

DES News

Department of Engineering Science

April 2011 | Alumni and Friends quarterly newsletter | Number 10

Dear Alumni and Friends

This is yet another one of my many "firsts" as Head of Department - my very first column for the DES News. How did that happen? When I arrived in NZ in February 2000 as a lecturer, intending to spend a year away from my home university in Germany to gain some international experience, I certainly had no clue that I'd ever be in this office writing this column. I had kept my flat in Germany for my planned return 12 months later while living out of a suitcase in an ex-motel in Greenlane. Of course the department was still located on level 6 of the Engineering building, and there was no DES Newsletter, so it was impossible to predict April 2011 then. I tend to blame David Ryan (Head of Department in 2000) for it all, who told me "You can stay as long as you wish" not too long after my arrival. Things have progressed quite a bit in the last decade, and here I am, thinking about what to put in this text. I'm very proud to be part of the DES family, and (for a limited time) in the driver's seat. And I'll do my very best to serve the department as my predecessors have done.



With the start of the 2011 academic year, I am very pleased to report on the excellent quality of our student intake into Part II of the Biomedical Engineering and Engineering Science degrees. With 25 and 35 students (including 7 and 9 accelerated pathway students), respectively, all places have been filled. Moreover, the quality of students is superb, with Grade Point Averages (GPA) of 6.4 and 5.83 required to gain entry in the programmes. These students all enjoyed their recent field trip to Rotorua, where they got to know each other during two and a half days of industry visits and fun activities (see inside for more on the field trip).

The next few months will be exciting times, as we will see some changes in staff. Ian Collins is retiring at the end of the first semester. It will be hard to imagine the department without Ian, who has been on the staff since 1981 and HoD from 1981 to 1991. Last but not least I want to congratulate Rosalind Archer and Edmund Crampin who have been promoted to Associate Professor with effect of 1 February. Well done and well deserved.

That's me for this time. Stay tuned and watch out for the next edition.

Professor Matthias Ehr Gott, Head of Department
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DES Alumnus joins Faculty of Engineering

Imee Tribo (Class of 2001) returns to support and promote women in engineering

We are delighted to welcome Imee Tribo back to the university, as Women in Engineering Equity Adviser. Imee commenced this role in December 2010, taking over from Robyn Macleod who has taken a leave of absence from the Faculty of Engineering.



Imee's role is to promote engineering to female secondary school students, teachers, school careers advisers and parents through school/community visits, publicity of female engineering role models and annual events such as Enginuity Day that encourage girls to consider courses and careers in engineering.

Imee also supports the female students within the Faculty of Engineering by providing information, support and assistance on academic, personal and career issues. She also oversees the Women in Engineering Network (WEN) which provides a wide range of social, academic, cultural, sporting and community volunteering opportunities. Imee says "I definitely have some big shoes to fill as Robyn did a great job in her time here, but I'm excited to spread the word about what engineering is and the opportunities that it offers, especially to women who may never have considered it before."

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Do you have news to share?

News on current staff and students is easy to obtain, because they're right here. News on wider family members - alumni and former staff - doesn't necessarily reach us. If you have something to share, email it to desnewsletter@auckland.ac.nz

SEE NEXT PAGE FOR IMEE'S PROFILE

Featured Alumni

Imee Tribo, Class of 2001

I was part of Datacom's January 2002 graduate intake, starting off as a Programmer. I've heard managers there say that EngSci graduates differ from Computer Science graduates because we focus on how to analyse a problem and formulate a solution before diving in to write code. I definitely had that skill, and it contributed to my quick progression in becoming a Business Analyst, where I was fortunate enough to gain experience in several different industries and put that problem-solving mindset to use.

A year later, I founded the Engineering Science Mentoring Program with a lot of help from friends who'd graduated with me. We volunteered our time and resources to give presentations to 4th year students on project presentations, job hunting, interviews and what to expect in your first job. It was a fun and rewarding experience, and a way to "give back" to the department.

In 2006, my husband and I moved to the United States to be closer to his family and have a good base for travelling. We lived in Seattle for 3 years, and initially, I took some time away from the corporate world by working as a nanny for a few months. I then worked in AT&T Mobility's B2B division, first as a Business Analyst then as a Product Manager. I had my own team of Business Analysts and worked on some exciting projects like iPhone launches. I also volunteered at a local transitional housing facility for women, teaching basic computer classes, which reminded me how easy it is to take the knowledge that we have for granted.

2009 was a big travelling year. After short trips to Mexico and Alaska, we left Seattle to spend most of the second half of the year travelling across the US and Europe, before moving back to New Zealand. There's a certain lifestyle here that's hard to beat, plus we wanted to be here for the Rugby World Cup. We're already planning our next big trip (hopefully Asia in 2012).

On returning, I found a job at Orion Health as a Development Project Manager (thanks to one of my former EngSci classmates), then discovered by chance (via another classmate) that Robyn Macleod was taking a leave of absence as the Women in Engineering Equity Adviser. I applied, and got the job.

150 year 12 students get a glimpse of BME

Around 150 Year 12 school students spent time with us in late January, learning about Biomedical Engineering as part of the fortnight-long 22nd Rotary National Science & Technology Forum.

The Year 12s were first given an overview of Biomedical Engineering by Associate Professor Edmund Crampin, followed by sessions on orthopaedics (bones), and the lung and its functions. The students came in six groups of 26, each group visiting for half a day. A good time was had by all - both the students attending, and the staff giving the presentation.

BME and EngSci Part II Field Trip

Sixty incoming students, accompanied by four staff, began their first semester in DES with the traditional three-day Part II Field Trip, which ran 10-12th March.

On the Thursday students visited Opus, Beca, IRL and Optima, in many cases hearing first hand from EngSci and BME graduates where their degrees can take them in terms of careers. That evening, in Rotorua, the students were charged with preparing dinner, and fully delivered.

The next day involved a visit to Contact Energy, where students were given a tour of the Wairakei geothermal fields and power station, organized by [Kerin Brockbank](#), another DES graduate. Lunch was at the Rotorua Museum, followed by a tour and 'interactive' account of the 1886 Tarawera eruption.

The Field Trip concluded on Saturday with a choice of either white water rafting (one raft flipped on the main waterfall, an event which was enjoyed by all except the occupants), or something that could be the future of green commuting, [Schweebing](#) (pictured right).



Congratulations to 2010 undergraduate prizewinners:

Cecil M Segedin Prize in Engineering Science

Christopher Vogel

Auckland Bioengineering Institute Prize in Biomedical Engineering

Tessa Paris

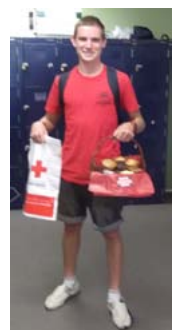
Senior Scholars

Iain Dunning & Christopher Vogel (Engineering Science)

Rebecca Pullon (Biomedical Engineering)

Cakes for Canterbury

Ordinarily, we would enjoy student baking once a year at the annual bakeoff. On Monday March 14th this year, however, the impressive baking talent of our undergraduates was again apparent in their fundraiser 'Cakes for Canterbury'. EngSci Part IV student and class rep Amelia White spearheaded the fundraiser, organising all the undergraduate years involved to either make or sell cupcakes, or a mixture of the two. Together, the BME and EngSci undergraduates raised \$664.70 which was deposited into the Red Cross earthquake appeal account as well as around \$60 worth of direct text donations to St Johns.



Left: An example of the deliciousness produced, these made by Sam Cheng (Part III EngSci) with the help of his mum
Centre: (Left to right) Amelia White, Kat Gilbert and Jesse Collis (all Part IV EngSci) counting the proceeds
Right: Alastair McDowell (Part II EngSci) out collecting

Former DES staff appointed Associate Editors

Honorary Associate Professor Don Nield has been appointed as an Associate Editor of the journal Transport in Porous Media (TiPM), with responsibility for papers on convection and heat transfer. Associate Professor Margot Gerritsen, a former staff member of the Department of Engineering Science who is now at Stanford University, has also been appointed an Associate Editor of TiPM, with responsibility for papers on numerical methods.



Don (who was Cecil Segedin's first PhD student) is now in his fiftieth year on the staff of The University of Auckland - half spent in the Department of Mathematics and half in DES (still Department of Theoretical and Applied Mechanics when he started). He now has a Hirsch index of 25, and spends his official retirement writing papers on convection in porous media in collaboration with [Andrey Kuznetsov](#) (North Carolina State University), [Antonio Barletta](#) (University of Bologna), Craig Simmonds (Flinders University) and others. Don and [Adrian Bejan](#) (Duke University) are currently talking with Springer about a possible fourth edition of their book Convection in Porous Media (1992, 1999, 2006), which has been cited over 1700 times. His current work involves nanofluids, power-law fluids, tridisperse porous media, and the effects of viscous dissipation, heterogeneity and throughflow.



Margot holds a PhD in Scientific Computing and Computational Mathematics from Stanford University, and was employed as a lecturer in DES from 1996 to 2001. Margot's research has addressed a range of topics including the oil, gas and coal industry, renewable energy options, fluid flow, design of sails for competitive yacht racing, the mathematics behind the internet, and financial mathematics. She was involved in an educational project with the National Geographic Society on the design of a remote control pterosaur which resulted in the production of a documentary entitled "[Sky Monsters](#)". Margot is currently an Associate Professor in the Department of Energy Resources Engineering, and Director of the Institute for Computational and Mathematical Engineering, both part of Stanford University.

Summer at Stanford

Mark Finch (BME, Class of 2006) visits two US universities

Last year I was lucky enough both to be accepted into Stanford University's Summer Institute for Entrepreneurship, and to receive a scholarship to attend.

The course is a one month intensive program designed to utilize a combination of lectures, team projects, small group discussions, workshops, and guest speakers to give the participants a comprehensive experience and a solid understanding of the process of starting a new business venture. The lectures taught both hard skills (such as finance, marketing, and accounting) and soft skills (such as public speaking, leadership, and networking) needed to excel in a business environment. The course is aimed at technically minded people (engineers, doctors, scientists etc) in an attempt to teach us how to 'bridge the gap' between academia and industry.

Spanning the course was a group project, in which we were required to come up with an idea, formulate a business model, and put together a funding pitch to be presented to venture capitalists at the end of the course. It was a whirlwind experience, and enormously beneficial to actually go through the process whilst having mentors there to help and guide us.

The guest speakers were entrepreneurs who spoke to us about their experiences. One of my favourites was Tim Westergren, founder of Pandora Radio, who took us through the highs and lows of his success. This included how he kept the dream alive and his employees motivated with no money during a stint of two years where he didn't have enough money to pay any of his employees - when he finally got funding, he told everyone by turning up to a weekly meeting and handing out cheques to everyone! He was an amazing inspiration and just shows how much influence one person and their idea can have on a group of people.



Mark Finch (left) at Stanford, with Geoff Whitcher, his entrepreneurial mentor (Commercial Director, UoA Developments)

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Featured Alumni

Keith Parks, Class of 1995

After graduating with a BE in EngSci in 1996, I did a thirteen month OE through the South Island, the Western USA, and South America.

In 1998, I joined Henwood Energy Services Inc (HESI - now part of ABB) in Sacramento, CA as a software developer maintaining simulation software used in the electricity industry. In 2000, I briefly joined a start-up in Boulder CO with a focus on energy system modelling (it "dot-bombed"). I then moved to Xcel Energy in Denver CO as a Generation Modeling Analyst. I used simulation tools to forecast fuel purchases and developed price signals to support energy trading.

Bored with the desk job, I quit and trained to become a course leader for the National Outdoor Leadership School taking young adults on outdoor adventures for weeks to months at a time.

In 2005, I ended my transient lifestyle by joining the National Renewable Energy Laboratory as an Energy Analyst. I developed simulation models for the Dept of Energy's hydrogen transportation fuels program.

In 2007, I joined Xcel Energy again as an Energy Trading Analyst. I developed models to assess the value of energy purchases including purchases of wind energy. In November 2009, I dedicated myself fulltime effort to wind energy integration efforts. I manage a contract with the National Center for Atmospheric Research (NCAR) developing a state-of-the-art wind energy forecasting tool.

On the side, I sell grass-fed beef from my father's ranch, fix-up homes, grow veges, and occasionally ski, cycle, and rock climb.



New Staff - IT support

Johnny Lu

Johnny graduated from The University of Auckland (UoA) in 2005 with a BSc in Computer Science. After his first job as an IT Support Technician at AUT, he returned to the UoA in 2008, this time as a member of the Faculty of Science IT support team 'SIT'.

Johnny is qualified as a Microsoft certified engineer and Cisco network technician, and his skills are focused around the Windows environment (desktop and server), with some recent experience of Linux. Johnny is outgoing and active, and in life outside work, he participates in outdoor sports such as soccer and swimming. He is also a keen filmgoer.

Laxman Sunkari

Much of Sunkari Laxman Murthy's family were in the Faculty of Engineering here before he was - his wife as Department of Mechanical Engineering admin, and his twin daughters having done their BE's in Biomedical Engineering and Computer Systems Engineering. He himself comes from an electrical engineering background, specializing in the design and optimisation of transmission lines. Prior to moving to New Zealand in 1998 he worked as a senior engineer in his field, in Saudi Arabia and then Dubai.

IT was the result of a necessary career change after moving to New Zealand. His new career began as a lab tutor at the AMES IT Training Academy in 2000, and Laxman was fortunate enough to develop a passion for IT. After working at various companies in the private sector he joined Mechanical Engineering as a temp, before moving to us in August of 2010. He has one other daughter, currently doing a BCom at AUT.

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I spent the next four months collaborating with Professor Ian Hunter's group at Massachusetts Institute of Technology's BioInstrumentation Laboratory as part of the MIT-ABI BioInstrumentation initiative, which is headed by Dr Andrew Taberner and funded by the Vice Chancellor's Strategic Development Fund. While at MIT I continued my research on WIMOTIONZ, the development of a wireless, inductively recharged, inertial measurement unit coupled with a mathematical model, drawing on the engineering expertise in Professor Hunter's lab. I also developed a GPS module for the MICA (Measurement, Instrumentation, Control, and Analysis) Project. The MICA project is a research and development project currently being developed in Professor Hunter's lab and is aimed at producing a line of sensors and generators that are linked together wirelessly and controlled from a laptop.

The experience of being immersed in Silicon Valley's entrepreneurial culture and MIT's engineering excellence, essentially being surrounded by some of the world's brightest people, was really inspirational and showed me that you can never dream too big.

Summer Scholarships 2010/2011

This year we had sixteen students on summer scholarships. Twelve were funded by the University, one by Fisher and Paykel Healthcare, and three by Andrew Pullan's research. The Auckland Bioengineering Institute also runs a number of summer scholarships which engage many of the Biomedical Engineering students.

Previously known as Summer Studentships, the scholarships are aimed at encouraging third and fourth year undergraduate students towards graduate study by giving them a taste of 'full time' research. Scholarships are offered annually over the summer break, and are worth \$5000. Following are some examples.

Iain Dunning, Part IV student 2010 - LPG: Linear Programming on GPUs

Most people are familiar with the steady increases in the computing power of desktop computers over the years, but researchers can always find uses for more. One option is to re-purpose a common computer component that is usually only used for producing 3D graphics: the GPU, or Graphics Processing Unit. GPUs are very good at doing a very large number of small steps all at once - for example, simultaneously figuring out what colour each pixel on your computer screen should be at any given moment. Recent changes in the software that drives these GPUs has opened up the possibility of using them to perform non-graphical tasks. In this project a computer program ("LPG") that solves linear programmes (a type of optimisation problem) with and without the use of these GPUs was written. It was found that if a GPU was utilised, problems could be solved up to 10 times faster than without them. This result suggests that there may be significant benefits to be had by modifying existing solvers to use GPUs.

What next for Iain? "I finished my undergraduate degree at the end of 2010, and was offered places in the Operations Research PhD programmes at MIT, Stanford and Cornell. I'm just back from a two week visit to America, and will be heading off for good in August to MIT. Until then I am tutoring and assisting in the running of a couple of courses in the department."

Paul Robertson, Part III student 2010 - Numerical analysis of upper airways

Over the summer I developed two protocols for Fisher & Paykel Healthcare Ltd. One was for extracting 3D surface models of the upper airways from CT scans, the other was for creating and running computational fluid dynamics (CFD) analyses of nasal cannulae in the upper airways. In creating these protocols I was not only required to develop and document the steps required, but I also had to find appropriate software tools for the job, which required extensive searching which (at times) proved a bit frustrating. However, in the end we settled on three software packages: Mimics, MeshLab and Ansys. Mimics and Meshlab were used for surface extraction while Ansys was used for the CFD analyses.

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What next for Paul? "2011 will be the final year of my BE, however this is actually my 3rd to last semester as I'm studying a conjoint degree (with arts majoring in German and French). Once I graduate, I'm planning to do a PhD overseas, although I'm not yet sure where I would like to study."

Amelia White, Part III student 2010 - Investigation into optimization of the ADHB general medicine roster

The aim of my summer project was to build improved rosters for the General Medicine ward. In order to do this essential roster rules were implemented as constraints within a mathematical model. Using this model, an optimal roster was developed which minimised the variance in patient numbers across wards. The resulting roster is expected to perform better than the current roster but further R & D is being undertaken before this solution will be implemented by the Auckland District Health Board (ADHB).



Featured Alumni: Jeff Meyer, Class of 1983

I was enticed into TAM (Department of Theoretical and Applied Mechanics) after meeting Cecil Segedin, and studied Engineering Science as part of a small group of 9 students - unusually, nearly 50 percent of them women. I was forever trying to find my Fiat Bambina motorcar which the engineers delighted in picking up and leaving in unusual places.

My first job was with BCHF in their IT department. Now the Beca group, they are today one of the largest employers of Engineering Science students. While there, I started to see some of the challenges of implementing complex IT solutions, and I was fortunate enough to work on some very interesting software projects requiring heuristic optimization solvers, with some great engineers. Almost immediately I resumed part-time university studies in Computer Science to gain a more structured understanding of computing algorithms and hardware, which has proved an extremely useful adjunct to Operations Research (OR) during my career.

I next joined Air New Zealand to develop software to create rosters for aircrew, using Operations Research. It was almost unheard of to have such a job opportunity in New Zealand - this was in the very early days of the now extremely successful relationship started by Professor David Ryan and a far-sighted executive, Paul Murray. I set up the Operations Research Group at Air NZ, and was promoted to be responsible for the administration of over 450 pilots, giving me invaluable experience in all aspects of crew management, from hiring, pay, qualifications, training, leave, promotion and so on. This was an extremely exciting and changeable time industrially, as the law had just changed to allow individual contracts and the airline was working with two pilot groups to introduce a complete change in pay, terms and conditions; a huge challenge!

At Air NZ, I collaborated closely with David Ryan to foster academic research on the many different issues needing to be solved for aircrew scheduling, with the result that many students carried out high-quality research on real business problems, making valuable contributions, and in many cases, being employed after finishing their studies. This included 4th year projects, Masters and PhD programs. This resulted in a suite of sophisticated optimization tools that provided high-quality rosters for staff, and improved productivity. In 2000, the work was recognized as world class when Air NZ crew scheduling systems were finalists in the prestigious Franz Edelman prize.

In 1998, a group of colleagues and I founded a company to provide advanced decision support systems for industry, with an initial focus on aircrew scheduling. Our focus changed in 2001 after the 9/11 twin towers event, as the global aviation economy collapsed. Fortunately, we won a major contract with Melbourne Metropolitan Ambulance Service, based on a prototype that one of the founders had developed. We commenced a journey which took us from being highly technical aviation optimization specialists, to believing that we had identified a niche market in Emergency Services decision support in which we could become world-leaders.

Optima and DES

In 1998, DES Alumni [Dr Paul Day](#) (Class of 1990, PhD 1996), [Jeff Meyer](#) (Class of 1983), and [Andrew Goldie](#) (Class of 1990, ME 1996) invited DES staff [Professor David Ryan](#) and [Dr Andrew Mason](#) (Class of 1987) to join them in founding a company that would develop advanced decision support systems for industry using advanced OR techniques. This was the birth of [The Optima Corporation](#).

Optima's initial focus was on aircrew scheduling, based on David Ryan's fifteen years collaboration with Air New Zealand, and experience gained by the three alumni while working at Air New Zealand (Air NZ). [Optima's work with Air NZ](#) came to be recognised as world class, and at the time, Air NZ stated that their work delivered annual savings of over NZ \$15.6 million.

Although no-one appreciated it at the time, 2001 was to be the start of a major new business development for Optima. Andrew Mason had previously engaged with the St John ambulance service in a project to look at their staff rostering needs, which had shown the need for a simulation package. Andrew and colleague [Shane Henderson](#) (Lecturer in DES, 1999) developed one. Andrew gave talks about their work in Australia, and Alex Currell of the Metropolitan Ambulance Service in Melbourne became aware of what Andrew was doing.

Alex invited Andrew to make a formal submission as part of a tendering process to develop simulation software for Melbourne. Despite a number of approaches from significant New Zealand and Australian companies, Optima was the obvious choice for Andrew to bring on board, and the result was Optima's winning the tendering process.

The improved software developed for Melbourne went on to become [Optima Predict](#), Optima's most successful software product now being used in NZ, Australia, Britain, Denmark, Canada and the US. This was followed by [Optima Live](#).

Optima's leadership changed also. Jeff Meyer moved from CEO to Chief Technical Officer, and [Chris Mckay](#) - previously the CEO for Computerland New Zealand - was appointed to the position of CEO, for the strong strategic and commercial skills he could contribute to Optima.

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Featured Alumni: Jeff Meyer, Class of 1983

We took the company into the university business incubator, 'The Icehouse', and went through an angel capital investment round.

At this time, I moved from being managing director to chief technology officer. This company is now 'The Optima Corporation', providing software in 6 countries, and responsible for improving emergency response times for over 15 million people.

As a core member of a highly entrepreneurial startup, I travelled constantly to develop the business, meet customers, attend or present at conferences, and to ensure that each project was a success; I typically flew up to 5 times around the world in a year, all in economy. Flexibility was always paramount. I remember having flown to the UK for a meeting in a London hotel with what turned out to be our first UK customer, to find the entire city was locked down because the then US President George Bush was in town. Within 10 minutes, I had arranged an alternative meeting room in NZ House through NZ Trade and Enterprise. The outcome of the meeting was successful. I would also often fly half way round the world at extremely short notice to deliver a key presentation so that we could make progress with another customer. My belief is that if you won't visit a customer to sell, then how will they believe you will support them? So the bag was always packed. More recently, I was offered a management opportunity in the IT department of *Etihad Airways*, which I accepted to gain experience in a much larger company. Etihad is based in Abu Dhabi, UAE, and has the goal of being the best airline in the world, with the spirit and funding to match. I am now approaching two years in the Middle East, and look forwards to a very exciting 12-18 months ahead as the airline continues to make progress towards being a world brand.

I am also proud to say that I have a daughter who has graduated from Engineering Science in 2010, who is now working with *Derceto*, another NZ company implementing optimization-based solutions world-wide.

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Optima and DES

Optima continues to have a strong contingent of Engineering Science alumni. In addition to Dr Paul Day; *Natalie Rouse* (Class of 2001), *Amanda Day* nee Scott (MOR 1999), and *Dr Oliver Weide* (PhD, 2009) are also currently part of Optima's lead team. Peter Ebdon (Class of 2007, ME 2008), Patrick Heeny (Class of 2000) and Sarah Clark nee Kirkpatrick (Class of 2004) are also part of Optima. Optima's board of Directors includes members of the DES family - *David Ryan*, *David Clarke* (Class of 1980, ME 1983), and Ian McCrae (Class of 1981, ME 1983) is a past member of the board.

News in brief...

Academic promotions

As of February 1st, we have a new Professor, and two new Associate Professors. Congratulations to Professor Matthias Ehr Gott, Associate Professor Rosalind Archer, and Associate Professor Edmund Crampin.

INFORMS award for Philpott

Andy Philpott has been given a Meritorious Service Award by the INFORMS journal Operations Research, for his work as a member of the editorial board.

Quality teaching recognised

Peter Bier and Dr David Long were both placed in the top 15 of the Faculty of Engineering 2010 Teaching Awards.

All-rubber motor featured in New Scientist

The all-rubber motor developed by the Auckland Bioengineering Institute's Biomimetics Lab (headed by Iain Anderson) has been reported in the *New Scientist*. It is also due to appear in *Applied Physics Letters*.

FOR MORE...

UoA's April pinup

Andrew Pullan is the April 'featured researcher' on the 'The University of Auckland' website.

Upcoming events

DES Research Seminar Series

Information available at www.des.auckland.ac.nz/ua/research-seminar-series

Backissues

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<http://www.des.auckland.ac.nz/ua/home/for/alumniandfriends>

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