April 2021 Faculty of Engineering & the Built Environment University of Cape Town Vol. 17 Issue 1

Faculty Newsletter

Message from the Dean

As of 1 April 2021, we had 736 first-time entering students registered in the faculty. Our target was 741, so well done to everyone who worked so hard to secure the applicants. Thank you to all the staff who worked late into the night and over weekends answering queries and ensuring that all the offers went out. It was the first time we had registration entirely online, and I know there were some challenges, but overall, EBE did really well. I want to acknowledge the incredible work of Celeste Wilson and her team, who dealt with over 15 000 undergraduate applications. In total, we have 3166 undergraduates registered and 1141 postgraduates registered.

Thank you to Disa Mogashana and her team for running a very successful online orientation programme. It was certainly a mammoth task as they had to find new ways of getting the first years to connect and feel part of the EBE Faculty. The homeroom concept is slowly starting to take shape, and the departments are using them in different ways.

Congratulations to all the staff and students for their achievements that have been highlighted in the newsletter. It is exciting to see the number of start-ups that our alumni are developing.

Applications for 2022 open on 1 May, and the university's virtual open day will be held on 22 May 2021.

Wishing our Muslim colleagues all the best over Ramadan.

A-rating for Professor Michael Claeys

The University of Cape Town recently welcomed two new additions to its growing list of A-rated researchers. They are Professor Michael Claeys from the Department of Chemical Engineering and Professor Giona Tuccini from the Department of Italian Studies.

The National Research Foundation's (NRF) rating system is a key driver in their aim to build a globally competitive science system in South Africa.

A-ratings are awarded to researchers acknowledged as leading international scholars in their fields. The rating of individuals is based primarily on the quality and impact of their research outputs over the past eight years, taking into consideration the evaluation made by local and international peers.

Professor Claeys's research focuses primarily on catalysis for energy applications including the Fischer-Tropsch process, a technology which lies at the heart of South Africa's synthetic fuels and chemicals industry and one that is playing an increasingly important role worldwide in the production of green future fuels and chemicals from sustainable resources such as CO2 and hydrogen.

As a soft-funded researcher, a large portion of this research is conducted as part of industrial collaborations

including a longstanding partnership with energy and chemical company Sasol's Research and Development division. Claeys leads a team of high-level researchers from both UCT and Sasol in harnessing Fischer-Tropsch catalysis to address industrial problems in this field.

Read more at UCT News

3D data collection under way in Zanzibar

UNESCO, in partnership with World Monuments Fund (WMF), sent a team of experts from the University of Cape Town led by Prof. Heinz Rüther to the Stone Town of Zanzibar World Heritage property from 28 January to 2 February 2021. They are undertaking 3D data collection at the historic House of Wonders building, which partially collapsed on 25 December 2020, as part of an in-depth survey and condition assessment.

The mission team has captured metrically accurate spatial data using laser scanning, drone and terrestrial photography for photogrammetry, panorama photography and satellite images to ensure a high degree of accuracy. It is using the latest equipment to determine the presence and quantities of deformations at the House of Wonders. “All data captured will then be processed to generate 3D models, sections, plans, elevations, panoramas and panorama tours which will then be used to create site animations and interactive virtual worlds,” said Prof Rüther.

“This is the first of three technical missions planned by UNESCO as part the emergency rehabilitation efforts under way,” said Mr. Tirso Dos Santos, head of the UNESCO Office in Dar es Salaam. For the second mission, a team of architects and structural engineers from WMF travelled to Zanzibar to carry out an on-site condition assessment of structural damage and specify emergency stabilisation.

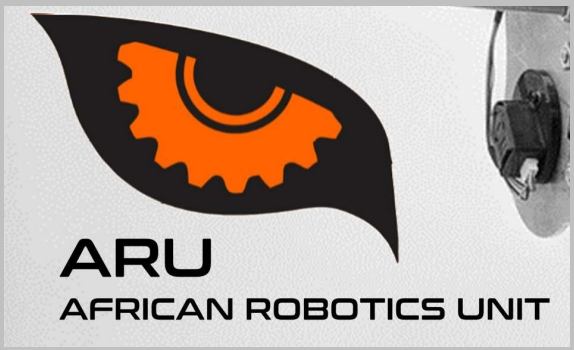
“UNESCO will continue to work closely with the State Party of the United Republic of Tanzania and the authorities of Zanzibar, the Sultanate of Oman, and other partners to assess and document essential information of the building in view of supporting efforts to develop a comprehensive approach for the rehabilitation of the House of Wonders and the safeguarding of the Stone Town of Zanzibar World Heritage site,” said Dr Mechtild Rössler, Director of UNESCO's World Heritage Centre.

The House of Wonders is a historic landmark in Zanzibar and an emblematic edifice in East Africa. It is a central component of the Outstanding Universal Value of the Stone Town of Zanzibar which was inscribed on the UNESCO World Heritage List in 2000 as a fine example of the Swahili coastal trading towns of East Africa. Stone Town retains its urban fabric and townscape virtually intact and contains many exceptional buildings that reflect a particular culture that has brought together and homogenised disparate elements of African, Arabic, Indian and European traditions over more than a millennium.

Article developed and first published by UNESCO. https://whc.unesco.org/en/news/2247

Two EBE Google research scholars

A/Professor Amir Patel and Dr Mohohlo Tsoeu have each been awarded the 2021 Google Research Scholar Award. The prestigious award aims to support early-career researchers who are pursuing research in fields relevant to Google. Patel and Tsoeu are the only recipients from an African university to be selected this year and the UCT's first-ever recipients. They are both members of the newly formed African Robotics Unit (ARU) in EBE.



Patel was awarded in the category of Machine Perception for a project titled "WildPose: 3D Animal Biomechanics in the Field using Multi-Sensor Data Fusion". Africa is home to the world's greatest animal athletes, but researchers still have an incomplete understanding of how they robustly traverse through the unstructured world. Attaining deeper insights into their abilities will be invaluable for legged robots if they are ever to leave the safe confines of the laboratory. Currently, the biggest impediment to a holistic understanding of animal locomotion is measuring and modelling whole-body motion in the wild. This project proposes to develop a deep-learning-based motion-capture system (*WildPose*), which leverages complementary sensor data to remotely obtain high-speed, whole-body 3D animal kinematics in the field from a single view. The system will enable videographers to capture biomechanical data from animals (such as cheetahs and lions) in the wild using a single handheld device, tapping a new source for data collection.

Tsoeu was awarded in the category of Natural Language Processing for a project titled "Corpora collection and complete natural language processing of isiXhosa, Sesotho and South African Sign languages". This project will contribute to the development of comprehensive high-quality language corpora for indigenous South African languages. It will further investigate and develop novel and high-performance machine-learning algorithms aimed at application areas such as automatic speech recognition, translation and text-to-speech/sign technology. These applications find a place in the growing area of human machine interfacing, but, most importantly for South Africa, they contribute towards bridging the human language divide and improving equal access and participation to restore the dignity of currently marginalised groups such as the deaf and hard-of-hearing communities.

Read UCT News

Distinguished International Associate

A/Professor Nico Fischer from the Department of Chemical Engineering has been named as a Distinguished International Associate of the Royal Academy of Engineering.

This programme is a new programme for excellent international engineers working across all sectors who are at the cutting edge of engineering research or innovation, and have existing collaborations or connections to the UK which they would like to intensify. In its first round, it will be open to alumni of Academy international programmes.

The programme aims to develop a broad international community or network of excellent diverse engineers across countries and disciplines, with research and innovation links to the UK, to work

alongside the Academy to enhance progress towards achieving its goals for an inclusive economy and sustainable society.

EWB 2020 Design Challenge Grand Finals

Joshua Elliot, a 2020 first-year chemical engineering student, reached the EWB 2020 Design Challenge's grand finals. Though he did not win a prize, reaching the final was an achievement on its own.

Last year, Naseeba Abbas, a lecturer in the CHE1005W (Chemical Engineering I) course, partnered with Engineers Without Borders South Africa. Students were tasked to develop engineering solutions for water and sanitation in Makers Valley in Johannesburg.

Five UCT students' projects were selected and submitted to the EWB-SA panel. Joshua Elliot's project on a Greywater Treatment Plant Design was one of two projects selected from across South African universities to compete in the Grand Final organised by EWB-UK. The event was held online in December 2020 and Joshua competed against students from the UK, USA, and South Africa.

Joshua's project focused on designing an environmentally, economically and socially viable greywater treatment plant. Joshua said, "Makers Valley receives approximately 70% of its water from Lesotho, after first flowing via the Vaal Dam. The purity of the water is extremely high; however, recently there have been recurring low water levels in the Lesotho dams. This has resulted in the water supply to Makers Valley and its neighbouring areas being threatened. My greywater treatment plant design can become an important contributor to the required solution for the current and continued water shortage problem in the area. The proposed plant's goal is to reduce the demand on the existing freshwater supply system for the area by supplementing it with recycled greywater."

Joshua said it had been an unbelievable experience that he thoroughly enjoyed. It gave him his first opportunity to apply things that he had been taught in lectures to a real-world scenario and which had the possibility of a positive impact on people's lives in a community. "It was an eye-opener to work through all the different aspects of a project, from conception and design right through to costing and implementation. Participating in this challenge allowed me to engage with like-minded students across South Africa. It provided a unique opportunity to experience the wisdom of international specialists in the field of engineering. I am grateful for having been afforded this opportunity," he added.

Through the EWB Design Challenge, EWB-UK wants to build a new generation of creative, innovative and globally responsible engineers who will spread their expertise across the globe and find solutions to the biggest challenges of our time.

2020 Young Engineer of the Year award

Byron Mawer PrEng, an alumnus of the Geotechnical Engineering Division in the Department of Civil Engineering, won the 2020 South African Institution of Civil Engineering (SAICE) Young Engineer of the Year award. This prestigious award is given as an honour to a young engineer under the age of 36 years who has rendered outstanding service to the profession and made a contribution of distinction to civil engineering in South Africa. Byron works for JG Afrika and is currently the chairman of the SAICE Western Cape Branch.

Chair of international youth council

Joanitta Ndawula, a PhD candidate in CoMSIRU, a research group in the Department of Civil Engineering, was elected as the Chair of the newly formed RILEM Youth Council (RYC). She is supported by ten other members from institutions around the world. RILEM, the International Union of Laboratories and Experts in Construction Materials Systems and Structures, was founded in 1947 to promote scientific cooperation in construction materials and structures.

In October 2020, thanks to the efforts of Professor Hans Beushausen, the current Chair of RILEM's Development Advisory Committee, the formation of the RYC was formally approved. Prof Beushausen said, "It was developed as an initiative to address the very low membership numbers of young and emerging researchers within the organisation. The future success of RILEM, as with any other organisation, depends on the ability of the organisation to assure continuity."

The youth community is intended to be an online facility for networking and knowledge exchange. By being members of the RYC young researchers will have access to world-leading research, technical committees and RILEM-sponsored PhD courses.

Joanitta said, "I'm very excited to be part of this initiative and this team of change-makers and look forward to seeing all of CoMSIRU in RILEM." As the Chairman of RILEM's Development Activity Committee, Prof. Beushausen is very happy that Joanitta has been selected as the RYC chair. "Not only has she been integral to the initiation and development of the RYC, but she has also approached the challenge with the enthusiasm, diligence and creativity we like to see in our students. We are very excited for her to represent CoMSIRU and sub-Saharan Africa on the council," added Prof Beushausen.

Rowing solo across the Atlantic Ocean

In December 2019 John Dempster, a third-year mechanical engineering student, took part in the Talisker Whisky Atlantic Challenge, which is regarded as the toughest rowing race in the world. John had been suffering from depression and anxiety and wanted to inspire South Africans suffering from mental health issues to seek help and break the stigma surrounding their suffering. John tackled the 3000-mile race from San Sebastian in La Gomera, Canary Islands, to Nelson's Dockyard, Antigua & Barbuda. He rowed an ocean rowing boat across the Atlantic Ocean and became the youngest African and 7th youngest person in the world ever to row solo across an ocean. He did it in 63 days, 9 hours and 14 minutes!

Pandemic praxis: adapting research methods within COVID-19 constraints

The University of Cape Town's African Centre for Cities' Nourished Child project is using a mix of photography and online messaging technology to continue doing fieldwork during the COVID-19 pandemic.

COVID-19 reached South Africa around the same time the Nourished Child project team was preparing to embark on a series of immersive group walks through the densely populated urban sites of Masiphumelele and Zweletemba in the Western Cape. With the country going into lockdown, the team faced a difficult choice: postpone important fieldwork or find a way to work within the constraints presented by COVID-19 restrictions. Here's how the team used a combination of photography and online messaging technology to pivot their research methodologies and continue their research work during a pandemic.

The aim of the Nourished Child project is to understand better the interconnections between food systems, urban systems and social systems and how these come together to affect the nutrition of women and children under the age of five.

According to Associate Professor Jane Battersby, who heads up the African Centre for Cities portion of the Nourished Child project, that's one of the reasons why the team was excited to be putting together a series of interactive walks.

"We planned on doing multiple themed Transect Walks in which small groups of residents and researchers would make their way through our focus neighbourhoods, identifying key features to discuss as they related to food systems, social systems and infrastructure. We were excited to use these walks as an immersive way of unearthing and interrogating how systems interact using visual clues and sites to prompt conversation."

When COVID-19 struck it quickly became clear that this form of fieldwork would no longer be possible.

"During Level 5 lockdown it would have been illegal for us to be in these areas and even thereafter we could not ethically put any of our participants or researchers at risk of getting sick."

The question then became: How could the team adapt their research methodology in a way that not only answered their original research questions but could also capture how the pandemic was affecting the nutrition of women and children under the age of five.

Read more at UCT News

New staff

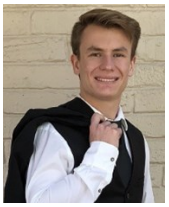
Welcome to new staff who have joined the faculty this year.

Mrs Heidi Boulnager joined the School of Architecture, Planning & Geomatics as a lecturer in January 2021.

Mrs Teboho Mofokeng joined the Department of Civil Engineering in January 2021.

Ms Huda Tayob joined the School of Architecture, Planning & Geomatics as a senior lecturer in March 2021.

Obituary



Michael Cilliers (20), a construction studies student, passed away on 4 January 2021 from a rare cancer which there was no standardised course of treatment, so his family could only opt for more trial-based, experimental and alternative avenues of treatment. Unfortunately, such procedures are not covered by medical aid, and so his sister together with fellow students set up a funding campaign to help with the treatment that Mike needed.

Nyanisi Hlongwane, a third year civil engineering student, passed away on Friday 19 March. Nyanisi had taken a leave of absence in 2020 and was hoping to return to her studies in 2021. Unfortunately, her health deteriorated and she passed away. Her funeral took place on Friday 26 March at Tshakhuma Luvhalani D, in Limpopo.

Fran Pocock, who worked in CeBER in the Department of Chemical Engineering, died on Saturday 11 April after a short illness. Fran joined UCT in February 1990 as a scientific officer and took early retirement in 2012 when she was the Scientific Officer and Lab Manager in CeBER. She leaves behind her husband Eric and son Simon.

Tania Douglas, a 1992 electrical engineering graduate, died on 20 March 2021 after a courageous battle with breast cancer. At the time of her death, Tania was a professor at UCT, held the prestigious South African Research Chair in Biomedical Engineering and Innovation, and served as director of the Biomedical Engineering Research Centre. She was a co-founder of CapeRay in 2010 and served on its board of directors.
Read the Obituary by Kit Vaughn.

Exploring ways to value water

Researchers from the University of Cape Town's transdisciplinary Future Water Institute recently highlighted some of their projects that explore different ways of valuing water. This is in keeping with the theme for this year's World Water Day on 22 March: "Valuing water" – determining what water means to people, understanding its true value and learning how best to protect this vital resource.

These water drops are the outcome of an engagement workshop hosted with youngsters in the local community to help them understand the value of water.

Four of the institute's emerging researchers – Jessica Fell, Emily Nicklin, Kalpana Maraj and Amber Abrams – presented some of their research projects that intersect with this theme at a webinar hosted by the Water Institute of Southern Africa.

Fell, a PhD candidate, provided an overview of the Future Water Institute's multifaceted research offering, highlighting its vision of sustainable and resilient water futures. She explained that the institute's mission is to conduct engaged research on water-sensitive approaches that sustain society's current and future water needs, while recognising the diverse meanings and values attached to water for and by different people.

Read more at UCT News

University rankings

The annual QS World University Rankings - one of the three top university ranking systems in the world - have been released for specific study areas, including law, engineering and finance. The rankings are based on global surveys of academics and employers, as well as the impact of the research published by academics. More than 1400 universities were studied and almost 14 million research papers reviewed as part of the rankings. The QS World University Rankings by Subject 2021 covers 51 disciplines and shows that South African universities were awarded high rankings in specific areas.

Here are some of the highest QS scores in different fields:

UCT's architecture course was also among the top 100.

Engineering

South Africa's mining and mineral engineering courses were rated among the best in the world, with Wits at position 13 worldwide, and the University of Pretoria at number 48.

For civil and construction engineering, UCT was ranked in the 151-200 range. In mechanical engineering, UCT (251-300 range) scored highest, followed by Stellenbosch and UP (301-350 range).

UCT and Wits both scored in the 251-300 range for chemical engineering.

Overall UCT is the best engineering university in South Africa, and fourth in Africa.

Business Insider

Greenovate Awards 2020

Annually the Green Building Council of South Africa and Growthpoint Properties organise the Greenovate Competition with the aim of exposing students to key focus areas of sustainability in the construction industry. The event was due to take place in 2020 but because of delays in universities' exam timetables and final project submissions, the 2020 Greenovate competition submissions were rescheduled for 2021. The competition is open to honours students in property studies, construction, quantity surveying and civil, mechanical, electrical and electronic engineering students.

Talia White, Dylan Hübner and Alan Hunter

Technology played a big role in keeping the momentum going with mentors assisting students via email, and judging taking place via video conference.

The universities that participated in the competition were the University of Witwatersrand, University of Pretoria, University of Johannesburg, Nelson Mandela University and UCT.

UCT took second and third place in the property stream. Second place went to Talia White, who was supervised by A/Professor Kathy Michell. Talia's project was "An investigation into Critical Success Factors for Sustainable Waste Management in shopping centres."

Third place went to Alan Hunter and Dylan Hübner, who were supervised by Dr Ali Moghayedi and A/ Professor Kathy Michell. Their project was "An investigation of the impact of implementing innovative technologies to reduce the energy consumption on the sustainability of South African commercial property".

Honorary degree for Emeritus Professor Daya Reddy

Emeritus Professor Daya Reddy received his honorary doctorate from the University of Stellenbosch on Thursday 1 April at a small physical graduation ceremony for doctoral graduates which was held on the Stellenbosch campus. He was honoured for his research leadership and scientific breakthroughs; for his exceptional contribution in strengthening and advancing science at a national and international level; and for his generosity in sharing his knowledge and expertise to develop students in the field of computational and applied mechanics.

Read more

Mechanical Engineering graduate

A 2011 Electromechanical graduate, Mkhokheli Ncube, in collaboration with Professor John Lazarus, Head of Urology at UCT, developed a low-cost wireless endoscope camera that could help bring minimal-access surgery to resource-constrained environments. Mkhokheli did a MSc in biomedical engineering and is currently working as a mechanical designer at Philips in the Netherlands.

Weighing in at a mere 184 grams and costing only USD230, the device prototype is much more mobile and affordable than its heavyweight wired counterparts that carry production price tags of as much as USD28 000.

Battery-operated and comprising a 3.7millimetre tube camera and LED illumination, the camera is capable of delivering high-definition (1280 × 720 pixels) video at 30 frames per second. This is transmitted wirelessly in near real-time via USB 2.0 interface with a Raspberry Pi Zero W miniature single-board computer module. The system is powered by a 1200mAh lithium polymer battery that lasts for over two hours.

Read more at UCT News

Funding for Biomedical start-up

Impulse Biomedical is another success story of a group of EBE alumni doing great things. Gokul Nair, a 2013 mechanical engineering graduate, is the co-founder of Impulse Biomedical. The other EBE alumni are Munya Matose, BSc Mechatronics in 2012; Seth Thompson, BSc Mechanical Engineering in 2015; and Yasheen Brijlal, a 2012 Electrical Engineering graduate. All four of them went on to complete their MSc in Biomedical Engineering at UCT. Giancarlo Beukes is the other co-founder, who also did his MSc in Biomedical Engineering at UCT.

Yasheen Brijlal, Seth Thompson, Munya Matose Giancarlo Beukes and Gokul Nair (seated)

Impulse Biomedical is a biomedical engineering startup. It has recently secured funding from Future Growth towards its innovative medical device, ZiBipen. The device has the potential to transform the emergency treatment of life-threatening anaphylaxis. It has developed an affordable solution for middle to low-income groups, and it is the first local innovation for the treatment of anaphylaxis. The group aims to broaden their offering and increase access to health technologies for South Africans.

Read more

EWB-UCT collaborates on Aquatecture Project

In 2018, the water crisis in South Africa reached its pinnacle when the population of Cape Town began counting the days before Day Zero. Today, like-minded organisations have joined their efforts in an exciting project which aims to prevent future Day Zeros through sustainable rainwater harvesting.

Aquatecture is a rainwater-harvesting concept designed by Studio Sway, a company which resides in the Netherlands under the leadership of South African-born Shaakira Jassat. Along with the engineer on the project and UCT alumnus Adam Ozinsky, they bought the design concept to life. It consists of a panel suited for the typical, compact urban environment as it can be bolted into the side of a building, creating a façade that captures rainwater through openings in the panel. The harvested rainwater is stored and can then be used throughout the building's water system.

Engineers Without Borders (EWB-UCT) has joined this project as the Research and Development team tasked with developing a database for the project, which is to evaluate the panel's efficiency in varying situations. This team is currently working on the pilot of the project which is located at the Granger Bay parking lot at the V&A Waterfront.

EWB members with a general proficiency in Excel, understanding of weather data, and a passion for water sustainability are encouraged to apply to be part of the Research and Development team for this exciting project. For more updates on this project, follow EWB-UCT on Instagram (@ewb_uct). You can also find EWB-UCT on LinkedIn as "Engineers Without Borders UCT". If you would like to learn more about the work of Studio Sway, their Instagram is @studio_sway.

EWB-UCT & GBCSA at the Aquatecture Panel

Article written by Ameer Khan and Bindiya Ravjee

Top marks for interdisciplinary and collaborative approach

What do you get when you combine the knowledge and work of a supervisor, two bright young students and a PhD candidate from another discipline? In Tobie Steyn and Tyler Kantor's case, it's earned them recognition from their department for one of the best papers in their year, and has provided new insight into epidemic modelling.

Steyn and Kantor are graduands at the University of Cape Town, and their thesis, "A Heterogeneous Compartment Model for the Dynamics of COVID-19 in South Africa", has been recognised by the Department of Chemical Engineering as one of the best papers in their year.

Under the supervision of Professor Klaus Möller, the head of the Process Modelling and Optimisation group, Steyn and Kantor used data from PhD candidate Leen Remmelzwaal's dashboard, Corona Stats (previously known as COVID-19 Stats SA).

Read More at UCT News

MechEng students off to sail at the Olympics

South African sailors Benji Daniel and Alex Burger have booked their spot at the Tokyo Olympics in the 49er class. They are both mechanical engineering undergraduate students, and have taken leave of absence to concentrate on their training for the Olympics, which take place in just over three months at Enoshima Yacht Harbour in Japan. The final selection for Team SA to Tokyo will need to be confirmed by the South African Confederation & Olympic Committee. Benji and Alex are now training and preparing and say that they are lucky to have good coaching and mentorship from previous Olympic sailors.

Benji Daniel and Alex Burger. Photo: Liesl King

Mpumi preparing for the Paralympics

Mpumelelo Mhlongo, a PhD candidate in Chemical Engineering, is a T44 SA Paralympian who holds three world records in the 100m, 200m and long jump. He is busy preparing to compete in the 2021 Tokyo Paralympics, which are due to take place from 24 August.

He was born with amniotic band syndrome, a rare birth defect, which left his right leg shorter and less developed than his left one. He was told that he would not walk but he defied all odds and took his first steps at six years old. In 2019, he started his #Mpumi2020 campaign to raise awareness on behalf of disabled people in Africa, and athletes in particular.

Shortlisted for 2021 Olympics

Hayley Preen, a final-year mechanical engineering student, has done it again. At the beginning of March, she travelled to Egypt as part of the South African team who participated in the African Continental Road Championships, where she received two golds and a silver. She then participated in the South African National Road Championships from Thursday 18 to Sunday 21 March, where she won the women's elite road race (133km) in a time of 4:18:06. She was crowned the 2021 South African National Race Champion and has been shortlisted for the 2021 Olympics.

VC's visit to EBE's homerooms