NANYANG TECHNOLOGICAL UNIVERSITY

@NTU

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EURO TECH

NTU forges new bonds with Europe

BRIGHT SPARKS

Firing the imagination of Olympiad medallists

CN Yang:
A life in science

The art of
Russell Pensyl

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EDITORIAL

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Front cover: Dr Yu Ting (School of Physical & Mathematical Sciences, College of Science) finds art in cutting-edge science with an interesting close-up of potassium-doped tungsten bronze nanowires. His piece is part of a "nano-art" series created by NTU students and researchers.

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A trip for the **intellect**

NTU's gift to last is science and technology, an endowment that looks set to grow with the university's positive inroads into Europe.

We've recently picked the brains of Nobel laureates from the continent (and elsewhere), engaged a delegation from the European University Association, and hosted the Swedish Minister for Higher Education and Research. *Discover Europe*, a scholastic and cultural event on campus attended by European diplomats, business leaders and academics, also unearthed the pull of Europe.

The allure of the larger world was recently the subject of discourse on campus, when Prof CN Yang, for whom a premier NTU science and engineering programme is named, expounded on the concept of beauty with inspiring lines from poets such as William Blake:

To see a world in a grain of sand,
And a heaven in a wild flower,
Hold infinity in the palm of your hand,
And eternity in an hour.

No doubt, many of our technological achievements seek to uplift souls, expanding both the high-tech and aesthetic frontiers. Take the example of Augmented Reality research being hotly pursued at the Interaction & Entertainment Research Centre (IERC). It's the stuff of IERC Director Russell Pensyl's dreams.

Elsewhere in *@NTU*, we find out why NTU has become a destination of choice for many former Olympiad medallists. For these phenomenally bright students on the fast track to academic superstardom, life has been good. Our talented CN Yang Scholars also share similar positive experiences.

What can we say; at NTU, it's a learning vacation.

Ms Tan Su Yuen
Editor-in-Chief
On behalf of the editorial team

"It was an easy choice for me to come to NTU."

– AZAT SULAEV,
PHYSICS OLYMPIAD MEDALLIST

See Bright Sparks *(pages 14–15)*
and Olympians at NTU *(pages 16–19)*

The *cutting* edge

RESEARCH In August, NTU and Chartered Semiconductor Manufacturing, one of the world's top foundries, jointly opened Chartered@NTU, a state-of-the-art laboratory housed at the School of Electrical & Electronic Engineering (EEE). The new facility will conduct research in nano-scale Complementary Metal-Oxide Semiconductor (CMOS) process technologies (these play a vital role in applications ranging from high-performance computers and network stations to game consoles).

Chartered@NTU is an extension of a pre-existing research partnership between NTU and Chartered. Says Prof Kam Chan Hin (far left), Chair of the School of EEE: "The semiconductor industry remains one of Singapore's key economic contributors. NTU's established R&D strength in microelectronics, coupled with Chartered's industry experience and marketing know-how, ensures that the projects we work on jointly will be cutting-edge and commercially relevant."

The next generation of IC chips

TECHNOLOGY Would you trade a tad less than perfect picture quality on your cellphone for the option to charge that phone only once every few weeks? This choice may be yours in the future as the newly established Institute for Sustainable Nanoelectronics (ISNE) at NTU develops the next generation of embedded Integrated Circuit chips. Led by Prof Krishna Palem, the Ken and Audrey Kennedy Professor of Computer Science at Rice University, ISNE aims to design chips that use over 100 times less energy, resulting in longer battery life. According to NTU President Dr Su Guaning, "leveraging the strengths of NTU and Rice, both top technological universities, will no doubt bring about exciting breakthroughs".

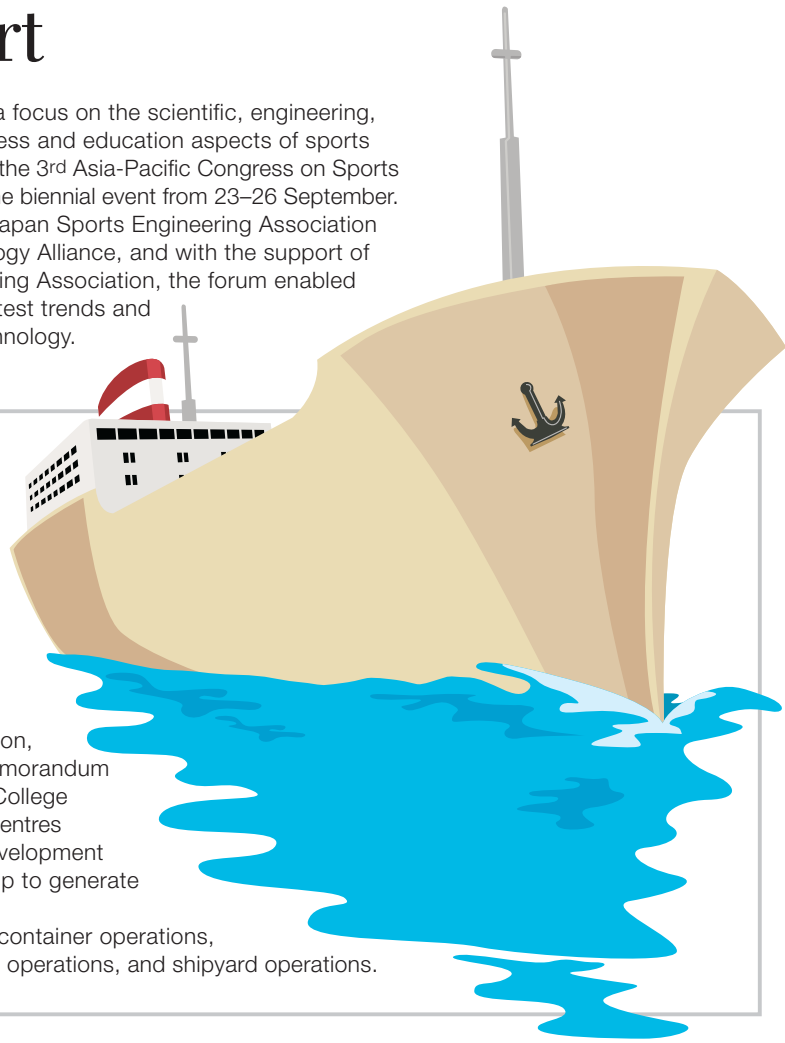
Go to page 30 for an interview with Prof Palem.

Making their case

COMPETITION The inaugural Asian Business Case Competition @ Nanyang 2007 drew an excellent response from participants. Held from 8–12 October, the event was organised by the Nanyang Business School (NBS) and was focused on the growing significance of Asia's impact on the global economy. Participants from top business schools from around the world worked to provide a business solution drawn from the dynamic Asian context. Each team was given 40 hours to study the assigned case and develop a presentation based on their analysis and recommendations. The final challenge involved a case study of world-leading Keppel Offshore and Marine, and in the end, it was the University of Florida team that took the honours. A great event that highlighted NBS' standing as the leading MBA programme in Singapore, and one of the top three in Asia.

Good sport

SPORTS TECHNOLOGY With a focus on the scientific, engineering, business and education aspects of sports technology, it is little wonder that the 3rd Asia-Pacific Congress on Sports Technology picked NTU to host the biennial event from 23–26 September. Organised in collaboration with Japan Sports Engineering Association and Australasian Sports Technology Alliance, and with the support of the International Sports Engineering Association, the forum enabled participants to learn about the latest trends and findings in the field of sports technology.



Port partners

MARITIME The Maritime Research Centre at NTU and the Engineering Research Centre of Container Supply Chain Technology, Ministry of Education, China at Shanghai Maritime University has signed a memorandum of understanding. Prof Pan Tso-Chien, Dean of NTU's College of Engineering, said: "The alliance of the two research centres signifies the possibilities of closer cooperation in the development of new technologies and new knowledge, which will help to generate solutions to real-life problems and benefit the industry."

Areas of research include technology for automating container operations, green port and green ships, shipping operations, marine operations, and shipyard operations.

Strategic forces at work

DEFENCE Two NTU laboratories that will give our soldiers a technological edge were officially opened on 7 September. Jointly established with DSO National Laboratories (DSO), the Electromagnetic Effects Research Laboratory (EMERL) focuses on developing new electromagnetically compatible electronic systems. The second laboratory, Temasek Laboratories at NTU (TL@NTU), is a partnership with the Defence Science & Technology Agency. It develops programmes linked to national security, such as monolithic microwave integrated circuits, radar technology and signal processing. The opening of the two laboratories marks a 20-year relationship between the Ministry of Defence and NTU, one that, as NTU President Dr Su Guaning noted in his opening address, has produced numerous benefits in both the defence and civilian fields.

Green science

CHALLENGE This season's National Science Challenge drew to a close with champion Raffles Institution capturing the honours for the second consecutive year. Jointly organised by the Agency for Science, Technology & Research and the Singapore Science Centre, the Challenge hosted 67 teams in the preliminary round. Twelve top-scoring teams were then selected to compete in the quarterfinals, which were broadcast on national television. The finals were held at the scenic surroundings of NTU's Nanyang Lake. Three teams took turns to collect water samples and subsequently conducted tests in order to propose a conceptual model to transform the water catchment into a sustainable eco-lake.

Meeting of minds

SCIENCE As a tribute to Prof CN Yang on the occasion of his 85th birthday, and to celebrate his contributions in physics, the Conference on Statistical Physics, High Energy, Condensed Matter and Mathematical Physics was held in Singapore from 31 October–3 November. Scientists including fellow Nobel laureates Profs Claude Cohen-Tannoudji, Walter Kohn and Martin Perl converged in Singapore to celebrate his birthday and present lectures.

Go to pages 20–21 for more on Prof Yang and the events held on the occasion of his 85th birthday.

Ministerial musings

FORUM The Ministerial Forum 2007, organised by the NTU Students' Union, drew a packed audience with Minister Mentor Lee Kuan Yew as the invited speaker.

Held on 4 October at the Nanyang Auditorium, the talk "Singapore in the 21st Century" sought to raise the awareness of students about issues affecting the nation. The Minister Mentor spoke on subjects ranging from economy and education to climate change. His openness and wit made for a compelling session in the annual Ministerial Forum series.

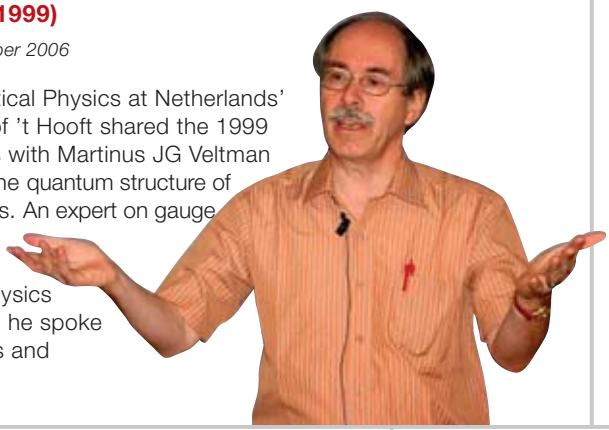
Nobel Winners at NTU

DISTINGUISHED SPEAKERS It has been another sterling academic year as top scientists have made a point to stop over at NTU to speak at the Nobel Laureate Public Lecture Series organised by NTU's Institute of Advanced Studies.

Gerard 't Hooft
Physics Laureate (1999)

Visited NTU on 16 November 2006

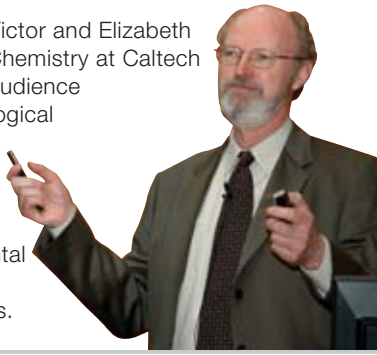
A professor in Theoretical Physics at Netherlands' Utrecht University, Prof 't Hooft shared the 1999 Nobel Prize in Physics with Martinus JG Veltman for their research on the quantum structure of electroweak interactions. An expert on gauge theories in black holes and quantum gravity, elementary particle physics and quantum physics, he spoke on Theoretical Physics and Science Fiction.



Robert Grubbs
Chemistry Laureate (2005)

Visited NTU on 1 February 2007

The award-winning Victor and Elizabeth Atkins Professor of Chemistry at Caltech commanded a rapt audience at the School of Biological Sciences when he gave a lecture on Applications of Olefin Metathesis Catalysts: Fundamental Research to Commercial Products.



Aaron Ciechanover
Chemistry Laureate (2004)

Visited NTU on 5 February 2007

An Israeli biologist from the Technion-Israel Institute of Technology, Prof Ciechanover was part of the team that helped the scientific community understand at the molecular level how a living cell controls central processes by breaking down certain proteins and not others.

Claude Cohen-Tannoudji
Physics Laureate (1997)

Visited NTU on 5–6 July 2007

Prof Cohen-Tannoudji of the College de France and Laboratoire Kastler Brossel spoke at NTU during the 1st International Workshop on Plasma Applications in Nanofabrication and Photovoltaic Solar Cells.

Anthony J Leggett
Physics Laureate (2003)

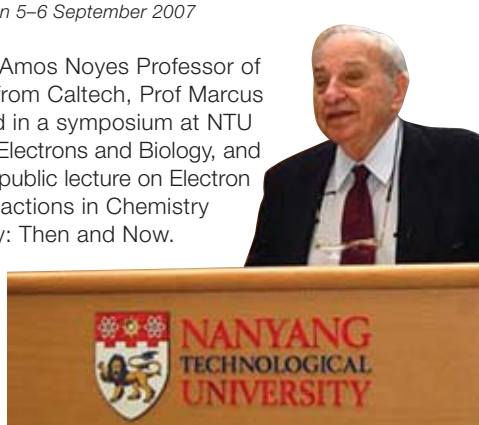
Visited NTU on 30 July–2 August 2007

Prof Leggett of the University of Illinois at Urbana-Champaign gave a series of lectures at the 4th Asia Pacific Workshop & Third Asia Pacific Conference on Quantum Information Science, held at the Nanyang Executive Centre.

Rudolph Marcus
Chemistry Laureate (1992)

Visited NTU on 5–6 September 2007

The Arthur Amos Noyes Professor of Chemistry from Caltech, Prof Marcus participated in a symposium at NTU on Energy, Electrons and Biology, and delivered a public lecture on Electron Transfer Reactions in Chemistry and Biology: Then and Now.



EURO TECH

The European explosion at NTU promises to take technology and science at the university to new heights.

In science, it is often the willingness to question and look beyond the established borders of knowledge that brings about new discoveries and breakthroughs. So it is that NTU's push to become a leading research university has led it to seek new areas of cooperation with premier institutions and companies from around the world. Among the most exciting of the university's initiatives have been those in Europe, and NTU's efforts in the region promise to yield enduring rewards across a range of disciplines.

By TAN MIKE TZE

NTU Provost Prof Bertil Andersson (left) with delegates of the EUA.

EUA delegates touring the aircraft hangar of the School of Mechanical & Aerospace Engineering.

Overview: NTU President Dr Su Guaning with Swedish Minister for Higher Education and Research Lars Leijonborg (second from right) and his team.

Learning in Europe

Modern-day Europe is a fascinating blend of cultures and contrasts, boasting a collection of independent states as well as one of the largest political unions in the world, the European Union (EU). This family of 27 member states embraces a population of 490 million people and shares many common political and economic institutions.

There is good reason for NTU's push into Europe. The region continues to be a hothouse of technological innovation, scientific advancement and engineering excellence, with a long and proud academic tradition. At present, NTU has built up a network of academic collaborations with institutions such as Federal Institute of Technology (Switzerland), Imperial College London (United Kingdom), Norwegian University of Science & Technology (Norway), Technical University of Munich and Fraunhofer MOEZ (Germany). NTU also has collaborative research programmes with major European companies such as Rolls-Royce, Siemens and Thales.

Besides being a fertile ground for academic and research partnerships, Europe has also served to provide funding for research projects. NTU researchers have submitted proposals to the French embassy's science and technology funding initiative, the Merlion Programme, and have also made successful bids under the EU's Asia Link Programme and its Framework Programme for Research and Technological Development.

Only connect

If NTU's European connections look set to deepen as the university makes further inroads through academic and research collaborations, it will be because these bonds were built on robust faculty and student relationships. NTU has a growing body of European-trained faculty members, many of whom have taught and conducted research at the finest institutions on the continent. With its commitment to becoming one of the world's leading research universities, NTU looks set to become an even bigger draw for faculty members and research students from Europe.

If there is one person who embodies the European brand of academic excellence at NTU, it is Provost Bertil Andersson, a Trustee of the Nobel Foundation and member of the Royal Swedish Academy of Sciences. Prof Andersson's involvement with the university has enhanced NTU's bonds with the highest levels of European science and research.

September 2007 marked an especially important step in this process with two visits to the Yunnan Garden campus, the first by a delegation from the European University Association (EUA). The EUA has members in 45 countries across Europe and this visit was its first official trip to an educational institution outside the continent. This event was soon followed by a visit from Swedish Minister for Higher Education and Research Lars Leijonborg, who was "very impressed" with what he saw. These cordial relationships are already yielding fruit, and will hopefully open the door to a host of expanded programmes involving academic collaborations and exchanges.

Minister Leijonborg's campus tour included a visit to the Chinese Heritage Centre and the School of Biological Sciences (below).

"[NTU is] ...one of the best and most prestigious universities in Asia, and maybe in the whole world. So I am very impressed with what I see here. The reason why I am in Singapore is that Singapore invests a lot of money in research, and I agree that that's the future for countries like Singapore and Sweden."

– SWEDISH MINISTER FOR HIGHER EDUCATION AND RESEARCH LARS LEIJONBORG, DURING HIS SEPTEMBER 2007 VISIT TO NTU'S YUNNAN GARDEN CAMPUS

EURO TECH AT NTU

Collaborative programmes have been key drivers of NTU's growth as a centre of research and technology.

The university now has an extensive and diverse network of academic and research partnerships with institutions and corporations from over 30 countries around the world. Among its European partners are:

THALES GROUP The Thales@NTU joint research laboratory develops dual-use technologies for commercial and defense applications. Headed by Assoc Prof Tjin Swee Chuan of NTU's School of Electrical & Electronic Engineering, the laboratory draws on researchers from Singapore and Europe to work on projects related to photonics, III-V semiconductor materials and devices, and ultra-wideband communication.

SIEMENS AUTOMATION AND DRIVES The Siemens Automation and Drives group is based in Germany and is the leading manufacturer in this field. It works with NTU to provide specialist training in electronics and micro-production, allowing for partnerships on advanced research and development on surface-mount technology, as well as providing NTU's students with internships and on-the-job training opportunities.

BI NORWEGIAN SCHOOL OF MANAGEMENT Norway's second largest educational institution (and one of Europe's leading business schools) works with NTU to provide a BSc (Honours) degree in Maritime Studies, leading to the award of the BSc (Maritime Studies) degree by NTU.

Students first

But it is not only NTU's faculty members who have well-established ties with Europe; students too have strong bonds with the continent. Since 2005, NTU's Global Immersion Programme (GIP) has allowed students to study and conduct research at leading European institutions such as University of Technology of Troyes, University of Technology of Compiegne and INSA-Lyon (France), as well as Ecole Polytechnique Federale de Lausanne and University of St Gallen (Switzerland). This has been invaluable in producing a deeper and more creative student body, one with a greater appreciation of other cultures – an essential trait of a global university.

If NTU students have found Europe a fascinating destination, the reverse has been true as well. The university's strengths within Asia as a multicultural research university combining science, the humanities, engineering, business studies and fine arts has drawn a growing number of European students. The international character of the campus has benefited greatly from this, and European students now represent the biggest group of exchange students at NTU.

Conquering the peaks: GIP students at Switzerland's University of St Gallen heed the call of the alps.

Parisian days: The Arc de Triomphe in Paris, France, beckons GIP students from the School of Chemical & Biomedical Engineering studying at the University of Technology of Compiegne.

PHOTOS: GIP, NTU

"Opening the world to our students and researchers remains an integral part of NTU's mission."

– NTU PRESIDENT DR SU GUANING

Future gazing

Given the many synergies between NTU and Europe, new areas of cooperation look set to bloom. The range of these partnerships will extend beyond the academic and research fields. The political and economic union of Europe has meant that governments and institutions there have had to deal with many issues (such as climate change and the increasing need for standards) before the rest of the world. This experience can serve as a template for how other nations may eventually face similar challenges. Solving them will require a multi-disciplinary approach, new lines of communication among researchers and the commitment to funding and excellence. These are all areas in which NTU is already leading from the front.

Opportunities for NTU to work with Europe are already in place. In 2008,

Creating new synergies between NTU and Europe.

NTU will be taking part for the first time in the Euroscience Open Forum in Barcelona, Spain. This biennial event is a platform for debate and communication for the European scientific community of all disciplines (including social sciences and the humanities), in government, academia, business and industry.

Beyond the EU, NTU is also working on developing ties with Central and Eastern Europe. In October 2007, Associate Provost Prof Er Meng Hwa accompanied Prime Minister Lee Hsien Loong on his official visit to Hungary and Poland, while NTU faculty members have also made exploratory trips to Russia, the Czech Republic and Poland.

In his opening address for Discover Europe 2007, an event to establish new interactions between the university and Europe, NTU President Dr Su Guaning noted that "opening the world to our students and researchers remains an integral part of NTU's mission". With warmer ties, more dialogue and greater access to new ideas, NTU's European explosion looks set to continue.

Ambassador Holger Standertskjold tours NTU's Research Pavilion at Discover Europe 2007.

Launching Discover Europe 2007 at the Nanyang Auditorium: NTU President Dr Su Guaning with Ambassador Standertskjold, Head of the European Commission's Delegation in Singapore.

DIALOGUE AND DISCOVERY

Bringing a taste of Europe to campus.

Opening the world to NTU's students and researchers is integral to the university's mission, and NTU now has a network of partners in Asia (such as Indian Institute of Technology, Peking University, Shanghai Jiaotong University and Waseda University), the United States (such as Caltech, Carnegie Mellon University, Cornell University, Georgia Institute of Technology, MIT, Stanford University and University of Washington) and beyond. The Discover Europe 2007 event, held at the Nanyang Auditorium in October, was important in allowing students and faculty members to venture forward and to discover the academic and professional opportunities offered by the EU.

Organised by NTU, the Delegation of the European Commission to Singapore and the European Chamber of Commerce, the event incorporated a career fair, panel discussions, career seminars and a cultural pavilion hosted by European embassies and cultural institutions. NTU's research and engineering projects played a feature role at the event, with a showcase of work from the various schools with partners from Belgium, Finland, France, Italy, Germany, Sweden, Switzerland and the United Kingdom.

> "Our collaboration with the European Commission's Delegation aligns well with NTU's ambitions to be a great global university."
>
> **– NTU PRESIDENT DR SU GUANING, AT THE OPENING OF DISCOVER EUROPE 2007**

NTU's academic excellence makes it the place to be for many Olympiad students.

BR SPARKS

Undergraduate life at NTU holds many surprises. While some students experience university life as a pleasant search for their life's work, others have long discovered their calling. Among NTU's diverse international student community, one group stands out for having already found and nurtured a passion for the sciences – those undergraduates who have previously participated in the international and national Olympiads.

YOUTH IN SCIENCE

A collection of annual competitions held in the fields of mathematics, physics, chemistry, biology, informatics, astronomy and linguistics, the Olympiads seek above all else to promote a career in the sciences.

Policymakers in the field of education know that an academic system that nurtures scientific talent is one that is investing in its future. For this reason, Olympiad training can stretch over many months, with the international edition of the Olympiads capping a prolonged and intense series of competitions to find the top high school and pre-university students from around the world.

Given their excellent academic foundation and love of the sciences, Olympiad students have been a compelling addition to NTU's student body. The university has long recognised the importance of providing an environment

IGHT

By TAN MIKE TZE
PHOTOS: **DIOSDADO VINCOY, JR**

in which excellence can take root, and in July 2006, played host to the 37th edition of the International Physics Olympiad. Besides taking part in the competition itself, students and teachers from over 85 countries were treated to talks by eminent scientists such as Professors CN Yang, Douglas Osheroff, Masatoshi Koshiba, Aaron Ciechanover and Paul Davies.

THE NTU CONNECTION

The Olympiad-NTU connection looks set to grow even deeper – in recent years, the university has become a particular destination of choice for many Olympiad students. The reasons for this are manifold. In addition to the university's reputation in the sciences, Olympiad students cited its excellent facilities, the inspiration of further research, challenging academic programme and commitment to nurturing young talent (evident in the number of scholarship options open to them, such as the ASEAN, CN Yang, Nanyang, Singapore and SembCorp scholarships).

The result has been beneficial to the larger student population as well, marking a partnership of the best minds and helping to contribute to the university's research and academic excellence. As science and technology continue to define the world we live in, the affinities between the Olympiads and NTU will enable the university to scale even greater heights.

OLYMPIANS AT NTU

Taking the road less travelled.

For six former Olympiad medallists, undergraduate life at NTU has been a rich and transformative experience.

Nikolay Berezhnoy

Kazakhstan

NTU Nanyang Scholar, Biological Sciences (4th Year)

2001 International Biology Olympiad (Brussels, Belgium), Silver

2002 International Biology Olympiad (Riga, Latvia), Bronze

My interest in biology started in school, when I was driven to prepare for the International Biology Olympiads. Before taking part in the international competition, we had to compete at home to become one of the best, in order to be selected for the team. It was difficult but I had good friends and teachers.

I liked the experience of going overseas very much, and from then onwards, thought I would like to study overseas. That was one of the reasons I came to Singapore.

I went to university in Kazakhstan for one year, and then applied to NTU. I wanted to study here because friends who had taken part in the Asian Physics Olympiad in 2002, which was held in Singapore, had told me that NTU was receptive to Olympiad participants. I am now on a Nanyang Scholarship.

Studying here is different from studying in Kazakhstan; it is harder here and I spend more time reviewing my lecture materials. The facilities are great, and my friends and classmates too. In the long run, I want to go back to Kazakhstan, but right now I want to see the world first. When I go home, I want to bring the best of the world with me.

I go out, especially on weekends, with my Singaporean classmates. There are so many varieties of food here that I can't name a favourite. I have tried the so-called "best *murtabak* in Singapore", Muthu's Curry in Little India and *satay* at Lau Pa Sat!

After I graduate, I will be applying for the PhD programme at NTU, and will be working for three years after in Singapore to fulfil my bond. I am looking to study DNA and protein interactions on a molecular level, using biophysical methods.

> "In the long run, I want to go back to Kazakhstan, but right now I want to see the world first. When I go home, I want to bring the best of the world with me."

Parviz Hajiyev

Azerbaijan

NTU Nanyang Scholar, Physics & Applied Physics (1st Year)

2006 International Physics Olympiad (Singapore), Silver

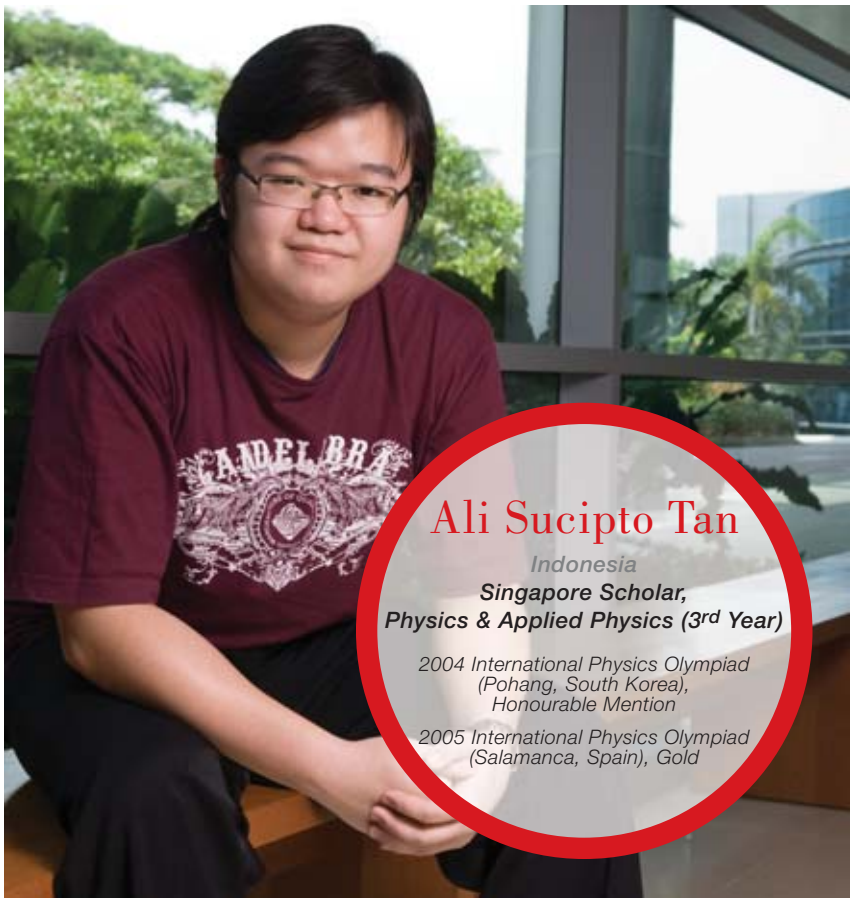
2007 International Physics Olympiad (Isfahan, Iran), Bronze

I am 17 years old. I have always been interested in physics, and had good teachers in the subject. I first came to Singapore in 2006 for the International Physics Olympiad, which was held at NTU. Though I later applied to universities in Turkey and Azerbaijan, I finally chose to come here on a Nanyang Scholarship.

When I first started studying at NTU, I had a problem with the language, but it is better for me now!

Singapore has a rich mix of cultures, and its education system is very good. You can feel the competitiveness here in many different areas. I want to study physics well and to do research in the future, especially in quantum physics and electromagnetics.

> "Singapore has a rich mix of cultures, and its education system is very good."



Ali Sucipto Tan

Indonesia

Singapore Scholar, Physics & Applied Physics (3rd Year)

2004 International Physics Olympiad (Pohang, South Korea), Honourable Mention

2005 International Physics Olympiad (Salamanca, Spain), Gold

I am studying physics now and am in my third year. I had wanted to come to NTU before I took part in the Olympiads, and my original plan had been to study computer engineering, because at that time, NTU did not offer a physics programme. Then in 2005, I learnt about NTU's new School of Physical & Mathematical Sciences, so it was a very good opportunity for me to continue studying physics.

It is a nice environment here, and the classes are competitive. When we were training for the Olympiads, we were self-taught, and that is how I like to study. After I graduate, I want to go into graduate studies and find a research group that is relevant to my final-year project.

> "It is a nice environment here, and the classes are competitive."

I decided to come to NTU four years ago. I already knew about the university as it is well-known in my high school and we all wanted to come here. I was in the School of Mechanical & Aerospace Engineering at first because there wasn't a physics programme here when I arrived. But after a year, I missed physics and managed to join the new School of Physical & Mathematical Sciences. It wasn't as hard as I thought to switch because the Mechanical & Aerospace Engineering course had the same foundation.

I have a good friendship with my supervisors, so it has been very satisfying for me at NTU. We use computers, lasers and optical facilities to do our research. I have an ASEAN Undergraduate Scholarship and would prefer to conduct research in the future rather than work in a corporate office.

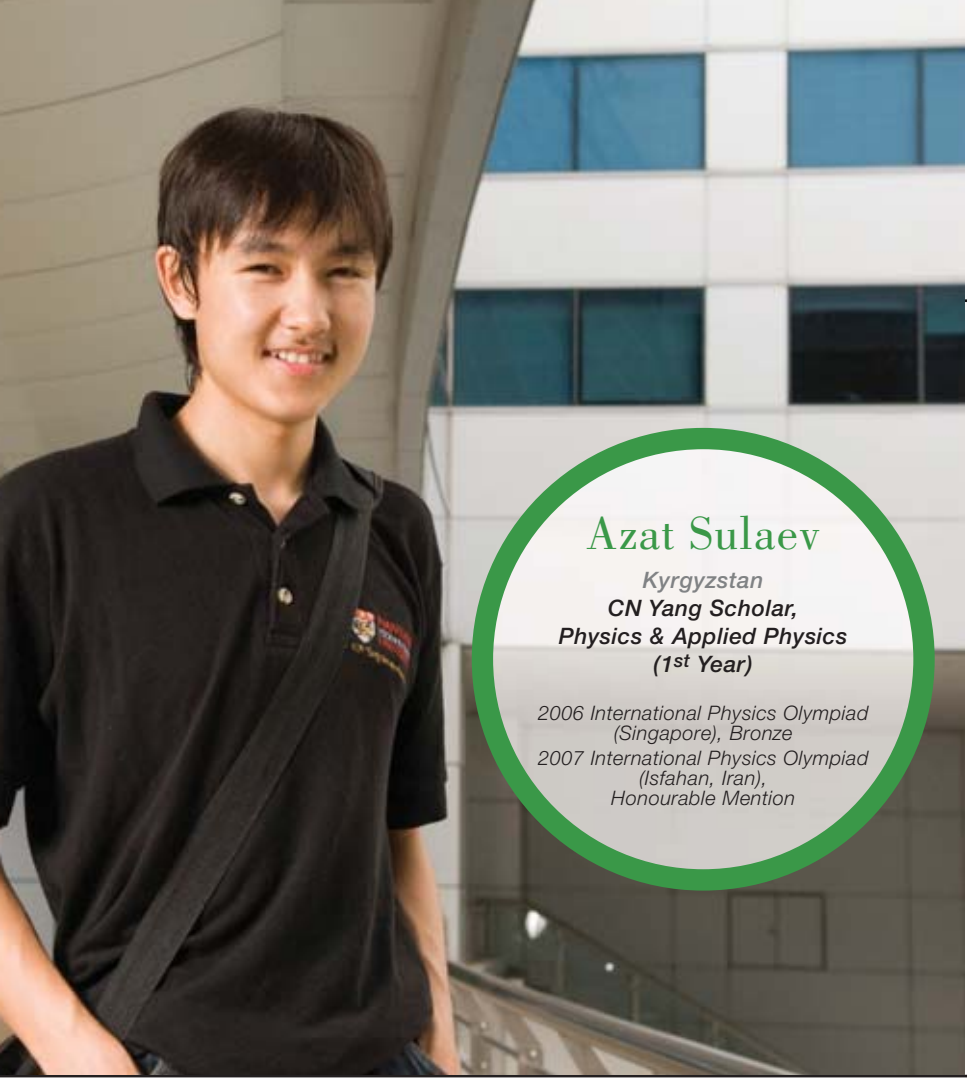
> "I already knew about the university as it is well-known in my high school and we all wanted to come here."

Edbert Jarvis Sie

Indonesia

ASEAN Undergraduate Scholar, Physics & Applied Physics (4th Year)

2004 International Physics Olympiad (Pohang, South Korea), Silver



Azat Sulaev

Kyrgyzstan

CN Yang Scholar, Physics & Applied Physics (1st Year)

2006 International Physics Olympiad (Singapore), Bronze
2007 International Physics Olympiad (Isfahan, Iran), Honourable Mention

I am 18 years old. I have managed to attend a number of Olympiads and liked the experience.

Though I had also applied to universities in Kyrgyzstan, it was an easy choice for me to come here. I decided to study at NTU because of the excellent CN Yang Scholars Programme. The coursework is extensive and I have found biology and chemistry quite difficult.

I came to Singapore in August and found the adjustment quite hard, but it is getting easier. On Tuesdays, I like to play football with my hall-mates. My favourite team is Chelsea!

I would like to do a PhD in physics, and then become a teacher. That's the most important thing to me.

> "I decided to study at NTU because of the excellent CN Yang Scholars Programme."

Vo Van Hung

Vietnam

ASEAN Undergraduate Scholar, Mathematics & Economics (1st Year)

2003 Singapore Mathematics Olympiad, Gold
2004 Singapore Mathematics Olympiad, Silver
2005 Singapore Mathematics Olympiad, Gold
2006 Singapore Mathematics Olympiad, Silver

I chose to study at NTU because I was looking for a school with international recognition, and I also wanted to interact with students from different countries. NTU was the right choice for me.

I am 20 years old now. After graduating, I want to go into teaching at the university level. I would like to go back to Vietnam as I have a sense of connection there. I am amazed at how quickly things have changed at home. But I am keeping my options open right now about where I want to go, because I think I will know better in a few years.

> "I chose to study at NTU because I was looking for a school with international recognition, and I also wanted to interact with students from different countries."

A LIFE IN SCIENCE

Professor CN Yang, in his own words.

Prof CN Yang is a product of both the East and the West. Born in Hefei, Anhui province, China, in 1922, he travelled in 1945 to the United States, where his pioneering work in elementary physics earned him and fellow scientist Tsung Dao-Lee the 1957 Nobel Prize in Physics.

Prof Yang was at NTU in October to attend the range of events organised by the university in honour of his 85th birthday and to mark the 50th anniversary of his receiving the Nobel Prize. On 30 October, a room at the Institute of Advanced Studies (IAS) was dedicated to him. Prof Yang also witnessed the signing of a memorandum of understanding between NTU and Tsinghua University to promote student and faculty exchange. At a press conference hosted by NTU President Dr Su Guaning, he shared his memories and thoughts with a clarity that spoke of a lifetime devoted to the sciences.

BEGINNINGS

I first visited Nanyang University (Nantah) in the year 1967. I was on my way from Canberra, Australia, to Israel, and in those days, the airplane had to stop at several places on the way. So it happened that I was staying at a hotel in the centre of Singapore, the Cathay.

Singapore in 1967 is very different from the Singapore of today. I'd known about Nanyang University because in 1953, I was in my office in Princeton at the Institute for Advanced Study when I was visited by Professor Choong Shin-Piaw, whom I'd known at Kunming during my student days. He was a research worker at the Research Institute of Physics. He had come to Princeton to recruit me to become a faculty member of Nanyang University.

I declined the offer, but I remembered the event. So in 1967 I called the physics department at Nanyang University, and Professor Choong was very happy that I was in Singapore. So he drove over to my hotel and brought me to Nanyang University.

At the time Nanyang University was established, Singapore was still a colony of Great Britain. Everything has greatly changed. I think there are very few countries in the world that have changed as much in the last 50 years as Singapore. I have been in Singapore many times, and I am enormously impressed. I think the people of Singapore should be proud of their collective achievements.

PASSAGES

The original Nanyang University main building reminds me of Xiamen University, where my father was a professor from the years 1928 to 1929. I was six years old and we lived on the Xiamen campus. And I remember vividly that the main building of Xiamen University and the main building here were almost identical.*

Higher education was born in Europe many centuries ago; in China, it is essentially only a hundred years old. Both Nanyang University and Xiamen University were built because of the generosity of men who were very rich, but who came from very poor backgrounds.

I am now 85 years old, and it is clear that my days are coming rapidly to an end, but I have been very fortunate in my old age. I see that the civilisation that I am most concerned with is making progress. In fact, the whole of East Asia, and all the

First visit in 1967: This year marks the 40th anniversary of Prof Yang's academic involvement with Nantah.

Sought-after: In 1970, Prof Yang was appointed Nantah's External Examiner of Physics.

Meeting Nantah students during a visit in 1976.

PHOTOS: **IAS, NTU/GLOBAL PUBLISHING**

countries under the influence of Chinese culture, are making good progress. I told Weng Fan, my wife, that she should observe the exciting future development of the region, and tell me about it when she joins me again.

THE PROGRESS OF SCIENCE

The question of what has been the most important development in science during the last 50 years is a broad one. Perhaps you will all agree that it is the progress in the biological sciences that has been the most important, if we use the measure of what has most benefited the greatest number of people. I believe that even in the 21st century, for the next 50 years and more, this will still be true.

In physics, after the pioneering work of James Clerk Maxwell and Michael Faraday, there have been many more surprising discoveries. But in my opinion, developments in physics in the 21st century will be different from those of the 20th century.

The key difference is that during the 20th century, the most important discoveries in physics were those to do with our basic understanding of matter. In the 21st century, there will be less of these critical and basic lessons, but more that are related to how we actually live our lives. I believe that for a country like Singapore, which has a limited population, developments that affect lifestyles and productivity will be especially important.

CELEBRATIONS

There is some confusion about my actual birthday. That is because when I was born in 1922, in Hefei, China, nobody used the solar calendar. So my parents did not know my real birthday in the solar calendar system. I only knew I was born on the 11th day of the 8th moon of the lunar calendar in the Year of the Dog.

Come 1945 and I was applying for a passport to go to the United States, so I had to fill in my birthday according to the solar calendar system. There was no way I could confirm this, so I made a calculation – and I was wrong by about 10 days. So 22 September became my birthday.

Some ten years later, I learnt from a book that my real birthday in the solar system calendar was 1 October. But I decided that it would be too confusing to change, so my official birthday remained the wrong one.

So every year, near my birthday, I have a lunar calendar birthday, a solar calendar birthday and an official birthday. As a consequence, many times I have no birthday celebration at all.

A BIRTHDAY WISH

To tell you the truth, I have thought about this.

I think the world has changed extremely rapidly, especially in the last 30 or 40 years. What is shaping up today is that the United States is the dominant power in the world, but coming up soon is China, a very large country with a population of 1.3 billion people and a GDP increase of over 10 per cent per year for the last five years. So many people feel that there may be a possible conflict between the United States and China in the future. I am afraid there is such a possibility, and my dominant wish is that this will not happen.

I am rooted in Chinese culture. I now live in China, but I have lived in the United States for over 60 years. I know both countries very well; I know the people of both countries very well. So I hope the two countries can get along with each other.

It was standing room only at the Nanyang Auditorium on 3 November 2007, at the public lecture by renowned Chinese artist Prof Fan Zeng (bottom left) and Prof CN Yang. Speaking from the tradition of classical Chinese painting, Prof Fan delivered a lecture that NTU President Dr Su Guaning (centre) likened to a tour of the entire world, one that touched on literature, religion and science in equal measure.

Prof Yang's concise discourse was founded on three points – Asian and Western concepts of beauty, the beauty of Chinese calligraphy, and beauty from a scientific perspective. Leavening his ideas with quotes from Shakespeare, Milton and Blake, Prof Yang brought the lecture to an elegant close by reflecting that if scientific equations are a form of poetry written by Nature's creator, then scientific discovery is an act with spiritual overtones.

MAIN PHOTOS: **AIDAN YEOH**

** Both campuses were established with endowments by the community leader and philanthropist Tan Kah Kee (1874–1961).*

HEAD START

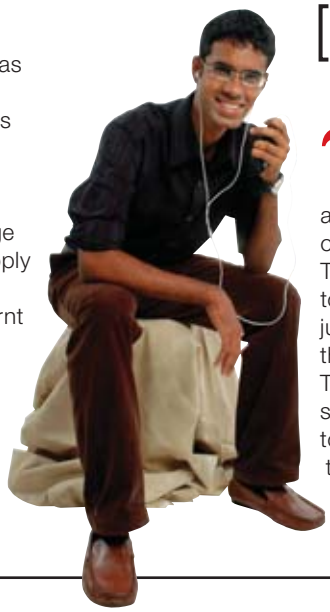
The CN Yang Scholars Programme gives a boost to those who have chosen the paths of science, engineering and mathematics.

The premier undergraduate programme for science and engineering students shares the same guiding philosophy as the Caltech Core Curriculum and the MIT General Institute Requirement in seeking to provide a strong foundation in science and mathematics. This prepares students for research at the highest level. *@NTU* caught up with a few of the programme's scholars to learn about their experiences.

Foong Sook Ching

[2nd Year, Chemical & Biomolecular Engineering]

The CN Yang Scholars Programme has allowed me to stretch my potential by allowing me to engage in rigorous research programmes that are not covered within the usual school curriculum. I aspire to make use of the skills and knowledge that I have acquired and to apply them to my work in the future. Hopefully, whatever I have learnt will not go to waste and I will be a successful chemical engineer or businesswoman one day. The programme has been a once-in-a-lifetime experience that I will never forget or regret.



Yuvaraman Viswanathan

[1st Year, Engineering]

The CN Yang Scholars Programme has given me the chance to be among the best in the fields of science and mathematics. Though I am not among the top students in the programme, just by being in it, I have had the chance to learn from the best. The programme has given me a solid foundation which I can use to pursue future undertakings in the engineering field. In a word, it has been fabulous.

Fitri Juniwati

[2nd Year, Chemical & Biomolecular Engineering]

The opportunity to take so many science modules has allowed me to look at the subject in a broader perspective. I think the most valuable lesson for me is that through learning so many new things, I know better how to cope when facing new challenges.

I hope to have the privilege of tasting other fields of science before deciding what to do after my undergraduate course. The programme has been an unforgettable experience.

Kyaw Zin Htet

[1st Year, Aerospace Engineering]

What made the CN Yang Scholars Programme stand out for me was its emphasis on research and the holistic development of students. The courses have given me a solid theoretical and research foundation, which is further strengthened by the focus on practical and engineering skills. I have also had the privilege of working with knowledgeable researchers in the labs as well as dedicated engineers in the field, due to the unique mentoring programme.

Er Chern Han

[2nd Year, Physics & Applied Physics]

I have been deeply interested in physics since I was young. The CN Yang Scholars Programme has broadened my exposure and influenced my way of thinking, letting me learn more about doing science in unconventional ways. I have become more determined in pursuing my dream of becoming a physicist. In this programme, I feel like the sky's the limit.

Eng Suky

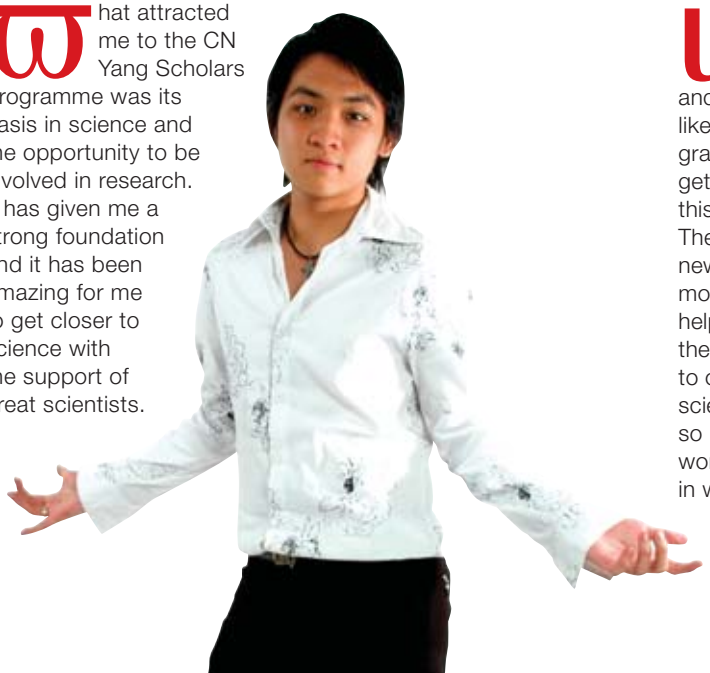
[1st Year, Aerospace Engineering]

The programme has exposed me to areas in science and mathematics that I hadn't known before. I get to learn more aspects of science as well as to appreciate equations and how they were derived by the famous scientists and mathematicians of the past. Even though certain courses are not directly related to aerospace engineering, I feel happy to be in them because I get to explore new concepts and ideas.

Wahyu Saputra

[1st Year, Chemical & Biomolecular Engineering]

What attracted me to the CN Yang Scholars Programme was its basis in science and the opportunity to be involved in research. It has given me a strong foundation and it has been amazing for me to get closer to science with the support of great scientists.

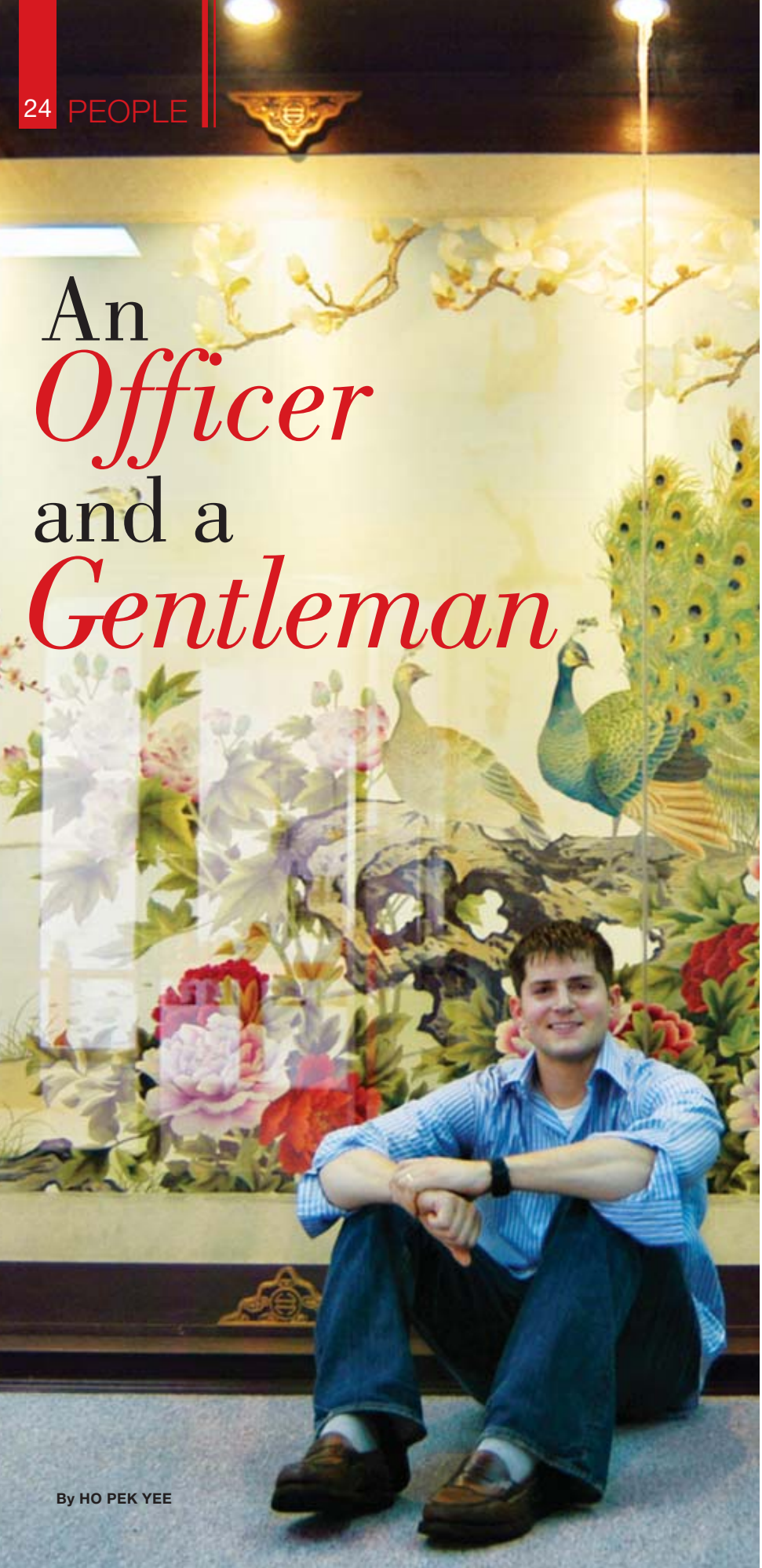


Tanvee Rao

[1st Year, Aerospace Engineering]

I was attracted to the CN Yang Scholars Programme by the fact that it is meant for scientists and researchers-to-be. I never really liked the idea of doing an MBA after graduation and would much rather get into research, so the idea behind this scholarship appealed to me. The programme has given me a new way of seeing things, and the modules I am doing now will probably help me better understand and apply the course matter I learn in the years to come. I hope to appreciate the sciences more with this programme, so I may never lose interest in the work I do and, more importantly, in what I learn.

An *Officer* and a *Gentleman*



A top West Point graduate and now Master of Arts in Contemporary China student at NTU, Dan Vallone brings together the best of Asia and the West.

By HO PEK YEE

A graduate from the US Military Academy at West Point and a Fulbright Scholar pursuing a Master of Arts in Contemporary China (MACC) at NTU, Daniel Andrew Vallone is both an officer and a gentleman.

On a three-week language immersion visit to a foreign military academy last year, he was the perfect guest, embracing the food and even learning to greet his hosts in their regional dialect.

"In all he does, he makes a positive difference in the lives around him," says Suzanne Nielsen from the US Military Academy. "While exceeding standards in all that West Point demands, Dan chose to share what little discretionary time he has to continue the community services he values so highly. He visited veterans' homes, mentored a local child through a cadet Big Brothers organisation, was a Special Olympics volunteer, and participated in a physics outreach programme for middle school students."

THE NTU EXPERIENCE

There is certainly a lot you can tell from watching the things Dan does. He has obtained a grade point average of 3.942 at West Point, which puts him in the top two per cent of his class. He aims to become a Foreign Area Officer in the military, strengthening relationships with China and Asian countries "through military exchanges, joint exercises, and the open exchange of ideas". And he plans to do that with the help of an MACC from NTU.

"NTU has a fantastic Master of Arts in Contemporary China programme that truly explores all facets of modern China, while

delving into the historical forces operating in the country," Dan says, even as he reveals his belief that his experience in NTU will enrich his understanding in ways that a similar programme in other countries cannot. "Also important is NTU's diversity – I am learning alongside students from Asia, America and Europe. The ideas put forth by such a diverse student body have helped me gain a better understanding of different cultures."

> "At NTU, I am learning alongside students from Asia, America and Europe. The ideas put forth by such a diverse student body have helped me gain a better understanding of different cultures."

A visit to NTU's Chinese Heritage Centre (far left, top and centre).

SERVING OTHERS

If you ask those who understand him best, however, it is probably not what he does that makes the 23-year-old stand head and shoulders above other men – it is who he is.

"As I get to know Dan better, I have come to recognise that his dedicated pursuit of knowledge and understanding stems from his desire to serve in a meaningful way," says Assoc Prof Thomas G Nimick, who taught History of China at West Point. "He has realised that knowledge is the key to effective service. His questions reveal a deep compassion for people caught in the middle of a conflict, a desire to make a difference, and dedication to doing what is right. His level of caring and dedication is an inextricable part of him."

Dan grew up in a small town called Epping in New Hampshire, USA. Working at his grandparents' grocery store from when he was six until he graduated from high school allowed him to know almost everyone in the little town. "Growing up in a small community definitely shaped my values and perspective on life," he says. "In small communities, personal relationships are extremely vital and strong, and I have continued to believe in the importance of building strong relationships with people I meet."

The son of a music teacher and an elementary school principal, Dan says his interest in foreign cultures began when his parents decided to participate in an international teacher exchange programme: "I welcomed into my family educators such as a lady named Olga from the Soviet Union, who called me *meesh* or mouse, and another teacher named Sou Yee from Hong Kong, who brought a beautiful silk dress for my mother. These teachers showed me that those affected by foreign policies are real people, with dreams and families."

LEARNING ABOUT ASIA

Dan's parents also instilled in him a deep sense of service. "When America began sending troops overseas, I knew I belonged with them," he says. "I went to West Point because, as an officer, I will not only lead soldiers, but also help them wrestle with their values and dreams. However, when considering academics, I majored in East Asian Studies, and have since sought every opportunity to study China."

Hoping to travel to other parts of Southeast Asia to better his understanding of the region and its people at large, Dan says: "I am committed to using the cultural awareness and scholarly expertise I would gain through the MACC programme in a lifelong effort towards fostering relationships that benefit not only the people of America, but also help provide the conditions necessary for peace and prosperity across the region."

Welcome to NTU, Dan.

DRAGON'S EYE VIEW

Exploring China in all its complexity.

Those looking to understand the sweeping changes that China is undergoing will find much to value in NTU's Master of Arts in Contemporary China programme. Built upon NTU's tradition of China studies and its bilingual, multicultural learning environment, the programme was launched in July 2005 and has been designed for professionals seeking a grounded look at modern China.

The MACC programme is noted for its depth, with a cross-disciplinary course of studies drawn from the School of Humanities & Social Sciences, the S Rajaratnam School of International Studies and the Wee Kim Wee School of Communication & Information. Students are free to choose electives from three clusters of subjects (Economy and Business, Politics and International Relations, and Society and Culture). One of the programme's highlights is the mandatory multi-city immersion requirement, which took students to Jiangxi province in 2006 and Liaoning province in 2007 – a great way to discover the Central Kingdom for yourself.

There are currently 48 students in the MACC programme. Despite its relatively recent introduction, it has attracted students from Europe, the US, the Middle East, the Asia Pacific and even China. Given the country's growing economic and political influence, it seems certain that the programme's unique focus and comprehensive approach will draw even more students in the future.

The man with the FUNNY HAT

A hybrid sensor headset by any other name is part of groundbreaking research in Augmented Reality by RUSSELL PENSYL, who is likely to wear a few hats at any one time.

By HO PEK YEE
PHOTOS: DIOSDADO VINCOY, JR

It's a bird. It's a hat. No, it's a hybrid sensor headset.

Bringing 3D technology to another, well, dimension, the unique device uses light-emitting diodes and accelerometers to track hand or head motion-cum-orientation when attached to various parts of the human body. It's part of some groundbreaking research on Augmented Reality (AR) technology by Assoc Prof Russell Pensyl and his team at NTU's Interaction & Entertainment Research Centre (IERC). AR is a field of computer research that combines real-world and computer-generated virtual objects and characters.

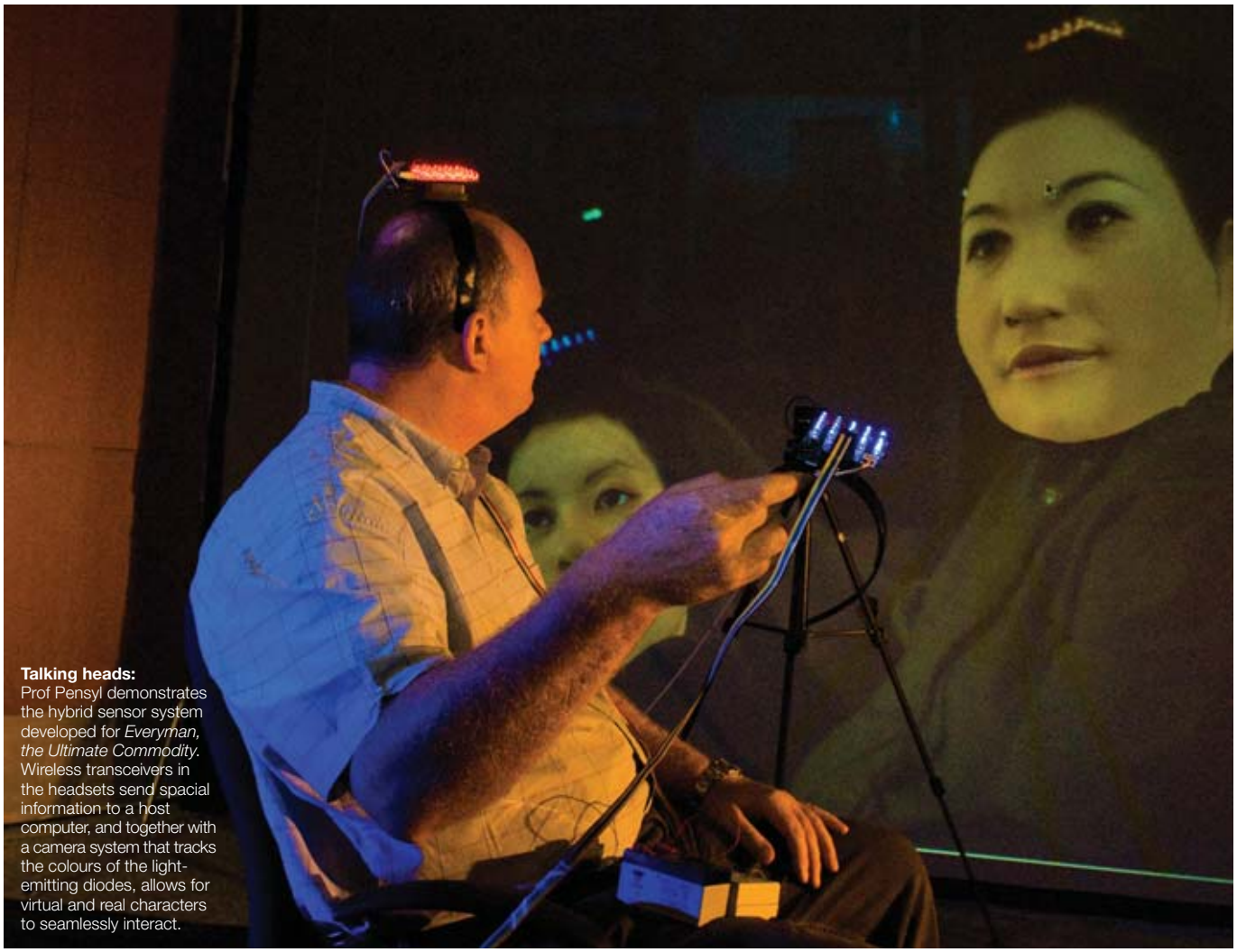
"I find the idea of this new technology very intriguing, especially for the creation of a new form of entertainment that can take animation or games to real-world spaces," says Russell. "Applications that bring the experience to a large volume whereby users can interact with virtual characters in real-world or architectural space is where I wish to take the technology."

And he's getting there.

ON THE FRINGE

For the Fringe Toronto Theatre Festival in July this year, Russell worked with NTU Assistant Professor of English and writer Daniel Jernigan to direct and stage *Everyman, the Ultimate Commodity,* using AR technology to alter the appearance of the actors in real time so that they all begin to look alike. Adapted from an original story by Singaporean author Gopal Baratham, *Everyman, the Ultimate Commodity* is a dystopian tale of a scientist who creates a substance that turns everyone into a universal organ donor. The government decides to add it into the drinking water and create body parts for sale to the highest bidders, but the side effect is that everyone begins to look the same. In tandem with pre-recorded tracks, hybrid sensor headsets control the positions of the virtual actors' heads, which talk, respond, and express emotions in real time. "Even though the technology is critical to the project, it should be clear that the narrative and the drama are the most important," says Russell. "The impact of the greatest technology, without compelling content or experiences that engage the audience, is hollow at best."

It must be said that the former Executive Vice-Dean of NTU's School of Art,



Talking heads: Prof Pensyl demonstrates the hybrid sensor system developed for *Everyman, the Ultimate Commodity*. Wireless transceivers in the headsets send spacial information to a host computer, and together with a camera system that tracks the colours of the light-emitting diodes, allows for virtual and real characters to seamlessly interact.

> If we can find ways to push some of our new discoveries in technology and science to compelling user experiences, art works and culturally relevant products and services, we will have brought forward NTU's contribution to building not only Singaporean society, but culture across the planet as a whole.

Design & Media (ADM) likes to wear many hats – no pun intended. He began his career in 1984 as an art director and designer for a company that developed educational software on an Apple II platform – "this was truly the dinosaur days of CGI [Computer-Generated Imagery]" – but was soon embracing disciplines as diverse as art, theatre, music, communications, philosophy and education.

"My involvement in new media was *not* a choice," he maintains. "Perhaps it was an accident. I was studying what my parents expected – something that would secure a future job in Computer Science. Then I took an introduction to design course, and found I had talent and a growing interest. This was before we knew that digital technology would impact and be affected by art and design in such a big way. I chose to complete a double major in Computer Science and the Arts.

"People used to ask me, 'How can you get these two totally separate fields together in your head?' I really had no answer, except that I was interested in a lot of things, and college was the place to explore and learn as much as possible."

Russell graduated with a Master of Fine Arts (Multimedia, Electronic Music)

from Western Michigan University in 1988, the same year that he set up his own computer animation company at Virginia Beach. In 1990, he started his second outfit at Dallas, where he added to his client list Fortune 500 organisations such as Apple, IBM, Motorola, Sony and Disney.

"In previous universities I have worked in, there was an impediment to crossing disciplines between art or design and science or engineering," says Russell, "When I tried to create a combined subject in Game Design & Development and Computer Science, my colleagues and I had tremendous difficulty in making it work."

DRAWN TO NTU

After teaching in America for 13 years, Russell moved to Asia as the Chair of Peking University's Department of Digital Art and Design, and also its Director of Digital Animation. He joined NTU in September 2004. "At NTU, it was stated that interdisciplinary work across multiple domains was encouraged and expected. This and the incredible resources and talented students attracted me, and I gave up tenure at my previous American university to come to NTU."

In July 2006, he was transferred to the School of Computer Engineering to head IERC, which allowed him "some freedom" to carry forward NTU's mission to push the interactive digital media research forward in an interdisciplinary manner.

Russell's goal? "To foster an environment where discourse on culturally relevant topics related to design and technology takes place." Projects in the pipeline include an interactive installation, *The Long Bar*, which allows the audience to experience a narrative in a real-world space where virtual characters can be interacted with in real time.

"There is value to the research that the incredibly smart people at NTU are doing," he says. "If we can find ways to push some of our new discoveries in technology and science to compelling user experiences, art works, and culturally relevant products and services, we will have brought forward NTU's contribution to building not only Singaporean society, but culture across the planet as a whole."

You just have to take your hybrid sensor headset off to this guy.

THE SCIENCE OF ART

Expanding the technological and creative frontiers at NTU.

Strange and wonderful things are brewing at the Research TechnoPlaza, home of the IERC. Established in 2006, this cutting-edge university-level research centre is dedicated to cross-disciplinary collaborations with its many industry and arts partners. Key areas of focus include interactive fine art, augmented and mixed reality, interactive spaces, robotics, games, education, training and simulation. At present, IERC comprises an international team led by Assoc Prof Russell Pensyl that is working to put the latest technologies in the service of modern art. The results offer an intriguing glimpse into the future of high-tech entertainment. Some of IERC's recent projects and applications include:

PHOTO: **IERC**

***Periphery* (Beijing, China, 2006)**

A site-specific artwork developed specially for Beijing, *Periphery* explores how changes in time can provide a glimpse into culture and ethnography. This interactive media installation by Assoc Prof Russell Pensyl and IERC Research Associate Ta Huynh Duy Nguyen uses a computer vision system to detect the movement of viewers and reveal different interfaces and layers of imagery.

***Everyman, the Ultimate Commodity* (Toronto, Canada, 2007)**

PHOTO: **IERC**

This mind-bending play by IERC's Asst Prof Daniel Jernigan is based on a short story by Gopal Baratham. Using augmented reality technologies developed from IERC's research projects, it combines live action with computer-generated images and characters to form a new kind of narrative. The system integrates the use of computer vision and inertial sensors to achieve the accurate tracking of spatial positions, postures and orientations of people within a given space, under difficult lighting conditions.

PHOTO: **CHRIS HERZFELD**

***Devolution* (Sydney, Australia, 2007)**

Devolution is a striking contemporary dance collaboration between IERC's Assoc Prof Louis-Philippe Demers and the Australian Dance Theatre. For the production, Demers created 30 robots that interacted freely with performers. The result is a fantastic fusion of choreography with robotics, sound and video, one that has received numerous awards and which will be making its European debut in Paris, France, in November 2007.

***Justeen* (2008)**

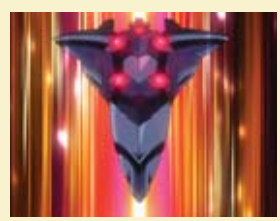


PHOTO: **IERC**

This animation production project is a joint venture between IERC, NTU's School of Computer Engineering and Tokyo-based Anime International Company. The team (with software engineering by NTU's Prof Seah Hock Soon and Asst Prof Tian Feng, and production pipeline design by Assoc Prof Russell Pensyl) developed new computer-assisted cell animation software that streamlines a production process that had previously been done by an army of 'in-betweeners' to draw all the frames that go between the "key" frames of master animators.

In search of *Imperfection*

For Prof Krishna Palem, the Director of the newly established Institute for Sustainable Nanoelectronics (ISNE), and his team, imperfection is the new buzzword for the next generation of integrated chips.

By **HO PEK YEE**
PHOTO: **AIDAN YEOH**

You are the Ken and Audrey Kennedy Professor of Computer Science at Houston's Rice University, and also the founder of its Value of Information-based Sustainable Embedded Nanocomputing Centre (VISEN). What can we expect from the collaboration between VISEN and NTU's ISNE?
NTU, Rice and some of our other partners at Caltech, Georgia Tech and Harvard all bring skills that we truly believe will change the way integrated circuits or computer chips will be designed and used over the next 10 to 20 years, by using devices that are "nanometres" in size.

Is size all that matters?
No, the research is an NTU-funded $4 million project to find ways to develop a new range of electronic equipment that will consume 100 times less energy, while cutting design and production costs. In order to do this, we have to develop strategies that run counter to conventional engineering principles, where perfection is the norm.

What was it about NTU that attracted you to this project?
It was the ability to create revolutionary computing technologies with deep roots in physics and mathematics. ISNE offers the potential for an absolutely world-class platform for pursuing the next few generations of technology behind all kinds of computers, a terrific team to work with, and the support and help I need to grow.

You are a leader in the field of Embedded Systems research, having founded one of the earliest laboratories dedicated to this field in 1994, the Real-time Compilation Technologies and Instruction Level Parallelism (ReaCT-ILP) laboratory at New York University's Courant Institute of Mathematical Sciences. How did your interest in this area start?
Firstly, I saw a need in 1994 to add systematic foundations to a field that was not yet mature. There were (and are) more embedded computers than non-embedded computers, yet embedded systems are like Cinderella, who can rise from obscurity to surprise you. Secondly, my interest came from the numerous intellectual challenges posed by the field of embedded systems research.

What are the applications of the work at ISNE for the ordinary person on the street?
A new way of looking at engineering design means creating a product that is designed to be "just good enough" for the task it needs to perform. For the person on the street, this means lower costs and a longer battery life – just imagine a $5 cellphone that you only need to charge once in two weeks or even once a month. This is an example of the "holy grail" we will be seeking. What this means for the semiconductor landscape in Singapore is the rapid and early access to potential technology breakthroughs through the institute.

You know the Singaporean context well.
Although I have been living in the US since 1979, I visit Asia often. Singapore is a truly remarkable (and perhaps unprecedented) exercise in success and prosperity, with a truly Asian core. I had many challenging activities at what is now A*STAR [Agency for Science, Technology & Research], and helped start its early thematic programme in Embedded and Hybrid Systems at NTU. As the director of ISNE, I will be spending a significant amount of time here. My wife (who is an artist and fashion designer from Busan, South Korea) and I are both looking forward to this.

What has been the driving force behind your work?
A desire to create knowledge, but ultimately and hopefully to add value to society at large. Most of all, perhaps what drives me is the fun my students and I get from doing this work – it never feels like work, which is what keeps us going, without ever feeling we want to stop.

High Ambition

Things are just a little bit different at NTU's Research TechnoPlaza. Located in the southwestern corner of the campus, this nine-storey technology hub was designed to be a hotbed of multi-disciplinary research. Completed in 2002, it now houses an eclectic mix of researchers, entrepreneurs and venture capitalists. Among the centres here are the Temasek Laboratories@NTU, the Intelligent Systems Centre, the BioMedical Engineering Research Centre, the Environmental Engineering Research Centre, Thales@NTU, and the Interaction & Entertainment Research Centre.

The building is a study in contrasts. Clad in glass and metal, it is partially hidden by trees and red firebrands *(Cordyline fruticosa)*. Inside, the atrium rises to a coffered aluminium ceiling, creating a space ideally suited to hatching grand ideas and seeing them to fruition.

PHOTO: NANYANG TECHNOPRENEURSHIP CENTRE

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4th in the Asia Pacific
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– Economist Intelligence Unit (2004–2007)

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3rd in the Asia Pacific
World Top 100
– The Financial Times (2007)

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