

Thrills and spills at Engineering Design Show



When things go pear-shaped: Second-year engineering student Lei 'Bobby' Hao watches in disappointment as his ball collecting machine fails to perform as planned during the Engineering Design Show.

What's successful in the workshop doesn't always work when put on show. This was the lesson learnt by second year engineering students at last year's Waikato University Carter Holt Harvey Pulp & Paper Engineering Design Show.

The task over the course of the semester was to create a machine which could travel quickly between two points, collecting four balls from one end of a ramp and depositing them at the other end. The machines battled it out at the Design Show as part of the proceedings.

The winners on the day were a team ironically named Tortoise, whose ball collecting machine collected the most balls in the shortest amount of time.

The Engineering Design Show gave Waikato University engineering students from years two, three and four the opportunity to showcase prototypes, posters and design projects they had been working on as part of their degree.

Find out more:
www.sci.waikato.ac.nz/about-us/engineering

Quake recovery

Choosing the University of Waikato because of its in-depth focus on Earth Sciences and Environmental Sciences has paid off for a former student of St John's College Hamilton. Kit Lawrence has scored a full-time graduate position with AECOM following an eight month BSc(Tech) work placement.

Kit is currently working as an Engineering Geologist in Christchurch, where he is involved in testing ground conditions under existing and proposed buildings. He then uses the results to recommend suitable foundation options.

"It's been a real privilege to be able to help the people of Christchurch get back to normal. The amount of damage there still amazes me and I'm just glad to be there."

Kit has a two year contract with AECOM and, following this, hopes to travel the world with AECOM in order to gain some great experience.



Waikato teams make Microsoft Imagine Cup final

Two University of Waikato teams have made the final of the 2013 New Zealand Microsoft Imagine Cup.

The technology competition is the world's largest, which invites tertiary students from around the globe to create software using Microsoft applications, to find real solutions to real-world problems.

The first team's app, titled *My Storyteller*, is designed to bring families with one parent working away from home closer together. The app allows caregivers to record themselves telling a custom story to their child while overseas, which is then sent home through the internet and can be played back at any time.

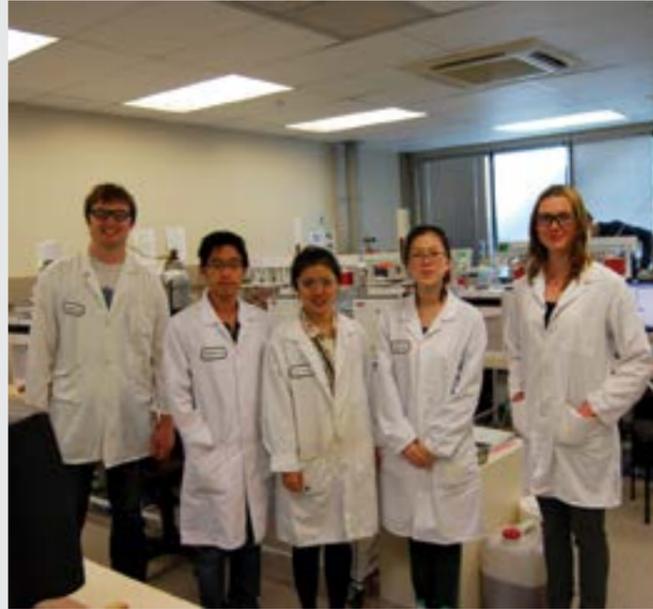
The second Waikato team to secure a place in

the final have created a vaccination/medical records smartphone app designed for third world countries. The app can keep records of vaccines for an entire family and will notify the user, or other family members via text, when they are due for a booster shot.

The Microsoft NZ Imagine Cup final will be held in Auckland from 24-25 March 2013.

Chemistry internships at Hill Labs

For five university science students the chance to work in a commercial analytical laboratory in Hamilton over the summer is the career break they've been dreaming of.



Interns at Hill Laboratories Innovation Park lab: Jason Kirkham (University of Waikato), Edmond Teoh, Jessica Wibowo (Auckland University), Cindy Wan (AUT) and Lisa Brown (University of Waikato).

In collaboration with a government scheme, Hill Laboratories has taken on five interns, offering them the chance to gain commercial experience while applying their university learning.

Intern Jason Kirkham is studying for a Bachelor of Science at Waikato University. From Nelson, Jason was originally studying at Canterbury but moved to Hamilton last year. Jason said science has always fascinated him, particularly biology and chemistry. "Learning science can be difficult. Everyone has their strong and weak points, but it's the applicability that's exciting and once you understand the science and start applying it – that's when things get really interesting."

Jason is working in Hill Laboratories' environmental division. His project is on the optimisation of sample filtration for nutrient analysis.

Lisa Brown from Te Aroha has recently finished her Bachelor of Science at the University of Waikato. Her project involves validating and updating one of the methods used for inorganic water testing.

Both Waikato students agree that it's a very competitive student environment. This internship has helped them to get real experience, make valuable contacts and have a great reference for their CVs.

Find out more: www.sci.waikato.ac.nz/about-us/chemistry

Researching mouse-ear proteins

University of Waikato student Blaise Forrester-Gauntlett has been awarded a New Zealand Health Research Council Māori Health Research Masters Scholarship for her research looking at a novel gene in the mouse auditory system.

The Masters student is working on her thesis under the supervision of Dr Linda Peters, analysing the novel gene vitelline membrane outer layer 1 (or vmo-1) found in the mouse auditory system.

Vmo-1 is of particular interest because it is believed to be responsible for acting as a membrane that keeps inner ear fluid separate, influencing and maintaining hearing and balance.

"Vmo-1 was discovered to be expressed in the inner ear membrane of mice. It's a specific protein found in the inner ear of most mammals, and at the moment there is no current explanation for what it does.

"The key objective of this research is to investigate the expression of vmo-1 at different developmental time points in the mouse auditory system and to figure out what it's doing, and any potential applications for the protein."

To conduct her research, Blaise will be using blotting methodology to identify the protein and performing immunohistochemistry tests to detect the protein in the mouse ear tissue. The data generated will unravel the role vmo-1 plays in the auditory system.

"If we can figure out what it is doing, what the function is, then we can see what useful applications can come from isolating it."

The New Zealand Health Research Council scholarship is worth \$4500 and provides financial support to researchers looking at a range of health issues of importance to New Zealand.

Blaise attended Kelston Girls' High School in Auckland and completed a Bachelor of Science majoring in Biological Sciences, before starting her Master of Science.

"The thing I like best about Waikato is how hands-on and relevant the practical labs are. You actually get to do real experiments that scientists and researchers use in the lab."

If you're interested in Biological Sciences and would like to try out some hands-on experiments in the University labs, make sure you're registered for Waikato Experience Biology Days (4-5 June) and/or Science Open Day (19 July). See the back page of this newsletter for further details on both events.



A novel gene: Masters student Blaise Forrester-Gauntlett is researching the role of vmo-1 found in the mouse auditory system.

Code Camp trains a new batch of Code Avengers

Last month about 48 Year 9 and 10 students spent three days at Waikato University learning computer programming basics at Code Camp.

Event organiser, Computer Science PhD student Michael Walmsley wants to make learning



computer code more attractive for students interested in constructing games and apps. His plan is to revolutionise the way computer science is taught in schools.

The camp is based around Michael's free online courses – www.codeavengers.com – which helps people learn the fundamentals of programming and web development. Aligned with new NCEA programming and computer science achievement standards, Code Avengers provides teachers and students a clear path to teaching and learning JavaScript programming and web development.

Cousins Troy and Hohua Hemi, both from Hamilton Boys' High School, attended the camp and say they see themselves getting involved in the computer science industry in

the future.

"Throughout the camp students learnt three computer languages and on the last day they did an exercise where they created a chatterbot – a program that you can ask questions and it will talk back to you," says Michael.

"With Code Camp, what they would usually learn throughout a term at school, they're learning over a couple of hours and then putting it into practice."

A second Code Camp will run from 22 – 24 April. Visit www.codeavengers.com to register.

Master of glass

University of Waikato PhD student Megan Grainger has been awarded an exclusive Fulbright Travel Award to present her Masters research at the University of Montana.

The awards are for New Zealand academics, artists or professionals to present their work to American audiences. Megan will be presenting her Masters research while continuing work on her PhD in Montana later this year.

"My Masters research concerns using laser blasting techniques to categorise automotive glass. A possible use of the database is for crime scene investigations, to trace broken glass back to a specific make of vehicle. My database of samples consists of glass from around the world and shows the ability to categorise the glass samples into country of origin."

The research was completed in collaboration with the Institute of Environmental Science and Research, who are the sole provider of forensic services to the New Zealand Police.

The Fulbright Travel Award isn't Megan's only reason for going to Montana. Last year she received a Claude McCarthy Fellowship to help her travel to the States to work more closely with her external supervisor University of Montana Emeritus Professor Richard Field who is working with her on a study of mānuka honey properties.

Engineering success



From left, Waikato Graduate Women Trust Administrator Vivienne Evans, Professor Janis Swan, René Englebrecht and Professor Ann Mc Kim.

University of Waikato student René Englebrecht is the first recipient of the New Zealand Federation of Graduate Women (NZFGW) prize.

The \$1000 prize was established last year and will be awarded annually to the most outstanding female student in their third year of study towards an engineering degree.

The NZFGW is affiliated to the International Federation of University Women which works to empower women and girls through lifelong education for leadership and aims to assist the advancement of women in higher education.

"It's wonderful to receive recognition in a male-dominated field such as engineering. "It also serves as motivation to keep doing what I love

doing to possibly inspire other young women," says René.

René is enrolled in the University of Waikato's Materials and Process Engineering programme of the Bachelor of Engineering (Honours). She has completed the first three years of the programme and 400 hours of industry placement and is currently completing the second 400 hours with PDV Engineering Ltd, a consulting process engineering company.

The prize is a welcomed financial boost for René as she heads into her fourth year. "I have now been adopted into the NZFGW family which serves as a support that I can draw from for the rest of my career."

Materials & Processing

Why is Materials & Processing important?

Efficiently converting New Zealand's raw materials and commodity goods into products is important to the national economy. To do this, we need to understand the properties of materials as diverse as food, wood, metals, plastics and fuel. Once we have this knowledge, we can design processes to manufacture these materials into local and export products.

What does Materials & Processing involve?

Materials and processing skills are used during industrial and other activities where materials are undergoing chemical, biochemical or physical changes. Process engineering involves knowing how to prepare raw materials, how to make reactions occur, and how to separate and purify the products. It also involves understanding how to limit and treat wastes, minimise energy use, and consider sustainable processes.

Ultimately, value is added to raw materials to produce useful products that can be as varied as dietary formulae, foods, ceramics that can withstand high temperatures, new metal alloys, pharmaceuticals, laminated boards, functional proteins, and composites.

What degree should I study?

You can study Materials & Processing as a major in the Bachelor of Science or Bachelor of Science(Technology), or you can study the Materials & Process Engineering programme in the Bachelor of Engineering (Honours).

What subjects do I need to study at school?

You must gain University Entrance in subjects such as physics, chemistry and mathematics, and technology is a good supporting subject. Some first-year papers have specific prerequisites. If you want guaranteed entry to the Bachelor of Engineering (Honours), you must have a minimum of 16 NCEA credits in Level 3 Calculus, and 14 credits in both Level 3 Chemistry and Level 3 Physics.

What type of papers can I expect to take in my first year?

During your first year you will take a selection of papers from engineering, materials science, chemistry, physics, and mathematics. The papers for the BE(Hons) are fully specified and also include computer science.

What about papers in my second year and beyond?

From year two your papers will cover a range of topics such as materials science, process thermodynamics, fluids, materials performance, mechanical engineering design, environmental technology, biotechnology, and technological innovation and management. The BE(Hons) also includes higher mathematics papers. Project work is a key aspect of understanding this subject.

Improving energy efficiency



Timothy Walmsley has made the most of his time at university. Following his studies at the Church College of New Zealand, he completed a Bachelor of Engineering (Honours) in Materials and Process Engineering. He enjoyed the small class sizes and the chance to work one-on-one with internationally recognised researchers.

During his degree he was offered the opportunity to join the Metals Research Group in the School of Engineering. "As part of my research I visited a Chinese university, where I gained extremely rewarding experiences and insights into technology."

Also during undergraduate study, Timothy's group won the best process design project for their study on 'Closed cycled spray drying in industrial milk powder plants' at the annual design showcase held for Waikato engineering students.

Timothy is currently completing a PhD in improving the energy efficiency of milk powder production. "Once I finish my PhD I'd like to find a position as an engineering lecturer. I enjoy teaching at a tertiary level and I love researching complex problems. In the long term I'd like to start a consultancy with a focus on energy."

Herbal medicine research



Exciting research, rewarding work placements and lots of traditional Kiwi adventures were the highlights of student life for graduate Norzaherah Ahmad.

After graduating with a Bachelor of Science majoring in Materials & Processing, Norzaherah returned to her home country of Malaysia, to work as a Research Officer at the Herbal Medicine Research Centre. The centre is part of the Institute for Medical Research (IMR), which is one of the research arms of the Ministry of Health, Malaysia.

"I'm involved in research on local herbs and herb products and evaluating their efficacy and toxicological effects. The highlight of my job has been discovering the types of research being done to help improve the wellbeing of Malaysians."

On your marks, get set, Game Jam

The Faculty of Computing and Mathematical Sciences at the University of Waikato hosted a leg of the 48 hour Global Game Jam last month, with an adventure game called 'The Seeker' winning site favourite.

The Seeker was created by David Neilsen, Hemi Ormsby, Thomas Bredin-Grey, and Mike Blanchett, and follows a spaceman through a series of stages as he battles foes while seeking 'the core'.

Bringing gaming fans together

Organised by Computer Science senior lecturer Bill Rogers and student Brian Cole, the Global Game Jam brings gaming fans together to create video and board games. It encourages experimentation and innovation - participants come together for 48 hours, form teams, and develop games around a theme that is announced at the start of the event.

"Once again it was a great weekend," said organiser Brian Cole. "All 45 Game Jammers put in a huge effort to get their games finished within 48 hours and it was good to see a few familiar faces from previous years as well as all the new ones."

High quality games

"There were two single person teams that completed this year who deserve mention; Joshua Scarsbrook and Issac Gilmour each put in a herculean effort and created games entirely by themselves. All the teams worked really hard and into the wee hours of the night and the quality of the games was really high."

Last year the Global Game Jam was held at 242 locations in 47 countries, and created over 2000 games in one weekend. All finished games will be archived onto the Global Game Jam website for all to play.

Download *The Seeker* at <http://globalgamejam.org/2013/seeker>



Waikato University once again hosted a leg of the 48 hour Global Game Jam.



The Seeker: A game created at the Waikato leg of the Global Game Jam.

St Paul's Collegiate regain ChemQuest title

St Paul's Collegiate have snatched back their title as the winners of the University of Waikato's ChemQuest challenge. Since 1997 the Hamilton school has won the competition eight times, but never more than twice in a row.

First place went to Paul Newton-Jackson, Hannah Clare and Mark Davis from the St Paul's Collegiate team with the interesting name of 'Knights of the Hexagonal Table with Alternating Double Bonds'. The students were awarded the James and Wells trophy, \$150 and a gold medal each.

The annual chemistry quiz gave almost 200 Year 12 chemistry students



First place winners from St Paul's Collegiate: (L to R) Paul Newton-Jackson, Hannah Clare and Mark Davis with Hill Laboratories' Martin Brock.

the chance to put their chemistry knowledge to the test in a pop quiz-style challenge.

The 'senses round' required students to sniff out a range of scents from small vials, with smells ranging from spearmint to vinegar. The 'demo' round included demonstrations featuring liquid nitrogen, exploding hydrogen balloons and chemical reactions that produce light.

"The students also have a lot of fun coming up with team names. Some of the more clever names this year included 'Plumbum' (the Latin name for lead), 'BrO' (chemical symbol for bromine oxide), 'In Our Element' and 'The Names Bond. Ionic Bond'", says event organiser Professor Bill Henderson.

Hamilton Boys' High School won second place, Te Awamutu College won third place, Tauranga Boys' College won fourth place, while fifth place went to Hamilton's Hillcrest High School.

ChemQuest 2013 will be held Wednesday 16 October. Talk to your science teacher if you are interested in entering a team.

Career Opportunities

MATERIALS ENGINEER (PLASTICS, COMPOSITES, METALLURGY)

PROCESS DESIGN ENGINEER (DAIRY, ENVIRONMENTAL, OIL, GAS)

ENERGY EFFICIENCY ENGINEER

RELIABILITY ENGINEER

ENVIRONMENTAL ENGINEER

PRODUCT/PROCESS DEVELOPMENT ENGINEER

Science Summer School a hit

Interactive, hands-on field and lab work were the highlights for students attending the Hill Laboratories Waikato Science Summer School last December.

The week-long action-packed Summer School gave 40 talented Year 12 students from around the central North Island the chance to get a taste for what it can be like to study science and engineering at a tertiary level. The adventure began with a full-on two day field trip exploring the Waikato River and surrounding areas and was followed by two days in Waikato University's science and engineering laboratories.

Application dates for the 2013 Hill Laboratories Waikato Science Summer School will be promoted in the Autumn Matter of Fact.



Making friends from other schools was a bonus for many of the attendees.



Dr Adrian Pittari taught the group about volcanic rocks.



Waders and nets were used to find out what is living in Lake Taupo.



Building water flow meters in Electronics.



Gathering water samples from Lake Maraetai.



Mapping the Waikato region in Earth Sciences.



A pit stop was made to view Mount Tongariro as it erupted clouds of steam in the distance.



Testing water samples in the Chemistry lab.

Computer Graphic Design

Bachelor of Computer Graphic Design (BCGD)

Computer Graphic Design involves creativity, art, technology and the communication of ideas. It encourages students to reach beyond the boundaries of traditional graphic design and explore the huge potential of the digital environment.

In the first year, you have the opportunity to develop a firm foundation in the core elements and principles of design, in both two and three dimensions. You will also learn essential techniques that will assist you in broadening your visual and verbal skills.

The second year offers motion graphics and the chance to explore the relationship between visual communication and screen-based technologies. By the time you enter your third year, you are ready to push the boundaries of visual communication, taking on the more professional challenges of internship as well as complex projects which cross many media.

Which subjects do I need to study at school?

Art (design, painting, photography, sculpture or printmaking), graphic design and mathematics to Year 12. English is recommended.

Why study a BCGD at Waikato?

- Combines excellent design and visual communication tuition with a rich combination of technology papers.
- Unique degree in line with new international developments in design education.
- Small classes with studio-based work.
- Can lead on to BCGD with Honours and Master of Computer Graphic Design.



Kelly Wilson
Degree: BCGD
School: Te Awamutu College

It was a tour through the design labs during a Waikato University Open Day that convinced Kelly she was on the right study path. "A student took me on a tour and introduced me to other current students," says Kelly. "That gave me the chance to find out exactly what the course covered and what I could expect. After that, I felt certain and assured I was in the right place."

Kelly chose the BCGD because of its strong design focus and because it also had a programming component. "With my degree, I plan to get as much experience as possible in design studios in the main centres and I hope that will lead me to jobs and clients around the world."

Eventually Kelly would like to open her own design studio in New Zealand and says she's really enjoyed the opportunities at Waikato to present, display and share her work with other design students and in turn get to see their "amazing" work.

"Events such as the end-of-year degree shows for third year students are a great way to be inspired and engage with other designers."

Infinity and beyond



DESIGNER/FRONTEND DEVELOPER, INFINITY

Scott Alonzo walked out of University straight into a job at design company Infinity – thanks to a referral from his lecturer.

Scott is a Designer and Frontend Developer working mostly on websites. "I'm responsible for designing user experiences, layouts, and graphics and I build websites in HTML, CSS, PHP and JavaScript."

The former Sir Edmund Hillary Scholar is working with young, talented, like-minded people at Infinity and says he's learning fast and having fun.

"My advice to prospective students? Go to University and expect to gain a desire to learn; don't expect to have all the knowledge just given to you." He says his degree has given him a lot of scope to work in a number of design areas and once he has more experience, he plans to take his skills overseas to work.

Career Opportunities

ANIMATOR

COMPUTER GAME DESIGNER

WEB DESIGNER

VISUAL EFFECTS ARTIST

3D MODELLER

TV GRAPHICS DESIGNER

ADVERTISING DESIGNER

INTERACTIVE DESIGNER

MOTION GRAPHICS DESIGNER

CORPORATE GRAPHIC DESIGNER

PUBLICATION DESIGNER

“I don't know what I want to do when I leave school!”

It's ok not to know the exact job that you want to have when you leave school or university. In fact working towards a specific job or career is becoming more and more uncommon. Some researchers suggest that you can expect to change your career 5-7 times in your lifetime. If you're struggling to decide which path to go down, or even if you think you've decided, have a think about these key ideas first.

Find a flexible degree

Having the flexibility to change your area of focus as you progress through your study can make a huge difference; especially if like most school leavers, you're not 100% sure you're heading in the right direction. All bachelors degrees offered by The University of Waikato give you lots of options in your first year, giving you the room to try a bit of everything, before deciding which major to focus on in your second year. In many instances you will also have the flexibility to switch the focus of your study after just a few papers, after your first year and beyond.

Which subject should I study?

Consider your interests, skills, values and qualities. You should also ask yourself: What am I good at? What do I like to do in my spare time? What have I achieved already? What things am I passionate about? If you love to fix things, mechanical engineering may be for you. If you love animals a science degree majoring in animal behaviour may suit you perfectly. If you pick a career path which incorporates something you know that you enjoy, you are more likely to stay in that career long term.

Working conditions

Another important thing to consider is the type of working environment you would enjoy. Do you want to work indoors or outdoors? Do you want to work Monday-Friday, 8.30am-5.00pm or are you happy to work long hours and/or shift work? Do you want to work with people? Do you want to work in front of a computer? An easy example is the working conditions of a doctor. Saving lives is an amazing feeling, but with the job often comes working long, unsocial hours, indoors, dealing with stressful situations, emotions and potentially lots of blood.

Family expectations

Family expectations can be difficult at times. Maybe your parents or whānau have a strong opinion about what career you should pursue which does not match your own views. Beginning a course because someone else thinks it's a good idea is not a good way to start your career. Talk through your feelings with someone who will listen and work out a plan so that both you and your parents or whānau are happy with the situation.

Useful tools

Useful information and interactive tools: <http://www.careers.govt.nz/>
Careers in science and engineering: <http://sci.waikato.ac.nz/study/careers>

Remember, it's ok to feel uncertain about your career plan at this stage in your life. As you grow and learn new skills, new opportunities will arise where you least expect them and you may find your career plan changes entirely!

What's on

17 MAY 2013

University Open Day

Attend mini-lectures and info sessions on degrees, check out the science and engineering labs and enjoy interactive activities throughout the Waikato University campus.

4-5 JUNE 2013

Waikato Experience Biology Days

Year 13 Biology students and teachers are invited to attend seminars and lab work covering topics such as DNA technology, human evolution, biotechnology, and animal behaviour/plant responses to the environment.

Visit www.sci.waikato.ac.nz/webdays

6-7 JUNE 2013

Osborne Physics and Engineering Days

Talks and practical demonstrations focus on applications of physics, and provide students with examples of how the physics they are learning at school can be used in real life.

Visit www.sci.waikato.ac.nz/opsendays

12 JUNE 2013

NZIC Analytical Chemistry Competition

Teams of Year 13 students are set an analytical task, requiring accurate and careful analysis of an unknown substance.

Visit www.sci.waikato.ac.nz/chemcomp

18 JULY 2013

Engineering Open Day

Spend the day on campus with staff and students, experiencing engineering through hands-on workshops.

Visit www.sci.waikato.ac.nz/engopenday

19 JULY 2013

Science Open Day

This event offers students and their parents the chance to explore the areas of science available to study at Waikato University through hands-on workshops.

Visit www.sci.waikato.ac.nz/scienceopenday

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