

Auckland

MAKING AN IMPACT

NOW

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Power business

Turning wireless power research into a top business

Future-proofing Auckland

Creating a sustainable city

Making connections

The science of wound-healing



THE UNIVERSITY
OF AUCKLAND

NEW ZEALAND

Te Whare Wānanga o Tāmaki Makaurau



Bright sparks

Delivering electricity without plugs or cables may sound like science fiction but engineering and commerce graduate Fady Mishriki (pictured left) has turned it into commercial fact.

While still a student at The University of Auckland in 2005, Fady saw a way to take the Inductive Power Transfer that had been pioneered by electrical engineer Professor John Boys and build a business delivering high-efficiency wireless power solutions in situations where power cables and connections are expensive and unreliable.

With the support of the University-backed business incubator ICEHOUSE and UniServices, the University's commercialisation company, Fady is now CEO of PowerbyProxi, a global leader in providing wireless applications for aerospace, security systems, off-road vehicles and industrial robotics. The company has more than 30 customers including Fortune 100 companies and it has offices in New Zealand, the United States, Japan and Spain.

In Spain, Fady and his team have had their latest break-through. Spain is the world's third largest producer of wind power and PowerbyProxi has just completed ground-breaking trials to replace conventional slip rings in the turbines with its wireless technology.

"The challenge with wind-generation is maintenance costs", says Fady. "Modern wind turbines include control systems to alter the pitch of the rotating blades to make best use of available breezes and also turn them away from excessively high winds to avoid damage.

"These pitch control systems are connected through the rotating turbines hub using a mechanical slip ring, which looks something like the disc brakes on your car. The slip ring is prone to getting dust inside, wearing out or breaking down. We have replaced it with a Proxi-Ring™ 480 that makes the same connection without

touching. It doesn't rust, it's waterproof and it doesn't need cleaning or maintenance." IM FutuRe, one of Spain's leading wind turbine maintenance operations, has signed up PowerbyProxi for an initial roll out to 500 turbines.

Fady, who was born in Bahrain, was one of the founders of Spark, The University of Auckland's student-led entrepreneurial competition that has kick-started more than 70 companies, raised over \$85 million of capital and created 230 jobs. "Once I got involved in Spark I knew exactly what I wanted to do. Entrepreneurship was always in my upbringing."

He then teamed up with the former CEO of Microsoft New Zealand, Greg Cross. They launched PowerbyProxi in 2007 and were joined by fellow engineering student Kunal Bhargava (pictured right) as product development manager.

Their first big break came quickly when they secured John Deere, the world's largest maker of farm and forestry equipment, as an investor and customer.

PowerbyProxi still maintains strong ties to the University. Six University-trained engineers are based at the Auckland office and Fady is working with Dr Patrick Hu's Electrical and Computer Engineering laboratory to create a large research framework.

"We want to invest in training the next generation of wireless power engineers," says Fady, "many of whom will have the opportunity to work for us."

www.powerbyproxi.com

Auckland Now showcases the impact The University of Auckland has on Auckland, New Zealand and the international community through its teaching, research and community service. For more information contact us at: aucklandnow@auckland.ac.nz



Built to last

Turn on the tap and water comes out. If that doesn't happen, no activity in a city can be sustained. So how does our water get to taps and how long can we take it for granted?

This would usually be a topic for engineering and science students but a new, multi-disciplinary research project at The University of Auckland is calling on planners, architects, dancers and the education faculty to help understand the city's water issues.

The *Transforming Auckland* project is taking a practical and theoretical approach to the sustainability of water as well as transport, solar power, housing and green spaces and topics like leadership and support for our ethnic communities.

"We're working with research groups across the University in new ways to support the region-wide Auckland Council as well as community initiatives," says Professor Jenny Dixon, Dean of the National Institute of Creative Arts and Industries which is hosting *Transforming Auckland*. "At the same time we're contributing to national and international research on sustainability."

For water to continue to flow from taps people need to understand and value the resource and that comes down to public awareness. Architecture and planning students are mapping water around the city while science students focus on geomorphology and microbiology. Their work will become part of a series of urban installations.

Meanwhile post-graduate dance students are interviewing community members about water. Their ideas and experiences will be turned into public dance performances early next year.

"Almost everybody has something to say about water and we want to unearth people's connections and understandings, stories and imaginations," says project leader Dr Charlotte Sunde.

As well as collaborating across the University, the *Transforming Auckland* project has linked up with the Auckland Council to study sustainable urban growth.

Higher-density housing with good public transport links is a key strategy to encourage sustainable development and avoid sprawling suburbs, but overseas experience shows people aren't keen on high-density living.

With that in mind, Errol Haarhoff, who is Professor of Architecture and co-ordinator of the Urban Design programme, is leading a project funded by Auckland Council to assess three transit-orientated housing developments located near public transport routes in Onehunga, Albany and Waitakere.

"Council wants to understand the experiences of people in these developments," says Regan Solomon, team leader Built Environment in the Council's Research Investigations and Monitoring Department.

Errol's research team aims to find out what lessons can be learnt from these developments to help shape Auckland's future growth strategy. It is predicted that Auckland will need more than 170,000 new households by 2026 and affordable, good quality housing is a key to attracting a good migrant workforce. "We've got to deliver housing fit for purpose and to avoid further urban sprawl much of this will be at a higher density," says Errol.

"We live in uncertain times both economically and environmentally," concludes Jenny Dixon, "and a lot of the work we are doing with *Transforming Auckland* is about being prepared for the future."

www.transforming.auckland.ac.nz



Top rank

Morgane Elsen (pictured above) grew up in Belgium, close to some of the greatest art galleries and museums in the world, yet she chose to study Art History at The University of Auckland. As well as enjoying the New Zealand way of life, she was attracted to the University's high ranking internationally.

"I originally came to New Zealand on a school exchange," she says. "I really liked the lifestyle and the fact I could study at a world-class university encouraged me to stay."

According to the latest QS World University Rankings® – an annual league table of the world's top 600 universities – Auckland is the highest ranked in New Zealand at 82. Second is the University of Otago at 130 and the University of Canterbury is third at 212.

The University of Auckland's world ranking was also an important factor for 24-year-old Satya Brota Guha from Dhaka, Bangladesh, when he was considering where to study for his masters in electrical and electronics engineering. "Auckland's high ranking was the deciding factor over other universities," says Satya, who completed his undergraduate degree at North South University in Bangladesh, with exchanges to universities in Malaysia and Singapore.

The league table puts The University of Auckland on a par with prestigious international institutions such as Lund University in Sweden, 86, Fudan University in China 91, and The University of Adelaide, Australia 92 (Top of the list was the University of Cambridge, followed by Harvard.)

"I don't think New Zealanders realise what a truly world-class university they have here," says David Baker, the director of the University's International Office, who formerly held similar positions at Leeds and Durham Universities.

As well as its high overall ranking, Auckland is in the top 50 in individual subject areas: 18th in the world for Law, 23rd for Modern Languages, 27th in Psychology and 39th in both Medicine and Biological Sciences.

The QS World University Rankings® are compiled in close consultation with an international advisory board of leading academics. Universities are assessed on research, teaching, employability of graduates and global connections. These factors are measured by staff citations in respected journals, the ratio of staff to students, the experience of employers and the number of staff and students from overseas.

While the ranking is a key measure of the University's quality research and teaching, it is also critical for recruiting international students. We have 4,700 international students from more than 93 countries – by far the largest overseas student population in New Zealand. They pay full fees and contribute about \$70 million to the University's finances each year.

David says the University's long-term strategy is to attract more international students. However, some overseas governments will only sponsor students to the top 100 universities. "For example Chile has quite a big sponsorship programme but only Auckland and Otago in New Zealand meet the quality threshold to receive them. Other major international sponsors are less explicit about thresholds, but most seek to place their students at leading universities. So maintaining our positive ranking will continue to be very important."

www.topuniversities.com/university-rankings/world-university-rankings



Eye contact

When a Auckland man suffered alkaline burns to his cornea after high-pressure concrete was accidentally squirted into his eye, the wound refused to heal and doctors thought there was nothing more they could do to save his eye.

Enter Professor Colin Green and The University of Auckland's Connexin Biology team. For the past 10 years they have been developing a unique wound-healing gel called Nexagon®. The drug isn't registered yet but ophthalmologist Sue Ormonde received permission for compassionate use. She placed Nexagon® gel on the cornea and was rewarded to see the wound heal quickly and the man regain full sight.

Nexagon® is based on pioneering research into the biology of connexin (gap junction proteins involved in cell to cell communication) which could change the way doctors treat wounds from leg ulcers to damaged arteries. It goes back to 1998 when Colin made an important discovery about gap junctions. It was thought that these junctions opened at the wound to help the healing process. But when Colin tested this theory on damage in the brain he found the reverse - when the junctions were blocked, the wound got smaller, not bigger. "We decided this had to be a generic response so we started looking at skin wounds and other tissues in the body."

Throughout this discovery Colin, who is now Professor of Ophthalmology and Translational Vision Research, collaborated with Professor David Becker, a London-based cell biologist.

"We discovered that when you injure your body, you get an over-production of proteins that inflame the wound and this hampers the healing. It is probably something that evolved a long time ago when injury was likely to lead to a massive influx of bacteria and we needed a big inflammatory response. With modern hygiene we don't need it."

After help from UniServices, the University's commercialisation company, Colin and David founded CoDaTherapeutics (NZ) Ltd in 2003. Three years later they co-founded CoDa Therapeutics, Inc, which is based in San Diego. This company is developing two drugs:

Nexagon® gel works by stopping connexin proteins being made at the site of surface wounds. It is in Phase Two human trials in New Zealand and the United States.

The second, Peptagon, binds to gap junction channels at a wound site to reduce damage spread and inflammation. It is in an earlier stage of development but Colin says the aim is to deliver it internally through the blood stream to stop blood vessels leaking and to reduce inflammation and lesion spread after, for example, stroke and heart attack.

"We're also focused on macular degeneration in the eye which affects the vision of 10 percent of the population aged over 65," says Colin. "It's a chronic disease caused by inflammation at the back of the eye which we believe causes blood vessels to leak, leading to further inflammation and vision degeneration. We're trialling Peptagon to prevent disease progression, and even start the healing process."

The applications for this new biology will continue to open up, says Colin. "Until very recently the industry approach to wound healing has been to add an excess of something already present such as a growth factor. We're the first company that's said 'Hang on, if we stop something earlier on we can get vastly better healing.'"

www.codatherapeutics.com

Balancing act

Sean Brookman and Matthew Match are promising rugby players who also keep their eye on the ball when it comes to their studies.

They are the first recipients of The University of Auckland's John Drake Memorial Scholarship, worth \$5000 a year and given to an outstanding all-round school leaver to study and play for the University Rugby Club.

John Drake was a tight-head prop who graduated with a BCom from the University and played for the All Black team that won the 1987 Rugby World Cup. John died in 2008 and the scholarship honours his achievements and encourages students like Sean and Matthew to follow in his footsteps.

Sean, 18, who plays lock and is in his first year studying Law, says the scholarship has eased the financial pressure. "It has taken a load off my mind and means I can combine study with a rugby career."

Matthew, 20, agrees that the scholarship has made it possible for him to get the most out of his time at university. He plays blindside flanker and is in his second year of a Civil Engineering degree.

As well as playing for the University, both men have been with the Auckland Colts and aspire to getting into the premier ITM Cup team, the Super 12, and eventually a place in the All Blacks.

"But I think having another career is important," says Sean, "and it's pretty much a pre-requisite these days. Look at an All Black like Conrad Smith who has a Law degree. It's something to fall back on if you're injured, and it's a career if you don't get into top-level rugby."

Matt agrees: "It's good knowing I have all my career options covered."

www.johndrakescholarship.org.nz

