Faculty of

Engineering & the Built Environment

ALUMNI UPDATE

Message from the Dean

August 2018

Since our last newsletter in 2017, lots has happened on campus. Dr Max Price's term as Vice-Chancellor ended on 30 June, and Professor Mamokgethi Phakeng started her term of office on 1 July after serving as Deputy Vice-Chancellor for Research and Internationalisation since January 2017. Professor Phakeng has made clear her intentions to make a significant contribution towards making UCT more sustainable while seeking to transform the university and make it even more inclusive while improving its excellence in research, teaching and learning, and social responsiveness. It is an exciting new era, and we look forward to working with her.

UCT's academic reputation and employer reputation indicators improved in the 2019 QS World University Rankings, keeping the

institution as the top university in Africa. We are proud of our seven young alumni who have been named among the Mail & Guardian's Top 200. They are described as under-35s who have stood out from the pack, are talented and have shown themselves to be leaders. They give us great hope for the future.

Presently, all the departments are revising their curricula to ensure we are preparing our students for the rapidly transforming world. Students will be moving into the world of work where there will be new jobs that don't currently exist. We are emphasising design thinking, innovation and entrepreneurship and are developing new exciting areas of research around big data, biomedical engineering, robotics and artificial intelligence.

The ongoing support from our alumni is essential for our success. Alumni are coming back onto campus as guest lecturers, mentors, advisory board members and funders. We are deeply grateful for the contribution they make and look forward to seeing more alumni coming back to campus.

Should you wish to get in touch with the Faculty – please contact Mary Hilton.

Professor Alison Lewis
Dean: Faculty of Engineering & the Built Environment.

Continuing Professional Development

You want to stay relevant and competent in your profession or simply catch up with the latest developments in your field? Then register for a course with us! We offer practice-orientated short courses in the fields of engineering and the built environment. **Visit the CPD website (www.cpd.uct.ac.za) for more information or call Sandra Jemaar on 021 650 5793.**

Water-sensitive design win

Master's student Boipelo Madonsela, who is based at the University of Cape Town's innovative Future Water Institute, has won an award for the Most Promising Research for her work on ways of integrating water-sensitive design into the City of Cape Town's urban environment.

The recent water crisis in Cape Town, which catapulted the water issue into the public arena, has dovetailed with Madonsela's research, which was recognised in the student awards at the recent Water Institute of Southern Africa conference (WISA 2018) in Cape Town.

Her research focuses on the need for integrating urban design with environmental, social and engineering disciplines in managing the urban water cycle.

"The objective is to interrogate city governance structures related to water scarcity, flood risk and wastewater treatment in order to develop a better understanding of the current sustainability issues with respect to water management in the City of Cape Town," Madonsela said.

Her research also aims to highlight both the opportunities and barriers in the municipality's transition to being water sensitive. It was a natural transition flowing from her honours thesis in sustainable urban drainage systems.

Madonsela is also passionate about spreading the message of blending sustainability into every aspect of life.

"We need to have an environmental strategy in the city where the policies that are written and the work people do in different fields [are] informed by sustainability practices."

Madonsela hopes the recent rains will not slow the pace of working together and building resilience into policy and planning in the water space.

While recognising that the City of Cape Town has made some significant strides in becoming more sustainable, she says long-term planning is essential in building a resilient city. This became very clear during the water crisis.

"A lot of research, especially around water and the sustainability of water, has been on the technical aspects … on new solutions and innovations. My interest is in the transitions. You can have all these technologies, but you need to find a way to integrate them in the urban environment."

New HoD for Mechanical Engineering

On 1 April, Professor Genevieve Langdon became the first female Head of the Department of Mechanical Engineering at UCT. She joined the department in 2006, after being a research fellow at the Blast Impact and Survivability Research Unit (BISRU) from 2004 to 2006.

Genevieve reflects the ethos of transformation, nurturing and building her students and colleagues and effecting meaningful change to the curriculum.

She is the director of BISRU and her research involves examining the blast resistant properties of novel lightweight materials such as fibre-metal laminates and hybrid structures, passive blast mitigation, confined explosions and the failure modes of lightweight structures. You would probably never imagine that the mother of two with the gentle Liverpudlian accent is a master blaster. But master blaster is one of her professional tags. One of only three people at UCT with a blasting certificate from the South African Police Services, Professor Langdon spends her working hours measuring the impact of explosions in a test laboratory at the top end of campus.

Professor Langdon has received a number of awards, including an 1851 Royal Commission Research Fellowship and the UCT College of Fellows Young Researcher Award. She is the recipient of the Southern African Association for the Advancement of Science (S2A3) silver medal for outstanding research by a person under 40 years old. She also holds a C1 National Research Foundation rating, has co-authored over fifty journal articles and is a chartered engineer.

Exciting learners about technology

Meet MiiA, a self-assembly robot designed to help school goers start learning about electronics, programming and robotics from a young age.

MiiA is the first innovation of RD9 Solutions, a start-up created by two UCT engineering graduates, Tyrone van Balla and Ridhaa Benefeld. The business aims to tackle societal problems using technology in creative ways.

“Currently we’re focusing on the education sector, looking at how we can use technology to introduce kids to programming and electronics from an early age, while at the same time making learning more fun, engaging and stimulating,” explained Benefeld.

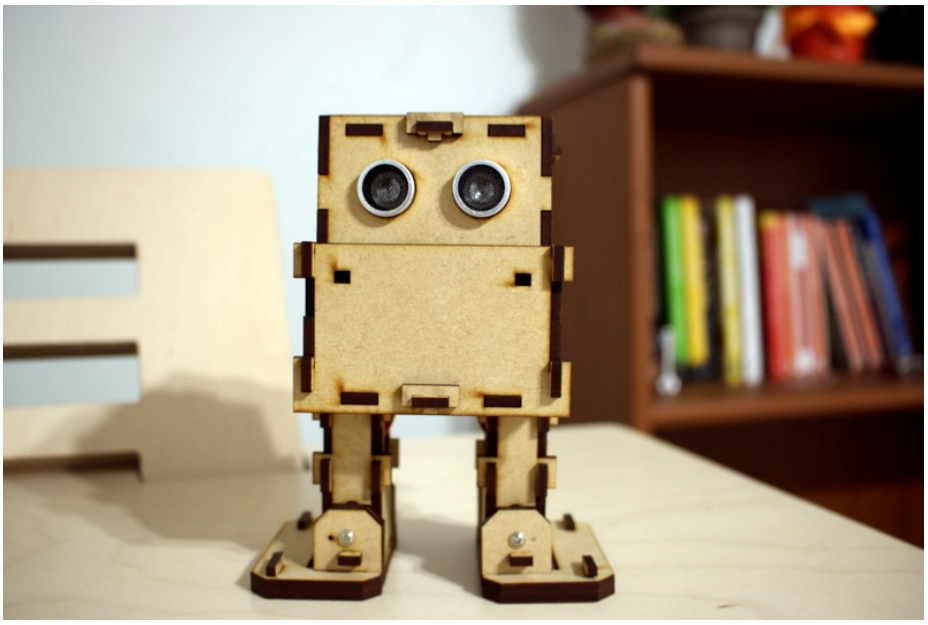
The robotic platform walks learners, anywhere between grades 8 and 11, through the major tasks and processes required to build a robot. Learners are introduced to key electronics and programming concepts before applying these new skills to building and programming MiiA.

“MiiA’s goal is really to lay the foundation for the careers of future scientists and engineers. We want to make students excited about technology and the ways in which they can use it,” said Van Balla.

“We want students to realise that they can do all these amazing things they hear about. We want to empower the masses to be able to employ technology innovatively and creatively to solve not only their own problems, but the world’s as well.”

DIY robot

“Being engineers, designing and building robots seemed like a fun way to spend our free time,” said Benefeld. But their hobby soon developed into a plausible business idea and the pair considered selling their inventions as toys.



They quickly learned that the market was saturated with robotic toys. What was lacking, however, was a product that taught people how to build their own robot.

Aims to tackle societal problems using technology in creative ways

“We then realised that we could use the robots as a platform to teach individuals about programming, technology, and robotics,” Benefeld continued.

The pair began developing a course for teaching these concepts to learners, while they built MiiA. Their “gamified” platform makes use of game elements and principles of video-game design.

“Our goal is now to create a suitable platform for teaching these concepts that is engaging, accessible and that promotes self-learning and encourages learners, no matter the pace at which they learn.”

Somewhere between all of this, the pair work full-time as engineers while pursuing their master’s degrees: Benefeld in information technology (in big data) and Van Balla in electrical and electronics engineering.

No longer 'nice-to-have'

While making MiiA learners will be exposed to programming and electronics.

“The world as we know it is changing. Mathematics and sciences are no longer nice-to-have subjects for anyone who wants to get ahead. At the same time, programming is becoming more and more relevant in many career fields today,” asserted Benefeld.

“Learning programming also teaches valuable problem-solving skills and the ability to think critically,” added Van Balla. It gives learners an opportunity to absorb concepts, and apply them to new and unique problems.

60th reunion for civil alumni

On 5 April 2018, 13 alumni from the civil engineering class of 1958 and their wives got together to celebrate their 60th reunion. Peter Bosman and his wife travelled all the way from Denver in the USA to join the reunion, with others coming from Johannesburg, KZN, and the Eastern and Western Cape. The alumni were collected from Welgelegen on middle campus and brought up to the New Engineering Building, where they were welcomed by Professor Pilate Moyo, the HoD for the Department of Civil Engineering. The group spent the day engaging with civil engineering staff and students. The alumni spoke to the students about their experiences and where their civil engineering degree had taken them. They all agreed that the civil engineering degree was one of the best courses for future enterprise. Even in their eighties, many of the alumni were still involved in the industry.

Peter Bosman (alumnus), Napo Mochekoane, (3rd civil engineering student) Njabula Thela (Senior technical officer) Suzanne Lambert and Tinashe Chipako (master's students) in the Waste Water lab where the students presented the recycled urine research project

The students took the alumni on a tour of the civil engineering laboratories, where they interacted with staff and students around their research work in the areas of the polar ice, structural steel and pipe water leakages. After lunch, Doug Calverey from SMEC spoke to them about the controversial Foreshore Freeway - Western Boulevard link. This was followed by four alumni giving talks on topics which ranged from Shakespeare's Ghost Writer to Ageing Health Hazards, Crypto Currencies and Interesting Travel Destinations. Their visit to UCT ended at 16h30. That evening they met up for dinner at Kelvin Grove, and on Friday, after a visit up Table Mountain, Brian Watkyns, the City Council member for Pinelands, took them on a tour of one of the desalination plants in the V & A Waterfront. On Saturday they had a farewell braai at Louis De Waal's house before they all went their separate ways.

The reunion was held in memory of Ron Strybis, who was instrumental in getting together the 50th reunion in 2008 and had done most of the arrangements for the 60th before he suddenly passed away on 27 February 2018.

Celebrating 80 years

In 1938, the Department of Quantity Surveying took in its first cohort of students. 80 years later the department has changed names a number of times over the years, and is now the Department of Construction Economics and Management in the Faculty of Engineering & the Built Environment. The department will be holding a 80 year celebration event later this year. The department has written to alumni asking them to send any anecdotes or memories they have of their time spent in the department. If you wish to attend the event or have something to send—please get in contact with Saul Nurick (SD.Nurick@uct.ac.za) or Karen Le Jeune (Karen.Lejeune@uct.ac.za).

50th reunion for civil engineering alumni

Five civil engineering graduates from the class of 1967 got together on Friday 17 November to celebrate their 50th reunion. The day started with a lunch at Rhodes Memorial with Professor Neil Armitage and then an interactive afternoon in the Department of Civil Engineering where various students and staff spoke to them about their research work. The Dean started off with a brief overview of the Faculty, followed by Neil, who gave an update on the civil engineering department. John Okedi, one of Neil's PhD students, gave a presentation on the work he is doing on stormwater collection. Dyllon Randall, a senior lecturer in the department, spoke on urine being the new liquid gold and this was followed by a tour of the Geotechnical Lab and a talk by Dr Kalumba and a number of his postgraduate students.

Nigel Mudge said "I enjoyed meeting all the old students, and I found the presentations very interesting. I must say, you are in a really nice building, and I got the impression that engineering is in a good space in spite of what the media feeds us."

The reunion ended off with a dinner at the Wild Fig. On departing, the group decided that they couldn't wait for their 60th reunion so would be back in five years' time.

***Back left to right**: John Okedi, Nigel Mudge, Kevin Wall* ***Seated left to right:** Alan Shelley, Eric Lowe and Alex Visser*

Help as a hand up

Graduations are celebrations, but few realise the struggles that many students face in getting across the line. The EBE Student in Distress Fund makes all the difference to students who find themselves in difficult financial circumstances.

Sometimes it's a fee deficit as small as R6 000 that stands between a student being able to graduate and stalling at the finish line. The Student in Distress Fund, along with counselling students receive when they get funds, plays an important function in the engineering faculty, said dean Professor Alison Lewis.

In a report on the fund for 2017, Lewis said, "It might not be a huge amount of money, but it helps us deal with cases that might fall through the cracks and we are able to intervene in a flexible way."

Student feedback such as this is testimony to the fund's value: "There's a Zulu saying that says, '*ngiswela imilomo yokuzibongela'* that simply means I'm out of words to say thank you."

Some aid was provided as a once-off, while other funding assisted students over a longer period, says faculty marketing and communications manager, Mary Hilton, who administers the programme.

Funds were used for fee deficits, laptops, stationery, books, transport, rent and vouchers for toiletries, medicine and food.

Should you wish to contribute to the EBE Student in Distress fund, you can donate here.

Award for sustainable energy for all

Professor Harald Winkler from the Energy Research Centre recently received the NSTF-South32 Special Annual Theme Award: Sustainable Energy for All. The award was in recognition of the United Nations International Decade of Sustainable Energy for All.

Reducing energy poverty at the same time as making a just transition to a low-carbon energy economy are key challenges of the 21st century. Over the last ten years, Winkler's research on energy and environment, in particular climate change and the economics of mitigation in the context of sustainable development, with a strong focus on poverty and development, has contributed information needed for this transition and informed energy and climate policy at national and international level. He has developed and implemented a research agenda demonstrating that the costs of a transition to a low-carbon energy need not be borne by poor households and communities. Winkler has published extensively on sustainable energy for all and, based on his research, advised on environmental and climate perspectives on Integrated Resource Plans for SA.

On receiving the award, Winkler said, "I could not have done my work without brilliant, passionate and committed colleagues at the Energy Research Centre and the University of Cape Town more widely. This does inspire me to continue thinking and co-producing knowledge on how we reduce poverty, inequality and GHG emissions."

UCT students to row across the Atlantic

Four young men from UCT will be taking on one of the toughest endurance challenges: the Talisker Whisky Atlantic Challenge. They will be rowing across the Atlantic Ocean in nothing but a rowing boat. Team MAD 4 Waves is made up of three engineering students, Cole Barnard (third-year civil engineering), Lee Gordon (final-year chemical engineering), Grant Soll (final-year chemical engineering), and Matthew Boynton, who is doing his honours in Physics.

Matthew Boynton, Lee Gordon, Grant Soll and Cole Barnard

Fewer people have rowed across the Atlantic than have reached the summit of Everest, journeyed to the North Pole or ventured into space. Team MAD 4 Waves will be setting off from the Canary Islands on their 5 500 km journey across the Atlantic in December 2018. They will be taking on the extreme challenges of the Atlantic, with their sights firmly set on being amongst the first boats to arrive and embrace the crowds in Antigua.

They have partnered with Make a Difference Leadership Foundation and will be raising funds with the objective of sponsoring a promising child through high school and raising funds to provide desks for 1000 learners across South Africa.

Team MAD 4 Waves is the only South African team entering the 2018 race, and they will be the youngest to have ever rowed across the Atlantic. Visit the MAD4 waves website to find out more.

Dual desalination could increase water yield

Reverse osmosis followed by eutectic freeze crystallisation, a process used to treat mine waste water, could boost fresh water yields during seawater desalination, a final-year chemical engineering project has shown. However, the process is currently expensive and needs further research.

The project by final-year chemical engineering students Fendi Lin and Anthony McHendrie showed that by combining the two processes, 85.6% of the water trapped in the reverse osmosis retentate can be reclaimed. It also minimises waste.

The retentate is that part of the 'feed' that does not pass through the polymer membrane during reverse osmosis. It is a saline or briny solution containing dissolved ions rejected by the membrane.

The term eutectic refers to a mixture of substances that melts or freezes at a single temperature. When a briny solution is cooled to its eutectic temperature, the water in the mixture crystallises as ice, which floats, and the salts crystallise out as solids, which sink. This allows for the separate extraction of pure water and individual salts from the solution.

The students' results showed that while reverse osmosis recovered 24% of the water from "salty" seawater, freeze crystallisation achieved 85.6% recovery from the retentate. When the two processes were combined they recovered 89.1% of the water, as well as salts.

The backdrop to McHendrie and Lin's research is sketched in their report: "The availability of fresh water affects 40% of the world's population. The water availability in South Africa is declining as the country faces one of the worst droughts for the past 30 years.

"Access to potable water is threatening Cape Town, in particular, as dams supplying the majority of the city with water have reached critically low levels. Therefore, it is important to recognise these issues and research ways in which to improve current situations."

This is where the eutectic freeze crystallisation process comes into its own.

Two major problems facing South Africa are the declining availability of sufficient quantities of water and the deterioration of the quality of the available water.

The increasing use of water recycling has increased the generation of saline streams and inorganic brines. With eutectic freeze crystallisation, pure water and pure individual salts can be recovered without any effluent discharge from binary systems.

Brenda Mehlo and Jemitias Chivavava from the Crystallisation and Precipitation Unit

"More research should be conducted with larger crystallisers as well as using a continuous process, which has potential for treating huge volumes."

But the "piggyback" process is expensive and needs more research before it can be considered to supplement Cape Town's dwindling water reserves, the students report.

"More research should be conducted with larger crystallisers as well as using a continuous process, which has potential for treating huge volumes. Furthermore, analysis into the economic feasibility should be studied."

The project's supervisors are Jemitias Chivavava, chief scientific officer of the Crystallisation and Precipitation Research Unit, and Professor Alison Lewis, dean of the Faculty of Engineering & the Built Environment and one of the unit's founding members.

The unit recently reported that the first full-scale working unit for eutectic freeze crystallisation treatment of waste water would soon be operational at the Tweefontein colliery in Mpumalanga.

In an earlier interview, Lewis said that cutting-edge technologies like eutectic freeze crystallisation have a great future.

"We need these kinds of innovative processes that offer multiple benefits, including eliminating waste ponds, the ability to treat hypersaline brines, the advantages of water recovery, salt recovery and potential revenue generation."

We remember

Professor Dee Bradshaw

Emeritus Professor Dee Bradshaw passed away on 7th June 2018 after a courageous battle with cancer, just a few months short of her 60th Birthday.

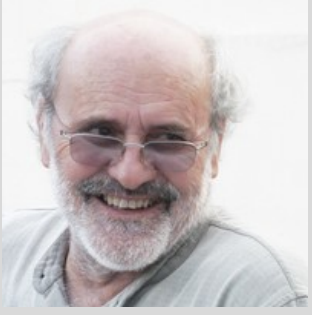
Throughout her illness, Dee remained a leading light and inspiration to students, colleagues and professionals across the globe.

She arrived at UCT in the late 1970s as a young undergraduate student entering a traditionally male dominated discipline and later graduated with a BSc in Chemical Engineering in 1981. With a young family to support, Dee started work as a part-time research assistant in the Flotation Group at UCT in 1983. Over the course of 25 years in this group, Dee emerged as an independent researcher with an international profile for her expertise in flotation chemistry, both in industry and academia. She also initiated several new research activities including the Depressant Research Facility and Process Mineralogy – both of which are still going strong within the Centre for Minerals Research. Following an industry-based sabbatical in 2007, Dee moved to Australia to take up a Professorship at the Julius Kruttschnitt Mineral Research Centre at the University of Queensland in Brisbane. Dee later returned to UCT in 2015 to take up a National Research Foundation South African Research Chair in Mineral Beneficiation and step in as Director of the interdisciplinary Minerals to Metals research grouping hosted by the Department of Chemical Engineering – posts which were both aimed at building a platform for sustainable development in Africa through metals and minerals, and which she held until her retirement in February 2018.

Read more

Emeritus Prof Fabio Todeschini

It is with great sadness that on 23 May 2018 we heard of the unexpected death of Emeritus Professor Fabio Todeschini. Fabio joined the Masters of Urban and Regional Planning programme in October 1976 as a Senior Lecturer and was an important figure in setting up the linked Masters in City Planning and Urban Design programme. He taught in the Urban Design, Planning, Architecture programmes until he retired, but continued to teach as a Senior Scholar in the Conservation and the Built Environment until March 2017. During his time at the University he was quite active in producing research. Since his retirement he has played a role in the heritage field and was serving on the CIFA Heritage Committee and the HWC Impact Assessment Committee.



Retirements

Professor Paul Bowen

Professor Paul Bowen from the Department of Construction Economics and Management will be retiring at the end of December 2018. Professor Bowen joined the department in 1990 as an Associate Professor. After completing his PhD in 1993, he received a promotion to full Professor. In 1998 he was appointed as the Head of the Department. From 2008 to 2010 he was a Deputy Dean for the Faculty of Engineering & the Built Environment. Paul holds a B2 rating with the National Research Foundation of South Africa and is a member of the South African

Academy of Science. His research interests embrace the psycho-social aspects of HIV/AIDS in the South African construction industry, and workplace stress experienced by construction professionals. Research outputs include a book and some 200 peer-reviewed journal and conference papers. He is currently Visiting Professor to RMIT University in Melbourne, Australia.

When asked what he will be doing post-retirement, he said, “I hope to continue my research projects and contribute to the research profile of the department. Other than that, time will be spent undertaking woodwork projects, devoting time to my family, and “smelling the roses”.

Mrs Kathy Evans

In 2000, Mrs Kathy Evans joined the Department of Construction Economics and Management as a senior lecturer. She has served as the programme convenor for the construction and property programmes at undergraduate and honours level, as well as the coordinator for the master’s degree in property studies.

When Kathy talks about her time at UCT, she bubbles over with enthusiasm when talking about all the students whom she has taught over the years. She keeps in touch with the department’s alumni and loves to hear their stories about where they are and what they are doing in the workplace. Through her work in industry, Kathy has a wide network of companies that she works closely with, and they keep her up to date with the needs of industry. She has a knack of matching graduates with industry needs.

Kathy is looking forward to retirement at the end of December 2018, when she will spend time creating a beautiful garden she has always wanted, pottering at home, and spending time with her family. She is also going to volunteer at the Riding for the Disabled, which provides the opportunity of therapeutic and recreational horse riding for disabled

people so that they might benefit in all aspects of their mental, physical and social lives.