

DES News

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March 2009 | The Newsletter for Engineering Science Alumni and Friends

For the March Newsletter from the HOD

Welcome again to DES News – our newsletter designed to keep you, our Alumni, our Alumni-in-waiting (ie current students) and friends of the Department of Engineering Science (DES) informed about what is happening in the extended DES family.

This newsletter goes out to you as we enter the 5th week of the academic year. A lot has already happened. The ten students that worked in the Department over the summer completed their summer studentships by giving short presentations on their work. The induction week for the Accelerated Pathway (AP) students, held in February, ended with 7 students choosing Engineering Science and 2 choosing Biomedical Engineering (for the "old timers" the Accelerated Pathway can be thought of as a replacement for the the old direct entry). The Part II Engineering Science and Biomedical Engineering students (all 49 of them) have completed their field trip (see article below), and now truly feel part of the Department. The Part IV students (all 56 of them) have all begun work on their final year projects. Amongst the projects, there were several that were sponsored by external companies, including Fisher and Paykel Healthcare and Beca Infrastructure Limited. The first Department BBQ has also been held with over 100 people packing out the balcony and common room on the 2nd floor of 70 Symonds St.

DES staff have also been very busy preparing and giving lectures, as well as conducting research. With over 600 students in each year group, teaching some of the core Engineering courses that are run by DES (such as Mathematical Modelling 1 and 2) is no mean feat, and involved repeating lectures (since the lecture theatres cannot hold all the students at one time). As HOD, it is particularly pleasing that we continue to attract very high quality students, and that DES staff (and former staff) get recognised for the quality of their research (see articles on Martyn Nash and Nicolas Smith). A particular recent highlight for me was meeting some of DES's recent (and not-so-recent) graduates during the site visits, held during the Part II field trip, and seeing how well they all were getting on in their respective careers.

As always, please feel free to provide feedback, using the email below, on this newsletter. In particular, if there is some aspect of the Department that you would like to hear about in this newsletter, please let me know.

Professor Andrew Pullan, Head of Department, hod_des@auckland.ac.nz

More photos from the 40th Anniversary Dinner



Mike O'Sullivan during his speech



Left to right, Jill Segedin, Merv Rosser, Rosemary Segedin cutting the cake.

Both photos taken by Godfrey Boehnke. For these and other photos see <http://www.esc.auckland.ac.nz/engineering-science-40th-anniversary>

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Dr Nicolas Smith awarded Oxford Chair

Nic has been appointed Professor of Computational Physiology at the University of Oxford. Nic graduated from us with a BE in Engineering Science in 1993, and PhD in Engineering Science in 1999. He then returned to us as a staff member in 2002, leaving in 2007 to take up a position at Oxford. He maintains a strong working relationship with the Department and the Auckland Bioengineering Institute.

His appointment to this position is a remarkable achievement especially for someone so relatively young.

Second Year Student Design Project featured in 2009 SolidWorks Calendar

Engineering Science student Christopher Vogel's telescope design was one of 12 selected from work submitted by Australian and New Zealand tertiary students.

The Modelling and Design course includes group work where Chris and his team created software to allow a user to control design parameters for a variety of telescope configurations. In the final phase of the course Chris modelled his telescope using the design package SolidWorks, and coupled this to the software controls created in the earlier group work.

From Christopher Vogel: "What I particularly liked about the group project was that it had a wide scope for what we could choose to focus on for our project. This meant that I could integrate some of what I was learning in an Astrophysics paper I was doing with Engsci 263, Modelling and Design. In the software component of the course, I created a series of functions which allowed the user to specify the type of object they wished to observe with their telescope, and having taken these parameters as input, the optimum aperture (diameter) and length of the telescope were calculated. This information was then used by my group members to determine other parameters like the weight of the telescope. Modelling the telescope in SolidWorks was an interesting challenge in problem solving, as it required a lot of careful thinking about how the various components would go together and be controlled using the software interface, while retaining the correct proportions.



The 2009 SolidWorks Calendar page featuring Christopher Vogel's telescope design



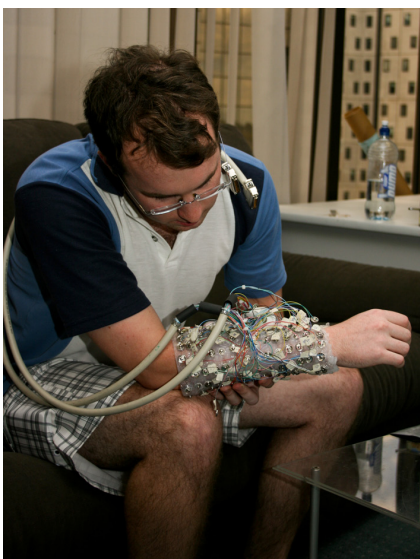
Featured Alumni – Robyn Nash, class of '84

Robyn Nash (nee Lee-Joe) decided on a degree in Engineering Science because she wanted to teach Maths and was inspired by Susan Spencer, her 7th form Maths teacher and the first woman Engineering Science graduate.

She began her degree in 1982 and was one of a class of 15. Friendships were quickly made and the class slotted into the Engineering Science mould as noted by Helen Renwick, then the Engineering School librarian, who observed them doing their first, and certainly not last, assignment together.

The workload was heavy, but the class still managed to have a lot of fun and laughs - putting out a "TAM the Chosen Few" flag outside the eighth floor of the Engineering building, holding up score cards for Professor Gregory's bad jokes during Materials lectures, missing a day of lectures to go on a tramp and wearing "I Hate the DEC-10" tee shirts in the computing labs, to name a few.

After she graduated, Robyn spent a year working in the Department under Mike O'Sullivan then moved into I.T. She married Jim in 1996 and they have 4 children. Much of the last ten years were spent at home with pre-schoolers until her youngest started school last year. She is currently working part-time as a contract Business Analyst.



Featured Student - Scott Walbran

Scott Walbran is a PhD candidate supervised by Iain Anderson (DES) and Emilio Calius (Industrial Research Ltd.)

Scott is one of our Biomedical Engineering graduates, now working towards his doctorate. His thesis is titled "Human computer interfacing in combination with artificial muscle technology"

"My work involves using human electrophysiological signals to control external devices. The device shown in the picture is a mould of my forearm with electrodes embedded designed to pick up electromyographic (EMG) signals.

Using the EMG data and Matlab, the optimal electrode sites for control of prostheses has been determined. This has implications in for mid-forearm amputees, as many of the muscles used to control the hand will still be healthy."

Photo taken by Part III student, Michelle Deacon.



Royal Society Award to Associate Professor Martyn Nash

Martyn Nash, a former student and current Associate Professor, has been awarded the prestigious James Cook Fellowship by the Royal Society of New Zealand.

The fellowship is awarded to "forward thinking" researchers who can make a significant contribution to New Zealand's knowledge base.

The \$220,000 award will allow Martyn to spend two years focusing solely on his research into ventricular fibrillation and breast cancer. He aims to develop an anatomically realistic computer model of the human heart to study ventricular fibrillation – an uncontrolled twitching of the muscles in the heart's lower chamber. Ventricular fibrillation, often caused by a heart attack, can kill a person in minutes and accounts for nearly half of all deaths in New Zealand.

His second goal is to develop a realistic 3D computer model of the breast based on medical imaging to help clinicians better detect and diagnose breast cancer.

As well as being a member of the Department of Engineering Science and The Auckland Bioengineering Institute, Martyn also has close affiliations with the Oxford University in the UK, where he spent six years as a Post-doctoral Research Scientist after completing his PhD at The University of Auckland.

Martyn is the third member of the Department of Engineering Science since 1996 to be awarded such a fellowship. The other James Cook Fellowship winners were Peter Hunter in 1999 (now director of the Auckland Bioengineering Institute) and Andrew Pullan in 2003.

Professor Andy Philpott member of finalist team in international award

The Institute for Operations Research and the Management Sciences (INFORMS) has announced Norske Skog as one of six finalists for the 2009 Franz Edelman Award for Achievement in Operations Research and the Management Sciences.

The connection between Norske Skog, one of the world's largest paper producers, and DES is Graeme Everett, an Engineering Science graduate and former MOR student of Andy's, who went on to become Energy Manager at Norske Skog's Tasman paper mill. Norske Skog asked Andy to work with Graeme and Kjetil Vatn (from their Oslo office) to help streamline its manufacturing and supply chain costs. Together they created a model called PIVOT (Paper Industry Value Optimization Tool).

PIVOT has saved the company more than (US)\$200 million over 11 years. PIVOT helps Norske Skog to better allocate raw materials to mills, and products to customers, across its global operations. When it needed to downsize, the model was used to best reallocate paper to other mills and recoup the optimal salvage value from its plants.

The team will travel to Phoenix, Arizona, in April for the competition final presentations after which the overall winner will be announced. The other finalists, selected from 200 companies, are IBM, HP, Marriott International, CSX Transportation and Zara.

This is only the second time that New Zealanders have been shortlisted for the award - both projects arising from research in DES. In 2000 software developed by Professor David Ryan and collaborators to optimize crew scheduling at Air New Zealand was named as a finalist.



Graeme Everett and Andy Philpott.
Photo from Graeme's MOR graduation.

Geothermal Update

Geothermal Research and Development in Engineering Science

With Maui gas running out and increasing concern about emission of carbon dioxide New Zealand is turning more to renewable energy sources for electricity production. In particular there are several new wind and geothermal projects either under construction or planned.

Engineering Science is playing a significant role in the geothermal developments. The geothermal engineering group, led by Mike O'Sullivan, is running computer models of Wairakei and Ohaaki for Contact Energy Limited. These modeling studies are being used by Contact to help plan their expansion of the Wairakei-Tauhara geothermal field and to optimize production from Ohaaki.

Ground subsidence has been an issue at Wairakei in the past and Mike's team are analysing this problem by combining their reservoir flow model (TOUGH2) with a rock mechanics model (ABAQUS). They have been successful at matching the past development of the Wairakei subsidence bowl.

The geothermal engineering group is also running a model of Mokai for Mighty River Power and has recently worked with PB Power on models of Ngawha (Northland) and Sarulla (Indonesia).

The geothermal engineering group is active on several research topics and in late 2006 started a six-year, FRST-funded, project on deep geothermal resources and environmental effects of geothermal production. This project is a collaborative effort with geoscientists in the Institute of Earth Science and Engineering (IESE) and is funded at \$700K/year.

Geothermal Update – continued from page 3

Recently the geothermal engineering group within Engineering Science has been responsible for the reinstatement of geothermal training at the University of Auckland. In 2007 and 2008 they organized the whole course and taught the engineering part of a Postgraduate Certificate in Geothermal Energy Technology. The PGCertGeothermTech attracted only 8 students in each year but we are hoping for more enrolments in 2009. Several short-courses ranging in length from 1 day up to 4 weeks are being offered on geothermal topics.

The interests of the geothermal engineering group extend well beyond "geothermal". For example they are also working on models of oil and gas reservoirs, coalbed methane extraction and carbon dioxide sequestration.

Part II Field Trip 2009

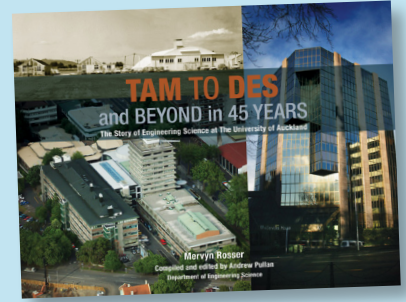
This year the field trip was held on March 12 to March 14th. The group comprised of 2nd year ENGSCI and BME students along with 5 staff members. On the Thursday we split the groups in to ENGSCI and BME and the ENGSCI students visited Opus and Beca, while the BME students visited IRL and Fisher and Paykel Healthcare. All of these companies were outstanding in their presentations to our students. It was good to see many ex students of our Department now working for these companies. We then headed off for a well deserved lunch break at the Drury Truck stop before continuing on to Rotorua.

This year we stayed at Crash Palace Backpackers with Chris as our host. On the Friday we had a visit to Wairakei Power Station and then we visited Whakarewarewa Thermal Village for a Maori cultural performance and a hangi. Both of these visits were educational and fun. Our HOD Andrew Pullan came down on the Friday to mix and mingle with the students and enjoyed getting to know them a bit better. On both nights of our field trip the students cooked the meals and show excellent culinary skills. Our host Chris at Crash Palace Backpackers made us all feel welcome and at home.

The atmosphere among the students was great and on Saturday, a good time was had by all during the 'fun' activities, which were lugeing and white water rafting.

Once again we had excellent service given to us by Goldline Bus Touring Company, whose drivers are always patient and calm, even though they have a bus full of talkative students. Our students were well behaved and a pleasure to take on a field trip. The staff, Associate Professor Martyn Nash, Dr Richard Clarke, Dr Michael O'Sullivan, Dr Vinod Suresh and Kim Williams all had a fantastic time and enjoyed the experience of meeting and getting to know our Part II students.

Part II Field Trip photos



TAM to DES and beyond in 45 years

TAM to DES is a commemorative book celebrating 40 years since the first graduates of the department completed.

If you are interested in acquiring your own copy of this book, please contact esc_admin@list.auckland.ac.nz (the cost is \$30 plus postage and packing).

How to Help

The Department has had a number of enquiries from Alumni and friends as to how they can help. There are many ways that you can help the Department, and some of these are listed here.

1. Pass this newsletter on to other Alumni and other interested parties
2. Providing opportunities for our students to gain practical work experience over the summer period at your place of work
3. Providing ideas and mentorship in Part IV projects
4. Financial donations for summer studentships and/or scholarships.

If you would like to help in any way please contact the HOD on hod_des@auckland.ac.nz