

## MEDIA RELEASE

26 September 2014

For immediate release

### **LAUNCH OF REHABILITATION RESEARCH INSTITUTE OF SINGAPORE A\*STAR, NTU, NHG sign Memorandum of Understanding at SHBC 2014**

The wheels are in motion to create a new centre for innovation for rehabilitation medicine. Some \$100 million will be committed to establish the Rehabilitation Research Institute of Singapore. The Institute, also known as the RRIS (pronounced “RISE”), is a collaboration between the Agency for Science, Technology and Research (A\*STAR), Nanyang Technological University (NTU) and National Healthcare Group (NHG). A Memorandum of Understanding which formalised the collaboration, was signed at the Singapore Health and Biomedical Congress (SHBC) 2014 Opening Ceremony this morning, and witnessed by Guest-of-Honour, Health Minister Gan Kim Yong.

RRIS will leverage on the expertise of scientists, clinicians and engineers to develop innovative technology solutions for better patient outcomes across the healthcare ecosystem. Key areas of study include stroke and neurological rehabilitation, clinical robotics and biomechanics, as well as the development of computer games for rehabilitation.

Stroke is one of the leading causes of death and disability globally. There are up to 9,000 new stroke cases in Singapore yearly, with numbers expected to rise with a rapidly ageing population. An estimated one in three stroke survivors requires various types of rehabilitation, which can include the use of robotics or advanced mechanical exoskeletons to help patients regain function in their limbs.

A\*STAR will provide a wide range of expertise in Biomedical sciences and Physical sciences, including its Brain-Computer Interface (BCI), wearable and neuroimaging technologies from the Institute for Infocomm Research (I<sup>2</sup>R). (More details on BCI are available in Annex A).

“In the past, doctors and engineers worked separately on different goals. Today, this model has changed. Doctors help provide valuable information to engineers who will then use it to

design complex algorithms to make technology work in a clinical setting. Our BCI technology was developed based on such partnerships,” said Dr Guan Cuntai, Head of Neural & Biomedical Technology Department I<sup>2</sup>R, A\*STAR.

NHG, through its flagship Tan Tock Seng Hospital (TTSH), will lend clinical expertise from Singapore’s largest team of rehabilitation physicians. A multi-disciplinary team of therapists will also provide expertise to bring research from bench to bedside, and develop practical solutions for patients.

“The future of rehabilitation medicine is very exciting as we continue to remain relevant, proactive and empathetic advocates for our patients and their families. We are focused on harnessing new technologies to achieve transformational outcomes for our patients, their families and our staff,” said Associate Professor Chan Kay Fei, senior consultant and former Head of the Department of Rehabilitation Medicine at TTSH.

Scientists at NTU will play a key role in translating basic science and clinical findings into real-life applications, through the use of cutting-edge technology.

NTU Provost, Professor Freddy Boey, said that NTU’s strength in robotics and biomedical applications will contribute greatly to the inter-disciplinary research conducted by RRIS. The Institute can also leverage on the world-class research expertise from NTU’s new medical school, the Lee Kong Chian School of Medicine which has NHG as its primary clinical training partner.

“Inter-disciplinary research, by combining medicine and biomedical engineering, is the way forward if we want to effectively tackle the health challenges of an increasingly ageing population. Together with our partners, we are looking to develop innovative treatments for patients recovering from illnesses such as stroke; new ways for the ageing population to stay healthy; and to treat or delay the onset of mental diseases such as dementia.

RRIS builds on existing partnerships in rehabilitation innovation. In the past six years, NTU and NHG have successfully collaborated on eight projects in the area of rehabilitative care. This includes the development of a robotic exoskeleton to help stroke patients recover their balance; and an upper limb rehabilitation robot that assists patients according to their different stages of recovery (for more information, see Annex B).

“R&D that leads to innovative outcomes is a key strategy for economic growth and for enhancing lives for Singaporeans. This collaboration is an example of that strategy at work. We are laying the foundations for a national ecosystem that will allow clinical and industry partners to tap on the diverse research capabilities across public and private sectors to create improved solutions that will improve rehabilitation outcomes for patients,” said Dr Tan Geok Leng, Executive Director, Science and Engineering Research Council, A\*STAR.

This is the second landmark clinical research collaboration between the three parties, following the launch of the Skin Research Institute of Singapore (SRIS) in 2013.

“The Rehabilitation Research Institute of Singapore is a strong follow up to the SRIS – a joint collaboration between A\*STAR, Nanyang Technological University and the National Skin Centre, barely a year ago,” said Associate Professor Lim Tock Han, Deputy Group CEO (Education & Research), NHG. “We are honoured to be able to build on the esteemed partnership with our valued partners in research once again.”

Some 3,000 delegates from Asia, Australia, United Kingdom and the United States, witnessed the signing of the MOU. They are in town for the two-day SHBC 2014, which is themed “*Redefining Healthcare for the Future – Educating, Innovating & Leading for Progress*”. The Congress held at the Max Atria@Singapore Expo, provides a platform for healthcare professionals to exchange knowledge and ideas to improve community care.

**For media queries, please contact:**

Hiroshi Limmell  
Assistant Head  
Corporate Communications  
**Agency for Science, Technology and Research**  
Tel: 6826 6145 / 9474 1738  
Email: [hiroshi\\_limmell@a-star.edu.sg](mailto:hiroshi_limmell@a-star.edu.sg)

Lester Kok  
Senior Assistant Manager  
Corporate Communications Office  
**Nanyang Technological University**  
Tel: 6790 6804  
Email: [lesterkok@ntu.edu.sg](mailto:lesterkok@ntu.edu.sg)

Tania Tan  
Manager  
Group Corporate Communications  
**National Healthcare Group**  
Tel: 6496 6267 / 9692 2887  
Email: [tania\\_ll\\_tan@nhg.com.sg](mailto:tania_ll_tan@nhg.com.sg)

**About the Agency for Science, Technology and Research (A\*STAR)**

The Agency for Science, Technology and Research (A\*STAR) is Singapore's lead public sector agency that fosters world-class scientific research and talent to drive economic growth and transform Singapore into a vibrant knowledge-based and innovation driven economy.

In line with its mission-oriented mandate, A\*STAR spearheads research and development in fields that are essential to growing Singapore's manufacturing sector and catalysing new growth industries. A\*STAR supports these economic clusters by providing intellectual, human and industrial capital to its partners in industry.

A\*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities, located in Biopolis and Fusionopolis, as well as their vicinity. These two R&D hubs house a bustling and diverse community of local and international research scientists and engineers from A\*STAR's research entities as well as a growing number of corporate laboratories.

For more information about A\*STAR, please visit: [www.a-star.edu.sg](http://www.a-star.edu.sg)

## About Nanyang Technological University

A research-intensive public university, Nanyang Technological University (NTU) has 33,500 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, and Humanities, Arts, & Social Sciences, and its Interdisciplinary Graduate School. It has a new medical school, the Lee Kong Chian School of Medicine, set up jointly with Imperial College London.

NTU is also home to world-class autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre on Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI), Energy Research Institute @ NTU (ERI@N) and the Institute on Asian Consumer Insight (ACI).

A fast-growing university with an international outlook, NTU is putting its global stamp on Five Peaks of Excellence: Sustainable Earth, Future Healthcare, New Media, New Silk Road, and Innovation Asia.

Besides the main Yunnan Garden campus, NTU also has a satellite campus in Singapore's science and tech hub, one-north, and a third campus in Novena, Singapore's medical district.

For more information, visit [www.ntu.edu.sg](http://www.ntu.edu.sg)

## About National Healthcare Group

The National Healthcare Group (NHG) is a leader in public healthcare in Singapore, recognised at home and abroad for the quality of its medical expertise and facilities. Care is provided through an integrated network of nine primary healthcare polyclinics, acute care hospital, national specialty centres, and business divisions. Together they bring a rich legacy of medical expertise to our philosophy of patient-centric care.

NHG's vision of "*Adding years of healthy life*" is more than just about healing the sick. It encompasses the more difficult but infinitely more rewarding task of preventing illness and preserving health and quality of life. With some 13,000 staff, NHG aims to provide care that is patient-centric, accessible, seamless, comprehensive, appropriate and cost-effective.

As the Regional Health System (RHS) for Central Singapore, it is vital for NHG to partner and collaborate with other stakeholders, community advisors, volunteer welfare organisations and others in this Care Network together with our patients, their families and caregivers to deliver integrated healthcare services and programmes that help in *Adding Years of Healthy Life* to all concerned.

More information is available at: <http://www.nhg.com.sg>

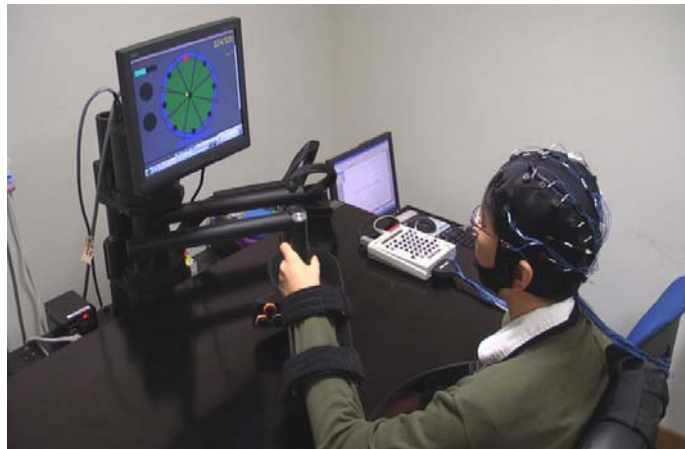
## **ANNEX A**

### **Advanced Rehabilitation Therapy for Stroke based on Brain-Computer Interface (ArtsBCI)**

Researchers at A\*STAR's Institute for Infocomm Research (I<sup>2</sup>R) have developed a non-invasive technology, which works by building direct interaction between the human brain and the computer. It converts human thoughts into action.

According to the World Health Organization (WHO)<sup>1</sup>, stroke is the second leading cause of death for people above the age of 60 years, with numbers expected to rise with a rapidly ageing population. Stroke survivors require various types of rehabilitation that include the use of robotics or advanced mechanical exoskeletons to help patients regain function in their limbs.

Traditionally, stroke rehabilitation exercises involve human-to-human interaction between a therapist and patient. The ArtsBCI technology uses a robotic machine to move a patient's arm, activated by electric signals picked up by an electroencephalogram (EEG) netting. Clinical trials were conducted at Tan Tock Seng Hospital and National Neuroscience Institute and were proven to help patients regain various degrees of mobility in stroke survivors.



**Image 1** shows a human model using brain signals, picked up by an electroencephalogram net worn over the head, to move a robotic exoskeleton attached to the patient's arm.

<sup>1</sup> Cardiovascular Disease (CVDs) Factsheet N<sup>o</sup>317, World Health Organization, Updated March 2013.

## **ANNEX B**

### **Examples of rehabilitation devices developed by NTU in partnership with Tan Tock Seng Hospital**

#### **(a) The H-Man: a portable low-cost planar robot for post-stroke rehabilitation of the upper limb**



*A demonstration of how H-Man works*

The H-Man is a robot that aims to help neuro-rehabilitation of stroke patients who suffer from weakness on one side of the body, motor incoordination and lack of muscle control of the upper limbs.

Built at a low cost and meant as a portable device, this robot is designed for motor function training of patients under limited supervision. The robot is highly portable, and can be placed upon a table or over a hospital bed. The rehabilitation training programme consists of a series of upper limb exercises tailored to the needs of the patient.

Powered using a cable-driven mechanism, the H-Man provides assistance and guidance to the patient depending on his condition and programme. For example, if the patient has erratic and unsteady upper limb movements, the robot will stabilise and guide the patient's hand toward the target. The H-Man can also generate force fields that push the patient's

hand sideways, which would help patients with improved motor skills learn how to compensate to external disturbances.

Given the low cost and portable nature of the robotic device, multiple H-Man robots can be deployed in hospitals, community centres, and in the home of patients. The joint research team hopes that robotic rehabilitation via the H-Man can complement existing robotic therapies and lead to improved patient outcomes.

The H-Man project is jointly led by Assistant Professor Domenico Campolo from Nanyang Technological University's School of Mechanical and Aerospace Engineering and Dr Karen Chua Sui Geok, Senior Consultant, Tan Tock Seng Hospital's Centre for Advanced Rehabilitation Therapeutics. The project is funded by the Ministry of Health.



## (b) NaTure-gaits – Natural and Tune-able Rehabilitation Gait System



*The NaTure-gaits in action*

This lower-limb rehabilitation machine aims to help patients regain their natural walking movement after they have been affected by stroke or after suffering a leg injury.

Worn like an exo-skeleton from the waist down, it helps to support the patient's legs by the form of a robotic orthosis or brace strapped to the thigh and calves.

Supported by a sturdy metal frame on wheels, the robot allows the patient to practice his walking gait by walking while minimising any risk of falling if he does lose his balance.

The patient's hip, knee and ankle joints are supported and assisted by the robotic orthosis, which is also able to gather feedback from the patient's movements. The information gathered by the robot assists therapists in their treatment of the patient, as it shows the patient's current gait and serves as a way to accurately monitor progress.

The project is led by Professor Low Kin Huat from Nanyang Technological University's School of Mechanical and Aerospace Engineering, and Dr Tow Peh Er, Senior Consultant from Tan Tock Seng Hospital's Centre for Advanced Rehabilitation Therapeutics.

The project is funded by the National Medical Research Council.