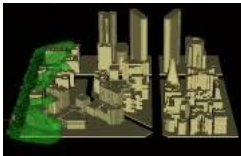


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A*STAR Showcases Nine Cutting-Edge Technologies For City Of The Future

Smart 3D urban planning



Intelligent urban infrastructure



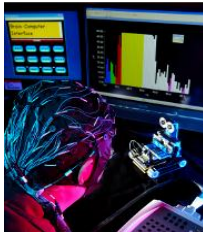
Innovative water quality monitoring



Smart healthcare – Cuffless blood pressure monitoring



Smart healthcare for ageing population



'Black Box' for cars



Smart homes – intelligent kitchen



Sustainable Living: World's first recycled spectacle frame



Sustainable Living: Biodegradable packaging



Singapore, 24 June 2008 – Nine cutting-edge technologies for future cities developed by Singapore's leading public research agency, the Agency for Science, Technology and Research (A*STAR), will be showcased at the World Cities Summit and the Singapore International Water Week from 24 – 26 June 2008.

Among the A*STAR innovations are:

- Highly-innovative 3D simulation software to facilitate megacity urban and defence planning

A*STAR Institute of High-Performance Computing (IHPC)'s 3D simulation software can help urban planners construct 3D urban models easily and quickly for megacity planning. The software is based on Geographical Information Systems (GIS) data, which are map-

based data that represents buildings, terrains, etc. The variety of models generated by the IHPC software can be put through simulations to ascertain their appropriateness for safety, environmental friendliness and structural robustness. At the same time, IHPC has also developed the computational fluid dynamics (CFD) simulation software that can help construct accurate, easy-to-understand analyses of dangerous contaminants to assist nations in their defence planning. The software is based on embedded mesh technology that allows for the complete modelling and simulation of airflow and pollutant dispersion pattern for an urban city in under a month's time, which is three to four times faster than the standard approach.

- Sensor technologies that enable real-time monitoring of the structural integrity of urban infrastructure

A*STAR Institute for Infocomm Research's Fibre Bragg Grating (FBG) sensors can be used for remote, real-time and non-destructive monitoring of the structural health of urban infrastructure like bridges. FBG sensors show better potential due to their small size, robustness and suitability for use in multiplexed sensor networks. When an FBG experiences a mechanical strain and/or a temperature change, it will result in a change in its Bragg wavelength that will alert observers to the strains in the infrastructure.

- First-of-its-kind "black box" for intelligent cars

This innovation by A*STAR Data Storage Institute is an in-vehicle event monitoring and storage (IVEM) system that acts like a 'black box' for cars. It uses an ingenious methodology for storing huge video data. Six cameras will be intelligently positioned around the car, capturing traffic movements every second on the move. The innovation will not only help to reduce disputes among drivers during accidents and hasten the process of post-accident processing for insurance claims, but will also help drivers review their driving habits to promote better road safety.

- Video imaging and analysis of fish behaviour for water quality monitoring

A*STAR Institute for Infocomm Research's cutting-edge video-monitoring technology is being adopted as part of a joint project with PUB, Singapore's national water agency, in the latter's simple early warning system of monitoring fish behaviour to detect possible variation in the water quality. The technology will enhance the safety and security of Singapore's water supply system. Both agencies will also look into marketing the technology overseas.

- Spectacle frames from recycled materials and biodegradable packaging for “green living”
By employing the cutting-edge expertise in life-cycle engineering at the A*STAR Singapore Institute of Manufacturing Technology (SIMTech), two local small-and-medium enterprises, Nanyang Optical and Grenidea Technologies, successfully penetrated international markets and captured a pie of the burgeoning “green economy”. Nanyang Optical developed the world’s first spectacle frames made from almost 100% recycled materials. It has received orders from major European markets in France, Germany and Italy. Grenidea leveraged on A*STAR’s expertise to enhance the development of its biodegradable packaging by reducing the lead time for product development and manufacturing cost. The packaging is currently being used by big retail stores worldwide such as J Sainsbury UK, COOP Sweden, Santa Sweet US and Coles Australia.

Details of all the nine technologies on showcase are at the [Annex](#).

“The world is facing tough global challenges including rapid urbanisation that put severe stress on infrastructure and resources, climate change with potentially devastating impact on human communities, depleting fossil fuels and the search for sustainable alternatives, ageing population and the need for cost effective caregiving, and highly-complex security threats in a much more globalised world. Science and technology constitute a significant part of the solutions to tackle these global challenges for all of us to enjoy a vibrant and sustainable living,” said Mr Lim Chuan Poh, Chairman of A*STAR.

“In the next phase of our development, A*STAR will strive to transform Singapore into a knowledge-based and innovation-driven nation that will not only have an impact on Singaporean society but also the region and beyond,” said Mr Lim, “A*STAR’s R&D capabilities and technologies will help to jumpstart new economic activities in Singapore to meet the huge global demand in areas such as urban solutions, healthcare, alternative energy and green products. In addition, we will create the future in Singapore as we infuse these cutting-edge technologies into our society, and make our country a model future city.”

Commenting on the technologies showcased at the exhibitions, Professor Chong Tow Chong, Executive Director of A*STAR Science and Engineering Council said, “These innovations are built upon Singapore’s strong science and engineering capabilities that have been nurtured in the last 15 years. Tackling global challenges will increasingly become a key focus of A*STAR’s research. This will require a multidisciplinary approach. With A*STAR’s science and engineering research institutes moving to Fusionopolis, Singapore’s global

science and technology powerhouse that will open in October 2008, we are well-placed to address these global challenges and seize new market and business opportunities for future economic growth of Singapore .“

Journalists/photographers are cordially invited to visit the A*STAR booth at the World Cities Summit 2008 (Singapore Pavilion).

Annex - A*STAR's Technologies at World Cities Summit / Singapore International Water Week

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

A*STAR is Singapore's lead agency for fostering world-class scientific research and talent for a vibrant knowledge-based Singapore. A*STAR actively nurtures public sector research and development in Biomedical Sciences, Physical Sciences and Engineering, with a particular focus on fields essential to Singapore's manufacturing industry and new growth industries. It oversees 19 research institutes and consortia and supports extramural research with the universities, hospital research centres and other local and international partners. At the heart of this knowledge intensive work is human capital. Top local and international scientific talent drive knowledge creation at A*STAR research institutes. The Agency also sends scholars for undergraduate, graduate and post-doctoral training in the best universities, a reflection of the high priority A*STAR places on nurturing the next generation of scientific talent.

For more information about A*STAR, please visit www.a-star.edu.sg.

About Fusionopolis

Fusionopolis is Singapore's science and technology hub that brings together scientists, research engineers and technology experts from a variety of science and engineering disciplines, to find innovative solutions for technological and lifestyle problems facing society and jumpstart future industries.

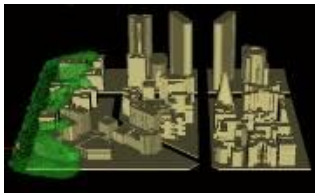
Fusionopolis will have more than 1500 researchers from the public labs under the Agency for Science, Technology and Research (A*STAR), with a broad spectrum of capabilities ranging from high performance computing to infocomm research, data storage, materials research and engineering, microelectronics, and manufacturing technology. The public labs work alongside corporate labs like those of Vestas, Thales Technology and Seiko Instruments to accelerate the development of technologies and new products, and bring them to market.

Fusionopolis is located in close proximity to A*STAR's biomedical sciences research institutes at Biopolis, which will open up opportunities for the fusion of capabilities across diverse scientific domains, thus paving the way for multi-disciplinary research.

A whole-of-Singapore approach has been taken at Fusionopolis to enable it to jumpstart future industries. Fusionopolis will also be home to Singapore's various industry-development public agencies such as the Media Development Authority, the Economic Development Board and SPRING Singapore.

ANNEX: A*STAR TECHNOLOGIES EXHIBITED AT WORLD CITIES SUMMIT AND SINGAPORE INTERNATIONAL WATER WEEK

Smart City Planning & Infrastructure



3D Urban Planning

Urban planners are faced with many huge challenges – an urban explosion where half of the world’s population will live in cities by the end of 2008, a figure that will reach 70 per cent by 2050, as well as new security threats in the form of accidental or intentional chemical / biological releases.

A*STAR Institute of High-Performance Computing (IHPC) has developed a 3D simulation software that can help urban planners construct 3D urban models easily and quickly for megacity planning. The software is based on Geographical Information Systems (GIS) data, which are map-based data that represents buildings, terrains, etc. While there are many 3D modeling solutions in the market, they are not targeted at GIS data. The variety of models generated by the IHPC software can be put through simulations to ascertain their appropriateness for safety, environmental friendliness and structural robustness. Planners can use these tools to experiment with and explore different scenarios.

At the same time, IHPC has also developed a computational fluid dynamics (CFD) simulation software that can help construct accurate, easy-to-understand analyses of dangerous contaminants to assist with nations in their defence planning. Through the CFD software, airflow and dispersion patterns in urban environment can be simulated quickly for a quick analysis of the environmental impact such as spread of toxic gases or pollution. The software is based on embedded mesh technology that allows for the complete modelling and simulation of airflow and pollutant dispersion pattern for an urban city in under a month’s time. This is three to four times faster as compared to the standard approach. With the CFD software, countries could do computations well ahead of time with different scenarios explored and captured in a database that can be recalled, manipulated and displayed during actual crises.



Smart Urban Infrastructure

Versatile and intelligent infrastructure will greatly help in the planning, building and maintenance of megacities of the future.

As cities get more congested, buildings get taller, roads and bridges get overloaded, and in the wake of natural disasters like earthquakes and floods, there is an important need to monitor the structural integrity and health condition of urban infrastructure like roads, bridges and buildings.

Traditional non-destructive testing techniques for the detection of

structural damage use ultrasonic and radiography, which are cumbersome, labour intensive and time consuming.

A*STAR Institute of Infocomm Research has applied its capabilities in Fibre Bragg Grating (FBG) sensors for the real-time and non-destructive structural health monitoring of urban infrastructure like bridges. FBG sensors show better potential due to their small size, robustness, suitability for use in multiplexed sensor networks as well as ease of fabrication. When an FBG experiences a mechanical strain and/or a temperature change, it will result in a change in its Bragg wavelength that will alert observers to the strains in the infrastructure.

Clean Water



Fish Activity Monitoring System

A collaboration between PUB, Singapore's national water agency, and A*STAR Institute for Infocomm Research (I²R), the Fish Activity Monitoring System (FAMS) is an innovation of the traditional method of manually monitoring fish activities as a simple early warning system of potential decline in water quality.

Under the traditional method, fish are kept in tanks and manually monitored for a sudden decline in the number of live fish. This method of monitoring fish activities is done on top of the regular comprehensive physical, chemical and bacteriological analysis of drinking water.

By deploying sophisticated image processing and analysing techniques in the locally-developed FAMS technology, the process of monitoring fish activities and raising alerts can now be fully automated. Any sudden dip in the number of live fish will raise a visual and audio alert to the operators at the control centre. This not only increases the reliability of the technique as an early warning system, but also allows the monitoring of fish to be carried out at a central location. This innovation will help enhance the security of water as a strategic resource.

Raising safety levels further, the PUB-I²R project team is currently improvising the system to raise alerts even earlier such that at the moment when a high number of fish show signs of distress, immediate action can be taken. FAMS has undergone user acceptance and will be deployed in the water supply system.

I²R's technology is a versatile one with applications in CCTV monitoring in trains to detect sudden collapse of passengers from colourless and odourless gas or suspicious bags that are left behind, and even in swimming pools as a drowning alert warning systems.

Intelligent Transport



'Black Box' for Cars

In the wake of a burgeoning vehicle population in cities, A*STAR's Data Storage Institute (DSI) has developed an in-vehicle event recorder that acts like a 'black box' for cars. This innovation comes in useful to drivers during accidents to resolve disputes or near-accidents to help drivers review where they could have gone wrong.

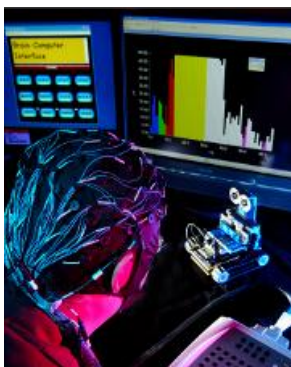
Current similar products have the ability to record real-time events only seconds before and after a possible accident due to limitations of mobile storage devices.

DSI's innovation utilises an ingenious methodology in storing huge video data with a big capacity of HDD and a stable record mechanism of a compact flash. Six cameras will be intelligently positioned around the car, observing traffic movements every second on the move. With the storage technology, the product is able to record 46 days of MPEG-4 non-stop without erasure of any files. This is a marked enhancement as compared to about 2.5 hours from current market products which typically use only one camera. DSI's innovation is also a wonderful platform for car infotainment. It has a solid hardware foundation that could withstand the demanding automobile environment (wide ranges of temperature and vibration). It also has enough storage capacity to enable future feature upgrades and digital data growth.

Certainly, the innovation can help reduce disputes among drivers during accidents and hasten the process of post-accident processing for insurance claims. It will also help drivers review their driving habits to promote better road safety. There is also great research potential in the forecasting and prevention of road accidents from the analysis of information based on the vehicle status, drivers' actions and history, and the collation of data from the surrounding traffic environment.

The product is currently being reviewed by potential partners.

Smart Healthcare & Living



Brain-Computer Interface

Advancements in info-communications technology offer new opportunities in advancing healthcare, particularly to help the physically-disabled and those in rehabilitation as well as to cater for the needs of an ageing society.

A*STAR Institute for Infocomm Research has developed a non-invasive brain-computer interface technology, which works by building direct interaction between the human brain and the computer such that human thoughts can be translated into

action.

The innovation will provide a way for people with complete loss of movements in the limbs to access the computer for performing tasks such as letter writing, sending emails and controlling home appliances.

In a joint project with Tan Tock Seng Hospital and the National Neuroscience Institute, the technology is also being deployed to assist in the rehabilitation process of stroke victims.

Some 10,000 new cases of stroke are diagnosed each year in Singapore, and up to 45% of patients do not completely recover bodily function. In addition, 85–90% of stroke survivors with severe upper-limb impairment do not regain full use of their arms or hands. Stroke rehabilitation has proven itself effective in restoring and improving function. Traditionally, it involves much human-to-human interaction between the therapist and patient. Recent research has shown encouraging preliminary results with new robotic-based rehabilitation techniques. Thus this project is designed to guide the user to perform rehabilitation exercises effectively, thereby maintaining his/her strong motivation to progress. The use of BCI technology may potentially automate and facilitate the stroke-rehabilitation process and complement traditional therapies.



Cuffless Blood Pressure Monitoring

With an ageing population and an increased prevalence of chronic diseases set against a backdrop of rising healthcare costs, the developed countries around the world are grappling with the challenge of providing comprehensive and manageable healthcare to their respective populace.

An example would be innovations that will allow individuals to keep tabs of their health on their own, which will ensure their continued well-being at a lower cost.

The cuffless blood pressure monitoring developed by the National University of Singapore as part of the Embedded and Hybrid Systems II Program funded and driven by A*STAR aims to meet this emerging need. High blood pressure, if left uncontrolled, can lead to serious complications like heart attack, stroke, blindness and chronic kidney failure. The most common blood pressure measurement uses a cuff to wrap around the upper arm with air pressure applied to temporarily block blood flow in the artery to acquire the readings. However, this technique is not suitable for long-term wear.

The new cuffless blood pressure monitoring can be worn easily like a watch for convenient and comfortable round-the-clock monitoring of blood pressure. It provides an indication of blood velocity by measuring the interval between the start of the cardiac cycle – indicated by a peak in the Electrocardiograph

(ECG) waveform – and the time that fresh arterial blood reaches the skin – indicated by the peak in Photo Plethysmogram (PPG) of the pulse oximeter.

The measured values of different physiological signs can be displayed on the PDA or mobile phone in real-time, and can even be relayed to remote specialists for further diagnosis.

Smart-cabinets that make home grocery stock-taking a breeze



Building on its expertise in RFID technology, A*STAR Institute for Infocomm Research (I²R) has developed highly-intelligent kitchen cabinets.

The cabinets automatically track all groceries in the kitchen cabinet and display the information via a touch-screen computer. Home-owners can check their inventory in seconds using this system. Or if they have forgotten where the item is placed, a search function will help them locate it easily. Alerts are raised when supplies of any of the groceries run low or when food items are nearing or past their expiry dates. There are currently no known RFID cabinets for home use.

The innovation also has many scalable features such as helping supermarkets track individuals' preferences and helping consumers generate a shopping list automatically.

The RFID technology developed by I²R is highly versatile and is currently being deployed in the national library in Singapore for easy tracking of books.

Green Technologies for a Green Economy

From plastic waste



And steel waste



World's First Eyewear Frame Made from Almost 100% Recycled Materials

Local SME, Nanyang Optical, tapped on the cutting-edge expertise of A*STAR Singapore Institute of Manufacturing Technology (SIMTech) in life cycle engineering to create products that can help it ride on the green wave and establish an international standing. SIMTech assessed products, processes and/or systems in terms of technical, environmental and economical aspects to identify and create sustainable total life cycle benefits.

Working with SIMTech, Nanyang Optical successfully developed the world's first range of eyewear frames that are made from nearly 100% recycled materials. The frames are made from recycled industrial waste like plastic and steel. Because it is the first time that recycled materials are being used so extensively in a product, there are many challenges were faced. The need to characterise and optimise the



processes coupled with the fact that standard machines are designed for virgin and not recycled materials represent some of the challenges. A key technological challenge was converting the industrial plastic waste into flat plastic sheets for cutting into desired eyewear frame shapes.



The products have been successfully launched at the premier Mido optical show – Milan International Optcis, Optometry and Ophthalmology – in May 2008. Nanyang Optical has since secured a partner in France to help it penetrate the European markets. Orders have been received from major European market players such as Lamy (France), OpticLand (Germany) and MyVision (Italy).

Empty Fruit Bunches of Oil Palm



Local SME’s Biodegradable Food Packaging Found in Big Retail Stores Worldwide

Local sustainable material company, Grenidea Technologies, leveraged on SIMTech’s life cycle engineering capabilities to better manage their product life cycle from design to manufacturing processes of its biodegradable food packaging. The product is made from agro-resin produced from empty fruit bunches of oil palm. Upon degradation, it can be used as fertiliser.



Biodegradable Packaging



In reviewing Grenidea’s entire product life cycle, SIMTech helped the company to understand the underlying issues to help it improve the lead time for product development and reduce the cost of the sustainable manufacturing process.

The product has been used at big retail stores worldwide including J Sainsbury UK, COOP Sweden, Trader Joe’s US, Santa Sweet US, and Coles Australia. Locally, the packaging can be found at Market Place Vivocity and NTUC Bukit Timah.



Fertiliser

