

# NEW EXPLOITS

Exploit Technologies is the commercialisation arm of A\*STAR.



## FEATURE

### >FLAGGING OFF SILICON PHOTONICS

What is the buzz about silicon photonics? Silicon photonics is an exciting technology with an emerging market and industry. The greatest promise of silicon photonics is the integration of different types of devices into a single silicon platform. Silicon has both active and passive capabilities and the potential to integrate them with a much higher yield as compared to other materials, going by the billions of ICs shipped. Monolithically integrating photonic devices with electronics – the convergence of electronic computing with optical communication in a single silicon chip – that's what A\*STAR aims to achieve through its Flagship Programme.

One way that this is done is through Research Collaboration Agreements (RCAs) such as the one between Institute of Microelectronics (IME) and US-based SiOptical Inc (SiOptical). Building on IME's established process modules for silicon photonics crystal and processing capabilities, this one-year collaborative project will see IME and SiOptical jointly develop silicon photonics technology and optoelectronics devices.

A major milestone in the Flagship Program for silicon photonics has been a three-party Memorandum of Understanding signed by IME, SiOptical and Chartered Semiconductor Manufacturing Ltd on 26th June 2006. The MOU paves the way for manufacturing of the devices

developed and marks the first industry move in Singapore to harness silicon photonics technologies.

As with other Flagship Programs, A\*STAR is interested in capturing the whole value chain – from building capabilities in fabrication to developing expertise in design and simulation of devices. Through establishing partnerships with companies and internal research programs within its research institutes, A\*STAR is thus able to strengthen its capabilities and IP portfolio. A\*STAR will also continue to identify and introduce collaborators to industry players in Singapore and support technology transfer via its commercialisation arm, Exploit Technologies Pte Ltd.



## THE BIG PICTURE

### >A TRIBUTE TO YOUR DEDICATION

In 2005, 43 licenses covering 23 technologies were signed with industry, yielding an estimated contract value of \$13.7 million. The bulk of these licenses were with local small and medium sized enterprises. We also spun off two companies. Our Research Institutes (RIs) recorded more than 150 collaborations (RCAs) with industry partners, largely multinational corporations.

Our \$15 million Commercialisation of Technology (COT) program funded 33 projects, to bridge the gap between research output and licensable products/processes. This resulted in 10 company licenses and several potential spin-offs. Thus our initiative, started in 2002, to commercialise our research is gaining significant momentum.

Exploit Technologies, the commercialisation arm of A\*STAR, has been at the forefront of it all. Moving forward, Exploit Technologies will be more proactive in marketing A\*STAR capabilities beyond finished research outputs.

In particular, Exploit Technologies will market the facilities available in our RIs for use and for collaborative work; our capabilities for collaborations in current and future developments; our people through GET-UP; our planning capabilities through the OTR team and technology road mapping; our market and financial/venture capital connections through our in-house venture team.

This is in addition to our existing activities in the critical areas of intellectual property management, technology intelligence and competitive intelligence, licensing of A\*STAR technologies, funding the transition from research to licensable technologies through RCAs, COT and Flagship projects, and preparing companies for incubation, spin-off, or integration with other companies.

We are embarking on a more proactive approach to commercialisation by participating in research themes alongside researchers and right from the beginning. This requires us to hire full time Program Directors, whose roles are to review

product and process roadmaps and explore licensing opportunities in the research areas over a period of two to three years.

In short, this new proactive approach falls under the following 3Cs:

- Providing the Cash for concurrent commercialisation;
- Providing the Connections for dynamic real-time technology and competitive intelligence; and
- Providing the Crew (CEOs, CIOs, CTOs, consultants – in-house and external) to license, co-create, and package business proposals to form companies.

Together with our innovators in our RIs and our partners in industry, we look forward to another great year ahead.

Regards,

**Boon Swan Foo**

## FEATURE

### >ULTRA-WIDEBAND ACTIVITIES UPDATE

Exploit Technologies organized an Ultra-Wideband (UWB) Activities Update meeting as a platform for A\*STAR's Research Institutes working on UWB-related projects to take stock of A\*STAR's UWB IP portfolio including technology, expertise, know-how and patents.

The meeting involved Exploit Technologies, A\*STAR's Science and Engineering Research Council (SERC) and Research Institutes (RIs) including the Institute of Infocomm Research (I<sup>2</sup>R), the Institute of Microelectronics (IME), the Data Storage Institute (DSI), and the Singapore Institute of Manufacturing Technology (SIMTech). The key objective of this meeting was to understand the strengths and weaknesses of the UWB IP portfolio so as to structure a framework for collaboration between the RIs to enable significant research and development in UWB.

Providing an overview of UWB market trends and forecasts, Frost & Sullivan noted that the increased connectivity between products resulted in more wireless connectivity overcrowding the radio frequency (RF) spectrum and thereby fueling the interest in UWB. With its higher bit rate (currently 40 to 600 Mbps) and lower power consumption (~0.1% that of mobile phones) for WPAN, UWB offers low cost solutions, enabling adoption in portable consumer electronics applications.

I<sup>2</sup>R and IME provided insights into UWB development. Exploit Technologies also took the opportunity to sought feedback from participants on three UWB Flagship Projects: namely WiMedia, low-rate low-power chipset, and mobile disk IC. Two of the three projects involved more than one research institute.

Moving forward, Exploit Technologies will be engaging management and scientists in its outreach programs to give them first hand experience in understanding the requirements and development in the UWB industry (see story – Connections: Courting Champions).

#### **The Need for Ultra-Wideband?**

Ultra-Wideband (UWB) usually refers to a radio communications technique based on transmitting very-short-duration pulses, often of duration of only nanoseconds or less, whereby the occupied bandwidth goes to very large values. This technique allows delivery of data at rates in excess of 100 Mbit/s, while using a small amount of power and operating in the same bands as existing communications without producing significant interference. However it is not limited to wireless communication. UWB can also use mains-wiring, coaxial cable or twisted-pair cables to communicate - with potential to deliver data faster than 1 gigabit per second.

## >THE JOURNEY TO ENTREPRENEURSHIP

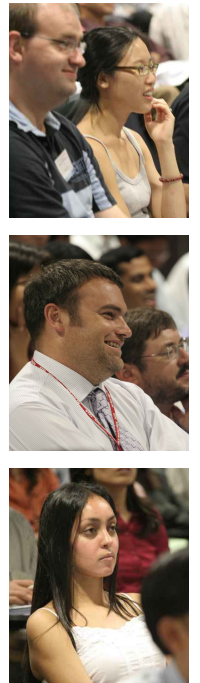
How can a group of young women who regularly congregate by the thousands in Japan's Shibuya area cause the downfall of a telecommunications giant?

In a world of fickle trends, where what's hot today is old-fashioned tomorrow, the "Shibuya Girls" have an uncanny skill of picking out what catches on nationally – from fashion to movies, from food to technology. One mobile telecommunication company made the mistake of not catering to the interest of these girls, thereby causing its loss of market leadership.

In his opening speech on "Innovation and Entrepreneurship" for A\*STAR's International Researchers Club (IRC) inaugural event, Mr Boon Swan Foo (Managing Director of A\*STAR and Executive Chairman of Exploit Technologies) reminded budding entrepreneurs of the perils of ignoring the influencers of decision-makers – the ultimate customers.

Mr Boon pointed out the distinctions between being enterprising, innovative and an entrepreneur. As a scientist, it is important to be innovative and enterprising first. In a similar vein, an entrepreneur need not be innovative. Good science is an important ingredient for a successful business.

However, to be an entrepreneur based on scientific innovation, he noted that some ingredients of success are good science, complimented by a strong understanding of users and usage. Much time and effort will need to be spent outside of science



to run businesses as well. Being an entrepreneur involves business and financial risk that may not be first nature to a scientist. Exploit Technologies can fill that gap to help researchers.

In the process of translating science-based innovations into entrepreneurial ventures, not understanding users or the market is a recipe for disaster. Good science must be complemented by a strong appreciation of users and usage.

This inaugural IRC event also featured three other distinguished speakers: Sir David Lane (Executive Director, Institute of Molecular and Cell Biology, A\*STAR); Mr Fong Saik Hay (CTO, ST Engineering Group and President, ST Dynamics); and

Dr Roberto Mariani (Founder, XID Technologies).

### Getting The Ride Of Your Life

Dr Roberto Mariani shared his experience of crossing the chasm from inventor to entrepreneur. XID is a spin-off of the Institute for Infocomm Research (I<sup>2</sup>R), A\*STAR. The company hinges on I<sup>2</sup>R's Face Matching Module, a technology that Dr Mariani helped develop.

Dr Mariani exemplified the transition from researcher to successful high tech start-up entrepreneur. Drawing from his experience, he described the need to build a solid foundation consisting of good technology, inventive spirit, and a vision to drive the business. Just as important is to have angel investors who share your vision, understand the technology and its potential.

Dr Mariani also impressed upon participants the importance of commitment and personal sacrifice in building a business: from being your business' first investor to not taking a pay and converting sweat into equity. As the business grows, it is important to surround yourself with shareholders and a management team that share the vision for the business, and to share the fruits of the labour when the business takes off.

### What is the International Researchers' Club?

Established in August 2001, the IRC organises social and educational events for its members and their families. The IRC aims to foster integration of foreign researchers into the fabric of Singapore's society, especially in the area of research.

IRC also focuses on developing entrepreneurial capability among its members, helping them realise their business ideas and sharpening their entrepreneurship skills on a variety of platforms.

IRC has grown into a thriving community of close to 600 members consisting of both local and foreign researchers at A\*STAR.

## >MOVING INNOVATIONS FROM RESEARCH TO BUSINESS WORLD

In 2005, Singapore companies and research institutes filed about 440 patent applications. The World Intellectual Property Organisation (WIPO) predicts that this will grow in the immediate short-term as Singapore becomes a major center for knowledge-based industries.

A\*STAR is among the top patent applicants in Singapore. Not surprising for A\*STAR's patent portfolio consists of over 2,000 patent applications and granted patents.

The concept behind intellectual property (IP) rights is that an invention is publicly disclosed in return for a limited monopoly granted by a government. This limited monopoly includes the right to exclude others from making, using, or selling the invention.

In Singapore, not only are more firms pursuing innovations in key technologies, they are more willing to patent these innovations, providing royalties and property rights to the patent owner.

A study commissioned by the IP Academy of Singapore and conducted by the NUS Entrepreneurship Center in mid-2005

showed that almost 60% of respondents indicated they have never ever considered pursuing a 'multiple strategy of licensing IP, spinning out new organisations or disposing of it to other parties.' It concluded that 'the lack of mature IP strategies is one factor hindering firms from systematically using and exploiting their IP'.

At A\*STAR, researchers devote their resources to research and development, while Exploit Technologies focuses on protecting and maximising the use of A\*STAR's IP. Exploit Technologies has an IP management system to protect and manage A\*STAR's patent portfolio.

For Singapore-based business entities such as small and medium-sized enterprises (SMEs) and start-up companies with limited IP infrastructure and/or knowledge of IP rights, and multinational corporations leveraging on available cutting-edge technologies to gain a competitive advantage, Exploit Technologies supports the transfer of A\*STAR technologies to these business entities to thereby enhance their respective global competitiveness.

### Did You Know?

- It becomes difficult to protect the originality of your work once it is published.
- After publication, inventions are no longer patentable in most jurisdictions.
- After a patent application is filed, you can typically exhibit or publish your work without the loss of patent protection.
- Patents can provide a strong economic incentive for a company to license A\*STAR technologies. It gives the firm that licenses the technologies sufficient time to recoup its investment.
- Some technologies lend themselves to copyright protection. Copyright protection is provided at creation. Under certain circumstances, copyright may be registered with the Patent and Trademark Offices in certain jurisdictions.

## >ONE-STOP EXPLOIT RFID CENTRE @ SIMTech

Mr. Boon Swan Foo, Executive Chairman of Exploit Technologies and MD of A\*STAR, announced details of a one-stop RFID centre that is opening in September 2006 in his keynote address to the EPCglobal/RFID Singapore Forum on 28th June 2006.

The RFID centre aims to link the RFID community, including companies and test centres, potential end-users such as government ministries, educational institutions, and research organizations such as A\*STAR, to collaborate on projects that encourage the adoption of RFID technology. For example, this RFID centre can help companies to capitalise on radio frequency identification (RFID) technology to help smooth out kinks in their supply chain logistics.

For more information on the RFID centre, please visit: <http://www.exploit-rfid.com>



## CoolTech!

### + Audiophiles Rejoice



Purist music aficionados who have so far resisted the trend towards digital audio players because they feel that the pristine quality sound of

CDs cannot be replicated by most audio compression codecs can expect a paradigm shift in the near future.

Thanks to the Institute for Infocomm Research's (I<sup>2</sup>R) contribution to MPEG-4 SLS (Scalable Lossless Coding) and ALS (Audio Lossless Coding) standards, a new dimension to audio archival, playback, downloading, and streaming is being ushered in.

"Current audio compression technologies require one to maintain audio files encoded at different qualities for different devices. Audio Advanced Zip (AAZip) eliminates the need for this as the file only needs to be encoded once in the lossless version," said Dr Susanto Rahardja, I<sup>2</sup>R's Divisional Director of Media Division.

AAZip was developed by I<sup>2</sup>R's Dr Rahardja, Dr Lin Xiao, Yu Rong Shan and Huang Hai Bin, and adopted as a reference model for the MPEG-4 SLS audio standard, pending publication by the ISO (International Standards Organization).

### + Safety Nest



In the absence of a vaccine, early identification of the H5N1 virus is especially important.

The global success of Veredus Lab's H5N1 Diagnostic Kit underlies the good work done by scientists from A\*STAR's Genome Institute of Singapore (GIS) – Dr Ren Ee Chee and Dr Lisa Ng.

The key ingredient in any successful test kit is the primers, which help to identify the virus's unique genetic material. For development of the H5N1 Diagnostic Kit, Dr Ren and Dr Ng leveraged on their

expertise gained from developing diagnostic tests for SARS. "The design of SARS primers was something that allowed us to figure out a similar strategy with bird flu," said Dr Ren. "Singapore can play a significant role in this global battle against bird flu by harnessing our scientific capabilities."

"When we first started working on the H5N1 virus, it was on a small-scale, motivated by genuine interest and also in seeing our work help others. We never expected it to go so far or become so important," said Dr Ng.

### + Clear Vision With Liquid Lens



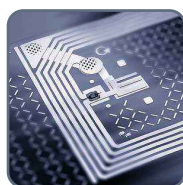
Mobile phones may one day take better pictures, thanks to the liquid lens technology developed by a team of researchers, led by Dr

Saman Dharmatilleke, at the Institute of Materials Research and Engineering (IMRE). The tiny lens, made of liquid, mimics the action of a human eye.

"Currently there is no practical alternative to compensate for the fixed focus lens system where a camera lens, for example, is moved along a linear axis until the image comes into focus," said Dr Dharmatilleke. "Our liquid lens, on the other hand, comprises only a droplet and no other cumbersome movable parts."

The key to the success of the lens is newly-developed fluids that flow in and out of the lens and control its shape without the need for electricity. "It will revolutionise the way we make the next generation of cameras, making them much smaller and less expensive," he concluded.

### + Tag Team



The Institute of Microelectronics' (IME) integrated radio frequency identification (RFID) tag with an on-chip antenna (OCA)

significantly reduces the size of the tag,

making it small enough to be embedded in laboratory samples, clothes, paper documents or cheques for validation, authentication and tracking purposes.

"Because of the miniaturisation and the architecture that eliminates expensive assembly, the cost of the chip can be reduced to a fraction of the current US 25-cent price for each tag," said Dr Rajinder Singh, IME's Head of IC and Systems Laboratory. "This economy opens up exciting new ways of exploiting the technology in such areas as biomedicine and pharmaceuticals, document authentication, tickets and currencies requiring small thin tags, as well as patient tracking in hospitals."

OCA-RFID TAG is suitable for niche applications where short range of 1-2mm and the small size of OCA-RFID is an advantage. Its low cost allows tagging of goods at item level, while its small size allows it to be embedded in media such as paper, etc

### + Contact Lens Therapy



Scientists Dr Edwin Chow and Dr Yi –Yan Yang from the Institute of Bioengineering and Nanotechnology (IBN)

invented a simple method of making polymeric lens materials that can be loaded with eye medication for ophthalmic drug delivery applications. The materials can also be modified to produce self-lubricating contact lenses, which will be useful to people with dry eyes.

"The resulting material is compatible with human skin cells, as well as human corneal epithelial cells," said Dr Chow. "It is permeable to gases such as oxygen and carbon dioxide, water and components of tear fluid. Thus, this material is suitable for use in biological and biomedical applications. Our approach allows greater flexibility in designing controlled drug delivery vehicles that can be tailored to different drugs and remain effective for extended periods."

## >CONNECTIONS: COURTING CHAMPIONS

To paraphrase Confucius in the context of technology commercialisation, “to know yourself and your environment is half the battle won.”

Exploit Technologies has intensified its outreach program to connect with “champions” or industry leaders to learn best practices and understand technical capabilities and cutting-edge technologies. At the same time it hopes to explore partnerships through collaboration.

### A Closer Look At The Research Institutes

Exploit Technologies is not only focused on connecting with external parties. Closer to home, it has initiated regular visits to the Science and Engineering Research Institutes to better understand their capabilities, facilities, research work and achievements.

Not only does this help the team do a better job of commercialising the institutes’ work, it paves the way for the development of inter-Research Institute collaborations. The resulting pooling of resources and expertise enables more and faster breakthroughs in research and development.

In the three trips that Exploit Technologies has conducted, the team was joined by management and researchers from A\*STAR’s research institutes as well as business partners.

Dr Jason Png, a researcher from A\*STAR’s Institute of High Performance Computing (IHPC) shared with us his experience:

#### What was the purpose of your trip?

Besides assessing the technical capabilities of our potential R&D collaborators, I was also asked to provide technical input based on my expertise in silicon photonics.

The rest of the team were actively engaging companies to explore collaborations with A\*STAR and the possibility of attracting their commercial and research activities to Singapore.

We also visited a number of venture capitalists to understand their approach in funding high-technology start-ups.

#### Was the experience beneficial to you?

Yes. I was exposed to companies whose research can drastically improve what is currently available. I saw first-hand the dynamic start-up scene in the US.

From the research standpoint, the intensity with which the companies conduct their research is something A\*STAR’s researchers

must emulate. No stones were left unturned in their quest for a ‘first-class’ product whilst meeting cost issues.

At the same time, researchers turned entrepreneurs that we met are very focused in their vision of success and in their execution of their plans. Trips of this nature will inspire our budding entrepreneurs.

#### Do you recommend this to other researchers?

Definitely. This is an excellent opportunity for researchers to be exposed to the competitive environment of actual market conditions. No compunctions!

#### Feedback:

“Visiting these companies allowed us to gauge the readiness of our technologies and explore collaborations. The trip helped us to manage our ignorance of companies and talents working in similar technologies. This experience is not what we can gather via the Internet.”

**Dr Lim Ser Yong, ED, SIMTech**

“This trip confirms the significance of IME’s R&D Foundry in attracting companies to Singapore. At the same time, ideas are relatively easy, but developing speed, cross-functional and cross-boundary collaboration are major challenges.”

**Prof Dim-Lee Kwong, ED, IME**

“Accessing the available research work at MIT Media Lab not only provide us with ideas on what they are doing, but also allows us to learn from their experience without repeating similar effort.”

**Eddie Tan, I’R**

“...the real kicker for me is... the story about how Walmart was using RFID to help locate items at the back of the store, so that store assistants are not misled that an item is out of stock & then proceed to order additional stock... which then triggers other back end processes such as sales forecasts, orders from suppliers etc.”

**Bernard Chew, NTUC CIO**

“...first hand view of necessary steps in the implementation of RFID enabled system... knowledge acquired from the trip allows us to make an independent assessment on the state of RFID adoption in US... site visits allowed us to see innovative application of the RFID technology and a glimpse of the possible ROIs.”

**Joshua Lee, DSTA/SAF**



Dr Png (extreme left) helping to court champions

## >INDUSTRY ROUNDTABLES ON FLAGSHIP PROJECTS

Exploit Technologies identified several promising technologies from A\*STAR's research institutes for further development as Flagship Projects. The goal is to develop these technologies concurrently with the involvement of industry to ensure that they are brought to maturity with defined commercial viability. This can only be achieved with industry validation, feedback and even partnerships with industry players.

In recent months, Exploit Technologies carried out two industry roundtables on two flagship projects:

### White Light Emitting Diodes (LEDs)

White LEDs is an established technology in the semiconductor industry. However, there is a resurging interest in this technology.



A\*STAR's Institute of Materials Research and Engineering (IMRE) solid state white LED technology uses only one active device with no phosphor coating. This solid state LED emits in the white spectrum and has the potential to replace the venerable incandescent light bulb and florescent tubes, boasting lower power consumption, longer life, and brighter lights.

### Lab On Chip (LoC)

Although there have been considerable investments in LoC development in view of its substantial commercial potential, market

growth has lagged predictions. Much of the development in LoC centers on applications in life science research for drug discovery. Exploit Technologies' LoC meeting involved A\*STAR's Science & Engineering research institutes, the Institute of Bioengineering & Nanotechnology, and the Institute of Molecular and Cell Biology, all representing innovators and end-users of LoC.



Three flagship proposals have been identified for LoC: DNA/RNA detection/analysis, water quality monitoring, and use of Si nanowires in LoC.

## >E-FILING MADE EASY

The Urban Redevelopment Authority (URA) has found a solution to its filing hassles – the KRIS Intelligent Filer (KIF).

URA will conduct a six-month trial of the KIF, which is built by Singapore-based software company SQL View. SQL View incorporated I<sup>2</sup>R's Text Categorisation Expert (TCX) and Fast Text Summarizer (FTS) into the company's Knowledge

Discovery Research Tool Neuro System. This System won a merit award in the Research and Development category of the 4th annual Asia-Pacific Information and Communications Technology Award (APICTA 2004), an annual event that recognises outstanding ICT R&D projects.

KIF can 'read' documents to determine their content and context using artificial

intelligence. It then classifies and stores the documents so that they can be easily retrieved. In addition, the system can classify information according to the roles and security access levels of users. URA manually files an estimated 100,000 documents each year. With this automatic electronic filing system, URA could be up to 80 percent more efficient in profiling documents.

## >IBN TECHNOLOGY SHOWCASE

A\*STAR's Institute of Bioengineering & Nanotechnology's (IBN) first technology showcase, held in Biopolis on 12th July 2006, attracted local and international biomedical companies as well as venture capitalists. Just three years old, IBN has built up an impressive portfolio of technologies through its innovative interdisciplinary approach to research. Together with Exploit Technologies, IBN's scientists have been taking these technologies to market through Flagship projects and a gap funding scheme internally referred to as COT (Commercialisation of Technology) funding.

The technology showcase was officiated by Mr Boon Swan Foo, Managing Director



of A\*STAR and Executive Chairman of Exploit Technologies. In his opening address, Mr Boon lauded IBN in its efforts to actively promote research to the next generation through its Youth Outreach Programme (YRP). Professor Jackie Ying, IBN's Executive Director, was on hand to provide an overview of IBN and an insight into its technology portfolio. Later in the day, participants were given the opportunity to tour the labs of both IBN as well as another A\*STAR Research Institute, the Bioprocessing Technology Institute (BTI).

Among the technologies on display was IBN's research on a fully automated biochip for the detection of cancer and infectious diseases such as dengue, SARs or avian influenza. Other highlights of the showcase include novel contact lenses for the treatment of a wide array of eye conditions and diseases, as well as a synthetic bone implant which mimics the chemical, structural and mechanical features of natural bone.

IBN's technology showcase provided participants a unique opportunity to gain insight into its technology portfolio and also served as a platform for companies and VCs to explore potential licensing and collaboration opportunities.

**>MAKE IT SNAPPY!**

Gain access to your computer system using your face. Sounds impossible? Well, it's now possible with Digital Info Technology's (DIT) SNAPPY Face Recogniser – an intelligent webcam with Face Recognition Screen Saver.

SNAPPY Face Recogniser is a face detection and recognition system that protects your computer and important information. Using advanced face recognition technology licensed from XID Technologies, it records and recognizes an existing computer user's

face to enable access by that user. This therefore prevents unauthorized access by others not registered to the computer.

XID Technologies is a spin-off of the Institute for Infocomm Research (I<sup>2</sup>R). The biometric face recognition company designs and deploys innovative solutions. XID Technologies integrated I<sup>2</sup>R's technologies into its Face Matching Module, a critical component for any complete and robust face recognition system.



**2 SNAPPY TO BE WON!**  
 Tell us how best you can use SNAPPY. Send your suggestions to [newsletter@exploit-tech.com](mailto:newsletter@exploit-tech.com). Result will be published in next issue of New Exploits.

Catch other cool technology in **Cool Tech!** on page 5.

**>RHyMeS FOR THE FUTURE**

A first in Asia, the RHyMeS Centre, or RFID Hospitality Management Systems Centre, was launched on 18 July 2006. Opened by Mr Boon Swan Foo, Managing Director of A\*STAR, the centre is committed to research and development of applications for RFID in lifestyle and hospitality management. The centre is set up by four partners, namely Ngee

Ann Polytechnic, Symbol Technologies, Sun Microsystems and Millenium & Copthorne International, and supported by A\*STAR. This collaboration will see projects involving A\*STAR technology such as RFID smart shelf for luggage depository management in hotels, as well as H.264 Advanced Video Coding for mobile entertainment dissemination to

the guests and security monitoring on mobile devices. This exciting partnership of vendors, technology providers and end users is set to realise deployment of RFID technologies to enhance customer service, enriching guest experience, and empowering operations efficiency and effectiveness in Singapore's hospitality industry.

**▶ NEW HORIZONS**

**UPCOMING EVENTS**

INSTITUTE	DATE	VENUE	EVENT / PUBLICITY PLATFORM
SIMTech	13 Jul-17 Aug	SIMTech	Technology Infusion Programme Course on "Advanced Coatings for Surface Protection and Functionalities"
I <sup>2</sup> R	7 Aug	I <sup>2</sup> R	5th I <sup>2</sup> R Distinguished Lecture on "Collective Intelligence" by Prof. Alex (Sandy) Pentland, MIT
SIMTech	16-18 Aug	Grand Copthorne Waterfront Hotel	INDIN 06 (4th International Conference on Industrial Informatics)
DSI	1 Sep	DSI	DSI Corporate Member Evening
I <sup>2</sup> R	1 Sep	Orchard Hotel	Infocomm Horizons
I <sup>2</sup> R	8 Sep	I <sup>2</sup> R	TechFest
I <sup>2</sup> R	13 Sep	I <sup>2</sup> R	I <sup>2</sup> R Staff Seminar on "Modeling an Ultrasonic Parametric Emitter System" by Mr. Kelvin Lee
SIMTech	13 Sep-18 Oct	SIMTech	Technology Infusion Programme Course on "Embedded Passive Components in PWBs"
IME	29 Sep	IME	Symposium on Microelectronics

For the latest updates on the above events, check out [http://www.a-star.edu.sg/astar/about/action/upcoming\\_events.do](http://www.a-star.edu.sg/astar/about/action/upcoming_events.do)