No man is an island entire of itself; every man is a piece of the continent, a part of the main.’ So wrote the English poet John Donne in 1624, more than 160 years before his compatriots set permanent foot on this continent, joining it and its indigenous inhabitants to the global main.

Donne was remarkably prescient. In the four centuries since his musing, humankind has moved from sailing ship to jet engine, from parochial lives to cosmopolitan connections, from degrees of separation to degrees of connection.

Universities cannot be islands entire of themselves, any more than their staff and students. RMIT University, which this week celebrates its 123rd anniversary, was among the first in Australia to embrace the benefits and challenges of internationalising education.

That process is deep, irreversible and at times exhilarating. It is a process that goes much further than the enrolment of overseas students into Australian programs. A thorough-going internationalisation also embraces engagement in delivering education in Asia and beyond; global linkages in the field of research; the internationalisation of academic staff; and the development of globally relevant curricula and qualifications.

One result of all this, and not the least important, is that our graduates venture into the employment marketplace equipped with genuinely portable skills, ones that see them in demand among employers not only in Australia but worldwide.

We live on the biggest island on earth, but one no longer cowed by the tyranny of distance. Education is global, educators are global, and this magazine is dedicated to celebrating those new and expanding horizons.

Professor Margaret Gardner AO
Vice-Chancellor and President, RMIT University
Thursday, 3 June, 2010
For the one in five Australians of working age suffering from serious chronic pain, the options are strictly limited. There’s morphine and ... well, there’s morphine. But research using one of the most powerful toxins in the natural world – the venom of marine cone snails – offers hope for a pain-free and addiction-free future.

“The big problems with morphine are its addictiveness and the fact that, over time, people develop a tolerance to it,” Professor David Adams says. “We don’t have that problem with the peptides derived from cone snail venom. People don’t develop tolerance and they don’t get hooked. There’s also a wide safety margin. With morphine, there’s little room for error – you overdose, you’re likely to die. But with peptides, there’ll be some side-effects but you will survive.”

Adams, the Director of the RMIT Health Innovations Research Institute, leads the University’s investigations into venom peptides, the cocktail of agents in cone snail venom that paralyses prey. His team focuses on isolating peptides that target particular receptors in pain pathways in a bid to find new treatments for chronic and neuropathic pain.

“Pharmaceutical companies spend billions trying to synthesise small molecules, but in cone snails, nature’s already done the work for us,” he says. “The peptides in cone snail venom have exquisite selectivity. The challenge we have is to understand the pathways and the targets, and put them to therapeutic use.”

Worldwide, there are more than 700 species of cone snails, with about two-thirds found in the Great Barrier Reef. Each species’ venom contains between 100 and 200 unique peptides, but fewer than 100 have been classified. “There’s enormous potential in this field for discovery,” Adams says. “We’re focused on the peptides that target pain pathways but there are many other possibilities, such as treatments for cardio-vascular conditions.”

Backed by a $1.4 million Australian Research Council grant, Adams and his team work with one of the world’s leading cone snail experts, Professor Frank Mari at Florida Atlantic University. The collaboration with Mari means RMIT can now broaden its investigations beyond Australian species. The team also works with researchers in the University of Calgary and a group based in Belgium, sharing their raw cone snail venom material, which is then synthesised for analysis.

While it’s been long known that cone snails are dangerous, and can even kill, the first studies of the venom in Australian species were conducted only in the late 1960s. “In some of the old medical reports where people had been stung by cone snails, they didn’t actually feel pain – most of them died because of respiratory paralysis,” Adams says.

“There was clearly a powerful toxin there but it took until the 1980s before medical researchers started to look into cone snail venom for therapeutic use. So far, just one peptide pain-killing drug has been approved for use in the US. But when you consider there are more than 100,000 unique peptides that we still know nothing about, the possibilities in this field are just breathtaking.”
Cities at the speed of light

China is rapidly becoming an urban nation, a development that poses many challenges. Deborah Sippitts reports
China is currently the world’s powerhouse of urban growth and manufacturing prowess. Like Britain in the days of the first industrial revolution, there are pros and cons associated with holding this title. As well as rapid urban growth and unrivalled economic activity, there is pollution, upheaval and continual change.

At the end of 2008, China’s population was 1.33 billion, with 723 million people living in rural areas and 607 million in urban areas (excluding Hong Kong, Macau and Taiwan). The United Nations has forecast that by 2015 the rural and urban populations will be about equal, and that by 2035 nearly 70 per cent of Chinese will live in urban areas. While China’s level of urbanisation is currently lower than the world’s average, the speed of its urbanisation is nonetheless unprecedented.

Professor Paul James, Director of the Global Cities Research Institute at RMIT, says that we are living through a period in which urban living has, for the first time in human history, supplanted rural life. “This is a momentous shift. However, cities, for all their vibrancy and liveliness, face a growing challenge of providing secure and sustainable places to live. Our research directly addresses this challenge through programs with significant impact on the ground.”

The Institute brings together key researchers working on understanding the complexity of globalising urban settings, from provincial centres to mega-cities.
Cities at the speed of light
(continued)

Associate Professor Christine Hudson says: “The research is highly collaborative, linking with institutions and people around the world in long-term partnerships. We emphasise questions of sustainability, resilience, security and adaptation in the face of the processes of globalisation and global climate change.”

Last year a delegation of RMIT researchers, including Hudson, delivered papers at an international conference in Shanghai, entitled China’s Urbanisation and Community Development under Globalisation. The conference focused on the social and cultural implications of urbanisation, particularly in Shanghai and the Yangtze River delta.

Conducted in Mandarin and English, it was held at the prestigious Shanghai Academy of Social Sciences (SASS) and co-sponsored by the Rosa Luxemburg Foundation of Germany. Founded in 1958 and administered by the Municipal Government of Shanghai, SASS is China’s oldest institution for the humanities and social sciences and the largest outside Beijing. It is a leading think-tank and a distinguished academic institution in China.

This month, the Global Cities Research Institute is holding a collaborative workshop with SASS in Shanghai – entitled Re-Imagining City Futures: Chinese Perspectives – and Professor Frank Zhang, the Director of the Centre for Policy and Strategic Studies at SASS, will take part.

“We will discuss issues such as increasing urbanisation, mass population mobilities, climate change, environmental degradation and other changes manifested at the global, national and local levels. We’ll be asking questions such as How do we map alternative futures? and How is China’s urban future aligned with a global future?,” Hudson says.

Another project looks at urbanisation in Chongqing, a major city in central western China, with 7.5 million people in its metro area but more than 32 million in the municipality of the same name.

“Chongqing was the wartime capital of China and is currently experiencing a massive displacement of people due to the Three Gorges dam project. I worked on a paper on Chongqing with Associate Professor SueAnne Ware, a landscape architect at RMIT,” Hudson says.

Other RMIT researchers involved with urbanisation projects include Professor Manfred Steger – globalisation and culture, Associate Professor Darryn McEvoy – climate change adaptation, Professor Supriya Singh – community sustainability, and Guosheng Chen – for her expertise on China and language abilities.

Chen is also working on a project for Ji County, a county in the far north of Tianjin municipality in China. Known as Tianjin’s backyard, Ji County includes spectacular natural scenery and a small section of the Great Wall of China. It has a population of 800,000 and is 115 kilometres from Tianjin city – one of Melbourne’s sister cities.

“If you go to Ji County, you can see the rest of Asia.”

Robbins took over the top floor of the ECNU’s new School of Fine Art building, installing a series of wind-operated drawing machines. “It was a perfect space for my work as the building was not quite finished, so there were parts still open to the elements. The machines I make operate in different ways – some rotate, others are on pendants or pivots – but they all rely on the power of natural elements to create the work.”

An RMIT alumnus and a lecturer in the University’s Art in Public Space program, Robbins has spent more than two decades perfecting the engineering behind his drawing machines, which he often sets up in coastal areas around Victoria.

“I find it a little bit like gardening. You do the work to put the machine up, but then you stand back and wait to see how it develops. It’s always so exciting to come back after a few hours and discover what the wind has drawn.”

Artist Cameron Robbins relies on the energy of nature to power his complex and intricate drawing machines, but in Shanghai he discovered a spirit that could move more than his art.

“There was such unbelievable enthusiasm in all the people we met,” he said. “It made you think anything’s possible. And the complexity and scale of the city made me feel more ambitious – I felt I had to come up with something that reflected that sort of energy.”

Robbins was in Shanghai late last year to prepare the ground for his first major international installation, part of the official Australian cultural contribution to the Shanghai World Expo 2010. A partnership between RMIT and East China Normal University (ECNU), the Maridians – Shanghai 2010: Transdisciplinary Art and Sound in Public Space Project saw Robbins collaborating with Chinese artists to create a multi-layered, site-specific work.
Putting a nation on a new path, especially one to prosperity, calls for more than a little outside help. And outside help is what the east African nation of Tanzania is getting as it works to reshape its economy from one based on agriculture and resources to one based on technology and services.

According to the CIA, Tanzania is in the bottom 10 per cent of the world’s economies in terms of per capita income. The economy depends heavily on agriculture, which accounts for more than 40 per cent of GDP, provides 85 per cent of exports, and employs 80 per cent of the workforce.

President Jakaya Kikwete’s plan to begin modernising the economy, by putting 1 per cent of the country’s GDP into research in an attempt to emulate the success of South Korea, has the backing of some heavy hitters, including information technology giant IBM. The company has put together a hand-picked team of advisors from across the globe to share ideas with officials and specialists in Tanzania.

The IBM team includes Dr Hossein Zadeh (pictured), an RMIT business services science specialist. Zadeh was among a group of academics who met a Tanzanian delegation, including the Minister for Education, the Tanzanian Ambassador to the USA, and a number of senior academics and administrators, when they visited IBM’s Almaden Research Center to discuss the collaboration earlier this year.

Zadeh, who was in the midst of a five-month industry placement at Almaden in California’s Silicon Valley, was joined by colleagues from Stanford, MIT and San Jose State universities in a presentation to the delegation about how Tanzania might go about introducing new technologies.

Part of the academics’ plan is to help Tanzania’s newly established University of Dodoma (UDom) establish itself as a centre of educational and research excellence in the region. Zadeh is currently researching ways to help UDom realise its dream.

With a background in engineering and the new discipline of services science, Zadeh has experience in creating the kind of education that a changing world needs. He established RMIT’s Masters Course in Business Services Science on the basis of discussions with industry about the capabilities they required from their services.

“Services science developed after Dr Jim Spohrer, from IBM, realised that around 75 per cent of the economies of the developed world are based on services,” Zadeh says.

“Dr Spohrer is IBM’s Global Director of University Programs and he has a great interest in helping countries like Tanzania advance and meet its educational and research goals and aspirations. Specialisation is the key to helping countries like Tanzania, and Egypt, which has also been part of IBM’s current Smarter Planet initiative.”

Smarter Planet is a global research initiative by IBM and has already seen tangible results in countries such as Singapore, Sweden and the UK.

During his stay at IBM, Zadeh also researched the interaction between the capabilities of service providers and service consumers – a key component of services science.
A former lepers' hospital in Belgium might not seem the most fertile place for innovative design practice and extending and sharing knowledge. Yet this is where RMIT's School of Architecture and Design is pioneering its Graduate Research Conference (GRC) in Europe.

Twice a year in Melbourne, invited “masters” in relevant architecture and design fields come together to be part of the Australian GRC and engage in a weekend of innovative discussion and debate. This innovative model of research through design practice was established in 1988 under the direction of Professor Leon van Schaik AO, who still chairs the Melbourne GRC.

Now, through a partnership with Saint Lucas School of Architecture at the Catholic University of Leuven, the GRC process has a European base in Ghent.

Professor Richard Blythe, who heads the School of Architecture and Design, says RMIT’s invitational postgraduate program has produced remarkable results. “We are now firmly established as a world leader in research through design practice. The invitational program has resulted in over 150 practitioners who have conducted research into their own practice.

“The quantity of successful graduates is only surpassed by their quality, with PhD graduates emerging to become significant leaders in their professions and the design community,” Blythe says.

The Ghent GRC program, which happens annually as part of a Masters candidature, will be managed by Dr Martyn Hook, who says that candidate interest is not just coming from Europe. “Obviously we have strong interest from European-based practitioners, including candidates from Belgium, Denmark, Estonia, France and the UK. But we also have strong interest from American-based practitioners who are interested in the global connections the GRC offers.

“The Melbourne program also has pulling power, as it provides access to further insights and practitioners and, as a city of cutting-edge architecture and design, is attractive in its own right,” Hook says.
“We seek out practitioners who have developed a body of architecture or design work demonstrating mastery of their field, invite them to reflect upon the nature of that mastery within a critical framework and to speculate, through design, on the nature of their future practice and demonstrate their findings publicly.

“We argue that architects and designers have a responsibility to the furtherance of their practice domain, and that this examination of the nature of their mastery promotes and extends the fundamental knowledge base of their profession, and thus its ability to service society.”

Blythe says that whether it’s in Melbourne or Ghent, the GRC offers more than a weekend of discourse and networking with other designers. “It means a continued participation in a global network of design at a high level. It provides candidates with a terrific network and ongoing design community that is locally placed but globally connected.”

Candidates see and celebrate differences in their work whether they are working as artists, fashion designers, object designers, landscape architects, architects or industrial designers. “For example, we currently have two very interesting program candidates who are working on design projects that involve death. One is a fashion designer designing death garments and researching the wrapping of dead people as a sustainable alternative to using coffins,” Blythe says.

“The other is a monumental mason and artist up in Brisbane, who is interested in how grave design can help with grief counselling and the whole process of coming to terms with a loved one’s death. He is interested in involving and engaging clients in the design and construction of a grave or headstone to see if this can help them come to terms with their loss.

“For one design he incorporated a seat in the grave, so that someone could sit in it and be closer to the dead person, for another design a person made a handprint in concrete to connect with the dead person.

“It’s inspiring and ground-breaking for practitioners like this to bond and interact with architects from London and urban activists from Estonia. In this way, the best thinkers and practitioners in architecture and design are attracted to the GRC, take part and enhance the process as they make global connections through the program,” he says.

“Each European GRC is a chance for RMIT staff and candidates to engage with international peers in both practical and academic architecture and design issues. And each Melbourne GRC offers Sint Lucas staff and candidates similar opportunities. Both programs add value to the academic cycle and design communities in both countries and beyond,” Blythe says.
Take an overcrowded hospital in Vietnam, a group of dedicated RMIT students and staff on both sides of the equator, mix them together and what do you get? New friends and a long-term partnership that will make a difference to the lives of Vietnamese families.

It’s well known among educators that the most effective learning comes through real-life experience. All RMIT degrees include work-integrated learning (WIL). Now, the WIL program is taking on a more global flavour, as the University’s Melbourne and Vietnam campuses join forces to bring about change in health care and social services.

In 2009, RMIT students and supervising staff began working with the paediatric department of Da Nang General Hospital in central Vietnam. Da Nang is the country’s third largest city, with more than 800,000 people. “Like many hospital departments in developing nations, the paediatric ward is overcrowded and under-resourced,” says Dr Julie Roberts, WIL Vietnam project leader.

During the first project, a multi-disciplinary team of students produced a comprehensive plan for the ward, addressing issues including infection control, ventilation and cooling, and patient management.

Then came a pleasant surprise. “The City of Da Nang decided to create a new women’s and children’s hospital in a 13-storey building,” says Roberts. “The Da Nang paediatric staff were so pleased with the calibre of our students’ work during the first project that they asked us to redesign the new building in its entirety.”

Designing a hospital is a huge undertaking, but according to Roberts, the students approached it like seasoned professionals. After extensive liaison with the hospital, local city council and businesses, RMIT project team representatives presented the final plans in March.

RMIT and Da Nang recently signed a memorandum of understanding. Discussion is underway about potential projects after the hospital moves into the new building, such as an efficiency audit of the new facilities and development of outreach services for children in remote districts.

The WIL program has spawned other projects, including working with the 1,000-bed No. 1 Children’s Hospital in Ho Chi Minh City to develop information brochures for parents and redesign the hospital playground. Next, Roberts hopes to help the hospital formalise parent support groups.

To be considered for the Vietnam projects, students must submit an application and attend an interview. “We don’t base selection decisions merely on academic results,” says Roberts. “Students will be working on real-life projects, so we’re more interested in attributes like independence and ability to work in a team.”

The onsite component of each project runs for two weeks, but takes months to plan. Students must research the subject thoroughly, develop a project plan for scrutiny by staff supervisors, and undertake cultural awareness and teamwork training.

Bachelor of Communications student Meg Gallagher was part of the team that developed brochures for No. 1 Children's Hospital. “I felt lucky to contribute to a project that’s really worthwhile,” she says, “and it was a great opportunity to work with people from another culture.”

Gallagher returned to Australia feeling more confident and independent. “I couldn’t have had an experience like it anywhere else.”
Poor mother, drawing water from a well contaminated with arsenic and fluoride. A young man, living beside a factory that pumps effluent into his local river. These are the people who are front of mind for Professor Suresh Bhargava and the international team of researchers he has brought together.

“We’re looking for practical solutions to these problems that are economical and can be used by anyone, regardless of wealth or education,” Bhargava says. “Ideas like nanocomposite clays that can be used to make pots that purify dirty groundwater and make it safe to drink – it’s home-brand high technology that’s cheap, easy to use and accessible to all.”

Spiralling air and water pollution have come hand-in-hand with India’s stunning economic boom. The number of waterways no longer fit for human use is rising while, in the south, rice crop yields are falling as smog blocks the sun. It’s been estimated that factoring in the cost of environmental degradation would halve India’s 9 per cent annual growth rate.

These issues are the focus of a new Joint Research Centre established by RMIT and one of India’s premier research institutes, the Indian Institute of Chemical Technology (IICT), based in Hyderabad. The joint centre hosts five top-level scientists and up to 20 PhD candidates who concentrate on developing new technologies for water and wastewater treatment, renewable energy, resource reuse and air pollution control.

“The ultimate objective is to find new ways to deal with some of the most serious environmental issues facing both developing and developed countries,” Bhargava says.

“Our PhD program is truly international, with supervisors from both RMIT and the IICT supporting each of the Centre’s doctoral researchers. Working closely with Indian researchers means we can design technologies that suit local needs, but Australia will also benefit from the green solutions we develop.”

On the domestic scale, cheap nanocomposite clays and liners for clay pots are being developed to remove arsenic and fluoride from drinking water. Researchers are also expanding a catalytic wet oxidation technique developed by RMIT for the treatment of industrial waste water. The technology, which prevents bacteria and organics from entering waterways, has been successfully tested in alumina refineries, pulp and paper mills, and in the oil and shale industries.

Sophisticated nanotechnologies are being used to tackle elemental mercury and carbon dioxide emissions from coal-fired power plants and other heavy industries. Researchers are working to enable the capture and reuse of CO₂ by combining it with methane to form syngas – a cheap renewable energy source. The conversion of mercury to a more manageable ionic form is also being investigated to significantly reduce treatment costs.

Bhargava is already fielding interest from industries eager to take advantage of the centre’s innovative approach. “There’s great potential for Australian industries with a serious presence in India and we’re already in discussion with key multinationals interested in sponsoring joint projects,” he says.

“This Centre gives us the chance to give RMIT graduates in-depth exposure to the culture and working environment of the world’s second fastest growing economy. But just as importantly, it establishes a fantastic platform for advancing the reach of Australian science, technology and industry in India.”
Climate change is fuelling not just temperatures but the risk of disaster. David Glanz reports

In California, firefighters have declared that there is no longer a bushfire season. They prefer instead to talk about periods of low and high risk – with the high-risk season extending much longer than before. It’s a big call, but one that reflects that climate change is not simply about higher average temperatures but also about higher risks of disaster.

Sceptics may scoff, but the insurance industry for one is taking the challenge seriously. According to Swiss Re, eight of the top 10 insured losses worldwide between 1970 and 2005 were weather-related, with five of those occurring in just two years, 2004 and 2005. Hurricane Katrina was more than twice as expensive as the 9/11 attacks.

What sort of additional disasters are we talking about, how often may they occur and how can we prepare for them? That’s the subject of a special report, Managing the Risks of Extreme Events and Disasters, being prepared by the Intergovernmental Panel on Climate Change, the body that has brought us the definitive word on human-related climate change.

It is a mammoth effort, combining delicate diplomacy (all 192 nation states that make up the IPCC have to agree the contents list), exacting scientific rigour (the draft report will be subjected to extensive peer review, with the work of more than 100 scientists to be coordinated) and speed. The report must be published within two years – a lightning fast turnaround in academic circles.

RMIT bushfire expert, Professor John Handmer, is a coordinating lead author for the chapter on the impact of climate extremes and aware that he’s juggling a hot topic. “Everyone wants to know if we’re going to have more heatwaves, fires, floods or droughts.”

Unlike the IPCC’s previous reports, which have focused on pure climate science, Managing the Risks involves an equal number of disaster experts, whose focus will be practical and action-oriented. The United Nation’s International Strategy for Disaster Reduction is backing the project and keen to establish how communities can become more adaptive and resilient.

At a time when everyone wants definitive answers, Handmer picks his way carefully through the nuances of climate disaster. “It’s incontrovertible that climate change is happening and will have negative outcomes – it is virtually certain that there will be more heatwaves, for example. The underlying science on this is longstanding. Papers from the late 1800s established the relationship between CO2 and warming, and calculations on the likely impact were being done in the 1930s.

“What is less clear cut is how this works its way through, thanks to what’s called the ‘attribution problem’. Take the Black Saturday bushfires in Victoria – was this a one-off event on the fringes of normal disasters, or was it made worse by climate change? The truth is, it’s difficult to make the call. Climate change may have had an effect, but so too would activities such as building in fire-prone zones, or arson.

“Disaster impacts show a strong upward trend – but separating the influence of increasing wealth and the increasing exposure of people, assets and economic activities to natural extremes from changes in those extremes is problematic.”

Handmer has taken on his unpaid role at a time when climate deniers are trying to turn scientists into public pariahs. “This is the biggest scientific effort in history, involving thousands of scientists directly and indirectly over two decades. There is a very large degree of detail – some of the draft chapters in Managing the Risks already have almost 1,000 references.

“Everything is subject to extensive peer review and draws from existing research that has already gone through rigorous testing and checking. It is also a very conservative and cautious process. But yes, it’s being written by humans who are not perfect and can make mistakes.

“The real problem is not the occasional mistake. It is that climate denial in Australia means that we have lost valuable commercial opportunities and gains in energy efficiency, which are being taken up in other countries, especially Europe.

“Australian science is seen as an important global player. In terms of climate change business opportunities, however, it seems that this country may be missing the boat.”
Imagine a world where paint doesn’t fade. Research into nanopigment technology could soon make colour fading in paint, plastics, textiles, glass and ceramics a thing of the past. And it will be non-toxic and environmentally friendly.

Professor Sati Bhattacharya and his team at RMIT’s Rheology and Materials Processing Centre (RMPC) have started the patenting process for the technology that provides better colour-fastness and also resists colour fading.

Their nanopigments use coloured particles that range in size from 50 to 100 nanometres. A nanometre is one-millionth of a millimetre, or one-billionth of a metre. They can be seen only under a powerful microscope, and help to evenly distribute colour across the surface of materials.

“Nanopigments can provide much better stability against fading and colour fastness for paints,” Bhattacharya says. “They maintain their fluorescence and colour stability after exposure to sunlight, while ordinary dyes fade.

“They also replace the hazardous heavy metal-based pigments that are currently used. The nanopigments use an organic base, without the toxic components such as cadmium, copper and other metals that we usually find.”

Bhattacharya’s team worked on a two-year project with Nanotechnology Victoria and Allied Colors and Additives before starting their patent application last November. Responding to industry needs, their focus was on fluorescent nanopigments, resulting in intellectual property development, protection and a licensing agreement with Aron Universal Ltd, which describes itself as India’s largest manufacturer and exporter of daylight fluorescent colours.

“Our design process means if we want a fluorescent pigment with a certain colour, we produce the nanopigment of the colour we want. It allows us to customise the nanopigments, so eventually you can have a greater variety of colours,” Bhattacharya says.

He and his team are also looking for ways to develop cool, black paints that reflect heat – particularly useful in a world where black cars of all shapes and sizes are becoming increasingly popular.

This work is currently concentrating on heat-reflecting pigments for car paint that can help to better protect vehicles from the effects of sun exposure. Originally part of a project researching cool pigments for the automotive industry, their work is not just concentrating on the outside of the car. Supported by the Cooperative Research Centre for Advanced Automotive Technology (AutoCRC), and Holden GM, RMIT’s RMPC is looking at how such pigments can be used on the plastics and other compounds used in car interiors as well.

By reducing the car’s absorption of heat, its internal temperature can be reduced, leading to improved comfort and reducing the use of air-conditioning, thereby saving energy consumption.

“The main challenge in achieving the effect of heat reflection is the need for maintaining the desired colour, such as black, which would normally absorb most heat,” Bhattacharya says. “The idea is that we are looking into the structure of these chemicals and how we can change those structures that will give us better heat reflection.”

Bhattacharya’s team members for nanopigment research are Dr Ivan Ivanov, Dr Sumanta Raha and Dr Nurul Quazi and PhD candidates, Edwin Baez and Balwinder Kaur.
When you think of Moe in Victoria’s Gippsland, images of mining, power generation and farming come to mind. Yet for Jason Seris, who was born and grew up there, these aren’t the images that filled his younger years.

Growing up, Seris’s dream was to be involved with flying aircraft, so after completing year 12 he chose to study aerospace engineering at RMIT.

He recently graduated with a Bachelor of Engineering (Aerospace) with first class honours and completed an internship at Rolls-Royce in Indianapolis, USA, where he worked with the GE Rolls-Royce Fighter Engine team. The team is developing the F136 – the world’s most advanced combat engine for the F-35 Joint Strike Fighter.

This year he will join the Rolls-Royce North American leadership development program – the first Australian to be chosen to take part in this prestigious program. He says he feels privileged to be part of the program.

“Rolls-Royce is one of the leading aircraft engine manufacturers in the world and to gain experience in such a large global company was fantastic.

“It’s almost impossible to have access to a company like Rolls-Royce. I think if I had written to the company a hundred times from Moe I would never have been offered an opportunity like this. My degree and the RMIT International Industry Experience and Research (RIIERP) program have opened up opportunities that I could never have dreamt of,” Seris says.

Jim Payton, Director of Business Development with the Fighter Engine team in Indianapolis, says that Australia is a leading partner in the F-35 Joint Strike Fighter program. “Seris and his fellow interns are making a real contribution to the development of the F136 engine. His selection for the leadership program is well-deserved recognition for this bright and hard-working young graduate,” Payton says.

As one of only a small number of recent graduates selected from several hundred applicants from around the world to join the leadership program, Seris begins his first placement in Indianapolis as a raw materials buyer in the purchasing team.

Over the five-year program he will complete five rotations across Rolls-Royce sites. Potentially he may find himself working in Washington DC, Singapore, Tokyo or at the company’s headquarters in Derby, UK.

“I’m very excited to continue my career with Rolls-Royce. The program develops graduates who demonstrate leadership potential, with the aim that they will progress rapidly to become senior leaders,” Seris says.

During his internship, he worked in business development, where he investigated the possibility of producing components in Australia for Rolls-Royce. He also worked in purchasing and visited suppliers around the USA to learn about manufacturing processes.

RIIERP Director, Professor Sylvester Abanteriba, says Rolls-Royce has been taking RMIT interns since 2002. “The technical skills imparted to our students by the highly professional and dedicated GE Rolls-Royce team ensure the quality of our graduates as competent professionals in an increasingly globalised economy,” Abanteriba says.

Clean, green speed machine

Not content with thrilling crowds at motor industry expos across Europe, the team behind Australia’s first hydrogen racing car is pushing the sustainable racer to its limits and setting world-record speeds for its class.

The car, which is powered by a two-cylinder internal combustion motorcycle engine converted to run on hydrogen, reached 133kmh during speed trials in Germany earlier this year.

The independently-verified results are being submitted to Guinness World Records. But the RMIT and Fachhochschule Ingolstadt University of Applied Sciences researchers behind the project are already aiming for 150kmh and beyond this European summer.
Professor Charlie Xue amid his storehouse of herbs.
Thanks to stringent cigarette advertising regulations and high-profile quit campaigns, Australia’s adult smoking rate fell from 34 per cent in 1980 to 19 per cent in 2007. Yet the fallout continues. According to QUIT Victoria, smoking is Australia’s leading preventable cause of death and disease, costing about $30 billion each year.

“Among its many other ill-effects, smoking is responsible for most cases of Chronic Obstructive Pulmonary Disease (COPD), an umbrella term referring to emphysema and chronic bronchitis,” says Professor Charlie Xue, Director of the Traditional and Complementary Medicine Research Program at RMIT’s Health Innovations Research Institute.

In people with COPD, lung tissue is progressively and irreversibly damaged. This leads to shortness of breath, fatigue, inability to perform day-to-day tasks and, eventually, death. Access Economics estimates that about 1.2 million Australians had moderate to severe COPD in 2008. Almost half were of working age, creating considerable ramifications for earnings and productivity.

In China, the situation is even more serious. As a developing nation, its regulatory system hasn’t yet caught up with countries like our own. “It is estimated that almost two-thirds of men in China smoke,” says Xue. “And, because COPD can take years to manifest, it’s reasonable to assume that the condition will become increasingly common in China for some time to come.”

According to Xue, Western medication provides only temporary and symptomatic relief from COPD. What’s more, the medication can have significant side-effects. But hope may be on the horizon – thanks to a collaborative study between RMIT and the Guangdong Provincial Academy of Chinese Medical Sciences in southern China into the potential use of traditional Chinese herbs for treating COPD.

“Traditional Chinese Medicine (TCM) is a complete healthcare system with a 2,500-year history,” says Xue. “Unlike Western medicine, which focuses on identifying and treating conditions affecting individual body systems and organs, TCM looks at the overall relationships between body systems and organs.”

TCM works on the premise that an imbalance in these relationships can affect the body’s energy, structure and/or function – making it more susceptible to disease. To restore the balance, TCM uses treatments like acupuncture, herbs, dietary modification and stress management.

Several years ago, Xue and senior respiratory physicians at Melbourne’s Box Hill Hospital began discussing the possibility of trialling a Chinese herb to treat COPD patients.

“Choosing which herb to study was no mean feat, since TCM uses almost 600 herbs, and often combines several to make a particular formulation,” says Xue. To complicate matters, his research team had to find a formulation with strong pre-existing evidence of quality, efficacy and safety. They also had to identify one that TCM practitioners can use in everyday practice.

Ginseng was the only herb that met both criteria. “Historically, ginseng has been used in TCM to improve lung, digestive and immune functions, and to increase general wellbeing,” says Xue. “We want to determine whether, and to what degree, ginseng can improve lung function and quality of life for COPD patients.”

Xue will lead two studies to answer these questions.

The first is a three-year trial beginning next month, recruiting 168 patients from Box Hill and Austin hospitals. $560,000 in funding will come from the National Health and Medical Research Council, with $30,000 from the National Institute of Complementary Medicine.

As an Adjunct Professor with the Guangdong Academy, Xue discussed the Melbourne ginseng study with his colleagues in China. “They were interested in expanding our work to trial the effectiveness of ginseng in combination with two other Chinese herbs,” he says. These herbs can’t yet be named because the formulation is subject to further pre-clinical evaluation.

Funded by $1.05 million from the Guangdong Academy, this three-to-four-year study is expected to begin in mid-2011, with about 200 participants from hospitals in southern China and Melbourne.

The two studies will enable researchers to compare the effectiveness of the three-herb formulation with ginseng on its own, based on data from randomised controlled trials. They will also determine whether the formulations could help reduce dependence on pharmaceutical medication.

For Xue and his team, the project is an opportunity to combine the best of Eastern and Western research methodology to tackle a major international health problem. “We in the West may tend to think that Eastern researchers have a lot to learn from us, but I believe we have a lot to learn from each other,” says Xue. “It goes both ways.”
Rugby is a hard, physically demanding game. Fast-paced, a lot of body contact, with players frequently thrown to the ground. But when it comes to the disabled version played in wheelchairs would the description still fit? Absolutely – fast paced, full contact, 110kg of combined wheelchair and athlete smashing into each other at speeds of up to 10 metres per second.

Wheelchairs that are used for sports differ from conventional “day chairs”, as they are tailored for self-propulsion and typically have cambered rear wheels for increased stability and improved turning capabilities.

Professor Franz Konstantin Fuss and Dr Mike Burton head an RMIT research team that is investigating customised wheelchair design for disabled athletes. Part of their research focuses on wheelchairs used for rugby.

Typically, wheelchairs used for sports are custom-built for individuals by manufacturers who use body measurement data from the intended user to drive the design and provide a specific user-fit.

Burton says current approaches to wheelchair customisation are mainly subjective, often relying on either the tacit knowledge of experienced users to provide a detailed specification, or a manufacturer’s ability to interpret a user’s specific needs and translate them into a suitable design.

“We have developed an experimental test rig that can be used to comprehensively evaluate controlled adjustments to all of the combined parameters that are used in rugby wheelchair design. This allows us to measure performance outputs and propulsion biomechanics while adjusting relevant wheelchair design parameters, such as seat position and wheel camber angle.

“A wheelchair that is built using the correct parametric design settings will result in a chair that is better tailored mechanically to an individual athlete. It will allow them to optimise their performance.”

To date, the research shows that key performance measures for wheelchair rugby are acceleration from standstill, sustained sprinting over short distances and the ability to perform tight turns at speed. Fuss says: “Optimum performance wheelchairs will prevent excessive energy being lost through the equipment. This helps a disabled athlete to be their true self when competing.

“For example, for a disabled athlete who plays wheelchair rugby with a weak left arm, the design of the wheelchair can take this into account and maximise the weaker push they get from that left arm to help them play and move more effectively.”

The team is currently working with the Australian Paralympic Committee to develop better fitting wheelchairs for athletes competing in the 2012 London Paralympics.

“We are also investigating the design of racing wheelchairs. We’ve found that by reducing the mass of a racing wheelchair by just 1kg we can improve an athlete’s winning time by at least 0.15 seconds. Less mass definitely equals improved performance,” Fuss says.

Better fitting and faster wheelchairs will help disabled athletes reach their full potential. As Fuss says: “We are working towards disabled athletes and able-bodied athletes competing together, with no boundaries in competitive sport.”

Burton adds: “But our research won’t just benefit disabled athletes; it will revolutionise wheelchairs for all disabled people. Eventually, wheelchairs will be more comfortable, they will fit people better and this will help disabled people around the world to get more out of life.”
The suave banker wears a 100 per cent Egyptian cotton shirt, designed in France and made in Italy. He politely receives your application, promising “support 24 hours a day, seven days a week”. The shirt is made by Chinese workers and the call centre is in India.

For consumers, the globalisation of labour is something that is out of sight and, mostly, out of mind. Production has moved dramatically from west to east and from north to the south. Increasingly, off shoring, out sourcing and international supply chain logistics are hallmarks of a global economy that creates winners and losers at both ends.

For business and management, globalisation presents complex labour challenges. A skills shortage, aka talent war, is a problem common to both developed and developing economies, says RMIT human resource management and Chinese studies expert, Professor Fang Lee Cooke (pictured).

“It means positions either go unfilled or filled by someone less qualified. On the flipside, firms can’t retain qualified people as they keep getting poached by competitors. This is a spiral that’s made worse by reluctance to invest in training.

“It happens at the top end, in professional roles like investment banking and insurance, and also on the managerial side, where there is a chronic shortage of managers with international exposure,” says Cooke.

At the lower end, intensified competition is driving costs down, degrading terms and conditions. “Exploitation is rampant in manufacturing sweatshops, with protection coming by way of sanctions and, more recently, international consumer groups like Fair Trade,” says Cooke.

Some dimensions of globalisation are misunderstood. “There’s a misconception that workers are dependent on local opportunities. Currently, we are seeing Chinese workers and engineers in Africa, just as we see Polish workers in Ireland.”

Prato, near Florence, hosts the largest Chinese migrant community in Italy for its fashion industry. There are more than 1,000 Chinese businesses employing more than 25,000 Chinese workers, many of them unofficial immigrants.

“Chinese migrant workers have transformed the dynamics of the textile industry that produces well-known luxury brands. Fake, semi-assembly and sweatshop labour products drive costs down and threaten the livelihood of local workers and businesses, generating conflict at times,” says Cooke.

In 2008, Chinese immigrants in Italy sent home around 1.68 billion euros, a significant share of the 6 billion in total Italian remittances.

So, if the shirt fits, will consumers, workers and investors continue to wear it? Cooke believes that the successful operation of multinational firms involves more than financial capital, technology know-how and market access. Increasingly, firms require political, social, environmental and cultural capital.

“Despite popular opinion, there is a significant opportunity cost associated with moving capital, such as factory, from one country or region to another.

“It’s about more than just the financials. The firms that will be sustainable are the ones that carefully tailor HRM strategies to a region, and understand the wider role that they can play in host country development by practising high-quality corporate social responsibility,” says Cooke.

Researching Asian business

The Asia-Pacific region has been one of the major beneficiaries of the globalisation of the world economy. RMIT’s College of Business has set up an Asia business and management studies centre to consolidate and expand knowledge and expertise in this area, and strengthen the University as a centre of Asian business research excellence.
Forty-nine per cent of RMIT academics come from overseas, bringing valuable cultural, industry and educational links.

Gosia Kaszubska traces three life stories

Suburban Melbourne is a long way from the rural town in the north-east Chinese province of Heilongjiang where Dr Lijing Wang was born. Covered in snow for months at a time, the town was home to families who had to be self-sufficient, making almost all they owned and eating only what their small farms could produce.

“My home town was quite similar to regional cities here but the way of life in the 1960s when I was growing up was more like the experience of Australia’s early settlers,” Wang says. “With the booming Chinese economy, the place has been transformed and the people there are working hard to catch up with the West.”

Wang studied in Tianjin for 13 years before coming to Australia in 1993 to reunite with his wife, who was studying in Sydney. He completed a doctorate in textile technology and joined what became RMIT’s School of Fashion and Textiles. After leaving for a decade-long stint as a textile research academic in Geelong, Wang returned to RMIT’s Brunswick campus last year.

His research focus is fibre processing and smart textiles, working on projects such as advanced sportswear, compression garments, intelligent electronic textiles and stab and bullet-proof fabrics. Wang’s strong ties to China’s textile manufacturing industry have, unsurprisingly, been helpful to his work.

“Maintaining my connections with the industry and research institutions in China has opened up many opportunities. Through my network in Tianjin, we recently signed off on an agreement between RMIT and Tianjin Polytechnic University, enabling their students to do the last years of their degrees here. I also work on research projects with various overseas institutions, including the Huazhong University of Science and Technology.

“As markets and production processes become increasingly global, these relationships will become even more vital in future. Textile technology is an area with immense growth potential. If we can bring together Australia’s strengths in research and technology with China’s manufacturing capabilities, who knows what we might achieve.”
Even as a little girl, playing ball games on the street outside her family’s apartment in the centre of Belgrade, Irena Cosic always knew what her future would hold. “My whole family – my mother, my father, my grandfather, my great aunt – they’re all engineers,” she says. “All my parents’ friends, nearly everyone I knew was an engineer. So I had no choice. There was just no other profession that was considered important.”

In the post-war years in Central Europe, engineers were more highly regarded than any other profession, playing a critical role in reconstruction efforts. Cosic focused at first on electronics then specialised in biomedical engineering, working to understand electro-magnetic waves and their effect on the brain, cells and proteins.

After working for 12 years in the Vinca Institute, the Serbian equivalent of the CSIRO, Cosic came to Australia with her family, “for the adventure”. At RMIT since 2002, Cosic is now the Associate Pro Vice-Chancellor for Research and Innovation, and leads the University’s Biomedical Electronic Group. The group’s many projects focus on developing the major breakthrough Cosic uncovered while still in Serbia – that the electro-magnetic properties of proteins in human cells define their biological function.

“I found out how to read information in the protein that tells us what it will do,” she says. “Before, it was like we could see individual letters but didn’t know which language the proteins were speaking. What I discovered was the language, which is electro-magnetic, but we’ve only just begun understanding how that language works.”

Though in Australia for more than two decades, Cosic has retained close ties to her homeland. She has long-standing collaborations with Vinca and the University of Belgrade, with academics swapping between RMIT and the Serbian institutes to further research projects. “Our early career researchers are also working together, taking the initiative and setting up their own partnerships with academics over there. That kind of cross-fertilisation of ideas, across such vast distances, it’s fantastic to see.”

Growing up in Delhi after the 1947 Indian partition, Supriya Singh saw in her own family a reflection of the social changes that transformed her country when 12 million people swept across the newly-created borders. “Education became very important, particularly for women,” she says. “I grew up always seeing my mother studying.

“Families like ours, who were dislocated from their homes at partition, didn’t have the security of men’s incomes or their kinship groups. Gender norms changed. Women’s place in the market, their search for financial independence – that was all my mother’s struggle.”

Informed by her experience, Singh brings great empathy to her work on the nature of globalisation and its relationship to money and technology at the RMIT Global Cities Research Institute. Her research covers one of the largest foreign money flows in the world – remittances sent home by migrant workers.

Remittances dwarf foreign aid and are worth more than direct foreign investment in developing countries, but their economic importance has only recently been recognised. India is the largest recipient of remittances, receiving about $US52 billion in 2008.

“Like much of my work, this issue touches a personal chord,” says Singh, who is also Professor, Sociology of Communications in RMIT’s College of Business. “My older sisters sent money home to Delhi from Mumbai and New York, and our survival depended on that 200 rupees each month.

“But in Asian cultures, sharing money within the family is simply the done thing. Money in Anglo-Australian families tends to flow one way – from parent or grandparent to child. It’s only when I came here in 1986 and started researching money that I realised the differences in cultural attitudes.”

Singh spent 19 years in Malaysia before coming to Melbourne. Australia, where she has lived longer than anywhere else, is now home. “Having lived in a range of different cultures, with a habit of reflecting on my experiences, I bring those observations to my work, where it all comes together.”
Despite sluggish business activity in the US and early hints of a slowdown in China, the next year bodes well for economic growth in our region.

Thanks to China’s astonishing economic growth rate and the subsequent export opportunities for its trading partners, Asia-Pacific rim countries fared reasonably well during the global financial crisis.

“In 2010-11, China will continue to hold the key to economic expansion in the region,” says Alan Oxley, Chairman of the Australian APEC Study Centre at RMIT (pictured). “The question is whether China’s demand for goods and services will continue at the current pace, or begin to moderate.”

According to Oxley, there are recent reports of warnings from high-ranking Chinese officials that the nation’s government has overstimulated state-owned enterprises to generate more products than the market can consume. This may reduce demand for imports.

On the other side of the Pacific, tentative signs of growing consumer confidence in the United States aren’t strong enough to outweigh the nation’s lingering debt problem. “In the wake of the global financial crisis, many businesses are still carrying heavy debts guaranteed by the US government,” says Oxley.

“Companies heavily in debt can’t do business. Until the government decides whether to bail them out or let them sink, US economic growth will lag behind that of many other APEC countries.”

The combination of a potential slowdown in China and sluggish activity in the US paints a picture of modest growth in the wider Asia-Pacific region in 2010-11; albeit at a rate higher than the rest of the world.

Ken Waller, financial regulation specialist and Director of the Australian APEC Study Centre, believes that the financial crisis and recovery period ahead highlight the importance of a key APEC goal: regulatory reform. “The countries that fare best in difficult economic times are those with the fewest regulatory impediments to doing business,” he says. “When there’s less money around, it’s harder to absorb business-related costs like transport and telecommunications.”

Restrictions on foreign ownership in countries like Indonesia, the Philippines and Malaysia, for example, can keep business costs artificially high, make it harder for companies to expand, and hamper national economic growth.

“Over the years, APEC countries have done a good job of removing trade barriers in manufacturing,” says Waller, “but now it’s critical to remove trade restrictions in the services sector to further reduce the cost of doing business.”

To support APEC in its goal of removing barriers to growth, the Australian APEC Study Centre trains government officials from around the region in key APEC priority areas including reforming regulations, raising investment capital via superannuation and insurance, and establishing public-private partnerships.

“As one of only three APEC Study Centres in the region,” says Waller, “we are proud of bringing people together for formal training and informal information exchange. Equipping them with the tools to create a better business environment can increase employment opportunities in their home countries and, ultimately, reduce poverty.”
Softly spoken Paul James likes a challenge. Although, when a couple of delegates walked out of his Middle East summit – shouting in response to an address they felt to be inaccurate and demeaning – he may have wondered what he was doing, a few days before Christmas, nearly 20,000 kilometres from home.

Late last year, Professor James and a team of RMIT Global Cities Research Institute colleagues brought together more than 200 reconciliation experts from around the world to tackle global cultural, racial, religious and political differences. The venue: Amman, with the support of HRH Prince Hassan of Jordan.

“It was incredibly complex setting up a forum for reconciliation in the Middle East attended by Israelis, Arabs, Palestinians, Bedouins, with Jewish, Christian, Hindu, and Muslim religions also represented. Months before the Summit we began briefing, dialogue and late-night teleconferences,” says James.

With people representing non-government organisations from 37 countries in different time zones, the scheduling of teleconferences became a logistical feat. “The global discussions, at times heated, became a disorienting experience of ignoring the usual divisions of local night and day,” says James.

The Pathways to Reconciliation Summit, part of the Global Reconciliation movement, has some big names attached. Patrons include Sir William Deane, Dr Lowitja O’Donaghue, Reverend Desmond Tutu, Aung San Suu Kyi, President Jose Ramos-Horta, Professor Bernard Lown and Professor Amartya Sen.

Global Reconciliation involves grass-roots projects that bring estranged peoples together to do something that is socially beneficial. It is developing a living archive of the world experience of reconciliation, having delivered events in Melbourne, London, New Delhi, Sarajevo and Amman since 2002.

Programs and partners, for example, provide support for children experiencing psychological trauma in Israel and the Palestinian Territories, assist in the reintegration of communities fractured by the HIV epidemic in Africa, develop curricula to promote peace and mutual understanding in schools in Asia and the Middle East, and ensure cultural sensitivity and ethical behaviour among health aid workers from Australia.

But the movement has critics. Some people say that James, and summit co-convenors Professor Paul Komesaroff and Dr Elizabeth Kath, should wait until the violence or oppression has finished before supporting projects.

“Some people ask, ‘how can you ask us to reconcile with people who continue to oppress us?’ Our response is that the moment of political resolution is infinitely deferrable. Unless we involve ourselves from below to find alternatives now, we will be waiting a long time for the grand road maps and blueprints to bring us peace,” says James.

And the two delegates that walked out, shouting? “Later in the morning, we saw those same individuals sitting with the person they felt had defiled their culture. They were hunched over a small table, drinking coffee, and talking animatedly through their differences,” says James.
How do non-Western artists capture their culture when it is in rapid transition from the traditional to the ultra-modern? That was the challenge that lay behind *Across the Gulf*, a major exhibition of works by 22 artists from Bahrain, Abu Dhabi and Dubai.

The project was initiated and developed by Metasenta, an arts research hub hosted by RMIT and University of the Arts London. Metasenta director, Dr Irene Barberis, says the exhibition – at the Brisbane ARC Biennial late last year – was striking.

“It presented a showcase of emerging and established artists who are all practising from within their culture, rather than building their practice in the West. These artists are making contemporary art in the face of a cultural landscape that is undergoing intensive and unparalleled change.”

*Blossom*, a 2009 digital print by Maitha Demalthan from the United Arab Emirates, was one of the works in *Across the Gulf.*