such a child enjoys.

We thought, "Can we not be able to live a more satisfying life?" and "Can we not play with equipment which can be used by any child at the habilitation facility?" Therefore, we developed the electric cart "CAHT" (Children's Adjustable Habilitation Tool) which can convert welfare equipment such as existing sitting position holding devices into an electric wheelchair.

This electric cart can be advanced with your own intentions without the help of others, so they can enjoy stress while at the same time enjoying it and making rehabilitation fun. In addition, because it is a telescopic mechanism, it can cope with various welfare devices. Besides, you can extend and retract without tools, so you can easily put it on the cart anytime and anywhere.

T15 – ReArm

Rom Parnichkun, Anas Suphakphaisarn, Sirapob Charoenpinyoying, Khakhanan Ngamdencharoensri

Thammasat University

Traditional rehabilitation has often focused on providing stroke patients with the best possible sets of stretches and exercises to help stimulate both the physical and mental state to full recovery, although patients' may quickly recover their lower limbs using traditional methods, a large number of patients still have difficulty fully recovering their upper limbs. Functional Rehabilitation focuses on recovering the patients through doing activities of daily living which in turn gives patients a better neural coordination and control when doing daily activities.

Unlike tradition rehabilitation, functional rehabilitation provides patients with an objective task which would directly benefit their execution of daily activities which in turn creates a looping effect making the patients use their affected limb more often, thus recovering faster. ReArm is a portable motor-powered exoskeleton capable of actively assisting patients by providing an anti-gravitation force to the arm. It is designed to give patients the ability to easily perform functional rehabilitation at home. It is also equipped with a spring assisted hand gripper to help patients open their hands to manipulate objects and to counteract spastic contraction.

T16 - Wireless wearable EMG-measuring device for rehabilitation monitoring

Kitchanan Asavatamrat, Pisitpong Wonngtha, Nattadet Chinthanathatset, Parisa Wu, Ariya Suthisophaarporn, Nattapat Tanjariyapor

Mahidol University

At the present, evaluation of the abnormal movement requires the experience of the technician but the amount of expert therapist in Thailand is not sufficient compared with the requirements. Dealing with the problem, the Wireless-Wearable EMG Measurement for Rehabilitation Monitoring can support the therapist to evaluate the symptom.

The Wireless Wearable EMG Measurement for Rehabilitation Monitoring is a device that uses the Electromyography technique to evaluate the patient that has the movement abnormal. The device was designed to be the wearable device that the patient can wear and do not obstruct the movement. The device will place on the vest and receive the data from electrodes through wireless connection to the program in computer. The program can record the EMG signal in total of 5 channels and display the summary of the EMG signal in the same time period. In addition, this program can record the data that the doctor can use this data to evaluate or diagnosis in the future.

T17 - eElectric Intelligent Stretching Board (EISB)

Guan-Yi Hong, Li-Ting Wang, Bo-Wen Wang, Hong-Yi Wu, Shu-Ling Wu

National Yang-Ming University

The calf muscle is one of the most overused and important muscles in our bodies. The calf muscles give us that extra push when running, climbing stairs or a steep hill. Stretching the calf muscles will decrease the risk of tearing muscles and can help with the recovery from much foot or knee pain. Sufficient calf muscles flexibility can also improve sporting and athletic performance. However, the commercial Calf-Stretching Devices, such as stretching boards or wedge, are not easy to adjust the stretching angle. This inconvenience in operation reduces the user's willingness to use the device.

T18 - Mr Augmen – A portable health management solution

Xin-Ting Liu, Bo-Yan Zeng, Chung-Hau Lee

Chang Gung University

In response to fill the gap to popularize the application of the health promotion, we aim to develop an easy-to-use mixed-reality health management device for the users to operate in different communities and home environment.

The users simply require to wear a head-mounted device and follows the assessment instructions of the virtual therapist as if in the real medical institutions. The users would be comfortable to use the assistive device which helps to motivate them to regularly perform the self-assessment and training exercise. Thus it will facilitate the goal of health management in terms of "early detection for early intervention."

T19 - Active balance and mobility

Warapong Narongrit, Satthanat Ongapibool, Chatchawan Malithong, Kamonchanok Wichutarach, Duangkamon Leelasirisri

Thammasat University

Seniority have a difficulty to train or exercise especially for strength and balance exercises which are very important to improve their quality of life and wellness. Because strength and balance exercises training are high risk of fall and need health care providers to help and assist. Fear of falling and the weakness of muscles are the pain points that limit the quality and quantity of exercise for the elderly.

Therefore, we invent the ACTIVE BALANCE & MOBILITY which is a station that allow training, testing and rehabilitation programs for seniority and patients with confidences and support including decrease loads of physiotherapists and sport scientists.

T20 - Audi-met: The alarm device for people with hearing loss

Donghyug, Kim, Juwon, Lee, Hwajin, Lee, Jinwoo, Lee, Geon Min, Park

Korea University

Recently, there has been a great increase in a spread of new vehicles such as electric scooters or electric bicycles. However, the number of accidents has also increased accordingly, and this new type of vehicles can be especially dangerous to people with auditory difficulties.

Many of the leading countries are seeking for the solution with the mandation of the helmets - We therefore are working on a new type of helmet that can sensualize the auditory simulations so that even the people with hearing problems can sense the signs around him or her.

Our new Audi-met senses the peripheral sounds by Arduino systems, and provides alerts to the drivers by vibrations. The frequency of vibration varies as the decibel around the situation varies – the frequency of vibration gets shorter as the alerts with higher sounds are made. We are also looking forward to the usage of our products from the elderly or even people without disabilities for extra safety precautions. Our new attachable “Audi-met” can sensualize the auditory stimulation by making a breeze vibration to anyone who uses it, without any extra barriers sensed.

T21 - Design and development of nasal creator device for cleft lip and palate patient

Chonnapha Phattanaphirom, Wanida Akkarachotisakul, Tanaporn Neelakan, Sulawan Waewsanga

Khon Kaen University

Cleft lip and palate (CLP) patients usually experience several facial deformities. In neonatal period, treatment goals mainly focus on reducing cleft deformity and build up a proper shape of alveolar ridge, lip and nose, by lip repair. Nevertheless, there is some relapse in the position and shape of nose after lip repair because of scar contraction. Therefore, it is recommended that all patients undergoing lip and nose repair use the device postoperatively for at least 3-6 months to achieve a symmetric and well-proportioned nose in CLP patients.

At this moment, there is no any device been manufactured for using during lip repair and post-surgical period in Thailand. As surgeons prefer to use these devices postoperatively, such devices were imported with high cost and had incompatible size and shape for Thai CLP patients.

Accordingly, the objective of this study was to design and develop Nasal Creator Device for molding a proper shape of nose using low cost-effective material with compatible size and shape for CLP patients which are mainly used during lip repair and postoperative period.

Design Category

D01 – PALnel

Kwok Ka Wing, Cheung Yuen Wah, Lau Alan, Lo Hiu Hung

The Hong Kong Polytechnic University

PALnel combines ‘pal’ and ‘panel’ together. This name shows the core value of product: being a friend of the aging to assist them to control electrical appliances and their home environment.

PALnel is a set of products to control electrical appliances. It mainly consists of a panel control part and the remote socket. It helps the ageing population with different declining conditions to control their home appliances easily. It incorporates flexibility and simplicity in addition to the strengths of other similar existing products, aiming at creating a safer and more convenient ways to control their home environments and accomplish independent life at home.

D02 - Hemiplegic shoulder rehabilitation station

Chamus Chew Yat Weng, Thaddeus Tang Rui En, Ethan Lim Zeng Hao

Nanyang Polytechnic Singapore

Shoulder pain resulting from hemiplegia is a common clinical consequence of a focal cerebral insult resulting from a vascular lesion (ie. hemorrhagic or ischemic stroke). Shoulder pain is a common problem after the patient having a stroke. Stroke affecting the upper limbs usually results in shoulder hemiplegia which often becomes painful overtime. It can occur as early as 2 weeks post stroke that can cause muscle poor function and shoulder-hand syndrome such as “frozen shoulder” and loss of range of motion. Normally, to treat the post-stroke pain shoulder, the physiotherapist will structure a rehabilitation programme for stroke patients using about 500 mm long hollow tube for the rehabilitation patient move his upper limbs slide back and forth horizontally or vertically. It was not steady and effective though. Our main task was to redesign/redevelop a simple portable motor bilateral drive mechanism with an induced controlled force for stroke patients to rehabilitate and relieve the hemiplegic shoulder pain.

D03 - Esi bag: Emergency safety intelligence bag

Jaomai Tungsiripat, Korn Hemrungronj, Kullanat Tovikkai, Marjimar Suvivhasopon, Supitchaya Hemrungronj

Chulalongkorn University Demonstration Elementary School

This Esi bag was designed for enhancing the safety of everyone before seeing the doctor or EMS come to home. It increases efficacy of first aid care with reachable price for home use, even in day care, nursing home, even in outreach rural school. This is an ideal medical guideline device system for first hand use such as student, caregiver of elderly. This can connect with the telemed facility of individual area. The carry pad and integrated wheel chair help transport sufferer out from difficult area to connect with EMS system. This prototype is a model for innovative first aid care system.

D04 - “Fun Circuit”

Guan-Jie Huang, Hsin-Yu Fan, Hsin-Yen Yu, Guan-Zhen Chen

Chang Gung University

Circuit training is a highly effective training model which can provide multiple users to participate in different interventional cognition and dexterity training at the same time. Each user can start from one of the training stations and switch to another sequentially and cyclically. The training stations can contain different functional evaluation, such as cognition, fine motor, hand-eye coordination etc. With the competition from other attendee, such training model can raise more motivation and interests for a user to participate. This project, named “Fun Circuit”, is an intelligent assistive system for circuit training. This system contains six training modules designed for six corresponding abilities: focus,

memory, reaction, dual-hand coordination, dexterity, and hand-eye coordination. Each module will be connected to an individual embedded system for data collection and transmission. The embedded system contains a microprocessor, a memory, a set of I/O interface, and a Bluetooth adaptor. An app was also implemented on a handheld tablet to communicate with each module. It is noticed that the program of each module can be upgraded in any times. The training data after collection can be used for further functional assessment and statistics, supporting numerous innovative applications in early rehabilitation, special education, and elderly healthcare areas.

D05 - Remember-Med

Poon Shun Lam Johnathan, Wong Hin Nang, Lee Chung Hon, Pang Long Yin, Liu Cheuk Nam
The Hong Kong Polytechnic University

Remember-Med is a revolutionary reminder system which consists of an app and a pillbox. It aims to serve people who need regular and frequent medication due to various medical conditions. The covers of the pillbox consist of different colours helping users differentiate different time intervals for intake. After opening the pillbox, the clip on the cover will fall and expose the 'USED' label to let users confirm that they have already taken the drugs. Besides, the app will remind the users to take the drugs at the right time by showing a notification with flashing light indicating the exact boxes to open. This help users follow their medication regime more accurately, conveniently and effortlessly.

D06 - The i-ExC game: Enhance cognitive performance, physical fitness and interaction in the normal elderly

Nutnicha Phensresirikun, Kanin Kiatarangul
Chulalongkorn University Demonstration Secondary School

With the growing population of older people, dementia depression and falling are leader causes of morbidity and mortality. Walking, the common activity is depend on both cognitive function and physical fitness. So the effectual way to reduce incident of falling is to strengthen the power of walking by increasing power of brain, body and their interaction.

The i-ExC game (Interaction of exercise for physical fitness and cognition) seem to be a safe, efficacious tool to improve cognitive performance, physical fitness and both correlation function in the same time. Accordingly, the creative designed of i-ExC game is able to motivate the elderly to join for training with fun every day. The game also provide social opportunities with the friends, family so it would be more than game for elderly to adapt their limited range of body, brain, activities of daily living and social to be more powerful in their golden year of life.

D07 – EasyPull

Raissa Chrizel Rivera Cabel, Siti Syarah Bte Suparman, Irsyad Jazli Bin Ramil, Nurdini Binte Jumain
ITE College East

The project Easypull aims to make removing a power plug simple and easy for consumers. With its lever system, it requires minimal strength to operate. Making it suitable for the elderly or those who have neurological disorders which impacts their motor strength.

D08 - Brain box: Brain exercise for 2 generations

Thipok Tungsiripat, Chiratchaya Hemrungronj, Nara Sthapitanonda, Nattam Osornprasop, Siranat Tovikkai
Chulalongkorn University Demonstration Elementary School

This brain box and the gaming guide are innovative toys for modern children who grew up with various technologies as a toy developed by bringing traditional Thai folk games to the wisdom of the people. The technology is more fun for today's generations. We want to reduce children's issues with smartphone play, online games. Actually, there are some good online games, but if it's an intense or

playing game too long, it will have several side effects, including those that may be ADHD-pseudo attention deficit hyperactive disorder. In physical effects, the eyes can be damaged by a long stare, the ears drum can be damaged from long use of the head phone. In mind effect, if the game is violent it will cause real violent in home. Lack of social skills is another unavoidable problem. All of these problems can occur in the elderly group, so this game can be used for training attention encounter with the declining process.

D09 - Automatic light shelf

Mohd Fairuz Izwan Bin Abdul Lait, Danielson Peter, Md As Ahza Iqmal, Sofianshahzaini Bin Md Yosof, Sirhajwan Idek

Keningau Vocational College

This project known as “Automatic Light Shelf” is a 4 tier moveable shelf equipped with LED lights that can be turned on with a single switch. The goal of the project is to assist senior citizens and people with physical limitations like people on wheelchairs by providing them shelf of a suitable height and design that can be placed in proximity to their chairs or beds. Its usage is most practical at nights when the light of the room has been turned off and the persons require lights to be able to see the items they intend to take from the shelf without turning on the room lights that may be uncomfortable for them and disturb others who might be in the same rooms and are asleep.

A survey was conducted on 20 working professionals to examine their perception on this project. The findings indicate that the majority of them rated this project as convenient, safe, beneficial, user-friendly, unique and had great quality. They also approved the design of the shelf as appealing, its ideal size and how it consumed less physical space. Above all, most of them believed the project could benefit senior citizens and people with physical limitations.

D10 - Able walker: Automatic balanced level easy walker

Supitchaya Hemrungronj, Korn Hemrungronj, Jaomai Tungsiripat, Kullanat Tovikkai, Marjimar Suvivhasopon

Chulalongkorn University Demonstration Elementary School

Able walker is able to help orthopedic patients, unstable patients from stroke, parkinson or dementia even normal elderly who feel uncomfortable, unsafe, uneasy with crutches, cane or original walker going up and down stair, difference levels automatically. Users able to adjust tilt, height and balance themselves more easily, more secure walk with safety sensors in different floor and inaccessible wheelchair area within compact price and portable to everywhere.

D11 - Nailed it!

Mo Hoi Yi, Wong Hiu Yan, Chan Mung Ni Monica, Lau Wai Man, Chui Tsz Kwan

The Hong Kong Polytechnics University

Nail clipping is a usual grooming task for everyone. It requires strong lateral pinch and finger dexterity to hold commercially available nail clippers. However, for people with weak pinch strength and poor finger dexterity as well as arthritis, nail clipping may be a difficult task. Thus, our palmar grasp nail clipper is designed to benefit the public and these populations. “Nailed it!” allows people to clip nails using palmar grasp in neutral wrist position effortlessly, without imposing stress on distal finger joints. Thus, it reduces joint pain. The non-slippery paddings provide comfort and prevent sliding out. It is easy to carry because of its small size and lightweight.

A common nail clipper is nailed on a R-shaped spring clamp with a thick iron wire looping over the lever of the clipper. After putting the iron wire over the end of the lever, users can operate “Nailed it!” with palmar grasp. When the clamp is pressed, the wire pulls down the lever of the clipper to cut the nails. “Nailed it!” is a cost-effective and energy-conserving universal design which can promote performance and independence in nail clipping.

D12 - Reclaiming accessibility: To lower-limb prosthetics within rural communities, in developing countries

Desiree Riny

Royal Melbourne Institute of Technology

This project was dedicated reclaiming prosthetic-care for amputee's that live in rural communities within developing countries. Amputees in these communities often cannot afford professional prosthetic care or live too far away from existing services.

While new technologies and services are being integrated into prosthetic services in developing countries, these developments often don't reach those in need, with up to 95% of amputees are going without access. Compounding this problem, devices produced with advanced-technologies such as 3D- printing are often difficult to repair and not always suited to rural environments. Faced with these limitations, amputees find innovative D.I.Y responses that are tailored to local materials and traditional practices.

The research conducted evaluated the technologies, materials, and processes currently accessible in locations within Africa (South Sudan, Cameroon), India (West Bengal, Jharkhand) and Cambodia (Ratanakiri, Battambang), then uses this information to develop D.I.Y. prosthetic designs that are informed by current medical 'best practice'. The resulting designs seek to give amputees independence and control over the construction of their prosthetics, without dependence on healthcare practitioners or NGO for ongoing care. Visual-Ethnography was used to gain an understanding of practices of re-purposing, repairing and crafting within these rural communities and builds onto this through design.

D13 - Liberty of walker

Chen Shih-Yu, Tanaka-Shiho

Kobe Design University

Our device as streamlined style with strong water proof form, and LED device are able to provide the safety issues, the LED device are not only design for user but also design for noted the people near by. And parking device is able to charge the battery and rent service in the same time, that make "Liberty of walker" become more convenience ever, and we are strongly believe "Liberty of walker" can bring user on totally new experience and offer user into one's true comfortable style without any pressure and inhibit.

In 2020 summer Olympic and Paralympics can support the great number of transportation problems as we thought, and after the experience we earned, we will try our best to make "Liberty of walker" become more fitness with it. All you have to do is sit on our "Liberty of walker" and take by assist with it. Your legs will feel less pressure and make user walk as comfortable with Omni assist device. User should be equality as human right, if they can't walk so far, that will be unnecessary at all, at the meantime, why we have to make user to use the useless walker for take a walk or take rehabilitation for it. That is definite not a friendly treatment as a human being.

D14 - Doctor-Do: Learning-based game application

Regita Nurina Salsabila, Adama Hoppy Natalusfi, Alfa Fadlilah, Hasan Syamil, Arifandis Winata

Universitas Brawijaya

Deafness problems experienced by deaf disabled people are an obstacle for them to do everything they can actually do, especially total deaf disabled people. With total deafness, diffables cannot hear even with aids. Therefore, we recognize this problem as a solution of four kinds of things at once (disability, education, awareness, psychology).

The key idea of these problems is how people with disabilities are able to learn through integrated learning methods such as the reflective maternal method etc. which are then digitally modified

using Virtual Mentors, promoting the care of non-disabled children to disabled children through fun-learning, and provide counseling services fostered by professional Volunteers as an effort to control emotions of persons with disabilities.

Doctor DO is an alternative learning media that can be a bridge to learning communication through the integration of Game-Based-Learning and Gamification for deaf and non-disabled people who can be packaged in an interesting and fun way. The development of fun-learning in Indonesia as well as technological progress has become a factor in making Doctor DO.

D15 - StrideX – Ergonomic new-age crutches

Akanksh K, Karil Garg, Sudarsan M S

Indian Institute of Technology Madras

The objective of our project is to provide a solution that allows patients to adjust and adapt to different environments with ease and improve the accessibility and ergonomics of a crutch as a whole.

The novelty of our crutch design lies in a simple real-time height adjustment mechanism that allows patients to quickly shift between the three given heights – for walking, to climb stairs and to sit while they are still on the crutch. All the heights have been carefully chosen so as to reduce the effort involved in the activities and improve stability. Additionally, the crutch provides an extra degree of freedom at the elbow joint allowing the users to access objects around them and do menial activities without having to remove their crutch.

Apart from the ergonomics, from a biomechanical point of view, the crutch has been devised to improve the load distribution, gait stability and reduce the impact during the gait. The focus is now on weight reduction and optimisation of the speed to energy expenditure ratio.

D16 - Effects of a task-specific virtual reality training for hemiparetic extremity on stroke: A pilot study

Karen Sie, Andy Yu Ka Hei, Cherry Lo Cheuk Wing, Yuko Ma Wan Ting

The Hong Kong Polytechnic University

Upper extremity hemiparesis after stroke is one of the major concerns following inpatient rehabilitation. With only very few of them demonstrate complete recovery. Task-specific training in activities of daily living training has been proven to be effective in promoting recovery of upper extremity after stroke. There is limited research on effectiveness of task-specific training with incorporation of virtual reality (VR) in distal upper extremity functions in stroke rehabilitation.

Thus, this study is to develop a new and innovative task-specific VR programme (TS-VR), built through Unity3D programme and Leap Motion Controller as input device, for distal hand function training and investigate whether a 2-week programme of TS-VR training would promote recovery of hemiparetic upper extremity in participants with chronic stroke.

After building TS-VR program with seven level of daily tasks, twenty participants are recruited to join the study. Outcome measures are done with pre- and post-training and follow up sessions. Findings of this study suggested that our newly TS-VR training system was useful and led to significant improvement in upper extremity functions in participants with chronic hemiparetic stroke after a 10-session training, and can be applied to clinical setting in future.

D17 - Snaker Spoon

Tsz Ching Fung, Wai Dik Chan, Ho Yan Lo, Hiu Fung To, Oi Wai Yan
The Hong Kong Polytechnic University

Our product is twistable as a snake so it can provide many benefits for adults and children with special needs who wish to feel more independent during mealtimes.

Snaker Spoon is composed of 3 parts, the spoon (Front), interface for angle turning (Middle) and the handle (Backside) . A spring is used to connect 3 parts of snaker spoon to allow angle adjustment in addition with magnets in between each part to ensure stability during feeding. By twisting lower spoon part and upper handle part into your most functional angles, you can enjoy own meal more successfully. Each of Front or Back part allows 6 directions of twisting respectively and totally 36 combination of direction are possible. It compensates dysfunctions for everyone encountering difficulties during eating.

Snaker Spoon allows feeding without limitation and let you have own angles to feed in comparison with the current commercial angled utensils. Its design is changeable to every other utensils such as fork or even knife!

D18 - Prosthetic amphibian

Ling-Yang Lao, Chung-Ken Wong, Hao-Wei Huang
Ming Chuan University, MCU

The innovative design of the prosthetic leg mainly uses FRP Glass Fiber for its core material. The pneumatic socket design provides for more comfortable use of the amputee's foot; allowing them more life needs, such as walking, running and cycling.

D19 - Movtivet: Movement stimulation versatility tool - for elderly

Thipok Tungsiripat, Chiratchaya Hemrungronj, Nara Sthapitanonda, Nattam Osornprasop, Siranat Tovikkai
Chulalongkorn University Demonstration Elementary School

Movtivet (Movement stimulation versatility tool) Portable Exercise Tool is a solution, focusing on bedridden patients and immobility elders, to support them a chance to be able to stand up and continue walking by themselves so that they can change their life to be healthy again. We believe that physical, mental and brain active are very important for a healthy human being.

The key feature of this portable device is for the user to be able to exercise anywhere and any time. It stimulates joint and muscle movements of lower body with different actions and helps users to exercise their muscles in various ways in order to do multi-tasks and control the coordination between brain and muscles to prevent falling. Health monitor programs are equipped, i.e. HR and Lactate monitor, to make sure the best results for users' health.

D20 - Gerimo add-on

Pathid Liamtrakoolpanich
Luamrudee International School

Many nations around the world are becoming an ageing society and with the increasing amount of elderly people, walking aids such as walkers have become more prevalent. In order to make the walker more convenient for users, we propose an add-on device to be used in conjunction with a walker.

This device serves to reduce the strength the user needs to exert to operate the walker and enable walkers to ascend a small number of steps which would make the walker more convenient within

households and similar locations. Our proposed portable device is to be attached at the lower side bars of the walkers and is to consist of an embedded controller to control the motion of mechanism with two DC motors attached to lower walker platforms of left side and right side. The motors are to continuously spin, turning a platform, which is always kept parallel to the ground through four-bar linkage mechanism. The platform pushes against the ground at the lowest point of its circular motion, driving the walker forward. This motion is repeated to automate the walker. The speed and direction would be controlled through force sensors at the handle processed by an embedded system.

D21 - Active Exo-spine (AES)

Sarasit Sirawattanakul, Suphicha Sirawattanakul
Chulalongkorn University Demonstration Secondary School

Back pain is one of the common health issues. Unfortunately, it can be severe or even fatal for elders who are immensely fragile if not being prevented. Consequently, people have been creating several types of equipment that help to prevent and cure these health issues. One of them is called back support, however, a critical drawback of this equipment is the inconvenience.

While users wear back support, they are not able to move voluntarily and can sometimes have breathing difficulties. As a result, we decided to design preventive equipment for back pain that allows users to maintain their ordinary actions called Active Exo-Spine or AES. Other preventive equipment will be replaced as users will be able to wear the AES throughout the day without any inconvenience.

The design of AES is an imitation of human spine with a flexible compact structure which gives AES a significant advantage as it allows users to move their upper bodies freely. Even so, when AES detects an abnormal posture of a user, it will then control and fix the user's spine into the correct position.

D22 - revosplint

Yu-Hua Cheng, Ching-Heng Hung, Gong-Chen Chang, Yu Pei
Taipei Medical University

Revosplint is light, breathable, multifunctional and can be customized. It can perform electrotherapy, thermotherapy and help rehabilitate the patients. All the techniques mentioned above make the whole treatment become more comfortable and more convenient.

D23 - Journey electric wheel chair

Phongsathon Tabonglek, Sukunya Phomkawong
Sakannokkhon Polytechnic College

The project "journey electric wheelchair" is especially designed and developed for the convenience of the differently abled people with comfortable structure and power. The raw materials are easily available at affordable price. The best thing of our project is that it helps the differently abled people to reach out to the world by not feeling backward staying home. They can travel around even if you are disabled. You just need to open the door and exert a little force by your hand to open and close the door of the electric journey wheelchair. There's enough space which will make you comfortable and can enjoy the trip to the fullest. It provides full safety, satisfaction, perfect control, good structure and support system to the users.

All in all, the "journey electric wheelchair" allow the differently abled people to come forward and experience the world. We have taken some tests and the test results were very satisfactory.

Oral Presentations at i-CREAtE 2019

Empowering from the bottom-up: ICT for enhancing service accessibility

Ms Kamolpun Punpuing, Ms Suphaphan Katekum, Ms Sasithorn Wonggavee
National Science And Technology Development Agency, Pathum Thani, Thailand

1A - Oral Presentations - Bradman Theatre, August 27, 2019, 13:30 - 15:00

Biography: Kamolpun Punpuing is head of the Research Strategic and Project Management Section, Research Center on Assistive Technology and Medical Devices, National Science and Technology Development Agency. She received a Ph.D. in social administration, and two master's degrees in social work studies, and information technology. Her combined knowledge in social science and science enables integrated aspects to her work. Her interest is in ICT for development, the Independent Living of people with disabilities, and a participatory research approach. She considers research processes as tools to get in touch with the real life situation of the target groups concerned.

The problem of access to services of people with disabilities and older persons reflects a policy-implementation gap, especially in rural areas. Significant challenges are lack of service information and poor service provider networking.

The objectives of this study are to analyze and design information systems for facilitating flow of information and creating virtual networking among service users and stakeholders under the service-integration scheme, and to study the Thai local context that supports utilization of the information system. This study applied a 'System Development Life Cycle' for information system analysis and design process. In-depth interview and participatory observation methods were used for exploring the community and organization context. Five people's organizations were selected as pilot sites: Two service centers for people with disabilities; and three quality-of-life development and vocational training centers for elderly people. A website, 'Synergy', was designed under web accessibility guidelines as a portal, to provide information openly for registered network stakeholders to update their own information. A web application, 'Service integration for people with disabilities and older persons system', offers empowering activities and community personal record database management of people's organizations. Central government policy makers need formal statistical information, mainly for budget allocation and evaluation purposes. Local government and people's groups at the community level need information to improve services and reach out to those left behind. The participatory process is a key for analyzing and 'bringing information to life'; raising awareness about hidden problems, and creating a sense of urgency for service accessibility. Information systems should have a simple interface, graphical presentation, and linkage with social media, mentioned - Facebook and Line applications. Face-to-face activities together with a one-year follow-up are part of the maintenance period. However, for individual users who cannot reach the internet, inter-personal communication is necessary.

Mechanical optimisation of a prosthetic knee for low-income venezuelan amputees

Mr Jesus Campo^{1,2}, Mrs Carmen Müller-Karger^{1,3}, Ms Belkys Amador^{1,4}

¹Biomechanics Group, Simon Bolivar University, Caracas, Venezuela, ²Dohrmann Consulting, Melbourne, Australia, ³Department of Mechanical and Materials Engineering, Florida International University, Miami, United States, ⁴Department of Mechanical Engineering, National Experimental University of Tachira, San Cristobal, Venezuela

1A - Oral Presentations, Bradman Theatre, August 27, 2019, 13:30 - 15:00

Biography: Jesús Campo Uribe is a forensic engineer working at Dohrmann Consulting (Australia). He received a bachelor's degree in mechanical engineering from Simon Bolivar University (Venezuela) and a master's degree in biomedical engineering with business from The University of Melbourne (Australia). Jesús has experience and is interested in rehabilitation engineering and assistive technologies. He worked in a project in Venezuela to provide accessible prosthetic knees to amputees and has recently participated in a project at the Royal Melbourne Hospital by analysing wheelchair stability and propulsion (through the calculation of the centre of gravity of wheelchair-bound users).

This work is framed by a macro project aiming to design, manufacture, and provide a low-budget and functional prosthetic knee to low-income population in Venezuela. This project consisted of a structural and manufacturing process optimisation of a preexisting external mechanical prosthetic knee, developed by the Biomechanics Group of Simon Bolivar University. The objectives of this project were to reduce the overall weight, the manufacturing time and costs, and to improve the kinematic performance of the device, in agreement with the needs of amputees and manufacturing technicians.

To achieve these goals, a novel prosthetic knee design was created and optimised by a multidisciplinary team (including engineers, prosthetists, manufacturing technicians, and amputees). An engineering design methodology was implemented to develop a patentable device; consecutively, computational and 3D printing methods were utilised to optimise the structure of the created device. More specifically, reiterative stress analyses using the finite element method (FEM) were performed during the optimisation process to ensure that all components of the device had a safety factor greater than 1, under the severe boundary and loading conditions indicated by the ISO 10328 standards. Additionally, computer-aided manufacturing (CAM) software was utilised to develop and optimise the manufacturing processes of each component of the prosthetic knee. Finally, a mechanical extension mechanism was designed and manufactured to ensure that the device provided desirable functional responses to amputees.

In summary, if compared to the preexisting device, it was possible to reduce the mass of the prosthesis by 23.6% (for a total of 388.51 g) and the manufacturing time by 20.4% (for a total of 13 hours and 31 minutes). This project represented a significant improvement towards achieving the goal of providing an accessible knee prosthesis to disadvantaged communities in Venezuela.

Training equipment for hand function rehabilitation driven by flexible chain

Ms Yixuan Xiao, Prof. Hongliu Yu, Mr Xinwei Li

University Of Shanghai For Science and Technology, Shanghai, China

1A - Oral Presentations, Bradman Theatre, August 27, 2019, 13:30 - 15:00

Biography: Master Candidate of the University of Shanghai for Science and Technology

Equipment for hand function rehabilitation can improve the rehabilitation efficiency of hand dysfunction caused by stroke and reduce the burden of rehabilitation physicians. In view of the relative shortage of rehabilitation equipment for hand dysfunction, a rehabilitation training device based on traction hand function is proposed in this paper, which is driven by a flexible chain mechanism. Its significant advantages include adjustable driving chain length and self-adaptive interfinger spacing. Relevant experimental parameters and tests of patients' usage were carried out with the experimental prototype. Experimental results show that patients can quickly complete the wearing. And fingers are driven by a flexible chain to achieve normal movement in the metacarpophalangeal (MCP) range of 0~90°. The range of interphalangeal (PIP) is 0~110°. The speed of the joint rotation is up to 120°/s, and the maximum thrust of the fingertip can reach 6.11N. It is suitable for patients with weak muscle tension or in flaccid paralysis period to carry out hand rehabilitation training.

Auto cue system for the person with Mild Cognitive Impairment

Dr Jiro Sagara¹, Dr Kiyohiro Omori², Dr Rumi Tanemura³, Dr Toru Nagao³, Dr Kazue Noda³

¹ Kobe Design University, Kobe, Japan, ² Hyogo Institute of Assistive Technology, Kobe, Japan, ³ Kobe University, Kobe, Japan

1B - Oral Presentations, Menzies Theatre, August 27, 2019, 13:30 - 15:00

Biography: Dr. Jiro Sagara is head and professor of dept. of Product and Interior Design, Kobe Design University, and Councilor of the Hyogo Institute of Assistive Technology as a part timer. Dr Sagara is a member of the Board of International Association for Universal Design, Adviser of Rehabilitation Engineering Society of JAPAN, and Auditor of Society of Design and Art fusing with Science and Technology. His interests include universal design, Assistive technology, the GENSAI design, Barrier-free environment.

In Japan, seven million senior citizens will be the dementia in 2025, and the ratio will be around 20% of senior citizens. The dementia is the progressive disease begin with memory disorder, which makes several troubles in the daily life, such as burn the pot on the stove, forgot to lock the door when outing or outing without purse or keys, forgot the place of the purse in the house, and so on. The most of senior citizens like to live in own home as long as possible, however they may abandon it and move to care facilities. The person with dementia also accomplish daily activity one by one when they get proper prompting.

The authors developed the auto-cue system which make appropriate prompt message by sensing surroundings to support independent behavior in their daily life as long as possible.

We adopted the MESH IoT tags produced by Sony Co. Ltd. as the prototype of auto-cue system to confirm the function and effectiveness. The MESH IoT tags are simply connected to any tablet and can create sequence on it. We tried two stages of test; one is temporally experience for the visitors in the model house and the other is long term trial by three subjects in their own house.

In the first trial, we found out the effectiveness of auto-cue by the respondents who have relation to the person with dementia, however we encountered several troubles in fixing the MESH tags and the tablet to real houses, caused by those limited features or unique behavior of the subjects.

The authors will make presentation about these trials and proposal of the total auto-cue system including other some devices which will assist Independence for the persons with early stage of dementia.

Intelligent bright lighting for people with dementia

Dr Kenneth Fong¹, Dr Hilda Cheung², Dr Tommy Wei², Dr KH Ting³

¹Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Kowloon, Hong Kong, Hong Kong SAR, China, ²Department of Building Services Engineering, The Hong Kong Polytechnic University, Kowloon, Hong Kong, Hong Kong SAR, China, ³University Research Facility in Behavioural and Systems Neuroscience, The Hong Kong Polytechnic University, Kowloon, Hong Kong, Hong Kong SAR, China

1B - Oral Presentations, Menzies Theatre, August 27, 2019, 13:30 - 15:00

Biography: Dr. Kenneth N. K. Fong is Associate Professor in the Department of Rehabilitation Sciences. He is an occupational therapist by background. He is also the Editor-in-Chief of the Hong Kong Journal of Occupational Therapy (HKJOT) (indexed in SCI with 2017 Impact Factor: 0.840). His research interest is in neurorehabilitation, environmental issues and assistive technology. In the last couple of years, his students got overseas awards in design of assistive technology products in different occasions including the Student Innovation World Challenge, i-CREAtE (2014-2018) held in different countries in Asia.

Background: This project is to develop an intelligent bright lighting system, which moderates the light source, wavelengths, and ambient light levels, and changes according to time of day, to improve circadian rhythms and determine the optimal therapeutic effect of using bright light for older people with dementia (PwD) in community dwellings in Hong Kong. We also examine the relationship between ambient light exposure and sleep quality with cognition and behavioural and psychological symptoms of dementia (BPSD), as well as quality of life of PwD and their caregivers.

Methods: We install the lighting system - a light box for the ceiling at the dining area and a freestanding desk lamp at bedside, at participants' homes for 6 months. To understand the needs of the PwD, we interview both PwD and their caregivers respectively to evaluate the cognitive function, quality of life, sleep quality, and BPSD of participants. Ambient light intensity received by PwD is measured by means of wearable light sensors for a 24-hour monitoring in a typical day.

Results: Participants (n=45) and their caregivers (n=42) were recruited from 3 local community centres. The needs assessment reveal that sleep quality is related to BPSD, particularly physical aggressive behaviors including grabbing, scratching others, anxiety and apathy. Decreased sleep duration is associated with reduced cognition. Ambient light intensity is not related to sleep disturbance but the difference between morning and night time is significantly correlated to sleep quality. Depression and cooler light temperature is correlated with cognitive performance.

Conclusion: Our findings suggested that sleep quality is related to BPSD and depression of PwD. Bright light therapy may be applied in design and environmental modification for the elderly at home for the optimal benefit of PwD to improve sleep, behavior and cognitive ability, and quality of life of their caregivers.

Wearable pre-impact fall detection: A systematic review

Dr Duojin Wang, Shiyu Liu

University of Shanghai For Science and Technology, Shanghai, China

1B - Oral Presentations, Menzies Theatre, August 27, 2019, 13:30 - 15:00

Biography: Duojin Wang works in the Institute of Rehabilitation Engineering and Technology at the University of Shanghai for Science and Technology. He received his PhD in human factors and product ergonomics at Technische Universitaet Berlin in 2014. At present, he mainly focuses on rehabilitation engineering, especially the development and research of home rehabilitation products.

Falls and the fall-related injuries are a public health problem, it can result in serious consequences. In recent years, there are a lot of researches about wearable pre-impact fall detection, but lacking of a relevant review. The purpose of this paper is to make a systematic review of it and provide some suggestions to further optimize the system. After database retrieval, there are 15 studies meet the standard that the system should detect the fall before the impact. Inertial sensors and surface Electromyography-based system (sEMG) are used in these researches. The most detection algorithms are threshold method and machine learning. Most studies have got a high specificity and sensitivity and adequate lead times to take the protective measures. This shows the feasibility and far prospect of pre-impact detector.

A movement based gaming workshop with LusioMATE

Mr Ben Dalton¹, Mr Justin Keenan, Mr Chris McGowan

¹Lusio , Sydney

1D - WORKSHOP (A movement based gaming workshop with LusioMATE), Fitzroy/Derwent Rooms, August 27, 2019, 13:30 - 15:00

Biography: Ben, Justin and Chris have a range of experience in technology, the corporate space and presenting. They love showing off LusioMATE and its potential to help a wide range of people with disabilities.

LusioMATE is a gesture-based, mobile gaming, ecosystem and service. The problem for almost anyone doing a program of physical therapy is that it can get boring and hard to maintain focus on your goal.

How many times have you been given a physical therapy program you either didn't do properly or complete?

Our inspiration comes from the millions of people with acquired or born disability, many of whom have no choice but to do a daily or regular physical therapy program to achieve movements that enable them to preserve or develop functional goals.

Our physical therapist's and families told us they would love a simple technology solution to monitor and motivate people in a fun and engaging way.

So for clinicians, clients, and any of those in need of motivation to move, we created LusioMATE.

LusioMATE is a wearable gaming controller that fits almost anywhere on the body that motivates people to do their physical therapy exercises in a fun and engaging way by playing any of the varied styles of games we have created and will continue to create.

LusioMATE is designed to be played at home, on the go or in a clinic on almost any device and can also be calibrated to almost anyone's range of movement be it big or small - this way, no one is locked out of the party. LusioMATE is a Prescription Gaming platform to prescribe activity, monitor

compliance and set tailored movement goals. Clinicians can easily review and motivate one or one hundred clients located anywhere in the world. Maximising time efficiency, the number of people they can help and their impact.

We now work with several different communities with varying needs, which demonstrates the true versatility and need for LusoMATE. We can't wait to show you!

New developments in home control technology

Dr Graeme Smith

Ability Technology, Forestville, Australia

1E - WORKSHOP (New Developments in Home Control Technology), Murray Room, August 27, 2019, 13:30 - 15:00

Biography: Founder and Executive Director of Ability Technology. Wide-ranging experience in assessing the computer-related technology needs of people with disability, including spinal injury, TBI, cerebral palsy and developmental delay. Provided expert assistive technology assessments nationally, in personal injury and medical negligence cases. Extensive practical research experience in disability and technology, covering such topics as videoconferencing, memory aids, mouth controlled computer aids, ECUs, speech recognition and technology for people with brain injury. Has served on the boards of ILC NSW and ARATA, contributed to government and parliamentary enquiries and presented at conferences and universities in Australia and overseas.

Generic home control technology (such as Amazon Alexa, Google Home and Apple HomeKit) has transformed and invigorated the environmental control (ECU) market. Ability Technology has been involved with many clients who have adopted the new technology, with mixed results. This workshop will provide an opportunity to share the experience we have gained. Some of the issues to be addressed are:

- Additional modules required when using these devices and the creation of longer chains of connected modules, with increased risk of failure, vulnerability to incompatibilities from updates in individual modules and concomitant support needs.
- Reliance on voice alone as an access method may be less than ideal for many clients and alternative or additional access methods may be complex.
- Reliance on internet-based home control technology can expose the client to increased risk of downtime and failure.
- The inappropriateness of voice control for some important home devices such as external doors and their lack of applicability to important domestic requirements such as bed control.
- The challenge for many users of having multiple accounts that are required for these devices and associated modules.
- Problems of ambient noise, and also problems for users with soft or variable voice quality.
- Concern among some users that they will lose personal supports if they opt for technology solutions such as these.
- Difficulties of trialling these systems as ECU solutions.
- Whether these systems may, in many cases, serve best as an adjunct to other ECU systems.

The workshop will show how to set up these devices and the additional appliance modules, using tablet in conjunction with the voice systems.

Avoiding joint axes misalignments in robotic shoulder rehabilitation exoskeleton

Dr Aibek Niyetkaliyev, Dr. Emre Sariyildiz, Prof. Gursel Alici

University of Wollongong, Wollongong, Австралия

2A - Oral Presentations, Bradman Theatre, August 27, 2019, 15:30 - 17:00

Biography: Aibek S. Niyetkaliyev received the B.Sc. degree in aerospace engineering with a minor in mathematics from Texas A&M University, College Station, TX, USA, in 2011, and the M.Sc. degree in mechanics from Eurasian National University, Astana, Kazakhstan, in 2015. He is currently working toward the Ph.D. degree in rehabilitation robotics at the University of Wollongong, Wollongong, Australia. His research interests include robot-assisted rehabilitation, biomechanical modeling, design, kinematics, and control of robot manipulators.

The use of robotic devices has received an increasing interest in the physical rehabilitation therapies of people with neurological impairments. In contrast to the end-effector based robots, the robotic exoskeleton's joints should be aligned with the human joints to provide anatomically accurate movements.

Most of the existing upper-limb rehabilitation exoskeletons consider the human shoulder as a single ball-and-socket joint whereas the proper shoulder functionality depends on the coupled motion with a so-called shoulder girdle. Neglecting the motion of the shoulder girdle leads not only to inevitable joint axes misalignments between human and robot but also limits the assistive capabilities of the shoulder exoskeleton.

This work presents the mechanism design with increased number of actuators that can assist the independent and coupled motion of the human shoulder complex avoiding uncomfortable joint axes misalignments. The proposed mechanism consists of five degrees-of-freedom (5-DOFs) hybrid structure with rigid and cable links. The 2-DOFs proximal module, designed to assist the shoulder girdle linkage, is modelled as a 4-bar rigid mechanism with active and passive joints to resolve the kinematic discrepancy caused by the distance between the robot structure and human body. The distal module, designed to assist the spherical shoulder joint, is a 3-DOFs cable-driven parallel mechanism with four active pulling cables between the two cuffs attached to the human limbs. In addition to the advantages of parallel structure, the use of cables reduces the mechanical interference, inertia and overall weight of the exoskeleton as all the actuators are placed on the fixed support base. The smooth cable transmissions do not restrict the natural human movements and actuation redundancy provides workspace free of singularities. The combined hybrid shoulder exoskeleton increases the overall workspace of the exoskeleton and provides segmental control of the human shoulder.

Research on joint torque estimation control strategy for elbow exoskeleton

Su Liu, Zhuang Liu, Xinwei Li, **Dr Sujiao Li**

University Of Shanghai For Science and Tehcnology, Shanghai, China

2A - Oral Presentations, Bradman Theatre, August 27, 2019, 15:30 - 17:00

Biography: Sujiao Li received the B.Eng. and the Ph.D degrees in biomedical engineering from Xi'an Jiaotong University. Since 2015, she has been a teacher in Institute of Rehabilitative Engineering & Technology, University of Shanghai for Science and Technology. Her current and previous research works focus on exoskeleton rehabilitation robots, intelligent prosthetic control based on EMG signals, human biomechanical analysis and simulation modeling, 3D printing medical orthopedic products

The rapid growth of the population of motor dysfunction has brought heavy economic and medical burden to the society. There has been growing interests in the research of exoskeleton technologies for motion assistance to help the rehabilitation and life assistance of the elderly and patients with neuromuscular impairments.

This research aims to design a degree of freedom elbow powered exoskeleton that provides assistive torque for the operator to perform specific rehabilitation tasks. Moreover, a control strategy is proposed to estimate elbow joint torque through the recurrent neural network, whose input components include surface electromyogram (sEMG), the angle and angular velocity of joint angle and shoulder posture. Finally, further experimental investigations, comparing the sEMG power under non-assistance and assistance conditions at different mean angular velocities (15 degrees/second, 30 degrees/second), are carried out to verify the validity of the human elbow joint torque estimation. The experimental results indicate there was highly consistent between expected torque and predicted torque (coefficient of determination, $R^2 0.97 \pm 0.05$). In addition, the average sEMG power of elbow assistance is significantly reduced, which based on the proposed control strategy at different average angular velocities. The results show that the proposed control strategy has good performance in elbow assistance and it is suitable for elbow powered exoskeleton suit. The strategy has potential to be applied for the active rehabilitation training for stroke patients.

Relationship between assistance force and walking motion in wheelchair operation

Mr Ryoji Onodera

2B - Oral Presentations, Menzies Theatre, August 27, 2019, 15:30 - 17:00

In Japan, one in four people is expected to become an elderly person in the year 2050. In addition, the number of people certified for long-term care/support need also tends to increase.

Currently, “elderly care by the elderly” is becoming a serious issue and it is obvious that it will be a big issue from the acceleration of aging in the future. As a result, the burden on the caregiver is increasing, and it is important to emphasize not only the QOL of the care recipient but also the improvement of the QOL of the caregiver. Meanwhile, interest in society participation of handicapped and elderly persons has been increasing.

In order to solve the above issues and promote social participation, we focused on the wheelchair with high demand among nursing care products, and experimentally investigated the relationship between assistance force and walking motion to understand assistance motion of a wheelchair.

We acquired the assistance force using 6-axis force sensor that installed in handle portion of the wheelchair, which is the pushing force in the traveling direction when advancing the wheelchair. Meanwhile, we understood the walking motion using the shank angle calculated by integrating the angular velocity obtained from the multi-axis motion sensor installed in the lower leg. Simultaneous measurement of assistance force and walking motion was carried out using these two sensors, and the relationship between them was investigated.

As a result, we confirmed that aggressive extrusion of assistance motion was started when one leg started in the swing phase and the swing phase finished and both legs were supported. In addition, although the assistance motion has also confirmed that one leg is being performed during the stance phase, the timing of the motion was that the start was 35~45% and the end was 80~90% from the heel contact.

Digitising notetaking accommodations: Revolutionising how students work with spoken information

Mr Jim Sprialis¹

¹Sonocent, Adelaide, Australia, Sonocent UK, Leeds, England

2D - WORKSHOP (Digitising Notetaking Accommodations: Revolutionising how Students Work with Spoken Information), Fitzroy/Derwent Rooms, August 27, 2019, 15:30 - 17:00

Biography: Jim Sprialis is a leading influence in the field of technology and inclusive education. His consultancy service offers expert advice, presentations, and training and support in a broad portfolio of inclusive technology solutions to schools, the tertiary sector and workplaces. With a specialist knowledge base around disability and learning difficulties such as dyslexia, he is passionate about promoting inclusive technologies and universal design approaches that can benefit everyone in their productivity and lifelong learning. Jim is also the Australian representative for Sonocent and supports Accessibility Advisers from several Australasian Universities to implement Sonocent Audio Notetaker as a notetaking accommodation.

Studies indicate that creating and reviewing notes effectively is directly related to student academic success. Better notes lead to improved retention of course material and, ultimately, better learning outcomes. However, notetaking is a highly complex task that places significant cognitive demands on memory and processing, making it one of the biggest challenges for students with disability or learning differences such as dyslexia.

This presentation will describe how students who require digital note taking accommodations are utilising Sonocent Audio Notetaker for Windows and Mac to address their barriers to taking effective notes. You will hear how the technology enables students of all abilities to capture, annotate, review and engage with spoken information from lectures, tutorials, webinars and flipped content.

In addition, you will learn how the software has enabled students with a disability or learning challenge, many of whom were previously dependent on peer notetakers, to move beyond accommodations to take considered, comprehensive notes independently, applying strategies designed to encourage active listening.

In evidencing how the software has created learning independence, supported retention, and raised academic attainment for over 120,000 students worldwide, reference will be made to staff and student feedback gathered from a survey of over 3,000 end-users, and to pilot studies carried out in US, UK and Australian universities.

An overview on assistive technology for eye gaze access

Mr Dennis Lo

ILC Tas, South Launceston, Australia

2E - WORKSHOP (An Overview on Assistive Technology for Eye Gaze Access), Murray Room, August 27, 2019, 15:30 - 17:00

Biography: Dennis is a Speech Pathologist with a specific interest in Assistive Technology and Alternative and Augmentative Communication (AAC). Dennis was involved in the development of the MND Tas Communication Equipment Library. He was also part of the Communication Aids Clinical Advisory Committee for Queensland Health (2010 - 2015). He has also been involved with professional bodies such as Speech Pathology Australia and other professional organisations as well as conferences such as the 7th and 8th iCreate.

Eye gaze access can be a powerful access solution for people facing computer access challenges. This workshop aims to provide an overview of assistive technology for eye gaze access. The focus of the session will be on the assessment and implementation process of eye gaze technology within a larger assistive technology ecosystem.

The session will cover the following aspects on eye gaze access technology:

1. technological basis around eye tracking systems
2. eye gaze access assistive technology available
3. mainstream eye tracking solutions and implementations
4. assessment and implementation of eye gaze access
5. interactions with other assistive technology
6. challenges and limitations

Discussions on current development around eye gaze technology will also be included in the session. The workshop will also provide demonstration and hands-on opportunities for participants (pending on equipment availability and time available for the session).

Affordable AT in the New South Wales Health System

Ms Jackie Hiller¹, Ms Louise Farrell²

¹EnableNSW, Healthshare NSW, Parramatta, Australia, ²Health and Social Policy Branch, NSWHealth, Australia

3A - Oral Presentations, Bradman Theatre, August 28, 2019, 13:30 - 15:30

Biography: ¹Jackie Hiller is Associate Director Patient Support Services and Manager of EnableNSW. Jackie is a registered occupational therapist with extensive experience working across health and disability sectors primarily with children with disability and their families. ²Louise Farrell is Director, Priority Programs Unit in the Health and Social Policy Branch of NSWHealth. Louise has policy responsibility for a number of areas including Assistive Technology

EnableNSW has been the primary government funding source for Assistive Technology in NSW managing a budget of \$80M per annum for the last 10 years. It is responsible for providing assistive technology (AT) and other programs to allow people with chronic health conditions or disability to live safely at home. In addition there are over 140 equipment loan pool sites distributed throughout NSW Hospitals and Community Health providing ready access to AT for people in contact with the health system.

In the light of major reforms in the Australian Aged Care and Disability systems, NSWHealth is working through a program of reform with an emphasis on ensuring health needs are met through AT funding. This includes AT for prevention and treatment of health conditions, recovery and rehabilitation and to facilitate safe and timely hospital discharge.

The key elements of this reform are to streamline access to all NSWHealth funded AT and the exploit the efficiencies and savings that come through safely reusing AT to ensure patient access is affordable and the system sustainable.

This presentation will provide an overview of the:

- reforms already undertaken to ensure a cost effective and efficient model for the provision of AT
- learnings from the establishment of a purpose-built facility to refurbish and recycle mobility and self-care equipment
- results of a recent review of the AT needs of the health system
- future directions moving to a shared economy to build on existing services within the health system.

The Impact of the NDIS on specialised AT Services

Dr Graeme Smith

Ability Technology, Forestville, Australia

3A - Oral Presentations, Bradman Theatre, August 28, 2019, 13:30 - 15:30

Biography: Founder and Executive Director of Ability Technology. Wide-ranging experience in assessing the computer-related technology needs of people with disability, including spinal injury, TBI, cerebral palsy and developmental delay. Provided expert assistive technology assessments nationally, in personal injury and medical negligence cases. Extensive practical research experience in disability and technology, covering such topics as videoconferencing, memory aids, mouth controlled computer aids, ECUs, speech recognition and technology for people with brain injury. Has served on the boards of ILC NSW and ARATA, contributed to government and parliamentary enquiries and presented at conferences and universities in Australia and overseas.

The National Disability Insurance Scheme promised much for people with disability in Australia. One of the key promises was choice – that rather than having services allocated to them, they would instead be offered a growing marketplace of goods and services from which they could choose.

Recent changes by the NDIA are producing outcomes in the area of Assistive Technology (AT) that are contrary to the promise of choice embedded in the NDIS. The paper will highlight two such policies that will have the consequence of squeezing out small, specialised AT providers in favour of large providers.

1. **20 Minute Travel Rule:** In July 2018 the NDIA announced restrictions on the funding of travel by therapists and others, including AT services. Claims for travel have been essentially limited to 20 mins each way. This has been a disaster for specialised AT services who, due to the paucity of expertise in this field, provide services to people in all parts of Sydney and in regional NSW. This work has ground to a stunning halt.
2. **New provider registration requirements** provide two pathways – verification, for small entities, and certification, with much more onerous requirements, for others. Unfortunately, small services structured as a company (which many are) must pursue the certification pathway. The cost for the audit process associated with this is at least \$11,000. This is a prohibitive cost for many small providers.

The impact of these two changes come on top of the administrative tangle that the NDIS has become and which provides a relatively heavier burden on small providers.

The end result is a retreat by many small AT providers into local area services. Only larger entities will be able to absorb the costs associated with these changes. This outcome is contrary to the spirit of the NDIS.

AT in the New Zealand context

David Andrews and Karen Beard-Greer

NZ Federation of Disability Information Centres

3A - Oral Presentations, Bradman Theatre, August 28, 2019, 13:30 - 15:30

Biography: David Andrews is Enable New Zealand's Acting General Manager. Prior to taking up this role, he has been the Operations Director at Enable New Zealand for four years, taking a strategic leadership role in all service areas of the organisation including equipment supply, contracting, procurement and allied health. David holds a Bachelor of Business Studies degree and has held management roles in both public and private entities for over 16 years.

Karen is the CEO of the Independent Living Charitable Trust in New Zealand, a non-government organisation (NGO) making daily living easier for people with disabilities and seniors by offering an extensive range of A/T solutions. Karen is an Executive of the New Zealand Federation of Disability Information Centres and was the New Zealand founding member for the Create Asia Alliance. She is a Director of Manawanui Support Ltd.

Kicking goals and having fun! How gaming assists goal achievement

Ms Elizabeth Nade

Cerebral Palsy Alliance, Allambie Heights, Australia

3B - Oral Presentations, Menzies Theatre, August 28, 2019, 13:30 - 15:30

Biography: Elizabeth Nade is an occupational therapist and currently is the Consultant for Assistive Technology at Cerebral Palsy Alliance. She has over 11 years' experience working with people with neurological disabilities in providing direct services as well as training, supporting and mentoring staff in the areas of complex seating and technology assessment, prescription and intervention. Elizabeth has a keen interest in how technology can assist users to achieve their goals and contribute towards their overall quality of life.

Electronic gaming is used to increase motivation, attention and engagement when working on therapeutic goals for children and adults with physical limitations related to a disability. This modality has been used with demonstrated efficacy with children and adults across a range of settings and impairments to increase overall physical and functional capabilities, reduce pain and even improve aspects of cognitive function (Horne-Moyer et al, 2014). Creating motivation for therapy through fun is a key goal of Cerebral Palsy Alliance. We partnered with Lusio Rehab in 2017 to offer a simple technology solution to motivate our clients to engage in their therapy and monitor their progress, both in clinic and at home to maximise their therapy outcomes to help achieve their goals. LusioMate is a gaming platform with wearable controller for users to engage in therapeutic activities to help them reach their goals such as playing soccer, tying their shoelaces or riding a bike. Through fun and engaging games, users can practice specific exercises and movements (that are prescribed and monitored by their physiotherapist or occupational therapist) needed to achieve their particular goal. Exercises that otherwise may appear boring and difficult to engage in. This presentation will outline how using LusioMates in our therapeutic practice at Cerebral Palsy Alliance has contributed to goal attainment for many of our clients both in a clinic setting and in the users' home. We will provide a user and parent perspectives regarding the difference this form of therapy makes to goal achievement.

Horne-Myer, H.L., Moyer, B.H., Messer, D.C., Messer, E.S. (2014). The use of electronic games in therapy: a review with clinical implications. Current Psychiatry Reports, 16(12): 520

Classification of reading disability degree: using non-word reading assessment

Dr Puttachart Potibal

Kasetsart University, Ladyao, Jatuchak, Thailand

3B - Oral Presentations, Menzies Theatre, August 28, 2019, 13:30 - 15:30

Biography: Dr.Puttachart Potibal (Ph.D.in Linguistics) is a lecturer at the department of linguistics, Kasetsart University, Thailand. She has worked with NECTEC in assistive technology research team for more than 10 years. Her works are about Thai language analysis supporting assistive technology for children with learning disability in reading and writing. Since 2013, her interests are in non-word reading assessment for children with dyslexia.

Kids with dyslexia have different levels of difficulty in reading. Coltheart, Max (2005) suggested that to read aloud pronounceable non-words is the only way of assessing how well a child can use letter-sound rules in translating print to speech, or how good they are at phonics. Irregular and non-word reading is the most effective procedure of a reading assessment.

In Puttachart Potibal (2017), Thai non-word reading and word writing are used in assessing reading difficulty of two children. The subjects' patterns of responses for reading 20 non-words show that both children cannot read most of unfamiliar words. It conforms to Temple, Christine M. and Marshall, John C. (1983) that the non-word reading is impossible for the deep dyslexics. In this article the non-word reading is used as a tool for assessing 102 students' reading. The non-word reading performance of the subjects can reveal how good they are at phonics. Therefore, five classes of difficulty in reading Thai non-words can reveal five degrees of phonological awareness. This may help teachers to identify students who may have a dyslexic difficulty. Moreover, teachers can apply this in evaluating a student's progress with his or her level of ability.

References

- [1] Coltheart, M. 2005. "Analysing developmental disorders of reading". In *Speech-Language Pathology*, June 2005; 7(2): 49-57. Taylor & Francis Group.
- [2] Potibal, P. 2017. "A Case Study of Reading Disability: Using Non-word Reading and Word Writing" in *Proceedings of the 11th i-CREATE*, August 22-24, 2017, Kobe, Japan.
- [3] Temple, C. M. and Marshall, J. C. 1983. "A case study of developmental phonological dyslexia". In *British Journal of Psychology*, 1983 November; Vol.74 (4): 517-533.

Ready to run – establishing RaceRunning for fun and fitness

Ms Prue Golland^{1,2}, Mr Richard Keith², Ms Jenni Cole^{2,3}

¹Cerebral Palsy Alliance, Allambie Heights, Australia, ²RaceRunning Australia, Sydney, Australia, ³Disability Sports Australia, Sydney, Australia

3B - Oral Presentations, Menzies Theatre, August 28, 2019, 13:30 - 15:30

Biography: Prue Golland, MPH (Distinction), B.App.Sc. (Physiotherapy), is an experienced physiotherapist with more than 15 years' experience working in the field of paediatric disability both in metropolitan and rural settings in Australia and overseas. She is the Senior Manager, Practice Leadership and Clinical Governance at Cerebral Palsy Alliance, Sydney. In 2015, Prue was awarded a Churchill Fellowship to investigate evidence based interventions for maximising gross motor outcomes in children with CP. During her Fellowship, Prue was introduced to RaceRunners and the sport of racerunning and has worked towards ensuring Australians have access to this innovative and exciting activity.

"I feel the need, the need for speed" – a classic line from a classic 80's movie¹ reflects a feeling that for so many of us, is taken for granted. When we want to feel the wind in our hair we can simply run. For people with mobility limitations, this is a feeling that has so often been unattainable. Until now. Invented in 1991 by Danish Paralympian and Occupational Therapist Connie Hansen, it has taken 27 years for the RaceRunner and the sport of racerunning to make it to Australia. A RaceRunner is a three-wheeled running bike which provides people with reduced mobility (people who use mobility aids such as walking frames and wheelchairs) an opportunity to walk and run – including people who would otherwise not have the ability to walk or run^{2,3}. This presentation will introduce you to the RaceRunner and the sport of racerunning, and explore the many and varied benefits from participating in this form of physical activity for fun, recreation and leisure. The establishment of RaceRunning Australia will be discussed along with a brief introduction to the current Cerebral Palsy International Sports and Recreation Association (CPISRA) RaceRunning classifications for people with cerebral palsy. Lastly, we will highlight ways in which you can get involved and try a RaceRunner for yourself.

[1] Jerry Bruckheimer, J. and Simpson, D. (Producers), & Scott, T. (Director). (1986). *Top Gun United States: Simpson/Bruckheimer*.

[2] Golland, P. (2016). *To investigate evidence based interventions for maximising gross motor outcomes in children with cerebral palsy. The Churchill Trust of Australia. Available <https://www.churchilltrust.com.au/fellows/detail/4020/Prue+Golland>*

[3] Hansen, C. *It's All About RaceRunning (resource adapted from Cerebral Palsy Sport UK - RaceRunning – an Introduction. Available <http://www.cpsport.org/sports/racerunning/racerunning-learning-resources/>*

Collaborative approach in delivery of AT for clients with MND

Mr Dennis Lo

ILC Tas, South Launceston, Australia

3D - WORKSHOP (Collaborative Approach in Delivery of AT for Clients with MND), Fitzroy/Derwent Rooms, August 28, 2019, 13:30 - 15:30

Biography: Dennis is a Speech Pathologist with a specific interest in Assistive Technology and Alternative and Augmentative Communication (AAC). Dennis was involved in the development of the MND Tas Communication Equipment Library. He was also part of the Communication Aids Clinical Advisory Committee for Queensland Health (2010 - 2015). He has also been involved with professional bodies such as Speech Pathology Australia and other professional organisations as well as conferences such as the 7th and 8th iCreate.

Due to the rapidly changing nature of progressive neurological conditions and funding limitations, it can be difficult for people with conditions such as motor neurone disease (MND) to access suitable assistive technology in a timely manner. This workshop will discuss the collaborative process between the Independent Living Centre Tasmania (ILC Tas) and Motor Neurone Disease Association Tasmania (MND Tas) when creating the MND Communication Equipment Library as a joint project.

This workshop aims to provide an overview of the challenges and solutions to the development of the project. As one of the major limiting factors during the development of the project is the limited funding and resources available, this presentation will cover some of the solutions that were implemented to navigate around costs and resource constraints. The experience can be relevant for not just low-resourced regions but also services that might want to maximise the cost-effectiveness of their equipment pool.

The workshop will cover the following aspects of the collaborative process:

- User needs identification: identification of user needs and gaps in the availability of AT for communication
- Designing the equipment library: decision process around equipment available and creative solutions to budgetary limitations
- Implementation of the project: Experience gained and challenges arose during the implementation phase
- Developing the library: Maximising the effectiveness of the equipment library through reissuing and equipment addition

Lessons Silicon Valley can teach the assistive tech industry

Mr Pete Horsley

Cerebral Palsy Alliance, Allambie Heights, Australia

3C - ORAL PRESENTATIONS, Nicholls Theatre, August 28, 2019, 13:30 - 15:30

Biography: Pete is the Founder of Cerebral Palsy Alliance's Tech Accelerator - Remarkable, Australia's first disability technology accelerator for startups creating technology that enables people with disability to overcome barriers they face each and every day. Peter started his career as a landscape architect and sees the potential for design and innovation to create positive systemic change.

Digital disruption is happening now and assistive technology is in the sights of big tech companies - Microsoft, Apple and Facebook. So what can we learn from Silicon Valley and how might we together transform the way we approach assistive technology design? Pete Horsley will cover outline 3 disruptive ideas that we can adopt to help transform the future of assistive technologies and will give real life examples from exciting Australian AT startups.

Participating people with disabilities in AT research and policy

Ms Articha Naravorawat

Thailand Research Institute For Empowerment Of Persons With Disabilities Foundation (trip), Rajchatewi, Thailand

3C - Oral Presentations, Nicholls Theatre, August 28, 2019, 13:30 - 15:30

Biography: Articha Naravorawat is manager Thailand Research Institute for Empowerment of Persons with disabilities Foundation. She received a Bachelor of Science, B.S. Psychology. Her operations also involve mechanism to support all kinds of researches including the researches related to disability movement and empowerment disability people. TRIP has already succeeded in the study about people with disabilities needs. Nowadays, they are struggle with the accessibility issue. From our cooperation, the government received the recommendation to develop the devises and accessibility, and the results from the study about people with disabilities' needs of innovation to improve their quality of lives.

Thailand Research Institute for Empowerment of Persons with disabilities Foundation (TRIP) is an institute initiated under Disabilities Thailand. Disabilities Thailand is an umbrella national organization of people with disabilities, consisting of five member organizations of people with disabilities. The main objectives of the institute are (1) to create knowledge body to strengthen organizations of persons with disabilities, (2) to enable persons with disabilities to become researchers who will contribute to changes in policies, service systems based on evidence, and (3) to increase the number of research and studies on disability issues. Research on assistive technology development and policy is one of core research themes of the institute. From the study on AT needs to improve independent living of persons with disabilities, it was found that persons with disabilities are facing significant inaccessibility. In telecommunication services, most of them have limited access to digital television service which does not incorporate the Universal Design Principles. TRIP incorporated with Disabilities Thailand presented recommendations to the government to improve accessibility of the service. All these efforts will lead to the development of a master plan of the Innovation and Assistive Technology Center. This will set the machine in motion for assistive technology development.

Technology use by workers with disabilities in the gig economy

Ms Maureen Linden

3C - Oral Presentations, Nicholls Theatre, August 28, 2019, 13:30 - 15:30

Biography: Maureen Linden, MS, is a Senior Research Engineer at the Georgia Institute of Technology, holding dual appointments with the Center for Inclusive Design and Innovation and the Center for Advanced Communications Policy. She has more than 25 years' experience in rehabilitation and assistive technology research, product development, service delivery and technical assistance. Her clinical work has focused on seating and wheeled mobility, workplace accommodations, and home modifications; having experience providing services in the United States medical and vocational rehabilitation models.

Millions of Americans participate in contingent work arrangements that differ from standard work arrangements characterized by permanent jobs with traditional employer-employee relationships. Contingent workers include agency temps, direct-hire temps, contract company workers, independent contractors, on-call workers, and day laborers. The emergence of online-based or mobile app-based employment opportunities as part of the nascent “gig economy” has further redefined employment and the labor market around the globe.

Whether contingent/gig work is beneficial to people with disabilities is unclear. Contingent work may provide flexibility that allows individuals opportunities where their health and functional needs prevent traditional work. On the other hand, contingent work typically offers lower pay and less job security. Finally, since contingent workers do not have an employer in the traditional sense, they fall outside the scope of legislation that requires employers to provide assistive technologies that they need to complete their work.

This presentation summarizes the mainstream and assistive technology use of 22 individuals with disabilities who were interviewed about their participation in contingent work, including the

technology they needed to find jobs and complete their work. Overall, we found that participants used assistive technology in ways very similar to technology use for conventional employment. As expected, assistive technologies used for computer access were very commonly used, as many contingent jobs were found with the help of online or mobile app-based services.

Additionally, assistive technologies that help with environmental access were also heavily used. Participants also noted a number of low-tech solutions to assist with their jobs. These were largely accommodations that the individual made for themselves. Many discussed the process to acquire their technology, which appear to vary from state to state as some vocational rehabilitation policies did not support contingent work. Further research is needed in this area as contingent work gains popularity.

Why Telepresence Robots and not FaceTime, Hangout, Skype, or Zoom?

Ms Patricia Bahr, Dr John Achrazoglou
University Of Iowa, Iowa City, United States

3C - Oral Presentations, Nicholls Theatre, August 28, 2019, 13:30 - 15:30

Biography: Bahr provides assistive technology (AT) and Universal Design instruction so that students and workers with disabilities can engage in all education classrooms, work in the profession of choice, and live independently. Bahr provides AT consultations for individuals of all ages with disabilities. Research collaboration is underway. For 24 years, Bahr worked at Gillette Children's Specialty Healthcare as rehabilitation engineer and supervisor of Mobile Outreach Clinic. Bahr holds a master's degree in Biomechanics. Bahr is on the BOD, past treasurer, and on the accreditation committee of the Rehabilitation Engineering and Assistive Technology Society of North America.

Introduction: Telepresence robots are computer- or device-controlled robots allowing people to view and hear the robot's operator. Likewise, the operator can view and hear what the robot is looking at and hearing (from TelepresenceRobots.com). Telepresence robots allow someone to be in and move around in two places at once. They are currently used in business, healthcare, homes, and education.

Purpose: Telepresence robots can address a broad range of issues and problems. Companies can reduce travel time and expenses, doctors can more often visit patients, hospital and homebound students can participate in regular classrooms, principals can have a presence in remote schools, families can interact with loved ones in care facilities, etc.

The mobility of the robot lends itself to active environments and interactions. Remotely, the operator can go to other parts of the room and meet with different groups or people; go from room to room, give a walking tour or step out for a private conversation. Telepresence robots allow greater independence; untethering the remote operator from someone having to hold, point, and move a webcam or device. An informal observation is that people seem drawn to telepresence robots and more naturally interact with and share more personal conversations than face-to-face in-person exchanges.

Activities Overview: We will review the history of telepresence technology with examples drawn from various settings. Features of the Double and other telepresence robots will be reviewed along with a demonstration of the Double robot. Comments and ideas will be solicited from the audience towards sharing experiences and envisioned uses.

Learning Outcomes:

- List five features of telepresence robots
- Describe four settings and provide examples where telepresence robots are used.
- Discuss three ways that telepresence robots can be used in their own professional or personal situation.

Licensing, assessment and vehicle modification process in Australia

Mr Bill Georgas, Head Engineer; Mr Tom Eley
PME Autoconversions, Hornsby Heights, Australia

3E - WORKSHOP (Licensing, Assessment and Vehicle Modification process in Australia), Murray Room,
August 28, 2019, 13:30 - 15:30

Biography: Bill Georges is the founder and CEO of Problem Management Engineering. Founded in 1989 after Bill a paraplegic and motor mechanic found the limited range of adapted driving controls available on the market to be inadequate. Bill is a pioneer in the industry in Australia paving the way for high level driving controls suitable for individuals with significant disabilities.

Tom Eley is a highly qualified and skilled OT, Motor Mechanic and Driving Instructor who specialised in complex driving solutions for drivers with significant disabilities. Tom has worked as an adviser for Vic roads and Standards Australia.

This is a 90-minute workshop to overview the process of driving with a significant physical disability in Australia from beginning to end. This would include (based on the NSW structure) fulfilling the medical guidelines, Occupational Therapist assessment, Selection of potential driving controls suitable for the individual, on-road driving assessment, prescription of suitable driving control, driver training, licensing, vehicle modification and hand over. We will include customer testimonials and aim to have a quadriplegic customer's vehicle with high level driving modifications available at our display stand for attendants to observe.

Included in our workshop will be an overview of some of the different driving controls available for all types of disabilities ranging from a Spinner knob and Left foot accelerator right through to full suite of electronic driving controls for drivers with significant physical disabilities. A PowerPoint presentation with videos, images and diagrams along with sample equipment will be utilised to help participants understand the various components. Most of the devices discussed will also be fitted to vehicles presented at our stand. We would also like to explain some of the standards and legislation that govern the vehicle modification industry including Australian and European Standards for driving controls, legislation around certifying a modified vehicle and conformance with Australian Design Rules.

We believe that this presentation will be very beneficial to international delegates that may not have such an established vehicle conversion industry and the surrounding regulations and standards that ensure safety and compliance.

Furthermore PME is at the forefront of developments with electronic driving controls and the only fitters of Paravan Spacedrive technology in the Southern Hemisphere along with many other state of the art and tailor made assistive technologies utilised in vehicle modifications for people with complex physical disabilities.

Rapid interim housing prototype by the Summer Foundation

Ms Cathy Bucolo, Ms Helen Jeisman¹
¹Summer Foundation, Box Hill, Australia

4A - Oral Presentations, Bradman Theatre, August 29, 2019, 11:00 - 13:00

Biography: Cathy Bucolo is the Clinical Practice Lead at the Summer Foundation Cathy and works to ensure people with disability have the right supports in place so they can live in the community. Learning from people's experiences in relation to the NDIS, housing and support models, and the health/NDIS interface, Cathy shares this knowledge with a variety of audiences in education and training workshops, resource development and conference presentations. Cathy has worked as a speech pathologist, case manager, consultant, trainer and project worker for more than 20 years. She specialises in acquired brain injury, rehabilitation, disability and advocacy, transitional living and capacity building.

Helen Jeisman is the Projects Support Officer at the Summer Foundation and works to support various projects across the organisation including the Rapid Interim Housing Prototype, Get Building SDA and the UpSkill initiative. Helen's versatile workload means she works broadly across the disability, housing and health sectors, ensuring people with disability are central to each project. Helen has worked extensively across the development of the Rapid Interim Housing prototype and has just finished showcasing the relocatable unit in Melbourne and Geelong. Helen is passionate about making the world a more accessible place.

Around 50 young Australians are admitted into nursing homes every week. The majority of these people enter aged care straight from a hospital or rehab setting. When someone acquires a disability – after being involved in a serious car accident, or experiencing a severe stroke or other trauma – the first challenge is medical. The next challenge is often finding somewhere to live beyond hospital. Many Australians don't live in accessible homes, so many people who acquire a disability can't return home until it has been modified to suit their needs. Some people have to look for somewhere entirely new to live. Either way, it takes time – usually many months. Meanwhile, people are stuck in hospital or too often forced into inappropriate housing, such as an aged care facility, where they quickly lose their independence and become disconnected from family and friends. The idea behind the Rapid Interim Housing prototype is to give people somewhere to live in the meantime. Once the necessary permits and preparation are complete, it can be relocated quickly – in a single day – providing a great temporary home for people as they rehabilitate and get their long-term home sorted. The Rapid Interim Housing prototype is an accessible, relocatable modular housing unit. The unit is an aspirational space promoting contemporary and inclusive living. It features smart home technology, wide doorways and generous circulation space to suit motorised wheelchairs, a flexible bedroom space with accessible ensuite bathroom, a kitchenette with adjustable cabinetry and provision for a ceiling-mounted hoist.

Designing a learning strategy to develop a universally-designed restaurant project

Dr Benjamas Kutintara

Faculty of Architecture, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

4A - Oral Presentations, Bradman Theatre, August 29, 2019, 11:00 - 13:00

Biography: Benjamas Kutintara is an Assistant Professor of Interior Architecture, Faculty of Architecture, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand. She received her doctorate in housing, interior design and resource management along with graduated certificate in gerontology from Virginia Polytechnic Institute and State University, Blacksburg, USA. Her research interests are universal design, design for older persons, design for people with disabilities and design for children.

Restaurants are public places which should be designed to accommodate people of all ages and abilities. Without an understanding of universal design concept, junior interior architecture students did not provide age friendly design features in their restaurant design projects. The objective of this study was to increase students' awareness of universal design and to develop students' work on an age friendly restaurant design project by using a learning strategy. The participants of this study included thirty junior interior architecture students. Each student was assigned to redesign their restaurant design projects to serve needs of people in all age groups. Before beginning the design process, the students toured award-winning accessible buildings. Each student was required to use a wheelchair maneuvering through a building and to write down the experience.

The students watched several cases of accessible buildings on video clips and listened to an elderly guest speaker. They learned directly from people with disability by attending a universal design workshop. A universal design checklist based on accessibility codes were used to evaluate buildings and the students' design works. Each student was received suggestions to improve his/her primary design solutions.

The students expressed an increased awareness of universal design concept. Analysis of the pre/post test results indicated a positive change. Each student redesigned his/her restaurant project in order to create an age friendly dining space responsive to various groups of customers, for example, elders, children, parents with toddlers, wheelchair users, people with impairment and foreigners. The students provided universally designed features in their restaurant projects such as accessible parking spaces, ramps, wide circulation paths, accessible restrooms, directional signs in three languages, baby high chairs and other assistive devices. In conclusion, the learning strategy used in this study led to meaningful results. However, additional studies are necessary on other interior spaces.

Assistive technology in the first Tasmanian universal access display home

Mr Dennis Lo, Pip Tyson

ILC Tas, South Launceston, Australia

4A - Oral Presentations, Bradman Theatre, August 29, 2019, 11:00 - 13:00

Biography: Dennis is a Speech Pathologist with a specific interest in Assistive Technology and Alternative and Augmentative Communication (AAC). Dennis was involved in the development of the MND Tas Communication Equipment Library. He was also part of the Communication Aids Clinical Advisory Committee for Queensland Health. He has also been involved with professional bodies such as Speech Pathology Australia as well as conferences such as the 7th and 8th iCreate.

Pip is an occupational therapist with over 15 years experience in the area of assistive technology, with a special interested in alternative IT access and smart home technology.

This presentation will discuss the process of incorporating of assistive technology in the Lifetime SmartHome project, which is the first Universal Access Display Home in Tasmania, built to the Platinum level of the Livable Housing Australia Design Guidelines. It was also the Overall winner of Master Builders Tasmania Awards for Excellence – Lifestyle for Seniors 2018. The Independent Living Centre Tasmania (ILC Tas) was involved in the integration of the assistive technology aspect of this project.

This presentation will discuss the assistive technology incorporated in the design and the building process of the display home, from accessible physical environment to smart home technology. This presentation will also discuss some of the challenges in integrating these assistive technology features in this project and how they were overcome.

This presentation will provide participants with practical examples of how assistive technology can be integrated into the home environment through the case study.

A smart tech necklace as a breakthrough for deaf

Mr Adama Natalusfi

Fisip, Kertoraharjo No 16, Ketawanggede, Lowokwaru, Indonesia

4B - ORAL PRESENTATIONS, Menzies Theatre, August 29, 2019, 11:00 - 13:00

Biography: Born in Medan, 11 December 1998 International Relation (IR) student in University of Brawijaya A social Innovation enthusiast, currently promote inclusive project for deaf.

Contributing to the Sustainable Development Goals in the 4.0 era, especially the education section, the notion of integration between inclusive education and disruptive innovation needs to be considered.

The world education system that is currently using a verbal or one-way communication teaching method is proved to be ineffective specifically towards deaf students. Communication is supposed to be the ‘bridge’ or ‘connector’ between human beings. A larger picture of the problem is, the substantial amount of the community in general and also intellectuals who barely understand the sign language which is the primary language used by the deaf. In order to solve this, there needs to be disruptive innovations and digital platforms to facilitate the deaf with their daily activities and also education. The inclusive education solution that the writer has to offer is an innovation in the form of a Smart Tech Necklace that can receive sound and voices and converts them into surrounding micro-vibrate from the direction of the sound which is integrated with the application called “Deaf Friendly”. This application’s six main features are: Deaf Mode, Daily Mode, Speech-to-Text, Deafreneurship, Pronunciation Training, Harmony Inclusion. Six of those features have a variety of functions that correlates with each other and could potentially create an environment that is friendly and inclusive towards the deaf, especially in the education environment.

Preventative care with disease risk prediction on health tracking application

Ms Natthanicha Suriyamongkol, Mr Sam Banani, Ms Surapa Thiemjarus, Mr Watcharakon Noothong
Assistive Technology and Medical Devices Research Center, National Science and Technology
Development Agency, Khlong Nueng, Khlong Luang, Thailand

4B - Oral Presentations, Menzies Theatre, August 29, 2019, 11:00 - 13:00

Biography: He is a researcher and the leader of the software development team. He has led many successful assistive application projects (e.g., agriculture, and local hospital). These applications have been facilitated the work of government officers and bettered the Thai people's lives.

Well-being is one of the indicators for quality of life. Better health and healthcare can be achieved through monitoring and evaluating a person's medical record in order to prevent illnesses and diseases. These pieces of information include health related-behaviors (e.g., dietary habits, physical activity, smoking, and use of alcohol) and health screening examinations (e.g., blood pressure level, cholesterol levels, and cancer screening). Health-related quality of life of a person can be significantly improved if physicians are able to access all medical records of the patient. However, these medical records are typically locally kept with illegible handwriting on papers. Therefore, the medical records are not easily accessible by other physicians, and the files may have been damaged over time. To overcome these issues, we developed a centralized system Family Folder Collector (FFC) for collecting information of people such as medical records and living environments in a digital format on the cloud. As a result, the medical records are more valid and reliable, and could be accessed by the physicians anywhere, anytime. The ability to predict diseases based on the history of medical records can help physicians to come up with a better treatment plan and to warn the person to change his/her lifestyle in order to early prevent the onset of diseases, especially those none communication diseases (NCDs). This paper presents a Bayesian method for predicting the risk level of an NCD based on medical records and family medical history records. Based on the risk assessment the FFC application can suggest a suitable diet and lifestyle for each individual to assist those in remote areas with a limited access to healthcare facilities to take a better care of their health in order to prevent chronic diseases such as diabetes or hypertension.

Free software & digital fabrication in creating affordable assistive devices

Mr Akhil SG, Mr Arun M, Mr Afsal Abdul Sathar, Mr Vaishak Anand
International Centre For Free & Open Source Software, Trivandrum, India

4B - Oral Presentations, Menzies Theatre, August 29, 2019, 11:00 - 13:00

Biography: Akhil SG is a Research Assistant at International Centre for Free and Open Source Software and Managing Trustee of Sahridhaya, a non-profit based in Kerala. His work now focuses on Assistive technology and application of technology for social change because technology needs to be inclusive to build the digital divide. Before ICFOSS, Akhil was the Technology Innovation Fellow of Kerala Startup Mission and while there, published Kerala Startup Ecosystem Report 2017, a comprehensive study of startup ecosystem in the state. In 2013, he along with friends founded the non-profit Sahridhaya, to inspire youth to use talents for driving social change.

The major challenge of a person with motor disability is access to affordable and personalized Assistive Technology (AT) solutions. There are endless possibilities of Free software and digital fabrication in providing cheap and scalable AT solutions. This was demonstrated in the 'T-slide' project where we built an ergonomic mouse, customized for a writer with severe motor disability (95%). The user was identified based on the present interaction with Information Communication Technology (ICT) devices. We identified user was in need of an adaptive computer access solution and was also interested in co-developing the product, by testing it and giving valuable feedback. A user-centered approach was followed, by giving utmost importance to the user's inputs in every stage of product design and development.

The team used various Free and Open Source Software (FOSS) like FreeCAD, KiCAD, Arduino IDE and Ultimaker Cura as well as powerful digital fabrication tools to create the personalized computer mouse. The hardware specifications, design files and source code of T-Slide Mouse are published

in the public Gitlab repository of ICFOSS, for anyone to refer to and replicate. The mouse can be used by persons with very limited finger movements to operate laptop and even wheelchairs. Anyone from around the world is free to use or improve upon the T-slide mouse by modifying the design parameters to create a version that would be the most comfortable for them. This is a Proof-Of-Concept (POC) for the potential of on-demand manufacturing of customized AT solutions using digital fabrication and Free Software tools.

Using iPad-AAC to facilitate communication participation in science curriculum

Prof Ya-ping Wu, Prof Ming Chung Chen

National Chiayi University, Chiayi City 60004, Taiwan

5A - Oral Presentations, Bradman Theatre, August 29, 2019, 13:30 - 15:00

Biography: Ya-Ping Wu is an Assistant Professor in the Department of Special Educational at National Chiayi University (NCYU) in Taiwan, where she has been on the faculty since 2013. She was responsible for the elementary teacher education program in severe disabilities at NCYU. Her primary areas of research interest are assistive technology, augmentative and alternative communication, autism/developmental disabilities, science, and math curriculum modification. She was also Co-Director of the Special Education Teaching Research Center at NCYU where conducts research and provides teacher training for in-service and pre-service special education teachers.

Many students with disabilities need assistive technology (AT), including augmentative and alternative communication (AAC), especially for those with autism with limited speech. iPad provides a powerful new tool to potentially enhance communication for individuals with limited speech. With the increased use of iPads in classrooms, special education teachers needed teaching methods to prepare students with disabilities to access this technology for classroom participation. However, current studies fail to report student's benefits to inquiry science curriculum in regards to their expression and communication. Effective implementation of AAC maybe can assist students with limited speech to reach their full communicative participation in a classroom.

This study used a multiple treatment design of single-subject research to examine an iPad-AAC integrating inquiry teaching to facilitate the communicative participation for an autism (Kevin) in a science curriculum. Kevin was a fourth-grader. He spoke only two-three words and usually used gestures to initiate interactions. The study included three phrases: baseline A (general teaching), intervention B (inquiry teaching), and intervention B+C (inquiry teaching and AAC). iPad with the VoiceSymbol AAC application (Unlimiter ATEL Inc. in Taiwan) was used as a speech-generating device (SGD) in the study. The communicative participation at class was collected, including initiated and responsive communication, and were calculated as the rate per minute. Results demonstrated Kevin showed increasingly initiated communicative participation after inquiry teaching integrating iPad-AAC (0.009/min), comparing to inquiry teaching only (0.009/min) and baseline (0/min). His responsive communication also demonstrated more independently in inquiry and AAC (0.69/min), than in inquiry teaching only (0.30/min) and baseline (0.01/min). The most frequent communication mode he used was iPad-AAC in intervention (0.29/min), and the other communication behaviors also increased after AAC introduced. Implications and future research are discussed.

Using ipad-AAC during functional communication training for students with CAS

Ms. Chao-wun Tan, Professor Ya-Ping Wu, Professor Ming-Chung Chen

National Chiayi University, Chiayi, Taiwan

5A - Oral Presentations, Bradman Theatre, August 29, 2019, 13:30 - 15:00

Biography: Chao-Wun Tan is a first-year master student in the Department of Special Education at the National Chiayi University (NCYU) in Taiwan. She is also a special education teacher of the elementary school in Taiwan, and her seniority is nearly two years. During her undergraduate studies, she conducted a research in the Department of Science and Technology of the Ministry of Science and Technology. The research subject was a student with intellectual disability or autism. The research topic was about aided language stimulation.

Childhood apraxia of speech (CAS) is a pediatric speech sound disorder resulting from poor motor speech planning and programming that is challenging to treat. They might not be able to move their

lips or tongue to the right place to say sounds. As potential users of augmentative and alternative communication (AAC), they use speech generated devices (SGDs), such as the iPad. SGDs can produce speech so provide an efficient means for obtaining a partner's attention, which indirectly creates opportunities for the AAC user's needs to be heard. Effective implementation of iPad-AAC during functional communication training (FCT) maybe can assist students with developmental disabilities to reduce inappropriate behaviors and promote communication performance.

This study used single subject A-B-A-B design to examine the effects of using iPad-AAC during FCT on inappropriate behaviors and communication performances. Hale was a 5th grader with CAS who engaged in inappropriate behaviors because of speech limitation. His inappropriate behaviors included off-task, tantrum, and attacking etc. After functional assessment, the function of his inappropriate behaviors was to escape. The FCT was designed to develop his alternative communication behaviors using iPad-AAC and to replace his inappropriate behaviors in class. The development variables were the inappropriate behaviors and communication performance and calculated by the frequency per session.

Data was collected from four phases, including baseline (A1, A2) and intervention (B1, B2). The iPad with the VoiceSymbol AAC application (Unlimiter ATEL Inc. in Taiwan) was used as a speech-generating device (SGD) in B1 and B2.

Results showed that after using iPad-AAC, Hale can reduce inappropriate behaviors (A1:2, B1:1, A2:2.6, B2:0.6) and increase alternative communication (A1: 3.2, B1:24.6, A2:9.6 , B2:26.6). Implications and future research directions are provided.

Incorporating AAC usage in class for children with a tracheostomy

Ms. Zih-yun Lin, Professor Ya-Ping Wu, Professor Ming-chung Chen
National Chiayi University, Chiayi, Taiwan

5A - ORAL PRESENTATIONS, Bradman Theatre, August 29, 2019, 13:30 - 15:00

Biography: Zih-Yun Lin is a first-year master student in the Department of Special Educational at National Chiayi University (NCYU) in Taiwan. She is also a Special Assistant of Center for Special Education Teaching at NCYU for half a year, that includes special education teacher professional development study holding. She has been a substitute teacher in a Special Self-Contained Class for half a year. She conducted the College Student Research of Ministry of Science and Technology during college, and the research is about grade-aligned math instruction for elementary students with moderate and severe development disabilities.

Over the last decade, tracheostomy has been increasingly performed in children, that resulted in needing a long-term medical technology and significant communication difficulties in their lives. Children with a tracheostomy usually were encouraged to use gesture and augmentative and alternative communication (AAC). AAC was designed to assist them to express more efficiently.

John, a third-grade student with a tracheostomy, usually used gesture and facial expressions to communicate before AAC intervention in this study. He can't participate in class and interact with peers. The iPad-AAC was recommended by the speech language pathologist (SLP). With the iPad used in class, the AAC overlay was designed by his special education teacher. Through the cooperation of SLP and special education teacher, the math curriculum was the priority for intervention. The case study was adopted in the study. John was taught to use the iPad-AAC to participate in math curriculum. The structured observations, anecdotal data, and math test were collected to analysis his communicative participation and math performance. Results demonstrated school personnel views of John's communicative performance changed over the course of the study. Prior to using iPad-AAC, John was seen as limited in the ability to adequately communicate with others. With the iPad-AAC, interaction and expressive communication substantially improved in math class. Math Test results showed an improved score of academic performance, and finally attained to 100% on test. School data also show improved social interaction with peers. The implications and recommendations were also discussed in the study.

“What’s new in the Zoo”: a cross-sectional study on latest and emerging technology solutions

Mr Joshua Selvadurai

Assistive Technology Australia

5B - WORKSHOP, Menzies Theatre, August 29, 2019, 13:30 - 15:00

Biography: Joshua Selvadurai is a Registered Occupational Therapist at Assistive Technology Australia, an accredited SWEPP Prescriber, and has also practised Occupational Therapy in both Singapore and India. With over a decade of experience as an Occupational Therapist, Joshua has largely been involved in providing expert advice, training and specialist information on a broad range of technology and built environment solutions. He has consequently developed a strong interest for emerging technology in the area of home automation and environmental control. He has also completed a Master in Business Administration, further studies in complex home modifications and is currently undertaking a Certificate IV in Training and Assessment.

Purpose: The purpose of this paper is to give an overview to the health professionals on latest and emerging assistive technology (AT) solutions for daily activities, home automation, community mobility, access, recording vitals and self-monitoring, AT for memory and cognitive functions including Robots, sleep and various other domains of independence.

Introduction and Background: A cross sectional market survey was conducted to establish available and emerging assistive technology options. Assistive Technology Australia provided a range of possible solutions from over 700 available and emerging technology options. These include “off the shelf” products, electronic assistive technology, inbuilt access in commercially available devices, apps, products and devices to enable autonomy. The products were then categorized, prioritized and those products which were shortlisted, were researched even further on its current evidences, application and its availability in Australia. The brief description on the individual product is available on request.

Overview of activities to be conducted: Hands on training on how to make your smart devices be accessible for people with additional needs.

Expected learning Outcome: By the end of the workshop, the attendees would be able to use the inbuilt options to customise a smart device accessible for people with needs. They would be aware of the latest and emerging technology, devices in various domains of independence.

Poster Presentations at i-CREAtE 2019

01 - Application of brain-computer interface on hemiplegic arm functions: a meta-analysis

Dr Kenneth N.K. Fong, Mr Zhongfei Bai

Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Kowloon, Hong Kong, Hong Kong

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Dr. Kenneth N. K. Fong is Associate Professor in the Department of Rehabilitation Sciences and an occupational therapist. He is also the Editor-in-Chief of the Hong Kong Journal of Occupational Therapy. He received the Department Outstanding Teaching Award in 2011 and the Faculty Team Teaching Award of the Faculty of Health and Social Sciences in 2010. His interest is in neurorehabilitation and assistive technology. In the last couple of years, his students also got overseas awards in design of assistive technology products in different occasions including the Student Innovation World Challenge, i-CREAtE held in different countries in Asia.

Background: A substantial number of clinical studies have demonstrated the functional recovery induced by the use of brain-computer interface in patients after stroke. The objectives of this systematic review and meta-analysis was to evaluate the effects of the use of BCI on promoting upper limb functions.

Methods: The databases - PubMed, Medline, EMBASE, CINAHL, CENTRAL, PsycINFO, and PEDro, were systematically searched for eligible clinical controlled trials regarding the effects of brain-computer interface in upper limb recovery after stroke. The PEDro scale was used for methodological quality evaluation. Meta-analysis on upper limb functions was performed by pooling the standardized mean difference (SMD). We also summarized the neural mechanism on the use of brain-computer interface on stroke.

Results: A total of 1022 records were screened. Fourteen clinical studies were included for the meta-analysis. The studies showed that the brain-computer interface seemed to be safe for patients with stroke. The results showed a medium effect size favoring the BCI on improving the upper limb functions after the intervention (SMD = 0.43; 95% CI = 0.20 – 0.66; I² = 43%; P < 0.001; Fixed-effect model), while the long-lasting effect on upper limb motor functions was not significant (SMD = 0.12; 95% CI = -0.28 – 0.52; I² = 0%; P = 0.540; Fixed-effect model).

Conclusion: The brain-computer interface is effective on improving upper limb functions in patients after stroke. The functional recovery may be attributed to the activation of the ipsilesional premotor and sensorimotor cortical network as well as the revision of the interhemispheric asymmetry.

02 - Fostering online customer engagement for disabled moviegoers: a preliminary research

Dr Hyeon-Cheol Kim, Mr Zong-Yi Zhu

Chung-Ang University, Seoul, South Korea

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Hyeon-Cheol Kim is a Professor of Marketing in the School of Business Administration, College of Business and Economics at Chung-Ang University, Seoul, Korea. His primary research interests include business education in multicultural context, human-computer interaction, educational technology, and design of online learning environments for consumers with disabilities.

SNS (Social Network Services) allow individuals to form online social networks and relationships. Accordingly, firms have utilized SNS to establish social relationships with their existing and potential customers with the intention to facilitate higher levels of online consumer engagement. In the competitive movie industry, movie distributors have adopted SNS as a marketing communication channel to generate positive behavioral intentions among its targeted customers. But little is known about the sustainable online customer engagement of disabled moviegoers.

According to previous studies on disability experiential consumption, it was observed that the disabled customers are more likely to experience critical limitations in establishing relationship with other individuals because of their physical handicap (Shpigelman & Gill, 2014). By sharing their personal insights on movies, the disabled moviegoers would have the opportunity to form and maintain relationships with others (Nam & Park, 2017). Hence, the primary purpose of this study is to investigate the formation of online engagement behavior among disabled moviegoers.

Relevant data will be collected from disabled moviegoers who possess the experience of using movie websites and sharing information pertaining to movies on top three multiplex brand pages in Korea.

This study will follow a value-exchange perspective to formulate a preliminary research model, based on which the relationship between perceived enjoyment, perceived utilitarian value, relationship quality, satisfaction, and online engagement will be demonstrated.

The findings of this study will offer both academic and managerial insights for movie distributors who are interested in building relationships with moviegoers with disability.

Reference

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03 - Trunk inclination positioning angle on swallowing and respiratory function

Prof Hsin-Yi Kathy Cheng¹, Prof Yan-Ying Ju², Prof Wann-Yun Shieh¹, Therapist Yu-Chun Yu³

¹Chang Gung University, Kwei-shan, Taoyuan 33302, Taiwan, ²National Taiwan Sport University, Kwei-shan, TaoYuan 33302, Taiwan, ³TaoYuan Municipal TaoYuan Special School, TaoYuan 33062, Taiwan

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Dr. Cheng is a professor in Graduate Institute of Early Intervention, Chang Gung University, Taiwan. She is also a physical therapist specialized in motor development and motor control. Her research interests include but not limited to assistive technology & rehabilitation engineering, movement biomechanics, adapted physical education, and the design and development of teaching and assessment tools for individuals with intellectual disabilities, children, and the elderly.

Statistics revealed that subjects with intellectual disability or multiple disabilities have problems in controlling muscle tone and maintaining posture. These subjects experience problems during feeding or eating. The adjustment of seat inclination would help in feeding/eating process. The aims of this study was to investigate the timing and coordination of swallowing and respiration in different seat inclination angles, with liquid and bolus. Currently twenty-six participants aged between 15-30 years old without any signs of swallowing difficulty were included. The combination of seat inclinations and food types were randomly assigned, with three repetitions in each combination. The trunk inclination angle was adjusted by a commercialized positioning wheelchair.

A total of 36 swallows were done, with at least 30 seconds rest in between each swallow. We used a self-developed wearable device to measure the submandibular muscle surface EMG, the movement of thyroid cartilage and respiratory status of nasal cavity. Variables measured including the EMG duration (DsEMG), swallowing apnea duration (SAD), total excursion time (TET), duration of 2nd deflection, FSR amplitude, Onset latency, DsEMG onset, DsEMG offset, FSR onset and FSR offset. These measurement were done in four seat inclination angles (5°, 15°, 30°, 45°) and three food contents (1ml water, 10ml water, and 5ml pudding bolus) for each subject.

The results indicated significant differences in seat inclination, mostly between 5° and 45°, in all variables except FSR amplitude. It also indicated significant differences in food contents almost among all variables. Significant interactions between seat inclination and food contents were only found in FSR offsets. The same protocol will be applied to participants with disabilities. These results would serve as the clinical guidance for proper feeding position with different food contents. The ergonomic data would also provide references for assistive technology professionals and practitioners in seat angle adjustment device design and development.

04 - Brain computer interface- neurofeedback improve cognition in MCI and elderly

Dr Solaphat Hemrungronj¹, Mr. Suwicha Jirayujaroensak^{2,3}, Dr. Setha Pan-ngum³, Dr. Pasin Isarasena², Miss Nutnicha Phensresirikun¹

¹Faculty of Medicine, Chulalongkorn University, Rama4 Rd, Pyathai, Prathumwan, Thailand, ²National Electronics and Computer Technology Center (NECTEC), Center of technology in cognitive care in elderly, Thailand, ³Department of computer engineering Faculty of Engineering, Chulalongkorn University, Pyathai, Prathumwan, Thailand

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Assoc.Prof. Solaphat Hemrungronj, MD. has her proficiency in clinical neuropsychiatry and dementia, cognitive assessment and computerized cognitive training. She has built her experience after 20 years in dementia research, service, teaching both medical students and psychiatric residents in Chulalongkorn University, Bangkok, Thailand. She and her team initiated cognitive fitness center in the hospital with the special program, customized individual cognitive training program for each elderly. She also translate her invention and research to service and practice both in cognitive fitness center and home use. She has strong inspiration to motivate social awareness for dementia care.

A brain computer interface neurofeedback training system (NFT) has been first developed to enhance attention for ADHD children. There are many well results support this intervention in this specific group. Anyway not only ADHD children, but also aging population have suffering from attention problems. Most elderly have to cope with attention, concentration, memory and other cognitive decline, especially when they have dementia. A game-based NFT system is a potential technology for improving cognitive function in both mild cognitive impairment and healthy groups. This study reviewed the factors determine in superior outcome of NFT from 2 study. Methods: The study compared result of intervention group with NFT in 2 study in normal and mild cognitive impairment elderly. As well as analyzed the factors associated with the efficacy of NFT

Result: This efficacy study show a significant treatment effect of NFT interventions improved sustained attention and working memory in normal elderly group but not significant in MCI. The factor associated are consisted of the number of training sessions, characteristic and theme of game, method of EEG signal processing.

Conclusion: Effective treatment with the NFT system improves sustained attention suggesting that this training potentially improve other cognitive functions such as executive functions and working memory in elderly.

06 - Locomotor and cognitive ability evaluation by a smart ball

Dr. Wann-Yun Shieh¹, Dr. Hsin-Yi Kathy Cheng¹, Dr. Yan-Ying Ju², Mr. Yu-Chung Yu³

¹Chang Gung University, Kweishan, Taiwan, ²National Taiwan Sport University, Kweishan, Taiwan, ³Taoyuan Municipal Taoyuan Special School, Taoyuan, Taiwan

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Wann-Yun Shieh received the B.S. and Ph.D. degree in Computer Science and Information Engineering from the National Chiao Tung University, Hsinchu, Taiwan in 1996 and 2003. Currently he works in the Department of Computer Science and Information Engineering, Chang Gung University, Taiwan. His research interests include embedded system, medical engineering, sensor technology, intelligent image recognition, and clinical application.

Adolescents with intellectual disabilities show maladaptive behavior in activities of daily living because of their physical abnormalities or neurological disorder. They typically have poor abilities to move their body smoothly, quickly, or gracefully, compared with typically developed adolescents. Locomotor performance is one of the important indicators to represent these abilities. There are already numerous wearable approaches and exercises designed for evaluating the locomotor performance but less for measuring the cognitive ability. In this study, different from using the wearable devices only, a smart ball with an inertial measurement sensor embedded inside was proposed to measure both of the locomotor performance and cognitive ability. Five ball games were applied in the test, including two dribbling games by foot and three by hands (ball taking, throwing,

and catching). Totally 25 adolescents with intellectual disabilities (aged 18.36 ± 2.46 years) and 25 typically developed adolescents (aged 18.36 ± 0.49 years) participated in the test. The experimental results showed that the proposed smart ball with wearable devices could effectively illustrate the difference of locomotor performance and cognitive ability between the two groups of participants. Moreover, the ball-playing methods can raise more interests for the adolescents with intellectual disabilities to finish the test.

07 - Development of a kinect-based health assessment system for the elderly

Ms Pei-fen Wu¹, PhD Chih-Hsiu Cheng²

¹School of Physical Therapy and Graduate Institute of Rehabilitation Science College of Medicine, Chang Gung University, No.259, Wen-Hwa 1st Rd, Kweishan, Taoyuan, Taiwan, R.O.C., ²School of Physical Therapy and Graduate Institute of Rehabilitation Science College of Medicine, Chang Gung University, No.259, Wen-Hwa 1st Rd, Kweishan, Taoyuan, Taiwan, R.O.C.

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Pei-Fen Wu became a graduate student of School of Physical Therapy and Graduate Institute of Rehabilitation Science in 2018. Her area of research includes the assessment system for physical performance in elderly.

Chih-Hsiu Cheng received his PhD from the Institute of Biomedical Engineering at National Taiwan University in 2008. He is currently an Assistant Professor of Rehabilitation Science at Chang Gung University. His area of research includes the spine biomechanics, gait analysis, and sports science with specific interest in developing assistive devices for the patients with movement disorders.

Background: The growth of elderly population is accompanied by the increasing need of health care. Good functional performance is related to a better quality of life. Our aim was to build a smart assessment system using the motion-sensing technology for the easily-accessible functional examination in elderly.

Methods: A kinect-based system equipped with two common physical examination tasks was developed. Thirty subjects participated in this study (15 males and 15 females, aged 22.7 ± 4.3 years). They performed the examination tasks including the forward reaching (FR) to measure the body flexibility, and the 30-sec sit-to-stand (STS) to quantify the strength of lower extremity. To validate the system, the FR and STS were assessed by the system and an experienced physiotherapist at the same time. All tasks would be retested after seven days. The reliability was analyzed by the intra-class correlation coefficient (ICC), while the validity was analyzed by the limit of agreement (LOA).

Results: The reaching range measured during FR (41.7 ± 9.7 cm), and the number of times during STS (13.0 ± 2.7) were similar by the kinect-based system and those assessed by the physiotherapist (37.6 ± 5.6 cm, and 13.1 ± 2.8 respectively). The test-retest reliability of FR task was lower (ICC = 0.24) by the system than those by the physiotherapist (ICC = 0.76), while the ICC for STS task were similar between the two methods (0.56 and 0.58). The agreement between the two methods in FR was positive higher (+LOA:13.84; -LOA:-5.71), and the LOA of STS was close to zero (+LOA: 0.33; -LOA: -0.48).

Discussion & Conclusion: The kinect-based system demonstrated a promising results and good agreement as the functional examination tool. It also showed a comparable test-retest reliability in quantifying the number of times during STS task compared with the conventional examination, while showed a low reliability in measuring the distance parameters during FR task.

08 - i-ExC game: Enhance cognitive, physical fitness and interaction in elderly

Dr Solaphat Hemrungronj, Miss Nutnicha Phensresirikun

Chulalongkorn University, Rama 4 Rd. Pyathai, Thailand

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: Assoc.Prof. Solaphat Hemrungronj, MD. She has her proficiency in clinical neuropsychiatry and dementia, cognitive assessment and computerized cognitive training. She has built her experience after 20 years in dementia

research, service, teaching both medical students and psychiatric residents in Chulalongkorn University, Bangkok, Thailand. She and her team initiated cognitive fitness center in the hospital with the special program, customized individual cognitive training program for each elderly. She also translate her invention and research to service and practice both in cognitive fitness center and home use. She has strong inspiration to motivate social awareness for dementia care.

Performing cognitive training and interactive physical exercise at the same time as a new innovation is simultaneous exercise and cognition or we call “ i-ExC Game”. Keep walking and active as common task of daily life is important but difficult for both frailty elderly and fatigue care giver.

The i-ExC game (Interaction of exercise for physical fitness and cognition) was designed by the expertized of neuropsychiatrist, sport scientist and game engineers to use as simultaneous exercise tool especially for elderly.

Methodology: 20 healthy and mild cognitive impairment older adults participated in purposive sampling pilot trial for four weeks intervention by i-ExC program training (12 sessions). Six participants had to be excluded due to did not complete participation, so they are 7,7 individuals left in healthy &MCI group.

Results: Both group of participants showed significant improvement in Berg scale with the p value 0.033 , 0.114 in normal and MCI group, also markedly improves in functional capacity score with p value 0.010 , 0.063 and emotional aspects score with p value 0.004 in normal group. CANTAB in subscale of RTI (simple reaction time) and PAL (pair associated learning) score showed slightly improve in MCI group and significant improve in healthy group while SSP (spatial span) and SWM (spatial working memory) showed significant improve in both groups.

There was a positive trend for the training gain of MCI group in memory task, while as they got significant improved result in all tasks in healthy group. This may indicated that there is a larger training effect for healthy adult more than MCI. The i-ExC game can boots up cognitive functions consist of attention, memory and executive ability including physical fitness and interaction in elderly.

We are looking forward for further study to use this i-ExC game for delaying the onset of dementia& frailty in the future.

09 - Emergency inflate and call belt

Mr Cameron Woo

Bergen County Academies, Hackensack, United States

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Biography: I am a current junior at the Bergen County Academies in the engineering academy. I have worked on this project under Carlos Nodarse in the Mechatronics Research Lab since sophomore year.

This project was made in order to improve safety for elderly people who want to remain independent.

For many seniors, falling can lead to serious harm, more specifically, the fracture of one’s hip. The severity can escalate if the person is home alone and cannot get up. In fact, every 20 minutes, an older adult dies from a fall in the United States. In addition, over 300,000 patients are hospitalized annually from hip fractures.

Devices, such as Life Alert, have addressed this issue, but a patient with dementia may not remember to use such a device.

This device addresses the issue by preventing injury and automating the call for help. By introducing automated calling and a safety airbag, elderly people with dementia will be safer when left alone, potentially saving lives.

The goal of this device is to have a compact safety belt with a CO2 inflatable airbag that promptly inflates when the belt detects that a person is falling down. The belt will also send a text message to a specified phone number in order to call for help.

10 - Examination of head mobility with an eye-gaze input system

Mr Shigeto Moriwaki

Shimane University, Izumo, Japan

Posters Plenary Session, Royal Theatre, August 29, 2019, 09:00 - 10:30

Introduction: The Tobii Eye Tracker is an eye-gaze input interface that enables computer operation with eye movements. People with severe disabilities, of which amyotrophic lateral sclerosis is representative, can operate computers using an eye-gaze input system. This study examined head mobility during computer operation using the Tobii Eye Tracker, with a focus on the operation method and the number of Japanese script characters (kanji characters)

Method: The participants were 13 healthy people (mean age 30.9 ± 7.2 years) who agreed to take part in this study after receiving a verbal explanation of the study purpose.

The participants used the Tobii Eye Tracker to operate a kanji character input software program (Miyasuku EyeCon). The task was to input a fixed text for 30 minutes using the input software. There were two operation methods. Method 1 used gaze alone, and Method 2 used gaze and an external switch. The measurement items were the number of characters input and head mobility 'Corpus' (Inter Reha Co., Ltd.).

For statistical analysis, the mean measurement values were calculated and the Mann-Whitney test was performed. SPSS Ver. 23 for Windows statistical software was used for all analyses. The significance level was set at $<5\%$.

Result: No significant differences were seen between the operation methods. For the analysis, subjects were divided into two groups based on the mean number of characters input, with a cutoff of 300 characters. The results showed that in the higher character input group, acceleration changed in the direction of the y-axis and z-axis. However, no significant difference was seen between the two groups.

Conclusion: There were no major differences in head movement depending on the operation method. However, the results suggested that subjects who input many characters may have faster movement on the y- and z-axes (nodding movement).

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