Radiology examination with Nintendo Wii
Fighting disease outbreaks with wireless tracing

Contact tracing – ever critical in infectious outbreaks such as SARS or Influenza A (H1N1) – can now be more efficiently carried out thanks to Bluetooth technology developed by a team from the NUS Department of Electrical and Computer Engineering spin-off, WiQ Networks.

The system which involves downloading the software Flulog and using hourly contact logs uploaded by mobile phones, is able to correlate personal particulars with identities logged by the phone. It automatically captures information of neighbouring phones via Bluetooth within a range of 10 metres. The data obtained, which includes the unique Bluetooth address from the phone’s manufacturer, time of contact and the name of the mobile phone, is sent to a secure database that can be accessed only by an authorised user.

With the recent outbreak of Influenza A (H1N1) worldwide, contact tracing is critical to containing the spread of the disease. Currently, contact tracing is carried out in two ways: interviewing infected patients regarding people they have been in recent contact with and asking visitors for information upon entry to a building.

The idea of a wireless contact-tracing method was first mooted during the Severe Acute Respiratory Syndrome (SARS) outbreak. During the SARS contagion, Dr Motani, who has been working on social networking applications in mobile phones, saw a direct application between contact tracing and mobile phones.

In 2006, a ‘mock infection’ was carried out to test Flulog. Dr Motani garnered support from the NUS Occupational Safety & Health Management Division while Sony Ericsson provided the mobile phones needed for the study. These phones were distributed to students and staff at the NUS Central Library. All were asked to carry on with their activities within the Library premises. Dr Motani found that within fractions of seconds, the software could provide details of each individual’s whereabouts. By contrast, manual contact tracing carried out at the Library took some time for data compilation, and it was not until the following day that information could be extracted.

The second trial began in early June this year, on the heels of the Influenza A (H1N1) outbreak. “Flulog seeks to complement what the Ministry of Health is doing. When individuals are at their respective institutions such as school or the work-place, it is easy to track their whereabouts,” said Dr Motani.

There are still some research and development capabilities to be improved upon, he said, which include incorporating the location feature on Flulog using either the Global Positioning System or finger-printing at Wi-Fi locations. There are also the human factors for consideration such as when mobile phone users forget to charge or switch on their phones.

In the near future, Dr Motani hopes to bring Flulog for use on a national scale. There are also talks with statisticians working on the model of epidemic spread who are interested in the data garnered by Flulog. This will help them understand how fast an outbreak can spread, and as a function of time, the percentage of the population who will be affected. Such data would be useful, for instance, in locating dengue hotspots.

Explaining the motivation for developing Flulog, Dr Mehul Motani, who led the team, said: “The data gathering process in traditional means of contact tracing is slow. It usually takes three to four days. It is also faulty as respondents might not remember the places they have been to and the people who have been around them.”

“Flulog seeks to complement what the Ministry of Health is doing. When individuals are at their respective institutions such as school or the work-place, it is easy to track their whereabouts,” – Dr Mehul Motani
NUSSU Volunteer Action Committee conferred Medal of Commendation

The NUSSU Volunteer Action Committee (NVAC) has been conferred the Medal of Commendation by Senior Minister and Coordinating Minister for National Security Professor S Jayakumar, at the Singapore Youth Award 2009 presentation ceremony held at the Istana on 5 July 2009.

Organised annually by the National Youth Council since 1975, the Singapore Youth Award (SYA) recognises and commends contributions made by youths who have excelled in their respective fields as well as contributed back to the community. It honours young people whose achievements will serve as an inspiration to others, and is the highest youth accolade in Singapore.

NVAC Chair and Year 3 Mechanical Engineering student Mr Lee Kok Leong said: “Being conferred the SYA Medal of Commendation 2009 is more than an achievement as it links all NVAC volunteers, past and present, into one family of people serving the community out of love.”

To qualify for the Medal of Commendation, NVAC had to surpass their previous accomplishments and contributions that had led them to win the Singapore Youth Award in 2002. Since then, NVAC has continued to play an active role in both global and national communities, through their numerous initiatives in promoting volunteerism among youths in Singapore as well as helping to raise awareness for global causes.

Internationally, NVAC has made its mark by being at the forefront of several fundraising projects in aid of natural disaster victims such as Cyclone Nargis in 2008. In addition, the team has organised overseas community service trips to Cambodia (Project Sang Khem), Myanmar (Project Pinnya Tazaung), Vietnam (Project Mam Xanh), and the Philippines (Project Big Hands, Bigger Hearts). All the projects, in aid of developing communities and villages with limited amenities, are still ongoing. An estimated 3,200 people have benefited from these projects.

NVAC also received the prestigious Commonwealth Youth Silver Award for demonstrating excellence in community work, and promoting the spirit of volunteerism among undergraduates in 2008.

RECOGNISED FOR THE SPIRIT OF GIVING: NVAC Chair Mr Lee Kok Leong (middle) and NVAC Vice-Chair Ms Ang Yi Jia (right) receiving the Medal of Commendation 2009 from Senior Minister and Coordinating Minister for National Security Prof S Jayakumar (left).

Assoc Prof Paulin Straughan appointed as a Nominated Member of Parliament

Vice Dean of the Faculty of Arts and Social Sciences (FASS) Assoc Prof Paulin Straughan was appointed as a Nominated Member of Parliament (NMP) by President S R Nathan on 16 July 2009. Assoc Prof Straughan, together with the other eight appointed NMPs, will serve a two year term.

Drawing on her experience as a sociologist and as a Vice Dean at FASS, Assoc Prof Straughan will speak on issues affecting families and youth. She hopes to raise the issue of how young people can be continually engaged through other means besides the Internet so that they do not get disenchanted with the system.

On her new appointment, Assoc Prof Straughan said: “It is a tremendous honour to be nominated by NUS and I am thankful for this privilege to serve.”

Assoc Prof Straughan and the other eight NMPs took their oaths of allegiance in Parliament on 20 July 2009. In her maiden speech in Parliament, Assoc Prof Straughan asked the House to consider regular contributions to the Central Provident Fund accounts of homemakers either by spouse or adult children, such as through a General Interbank Recurring Order (GIRO) system where standing orders can be issued to facilitate monthly top-ups. This allows homemakers to accumulate savings over time and be recognised for their critical domestic role.

First introduced in 1990, the NMPs scheme is aimed at providing an avenue for neutral, non-partisan feedback on issues. The Constitution was changed in July 1997 to allow the maximum number of NMPs to be raised from six to nine.
From computer gaming to medical scanning, here comes the Wii-mote

NUS researchers from the School of Computing, in collaboration with the Weill Cornell Medical Center, New York, have devised medical imaging software using the Nintendo Wii gaming system remote (or the Wii-mote) for radiology examination. The work was presented at the American Roentgen Ray Society, an annual conference for radiologists held in May 2009.

Asst Prof Michael S Brown and graduate student Mr Lu Zheng from the NUS Department of Computer Science, together with Asst Prof of Radiology, George Shih, of the Weill Cornell Medical Center, worked on the prototype. The Wii-mote allows the radiologist to control software to view MRI and CT images by simply tilting the Wii-mote from side to side. Asst Prof Shih’s team used this in trials and found this to be more ergonomic compared to the traditional use of the keyboard and mouse, as it decreases the possibility of repetitive motion injuries for radiologists. In addition, the Wii-mote has a range of around 10 meters, which makes it useful for classroom use for radiologists in training, where students even in the back of the room and use the Wii-mote to control the software during lecture.

Asst Prof Brown said: “The key idea here is not that we used a Wii-mote, but that this collaboration re-examined how radiologist software can be improved using newer interface technologies. It’s time to think beyond the standard keyboard and mouse interaction and embrace newer forms of interaction. The Wii-mote provides a nice example of the types of things that can be done. The other key point is a strong collaboration with people like Asst Prof Shih who push these new technologies in their own domain.”

On the collaboration, Weill Cornell’s Asst Prof Shih said: “We have really enjoyed working with NUS on this project. The medical field will benefit significantly from working with computer science researchers with world-class expertise such as Prof Brown and Lu Zheng.”

Asst Prof Shih said that given the talented group of graduate students on his team, he looked forward to working on other projects with NUS in the near future.
Developing an energy-friendly air-conditioning system

The way energy-thirsty air-conditioning works is about to undergo an overhaul. Researchers at the Solar Energy Research Institute of Singapore (SERIS), NUS, are working on a system to greatly decrease energy usage of air-conditioners by using solar thermal energy.

The research team led by SERIS’ Chief Executive Officer Prof Joachim Luther has recently been awarded funding from the Economic Development Board (EDB) under the Clean Energy Research Programme.

The research project is timely considering that figures from the National Environmental Agency have highlighted that Singaporean households accounted for close to a fifth of the total electricity consumption in 2007. In particular, air-conditioning and refrigeration made up the bulk of the households’ electricity consumption.

Prof Luther explained that traditionally, the way an air-conditioner works is that it first cools air from 30 degrees Celsius to around 8 degrees Celsius to remove humidity. This chilled air, which is no longer so humid, is then warmed up to around 21 degrees Celsius. Under tropical conditions, the process of dehumidification takes up 70 per cent of the energy consumption while only 30 per cent of energy would be necessary for cooling the air having reduced humidity from 30 to 20 degrees Celsius.

Over the past 10 years, Prof Luther has been working on a project similar to that proposed to the EDB, but which focused on Mediterranean and North African countries, where several test-bedding applications are in the pipeline. Responding to the EDB’s call, he explained that the idea was to transfer the Mediterranean project’s findings and to adapt as well as optimise them in the Singapore context where the average humidity in the air is considerably higher than in Southern Europe.

In applying dessicant dehumidification, humid air is first passed over a surface coated with a moisture-absorbing material such as silica gel. The dry air, still at ambient temperature, is then fed into the room to be conditioned. The room’s temperature is cooled to the desired level using a cold ceiling plate operating at about 20 degrees Celsius. The dehumidification units will be powered by heat (e.g. from solar energy) and not by electricity.

Prof Luther noted that the key to developing the prototype lies in material science. This is because normal silica gel is not optimal for the dehumidification of air. It is thus important to find the right material for humidity absorption and, thereafter, to get rid of the water. He is working closely with Prof Ng Kim Choon of the NUS Department of Mechanical Engineering.

To better accommodate the research team, a laboratory located off-campus at the International Business Park at Jurong East is being set up. Refurbishment is currently being done at a 400 square metre laboratory which will be ready by the fourth quarter of this year.

The project will be receiving a total funding of $2 million over a three-year period. A prototype for application in tropical climates is expected to be ready in two years.
**Placing Singapore’s economy as a front-runner on the global stage**

With Asia representing a diversity of capabilities, culture, languages and political economic systems, the global arena is set for Singapore to provide the economic leadership in bringing different parts of Asia together.

This is the view of Prof Bernard Yeung, Dean and Stephen Riady Distinguished Professor of Finance of the NUS Business School (BIZ) who was recently appointed member of the high-powered Economic Strategies Committee (ESC). The ESC is chaired by Singapore’s Finance Minister Tharman Shanmugaratnam.

The establishment of the ESC, first announced by Prime Minister Lee Hsien Loong in Parliament in May this year, is aimed at developing and recommending strategies to grow Singapore’s economy. The 25-member committee includes nine ministers, chief of Singapore’s central bank as well as leaders of foreign and local companies.

The eight sub-committees set up by the ESC plan to develop the areas which will make Singapore an economic front-runner.

These areas include seizing growth opportunities, developing a vibrant SME sector and globally-competitive local companies, attracting and rooting multinational corporations and global SMEs, growing knowledge capital and making Singapore a leading global city. There will also be strategies to foster inclusive growth, ensuring energy resilience and sustainable growth, and, lastly, to maximise value from land as a scarce resource.

“The committee, structure, objectives and organisation of the sub-committees all fall very well based on my understanding of the endogenous growth theory,” said Prof Yeung. He said one needs to first understand the modern economic growth theory. The endogenous growth theory tries to explain the lack of convergence in growth across countries. Conceptually, while two countries might have different growth rates initially, however over time, if production possibility is static, both countries should have similar technologies, inclination to save, similar capital-labour ratio, and similar living standards. The theory states that all economies will eventually converge, economically speaking. In reality, this is not the case as some countries are still more economically ahead of others, and production possibility is not static. Some countries are leading the “pack” – developing new capabilities with wide spread applications and-pushing production possibility limits outward. These countries enjoy higher growth rate and are drivers of international variations in growth rates and global growth.

Prof Yeung added: “My own research, as well as others, shows that in the cases of countries with good economies, you will find that they have a good institutional environment, much investment in human capital and constant stream of innovation and ideas.”

At NUS BIZ, the environment is ideal for the generation of knowledge capital. In his capacity as the School’s Dean, Prof Yeung’s vision is to make NUS BIZ a place for intellectual curiosity and academic excellence. In his first year as Dean, he aims to strengthen the BIZ culture – intellectual curiosity, integrity and excellence into all parties from its faculty and students to alumni.

Looking ahead, Prof Yeung plans to lead the School in scaling the next height. This would be achieved by recruitment and knowledge creation to meet the needs of the future. Given the high calibre of students and faculty at the School, the Dean also plans to engineer quantum improvement in the teaching programmes by bringing in value-add.

“We also need to continually step out of the ivory tower and improve our social impact. The collaboration with The Straits Times on the financial crisis is an example of bringing results outside of journals,” he pointed out. Other initiatives for creating social impact include the Enterprise 50, the tie-up with the Singapore Business Federation in establishing the Business Advisory Programme, and the Center for Asset Management and Research Institute (CAMRI). By working with corporations, CAMRI provides the opportunity for students to bring state-of-the-art finance theories to practice in tackling real life business questions.

The NUS BIZ Dean’s advice to business students is to grasp and learn as much as they can, grow intellectually, professionally and mentally, give and develop value proposition. Reminiscing on his student days, he said: “I always look back at my college years and find that they were the best years of my life – everyday I learned something new, everyday there was something to excite me.” Married with a wife in academia (a professor in Sociology and ARI) and two children, he is a self-confessed workaholic who still enjoys research and reading intellectually-stimulating research articles and books of any topics.

On his appointment to the ESC, Prof Yeung said that it “was a great honour” and would be “an exciting opportunity to learn from my esteemed committee members.”
We proudly celebrate the following recent achievements:

- **Singapore-MIT Alliance post-doctoral fellow Dr Li Ang** won the first prize of €5,000 at the International Scanning Probe Microscopy Image Contest 2009. Dr Li’s winning image entitled “Human malaria (*Plasmodium malariae*) infected red blood cells” was chosen by an international jury from over 250 entries submitted from over 30 countries. Currently working on his postdoctoral research with Prof Lim Chwee Teck from NUS Division of Bioengineering and Department of Mechanical Engineering, Dr Li’s research interests are in the applications of atomic force microscopy (AFM) in cellular and molecular biomechanics, surface morphology and mechanical characterisation of human malaria-infected red blood cells.

- **Department of Engineering Prof Choo Yoo Sang** was named the first Lloyd’s Register Educational Trust (LRET) Professor from Asia on 1 April 2009. He takes over from Prof Peter Marshall, formerly from Shell and University of Newcastle-upon-Tyne, England. The Professorship aims to further boost the growth of maritime research and development in Singapore, in particular, offshore research. This also marks the first time LRET has set up a professorship outside the UK, demonstrating the organisation’s confidence in Singapore’s commitment to develop the country’s offshore and maritime industry. To inaugurate the LRET professorship, Prof Choo delivered a lecture at the Third Lloyd’s Register Education Trust Lecture held on 4 August 2009.

- **NUS** won the silver award in the category of Workplace Safety and Health Performance Awards at the Workplace Safety and Health Awards 2009, the only institution of higher learning to have received this accolade. It was presented by the Workplace Safety and Health Council in collaboration with the Singapore Ministry of Manpower. NUS won for having achieved an injury rate of below 25 per cent of the industry average, and for having established a sound safety and health management system which was verified by an independent auditing firm. The Workplace Safety and Health Awards celebrate the best in workplace safety and health, recognising winners on a national level for their commitment and exemplary standards in Workplace Safety and Health.

- **INTERNATIONAL WIN: Dr Li Ang, post-doctoral fellow, Singapore-MIT Alliance (seated) and Prof Lim Chwee Teck from the Division of Bioengineering and Department of Mechanical Engineering, with the winning images.**

- **SILVER AWARD FOR SAFETY: Dr Peck Thian Guan, Director, Office of Safety, Health and Environment (left) receiving the award from Mr Heng Chiang Gnee, Deputy Chairman, Workplace Safety and Health Council.**

- **AT A GLANCE**
  - **At the 13th Association of Pacific Rim Universities (APRU) Annual Presidents Meeting held from 28 to 30 June 2009, NUS President Tan Chorh Chuan and Kyoto University President Hiroshi Matsumoto were elected to the APRU Steering Committee which provides leadership for the consortium. Hosted by the California Institute of Technology, 24 university presidents attended the annual meeting this year. With the theme “Grappling with global challenges: How universities can provide leadership and strategies to solve the problems of the 21st century”, the APRU Forum featured distinguished speakers and panel discussions on current issues facing the world economy, higher education curriculum and how universities can collaborate with business in research.**

- **NUS is the first recipient of the Wildlife Reserves Singapore Conservation Fund that is dedicated to wildlife conservation and education, with a focus on native animal conservation efforts and the issue of climate change. Launched on 10 July 2009, the fund will benefit the NUS Ah Meng Memorial Conservation Fund, which will receive $500,000 over five years. This will support the academic research and study of endangered native wildlife undertaken by students and faculty members of NUS. The first project to receive funding from the NUS Ah Meng Memorial Conservation Fund is a study on the banded langur, one of Singapore’s native endangered wildlife.**
Distinguished Visitor Lecture by Sir Roy Anderson

The number of human cases of pandemic (H1N1) influenza is on the rise in many countries. Against this background, the British High Commission and the NUS Yong Loo Lin School of Medicine, National University Health System hosted Sir Roy Anderson, eminent Infectious Disease expert and Rector of Imperial College, on 28 July 2009.

Sir Roy delivered an engaging lecture entitled “A new pandemic of H1N1 Influenza - its origins, likely course and the global response”. Addressing current key issues, Sir Roy provided views on the severity of the current pandemic and its impact, challenges in assessing the severity of the current pandemic, adoption and effectiveness of pandemic intervention measures and predicting future patterns of pandemic spread.

The lecture attracted a diverse audience of students and faculty, healthcare professionals, researchers, healthcare policy makers, biostatisticians and administrators from NUS, the Ministry of Health, the Agency for Science, Technology and Research, the National Research Foundation, the National University Health System and other healthcare institutions.

Sir Roy is regarded as one of the world’s leading authorities on the epidemiology and control of infectious diseases including tropical parasitic infections, Bovine spongiform encephalopathy (BSE), Variant Creutzfeldt-Jacob disease (vCJD), SARS, AIDS, influenza and foot and mouth diseases.

In his career as a scientist, he has focused on the use of mathematics coupled with experimental and field observations to predict the way infectious disease outbreaks will spread and how best to control them. He has also frequently advised governments and international agencies on public health and biomedical research issues. The author of 450 scientific articles, Sir Roy is a member of the Bill and Melinda Gates Grand Challenges advisory board, and currently chairs the science advisory board of the World Health Organization Neglected Tropical Diseases programme, and the Schistosomiasis Control Initiative advisory board funded by the Gates Foundation.

NUS research programmes awarded funding by National Research Foundation

Three research programmes from NUS were awarded funding from the National Research Foundation (NRF) on the recommendation of the International Evaluation Panel (IEP) for its Competitive Research Programme (CRP) Funding Scheme. The CRP Funding Scheme is granted based on the possible high potential economic and social impact the research might yield in the future. Each team receives up to S$10 million over a period of three to five years.

The 70 proposals received under the current CRP grant call span a wide spectrum of science and technology areas. A total of 16 white papers were selected for development into full proposals. These full proposals were internationally peer-reviewed before IEP made the assessment and recommended six for funding. The IEP members include IEP Chairman Dr Rita Colwell, NRF Scientific Advisory Board Member and Distinguished University Professor, University of Maryland College Park and Johns Hopkins University Bloomberg School of Public Health in the United States, as well as Dr Richard Roberts, Nobel Laureate and Chief Scientific Officer of New England Biolabs.

Dr Colwell said: “We are very pleased with the quality of the six projects recommended to receive the CRP grant.” She added that the international collaborations found in the CRP programmes would undoubtedly lead to synergistic discoveries that benefit participating countries.

NUS research programmes awarded NRF funding under the Competitive Research Programme Funding Scheme:

- Tailoring Oxide Electronics by Atomic Control
  Principal Investigator: Thirumalai Venkatesan, NUS

- Frontiers in Magnetic Recording Research: Vision for 10 Terabits per square inch
  Principal Investigator: Charanjit Singh Bhatia, NUS

- Adult and Induced Pluripotent Stem Cells for Neurological Disorders and CNS Repair
  Principal Investigator: George Augustine, Duke-NUS Graduate Medical School Singapore

Prof Charanjit Singh Bhatia of NUS’ Faculty of Engineering and the Principal Investigator of the awarded CRP project “Frontiers in Magnetic Recording Research”, said: “This award will enable my colleagues and I to attempt to achieve the goal of 10 terabits per square inch in magnetic storage, which is beyond existing process capabilities today. Doing this would require fundamental research into the basic physics of magnetism of small structures. We are hopeful and confident about creating some breakthroughs in magnetic recording research in Singapore.”

A total of 20 projects have benefitted from the CRP Scheme since its inception in 2007.

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