DUT — Durban University of Technology | Faculty of Engineering & the Built Environment | Department of Electrical Power Engineering

SAUPEC — Southern African Universities Power Engineering Conference | SAIEE | IEEE South Africa Section | University of Johannesburg — Faculty of Engineering and the Built Environment

POWER DIGEST

A NEWSLETTER PUBLICATION

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HIGHLIGHTS

Professor Katleho Moloi, A Chartered Engineer Endorsed By Institute Of Engineering And Technology (UK)

WRITER: SMANGELE NXUMALO
EDITED: NOMPUMELELO CHILI

Professor Katleho Moloi, the Associate Professor and Head of Department in Electrical Power Engineering (EPE) at the Durban University of Technology (DUT) Faculty of Engineering and the Built Environment, recently attained the designation of Chartered Engineer (CEng) from the Institute of Engineering and Technology (IET) in the United Kingdom (UK). Engaged in teaching, research, community engagement projects, and academic citizenship, Professor Moloi is a professional engineering technologist (Pr Tech Eng), a member of the South African Institute of Electrical Engineers (MSAIEE), a member of the Institute of Engineering and Technology in the UK, and registered with the Engineering Council of the United Kingdom (ECUK). He perceives the CEng status as a significant step in his engineering career, positioning him as a top expert. The process of obtaining the CEng status was described as rigorous.

"My dedication to engineering has been unwavering, and I have extensive experience as an industry engineer. Engaged in pioneering engineering advancements, I express my gratitude to Prof Fulufhelo Nemavhola (DVC: RIE) for his mentorship and guidance throughout my CEng registration journey and my life in general. I sincerely appreciate his support," said Prof Moloi.

"Firstly, a master's level of academic knowledge in Engineering is required. Demonstrating competencies aligned with standards set by the UK-SPEC Council is essential. Proficiency in 17 UK engineering outcomes must be showcased. A detailed report outlining engineering contributions is mandatory, a task that took me over a year to complete. Furthermore, defending this report before an expert panel from academia and industry is necessary, with the interview lasting up to four hours. Registration with the National Engineering Council is advantageous," Professor Moloi shared.

Professor Moloi expressed his exhilaration at achieving this new accolade and his delight and pride upon receiving the positive news. This milestone signifies fresh opportunities to engage with influential and inspiring individuals in the future. Anticipating a favourable outcome, he acknowledged the considerable effort invested in the application process.

"CEng are proficient at devising solutions for engineering challenges utilising new and existing technologies, driven by innovation, creativity, and adaptability. They bear technical responsibility for intricate systems carrying substantial risks. CEng possesses the theoretical expertise to address problems in emerging technologies and devise novel analytical approaches. They are accountable for effectively applying this knowledge to deliver innovative products and services or assuming technical oversight of complex engineering systems," Professor Moloi explained.

Attaining the CEng status will offer him various advantages, including recognition and credibility as it is globally acknowledged, showing he has met high standards of competence and professionalism in engineering. He believes his CEng status could lead to new opportunities for senior roles and leadership positions in the engineering industry. He intends to stay current with the latest developments, best practices, and technologies in his field to keep his CEng status.

DUT-DSI Space Science & CNS Research Centre And The South African Space Technology For Sustainable Development Foundation MOU Signing

WRITER: SMANGELE NXUMALO
EDITED: SINETHEMBA NGCOBO & NOMPUMELELO CHILI
PHOTOGRAPHER: KHULASANDE TSHAYILE.

Prof S Rathilal, Dr T Mazibuko, Prof E Ojo, Mr E Mhlongo, Prof K Moloi

The Space Science and Communication, Navigation and Surveillance (CNS) Research Centre in the Faculty of Engineering and the Built Environment at the Durban University of Technology (DUT) signed a Memorandum of Understanding (MoU) with the South African Space Technology for Sustainable Development Foundation at the Department of Electrical Power Engineering, Steve Biko campus on Friday, 16 February 2024.

Representing DUT in the signing ceremony was Professor Sudesh Rathilal, Acting Executive Dean of the Faculty of Engineering and the Build Environment, Professor Evans Eshiemogie Ojo and the South African Space Technology for Sustainable Development Foundation was represented by its Chairman, Dr Thabani Mazibuko, who is also a DUT alumnus and a Space Science Grant recipient for his Doctorate.

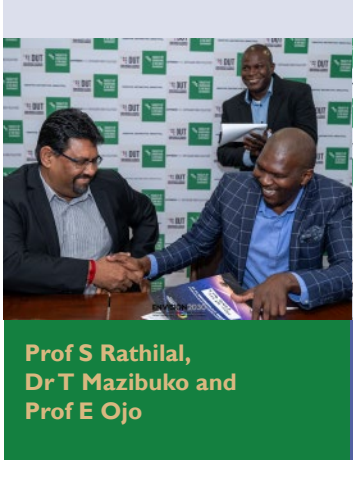
Facilitating the MoU signing ceremony was Prof Evans Ojo, an Electrical Power Engineering Senior lecturer and the head and coordinator of the DUT Space Centre and CNS Research Centre. He believes this MoU will commit both parties to work together towards their common goal, which is the pursuit of collaboration in space science.

According to Prof Ojo, some programmes that will come out from this MoU include Establishing a partnership for Science, Technology, Engineering and Mathematics (STEM) education and expanding the space science and innovation platform. Stimulating interest in STEM subjects and careers. Promoting the innovative use of space products and services by youth.

"This was pushed by one main mutual desired outcome to make these two organisations a hub for skills development, projects that are innovative in nature, bring solutions and align ourselves with national continental and international organisations and legislations for the betterment of our students and the society we live in. The South African space administration falls into four programme areas, namely: Earth Observation, Space Engineering, Space Operations, and Space Science," said Dr Mazibuko.

He believes the four programme areas of space science show the potential of space exploration and the wide range of opportunities that are still untapped. Dr Mazibuko indicated that these opportunities are indefinite and cannot be achieved when organisations are working in silos. He feels the exploration of more sectors in space science will benefit future generations as it will expose them to sectors that can absorb them into the workforce and entrepreneurship sector. Sharing the message of support, Professor Katleho Moloi, Head of Department: Electrical Power and Engineering, commended DUT alumnus Dr Thabani Mazibuko for coming back to partner with DUT in exploring the field of space science. He referred to the Israel-Gaza conflict, where it is said that drones are used to transport food and medicine to the people, saying the space science engineering has more to offer the world. Prof Moloi thanked Prof Ojo for his dedication in making this collaboration a reality and urged both parties to spread the news about the importance of understanding space science.

Professor Sudesh Rathilal, Acting Executive Dean: Faculty of Engineering and the Built Environment at DUT, shared the same sentiments. He said this collaboration was a great initiative that will see DUT using its education to capacitate the people of South Africa to understand that they live in a world of space science. Through collaborating, Prof Rathilal believes they will be able to reach a larger scale of people, which will lead to great things for the university and society.



Prof S Rathilal, Dr T Mazibuko and Prof E Ojo

Prof E Ojo and Dr T Mazibuko

Prof S Rathilal and Dr T Mazibuko

Prof K Moloi and Dr T Mazibuko

NEW ACADEMIC STAFF MEMBERS

Dr Sibongile Florina Phiri

Dr Sibongile Florina Phiri hails from Bloemfontein. and currently serves as a Lecturer in the Department of Electrical Power Engineering at Durban University of Technology. Dr Phiri completed a Postdoc fellowship at Vaal University of Technology from 2023 to 2024 in the Department of Electrical Power Engineering, where she was part of the Department Research and Innovation Committee (DRIC). Dr Phiri also worked as an Assistant Lecturer in the Department of Electrical Engineering at the Central University of Technology from 2020 to 2023. Dr Phiri was also appointed by DHET as an internal moderator for Industrial Electronics N2 at Matheo Tvet College (Bloemfontain) marking center from 2018 to 2023. She was actively involved in Women in Engineering & IT (WEIT). She holds qualifications including D-ENG in Electrical Engineering, M-ENGE Engineering, B-Tech in Engineering and N.-dip in Electrical Engineering from The Central University of Technology in Free State. Her research focused on an energy management scheme integrating the storage of recovered potential energy of RTG Grants.

Dr. Phiri has made significant contributions to the field with seven publications in reputable journals and conference papers, 2 Journal papers, and a Dissertation and Thesis. She has also been actively involved in teaching and Learning, presenting 1 Conference paper and another at a Teaching and Learning Conference. Dr. Phiri is registered as a candidate with ECSA. Her interests include intellectual activities, volunteering, community work, educational pursuits, restaurant dining, and sports like football.
When asked about her motivation for joining the Durban University of Technology, Dr Phiri highlighted the university's renowned engineering programs that align with her career goals and its reputation for providing an excellent learning environment.

Mr Sifiso Bongani Zikhali

Mr Sifiso Bongani Zikhali joined DUT as a Technician in a fixed-term contract for Electrical Principles 2. Mr Zikhali graduated with a B-Tech in Power Engineering in 2022 and a National Diploma in Electrical Engineering (Heavy Current) in 2015 and is currently enrolled as a student at DUT for Bachelor of Technology Honours in Electrical Power Engineering. Mr Zikhali has ten years of working experience in the industrial and academic sectors. During his five years in the electrical distribution networks, he was exposed to new substation constructions, switchgear/control room upgrades, and reticulation projects, which amounted to 21 projects located in different provinces of South Africa and outside the border.

Mr Zikhali also has a passion for Teaching and Learning. He has also accomplished five years of teaching experience in the TVET sector. He taught the Nated subjects from N1 to N6, including Engineering Mathematics, Electrical Trade Theory, Industrial Electronics, Electrotechnics and Engineering Science. The combination of industrial and academic experience played a significant role in the position held at the uMgungundlovu TVET college as the Electrical Engineering Facilitator for the skills programme for Apprentice (Trade) Students in 2023.

STAFF ACCOMPLISHMENT

Dr. Mbulelo Siyabonga Perfect Ngongoma

Dr. Mbulelo Siyabonga Perfect Ngongoma joined the DUT as a Lecturer and a Doctoral of engineering postgraduate in 2023. Dr Ngongoma obtained his Bachelor of Science Honours (B.Sc.Hons) and his Master of Science (M.Sc., Cum Laude) in Electrical Engineering at the University of KwaZulu-Natal (UKZN) in 2017 and 2019 respectively. Mr. Ngongoma has five years of professional expertise in several industry sectors. His research interests include Power Converters, Renewable Energy, Precision Agriculture, artificial intelligence, Machine Learning, Digital Systems, and Embedded Systems. We proudly announce that he has successfully obtained his Doctoral Degree in Engineering from the Durban University of Technology, specialising in Electrical Power Engineering. His research title is "Enhancing Post-Harvest Farm Yield Utilisation of a Machine Learning-base Fruits Disease Classification Model".

When asked to share his thoughts, Dr Ngongoma highlighted, "The doctoral research was effectively completed within a year, acquiring a PhD before turning 30. The investigation for my doctoral qualification yielded noteworthy discoveries with the capacity to transform the field of crop disease control in agribusinesses. Presently, I am in the process of patenting specific results from my doctoral research". "The journey may appear daunting; however, through dedication, commitment, and perseverance, I am confident that anything is achievable", added Dr Ngongoma.

ELECTRICAL POWER ENGINEERING – 2023 RESEARCH OUTPUTS

Articles in Refereed/Peer-reviewed Journals (2023)

1. Mlungisi Ntombela, Musasa Kabeya, and Katleho Moloi, "A comprehensive Review for Electric Vehicles Drive Circuits Technology, Operations and Challenges", World Electr. Veh. J. 2023, 14, 195. https://doi.org/10.3390/wevj14070195
2. Mlungisi Ntombela, Musasa Kabeya, and Katleho Moloi, "A Comprehensive Review of the Incorporation of Electric Vehicles and Renewable Energy Distributed Generation Regarding Smart Grids", World Electr. Veh. J. 2023, 14, 176, https://doi.org/10.3390/wevj14070176
3. Mlungisi Ntombela and Musasa Kabeya, "Reduction of Power Losses and Voltage Improvement in a Smart Grid Incorporated with Electric Vehicles", Sustainability (ISSN 2071-1050), 2023, 13, 10943. https://doi.org/10.3390/su131910943
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5. Mbulelo Siyabonga Perfect Ngongoma, Musasa Kabeya, Katleho Moloi, "A Review of Plant Disease Detection Systems for Farming Applications. Appl. Sci. 2023, 13, 5982. https://doi.org/10.3390/app13105982
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7. Umoh, V., Davidson, I.E., Adebiyi, A.A., and Ekpe, U., "Methods and Tools for PV and EV Hosting Capacity Determination in Low Voltage Distribution Networks—A Review." Energies, vol.16(8), pp.1-25, 2023. https://doi.org/10.3390/en16083609
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10. Osaloni, O.O., Akinyemi, A.S., Adebiyi, A.A., and Moloi, K., "Power loss analysis with dispersed generation in multifunction power conditioner design improves power quality." Accepted for publication by WSEAS Transactions on Power Systems.
11. Osaloni, O.O., Akinyemi, A.S., Adebiyi, A.A., and Moloi, K., "Optimal power quality enhancement Using a Radial Distribution System with an Improved Unified Power Quality Conditioner." Accepted for publication by WSEAS Transactions on Power Systems.
12. KT Akindeji, and Ewim, D.R.E. Economic and environmental analysis of a grid-connected hybrid power system for a University Campus. Bull Natl Res Cent 47, 75 (2023). https://doi.org/10.1186/s42269-023-01053-6
13. T. Adefarati, G. D. Obikoya, G. Sharma, A. K. Onaolapo, and K. T. Akindeji, "Design and feasibility analysis of grid-connected hybrid renewable energy system: perspective of commercial buildings," Energy Syst (2023). https://doi.org/10.1007/s12667-023-00578-z
14. Musa, U., Adebiyi, M.O., Adebiyi, A.A., and Adebiyi, A., "Development of a Machine Learning Model for Big Data Analytics." IEEE proceedings, vol. 1, pp. 1-6. 2023. https://doi.org/10.1109/SEB-SDG57117.2023.10124592
15. Igbekele, E.O., Aideloje, J., Adebiyi, A.A., and Adebiyi, A. "Product Verification using Blockchain Technology: A Systematic Review." IEEE proceedings, vol. 1, pp. 1-6. 2023. https://doi.org/10.1109/SEB-SDG57117.2023.10124602
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18. N. W. Ndlela, I. E. Davidson, and K. Moloi, "Power Planning for a Reliable Southern African Regional Grid," Energies, vol. 16, no. 3, p. 1028, 2023.
19. K. Behara, K. T. Akindeji, and G. Sharma. (2023). "Relationships of Abstraction and Application Complexity between Mathematics and Electrical Engineering Modules Attainment in Diploma Courses of South Africa," International Journal of Learning, Teaching and Educational Research, Vol. 22, No. 12, pp. 140-161. https://doi.org/10.26803/ijlter.22.12.8
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1. N. W. Ndlela and I. E. Davidson, "Progress in The Development of the Southern African Regional Grid," in 2023 31st Southern African Universities Power Engineering Conference (SAUPEC), Johannesburg, South Africa 24-26 January 2023 IEEE, pp. 1-5, doi: 10.1109/SAUPEC57889.2023.10057883.
2. N. W. Ndlela and K. Moloi, "Interactional Coordination of High Voltage DC and Flexible AC Transmission System Elements," in 2023 IEEE PES/IAS PowerAfrica, 2023: IEEE, pp. 1-5.
3. W. K. Ntuli, M. Kabeya and K. Moloi, "Review of South Africa's Standard Grid-Code Requirements for DG Renewables," 2023 IEEE PES/IAS PowerAfrica, Marrakech, Morocco, 2023, pp. 1-5, doi: 10.1109/PowerAfrica57932.2023.10363301.
5. Hoosen, N. G., Ojo, E. E., & Ijumba, N. M. (2023). The Analytical Study of the Controlled Switching of an AC Vacuum Circuit Breaker for Fault Interruption. In 2023 31st Southern African Universities Power Engineering Conference (SAUPEC). IEEE. doi:10.1109/saupec57889.2023.10057859
6. Mlungisi Ntombela, Musasa Kabeya, Katleho Moloi, "Review of the Technology and Problems Faced by Electric Vehicles Drive Circuits", 3rd International Conference on Electrical, Computer and Energy Technologies (ICECET 2023) 16-17 November 2023, Cape Town-South Africa.
7. Mlungisi Ntombela, Musasa Kabeya, Katleho Moloi, "Optimal placement of EV Charging Stations in the Distribution Network to Avoid Power Losses", 3rd International Conference on Electrical, Computer and Energy Technologies (ICECET 2023) 16-17 November 2023, Cape Town-South Africa
8. Philani Ngema, Kabeya Musasa, "Percentage Differential Relays on Power Transformer using MATLAB/SIMULINK through ABC algorithm and machine learning", 2023 IEEE PES/IAS PowerAfrica Conference, 6 November - 10 November 2023, Morocco.
9. Ngoni Gwatidzo, Kayode Timothy Akindeji, Musasa Kabeya, "Industrial Level 100 MW RE Grid Connection Preliminary Technical Feasibility Study", 2023 IEEE PES/IAS PowerAfrica Conference, 6 November - 10 November 2023, Morocco.
10. Welcome Khulekani Ntuli, Kabeya Musasa, "Review of South Africa's Standard Grid-Code Requirements for DG Renewables, ", 2023 IEEE PES/IAS PowerAfrica Conference, 6 November - 10 November 2023, Morocco.
11. Mlungisi Ntombela, Musasa Kabeya and Moketjema Leoaneka, "System Modification Using an Artificial Intelligence Hybrid Algorithm to Minimize Power Losses in the Transmission System", 8th IEOM North American Houston Conference on Industrial Engineering and Operations Management, Houston, Texas, USA, June 13-15, 2023.
12. Mlungisi Ntombela, Musasa Kabeya and Moketjema Leoaneka, "Distributed Generator Placement and Sizing for Power Transmission Network Modification Using Artificial Intelligent Algorithm", 8th IEOM North American Houston Conference on Industrial Engineering and Operations Management, Houston, Texas, USA, June 13-15, 2023.
13. Welcome Khulekani Ntuli and Musasa Kabeya, "Performance Analysis of Wind Energy Conversion Systems Integrating the Doubly Fed Induction Generator and the Permanent Magnet Synchronous Generator", 8th IEOM North American Houston Conference on Industrial Engineering and Operations Management, Houston, Texas, USA, June 13-15, 2023.
14. Mlungisi Ntombela, Musasa Kabeya and Moketjema Leoaneka, "Optimal Positioning and Sizing of Distributed Generation to Reconfigure Power Network Using Wind Power DG", 2023 31th Southern African Universities Power Engineering Conference (SAUPEC). University of Johannesburg, Auckland Park Bunting Road Campus.
15. Mlungisi Ntombela, Musasa Kabeya and Moketjema Leoaneka, "Optimal Positioning and Sizing of Distributed Generation to Reconfigure Power Network Using Artificial Intelligent Algorithm", 2023 31th Southern African Universities Power Engineering Conference (SAUPEC). University of Johannesburg, Auckland Park Bunting Road Campus.
16. M.S.P. Ngongoma, I. E. Davidson and J.T. Agee, "Comparative Analysis Of Simple Boost, Constant Boost And Maximum Boost Pulse Width Modulation Schemes On A Three-Phase Z-Source Inverter," 2023 31st Southern African Universities Power Engineering Conference (SAUPEC), Johannesburg, South Africa, 2023, pp. 1-6, doi: 10.1109/SAUPEC57889.2023.10057616.
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25. Adebiyi K.O., Mtukushe, N.F., Adebiyi, A.A., Akindeji, K.T., and Aluko, A.O., Development of a Sustainable Hybrid Energy System for a Mall in KwaZulu-Natal, South Africa. Presented at IEEE Sustainable, Clean & Emerging Energy Technologies Conference.
26. Umoh, V., Adebiyi, A.A., and Moloi, K., "Electric Vehicles Hosting Capacity Assessment for a South African Low Voltage Distribution Network." Presented at IEEE Conference Indonesia.
27. A. Falade, O. Bolaji, K. T. Akindeji and A. Adebiyi," Implementation of Multi-modal Speech Emotion Recognition Using Text Data and Audio Signals," 2023 International Conference on Science, Engineering and Business for Sustainable Development Goals (SEB-SDG), Omu-Aran, Nigeria, 2023, pp. 1-8, https://doi: 10.1109/SEB-SDG57117.2023.10124472.
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35. A. Mahlobo, O. E. Oni and K. T. Akindeji, "Voltage Fluctuation Correction for Renewable Energy Systems in Distribution Network," presented at III International Conference on Electrical, Computer and Energy Technologies (ICECET 2023), 16-17 November 2023, Cape Town-South Africa.
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38. Igbekele, E.O., Aideloje, J., Adebiyi, A.A., and Adebiyi, A. "Product Verification using Blockchain Technology: A Systematic Review." IEEE proceedings, vol. 1, pp. 1-6. 2023. https://doi.org/10.1109/SEB-SDG57117.2023.10124602

Chapters in Books (2023)

1. Bamgboye, P.O., Adebiyi, M.O., Adebiyi, A.A., Osang, F.B., Adebiyi, A.A., Enwere, M.N. and Shekari, A., "Text Classification on Customer Review Dataset Using Support Vector Machine." In Intelligent Sustainable Systems: Vol. 2, pp. 407-415. Singapore: Springer Nature. https://doi.org/10.1007/978-981-19-7663-6_38

Others (2023)

1. K. T Akindeji and K. Moloi: "Application of Artificial Intelligence Techniques in Smart Grid Protection and Control". Presented at Protection, Automation and Control (PAC) World Conference, Raleigh, North Carolina, USA, 28 – 31 August 2023.
2. A. K. Onaolapo, N.F. Mtukushe, A.A. Adebiyi, K.T Akindeji and A.O. Aluko: "Development of a Sustainable Hybrid Energy System for a Mall in KwaZulu-Natal, South Africa". Presented at Sustainable, Clean And Emerging Energy Technologies Conference (SCEETC), University Of Nigeria, Nsukka, Nigeria, 23 – 28 July 2023.
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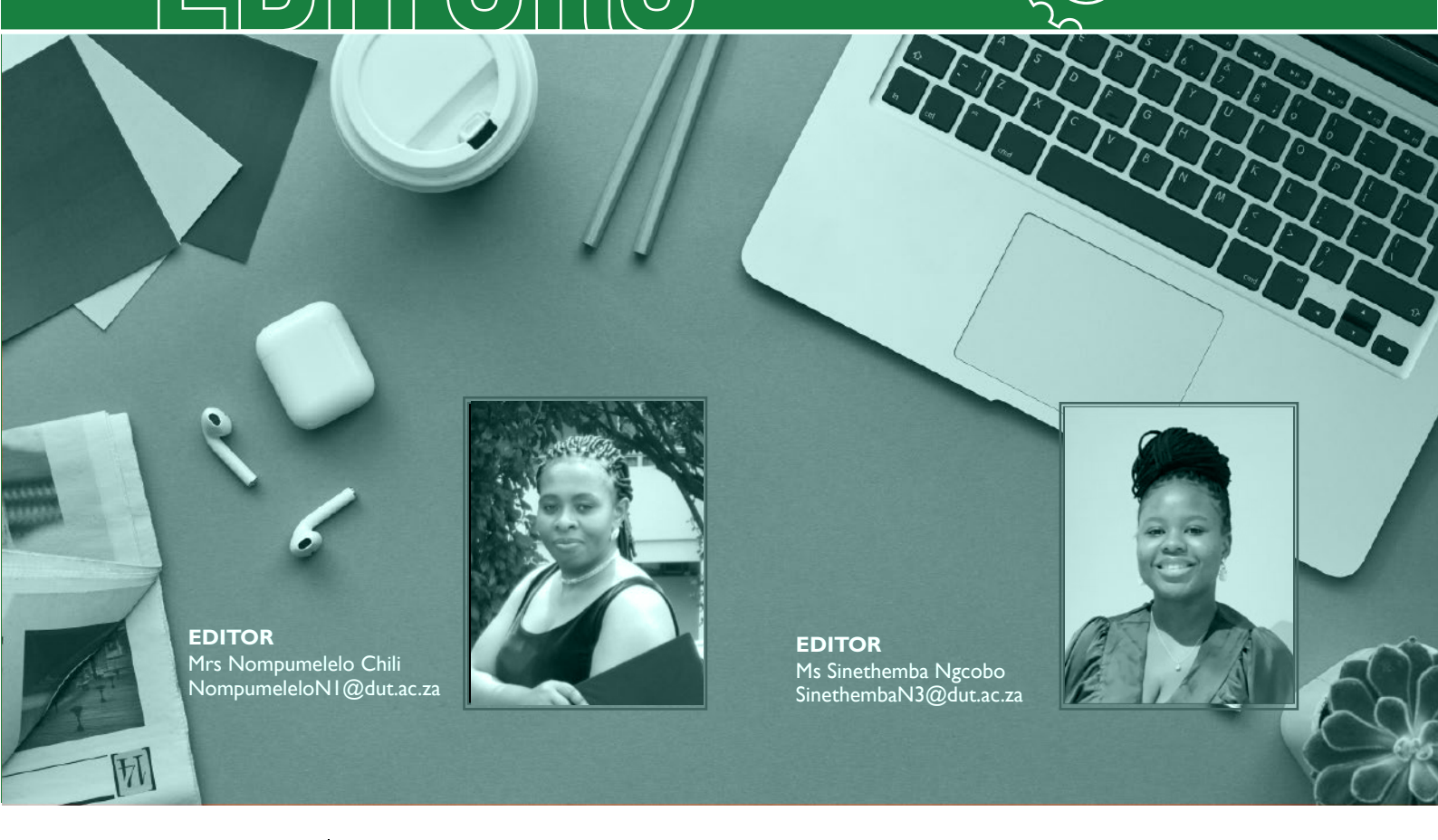
ACTING EDITORS



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CREATIVE. DISTINCTIVE. IMPACTFUL.