

# DES News

## Department of Engineering Science

December 2012 | Alumni and Friends quarterly newsletter | Number 17

### Dear Alumni and Friends

Writing the HoD column for an issue like this is always a pleasure. As the holiday season is approaching, we have also entered a season of celebrations.

First of all, it is with great pleasure that I have received the news of the promotion of Piaras Kelly and Andrew Taberner to Associate Professor – a well deserved recognition of their achievements in the department, and in Andrews case the ABI.

On December 6th and 11th the department welcomed the winning teams of the NZNTES competition for morning tea and a tour of the facilities. Staff and students helped to promote EngSci and BME as attractive study options to these very bright students.

On 10th and 11th December, the Operational Research Society of New Zealand held its annual conference at Victoria University of Wellington. A highlight, as always, was the Young Practitioners Prize. Three of the four winners are Engineering Science students: Olga Perederieieva in the PhD category, Simon Bull in the Masters section, and Emily Du in the undergraduate competition (jointly with Rosemary Read from Canterbury).

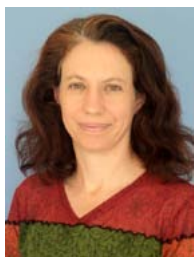
These awards seem to me the perfect end of another successful year for the department.

Finally, this is the last time I will be writing this, as my term as Head of Department is coming to an end. I am pleased to announce that you will next be hearing from the first female Head of Department in the history of this School of Engineering, Associate Professor Rosalind Archer. I wish you all a happy holiday season and a relaxing break.

Professor Matthias Ehr Gott, Head of Department  
[hod-des@auckland.ac.nz](mailto:hod-des@auckland.ac.nz)



Matthias Ehr Gott



Rosalind Archer



Piaras Kelly



Andrew Taberner

### News in brief...

#### Researchers meet Prince Charles

Prince Charles visited The University of Auckland as part of his recent tour, and met with four research teams. Iain Anderson's Biomimetics Lab was one of them. [For more...](#)



#### New Zealand's Next Top Engineering Scientist 2012

The winning team was James Gardner, Samuel Gilmour, Joe Lu, and John Theakston (brother of Elizabeth Theakston, BME Class of 2009) from St Kentigerns College. The two runner up teams were Antara Nahian, Jenny Nguyen, Carla Sy, and Clariss Wong from Botany Downs Secondary College, and Jack Barker, Akash Charles, Tim Hight, and Nick Waddington (all Year 12s) from Lynfield College.

### Do you have news to share?

Help! We would love to get news on alumni and former staff members of the DES family. If you have something to share, email it to [desnewsletter@auckland.ac.nz](mailto:desnewsletter@auckland.ac.nz)



### Iain makes the August JAP cover Iain Anderson (Class of 1980, PhD 1986, member of staff since 2000)

Artificial muscles, a type of electro-active polymer system are capable of actuation, power generation, sensing and even logic. But to achieve any one of these functions requires management of electric charge. The development of electronics to enable this has been one of the core activities of the Biomimetics Lab. Our work led to an invitation to contribute a Focused Review for the Journal of Applied Physics: "Multi-functional dielectric elastomer artificial muscles for soft and smart machines"[1]:

[http://jap.aip.org/resource/1/japiau/v112/i4/p041101\\_s1?bypassSSO=1](http://jap.aip.org/resource/1/japiau/v112/i4/p041101_s1?bypassSSO=1)

In my opinion the ultimate soft machine is the octopus. So it kind of made sense to use this for the cover. Perhaps this paid off- our article was the most downloaded paper for the month of September!

I photographed the octopus at Matheson's Bay earlier this year. My persistence paid off when it emerged from its home all red and unfriendly, but quite photogenic!

## Research Update - Optimisation Modelling Languages

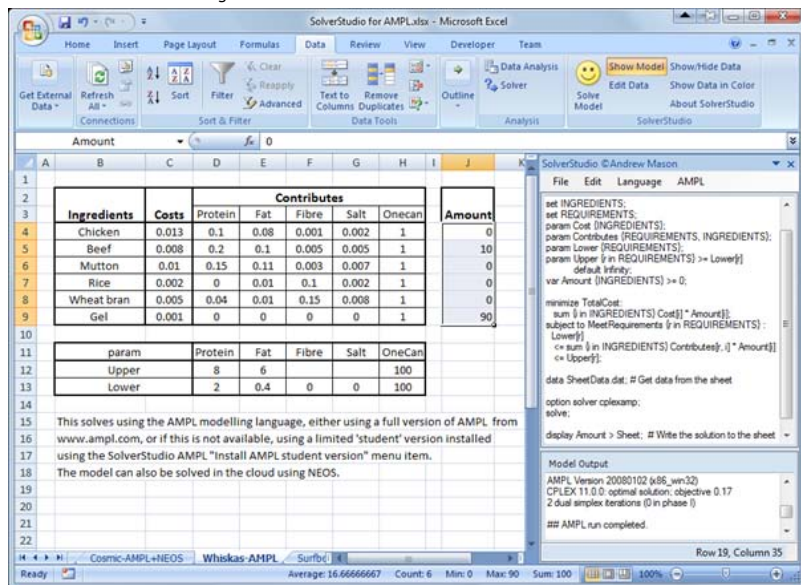
### Andrew Mason

While on sabbatical in Denmark last year, I created a new Excel add-in, SolverStudio (<http://solverstudio.org>), that allows users to build and solve optimisation models in Excel. SolverStudio follows on from a previous work of mine, OpenSolver (<http://opensolver.org>), another add-in that works with Excel's standard Solver models. SolverStudio is different in that it uses 'proper' modelling languages, and so the optimisation model is created and defined using mathematical notation separately from the data. SolverStudio supports all the popular optimisation languages:

1. PuLP, an open-source Python-based COIN-OR modelling language developed by Engineering Scientist Stu Mitchell.
2. AMPL, a commercial modelling language. OpenSolver either requires AMPL to be installed by the user, or can install a free trial version of AMPL that allows up to 300 variables and 300 constraints.
3. GMP (GNU MathProg Language), an open source AMPL look-alike developed as part of GLPK (GNU Linear Programming Kit).
4. GAMS, a commercial modelling language. SolverStudio requires GAMS to be installed by the user.
5. Gurobi, a commercial solver which can be accessed from SolverStudio using the Gurobi Python modelling interface.

SolverStudio lets you create and edit your optimisation model without leaving Excel, and to save your model inside your Excel spreadsheet. You can also easily link data on your spreadsheet to sets, parameters, constants and variables used in the model. SolverStudio can run the model to solve the problem and then put the answer back onto the spreadsheet. Figure 1 below shows SolverStudio running an AMPL model in Excel. The model is created and edited using the SolverStudio editor panel, with the data entered directly into the spreadsheet.

Figure 1: SolverStudio running an AMPL model



Cloud Optimisation: SolverStudio is currently being used in the ENGSCI 355 course to introduce students to AMPL. A new feature added to support this course is the ability to solve AMPL models "in the cloud" using the free NEOS server. This gives SolverStudio users free access to the full commercial versions of a wide range of solvers.

Seeking Problems for Free Model Development: If you are using an optimisation modelling language, then please visit <http://solverstudio.org> to download this free software. An Engineering Science student will be working on further developing SolverStudio over the summer, and so we would welcome your feedback and suggestions for improving SolverStudio. We are also looking for opportunities to test SolverStudio, so please contact me ([a.mason@auckland.ac.nz](mailto:a.mason@auckland.ac.nz)) if you have an optimisation problem that might benefit from a SolverStudio implementation.



### Featured Alumni

#### Sarah Milsom, Class of 2012

During my last 2 years of university I have worked for Adept Ltd, a plastics manufacturing company who have a medical subsidiary that develop plastic medical devices, often working with clinicians to address interesting and important medical needs. It was here that I was exposed to the challenge of designing for developing nations, as often we were approached by clinicians with a low resource operating environment in mind for their device. This really excited me as it made for interesting design constraints and added a real sense of purpose to a project.

At the end of my 4th year I started looking for graduate positions. I was encouraged to interview for management consulting firms in Australia and New Zealand due to the rigorous and interesting interview process which would provide good experience if nothing else. I was fortunate to be offered a position at one of the worlds top management consulting companies, LEK, and after much consideration decided to take the offer as an opportunity to diversify my experience on a path less trodden and to grow my business knowledge that I can later apply to my engineering career.

In the last few months I have been involved in a UoA pilot programme called "Engineers in Clinical Residence", which allowed me the opportunity to see medical devices being used in a hospital setting with the objective of finding projects that will look to improve on what was seen.

I still don't know where all this will lead me but I have become sure of my interests and abilities in biomedical engineering, particularly in design for developing nations, and I intend to steer my future in this direction

Sarah is finishing a BE/BA. [For more...](#)