Postdoctoral Fellowship Webinar

Introduction to Postdoctoral Research

at

Central University of Technology

Ms Cecilé Olivier

(olivierc@cut.ac.za)

(051) 507 4323

18 November 2020

TABLE OF CONTENT

1. PROGRAMME

START	TOPIC	PRESENTER
14:00	Overview of programme	Prof. Laetus OK Lategan Snr Director: Research Development & Postgraduate Studies
14:10	Welcoming	Prof. Alfred Ngowi DVC: Research, Innovation & Engagement
14:15	Postdoctoral Fellowship: Statistics	Ms. Cecilé Olivier Research Assistant: Administrative Projects
14:20	Presentation by Track 2 Postdoctoral fellows	Dr Annari Milne Faculty of Humanities
14:30		Dr Alice M Lepheana – Mokoena Faculty of Humanities
14:40	Presentation by Track 1 Postdoctoral fellows	Dr Omolola M Adeola Faculty of Engineering, Built Environment & IT
14:50		Dr Israel E Agbehadji DVC: RIE Office
15:00		Dr Chika I Chukwuma Faculty of Health and Environmental Sciences
15:10		Dr Thywill CK Dzogbewu Faculty of Engineering, Built Environment & IT
15:20		Dr Gaofetoge G Lenetha Faculty of Health and Environmental Sciences
15:30		Dr Rosemary Matikiti Faculty of Management Sciences
15:40		Dr Lameck Mugwagwa Faculty of Engineering, Built Environment & IT
15:50		Dr Ifeoma C Nwafor Faculty of Health and Environmental Sciences
16:00		Dr L Tangwe Stephan Faculty of Engineering, Built Environment & IT
16:10		Dr Philip Stott Faculty of Engineering, Built Environment & IT
16:20	Q&A	

2. MESSAGE FROM DVC: RESEARCH, INNOVATION and ENGAGEMENT

According to Wikipedia a postdoctoral researcher or postdoc is a person professionally conducting research after the completion of their doctoral studies. The ultimate goal of a postdoctoral research position is to pursue additional research, training, or teaching in order to have better skills to pursue a career in academia, research, or any other fields (Wikipedia, 2020 Wikipedia. Postdoctoral Researcher (https://en.wikipedia.org/wiki/Postdoctoral_researcher accessed on 16th November 2020).

Hence, postdoctoral researchers can be teaching fellows, can be attached to ongoing research projects, and others can bring their own funding from funding institutions to the host institutions.

At CUT, the main goal of the establishment of the postdoctoral fellowship is to advance the scholarly mission of the institution, while at the same time providing an environment in which the postdoc further increases expertise in a specialist subject including acquiring unique skills and methods. Furthermore, postdocs at CUT are expected to produce relevant publications in peer-reviewed academic journals or conferences.

We warmly welcome postdoctoral fellows to CUT and will endeavor to provide conducive environment for mutual benefit.

Prof. Alfred B Ngowi

DVC: RIE

3. POSTDOCTORAL FELLOWSHIP

The University is eager to grow its research capacity, relevance and competitiveness with the support of postdoctoral fellows. Postdoctoral fellows are globally regarded as emerging researchers who are growing their research expertise and competencies to become researchers in own right. This is accomplished through doing research, publishing research results in accredited research publications, acting as supervisor for postgraduate students and developing their research programmes into an externally funded research niche area.

ABOUT POSTDOCTORAL FELLOWSHIPS AT THE CUT

- A postdoctoral fellow is funded through a bursary or a grant.
- Postdoctoral fellowships are researching within recognised research activities of Research Centres.
- A postdoctoral fellow from an international university can hold the fellowship between three-twelve months in a twelve-month cycle.
- A postdoctoral fellow will be mentored by an established researcher who has successfully completed research projects, published research articles, supervised doctoral students and who is the holder of competitive research funds.

TRACK 1 & TRACK 2

Track 1: Full-time postdoctoral fellows are funded through a recognised bursary or grant for a maximum of three-years (3 x twelve-month cycles).

Track 2: Students who completed a Doctoral Degree at CUT but who are employed full-time outside CUT can be awarded a part-time postdoctoral fellowship to continue with their research.

CUT staff who completed their doctorates within n-3 can be accommodated in the emerging researchers programme.

Information regarding the general conditions for applications and the renewal of a postdoctoral fellowship is stated in the Policy on Regulation and Recruitment and Awarding of Grants (which is available on request).

4. Dr OMOLOLA M ADEOLA

Dr Adeola started her postdoctoral research at the Department of Information Technology, Central University of Technology, Free State, USAID-Funded ITIKI Drought Tool Project, in collaboration with the South African Weather Service in 2019.

She has a Ph.D. in Geoinformatics from the University of Pretoria, South Africa, M.Sc. in GIS from the University of Ibadan, Nigeria and B.Sc. Hons in Geography from the University of Ilorin, Nigeria.

Dr Omolola was one of the four best-rated applicants out of 21 applicants and thus awarded a research grant from the African Institute for Mathematical Sciences (AIMS) under the AIMS NEI Small Research Grant in Climate Change Science.

RESEARCH TOPIC

Development of a drought visualisation tool relevant for small scale farmers.

MENTORS

Prof. E Muthoni I Masinde and Prof. JO Botai (Adjunct Professor - CUT).

RESEARCH FOCUS

The focus of the postdoctoral research is to develop a community-driven drought visualisation tool. The system will make use of Geospatial software; ArcGIS to integrate artificial intelligence, indigenous knowledge, environmental and climate information. The system will provide locally relevant information that corresponds to local demands and conditions for local farmers that will facilitate climate change adaptation strategies.

IMPORTANT OUTCOME

1. An assessment of existing methodologies and gaps in drought monitoring and prediction.
2. An evaluation of the sensitivity of existing drought indices for their application for local content.
3. An assessment of human perception of climate induced drought through local indigenous knowledge.
4. A near real-time communication and a visualisation tool for droughts monitoring.

Published journal articles:

- Omolola M. Adisa, Muthoni Masinde, Joel O. Botai and Christina M. Botai. Bibliometric Analysis of Methods and Tools for Drought Monitoring and Prediction in Africa. Sustainability 2020, 12, 6516; doi:10.3390/su12166516.
- Lungile Makondo, Abiodun Adeola, Thabo Makgoale, Joel Botai, Omolola Adisa and Christina Botai. Influence of Climate on the Spatiotemporal Distribution of Malaria in Thulamela Municipality, Limpopo Province, South Africa. The Open Public Health Journal. DOI: 10.2174/1874944502013010246, 2020, 13, 246-256.

- Christina M. Botai, Joel O. Botai, Miriam Murambadoro, Nosipho N. Zwane, Abiodun A. Adeola, Jaco P. de Wit, Omolola M. Adisa. Scope, trends and opportunities for socio-hydrology research in Africa: A bibliometric analysis" South African Journal of Science (Under review).
- Omolola M. Adisa, Muthoni Masinde, Joel O. Botai and Christina M. Botai. Assessment of the dissimilarities of EDI and SPI Measures for drought determination in South Africa (Under review).

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

The fight against COVID-19 is still fierce, therefore many meetings and engagements on the research has gone virtual. Some of Dr Adeola's research outputs that were meant to be shared at either local and international conferences could not be shared and have been converted to full research articles, as many of the identified conferences were cancelled. The pandemic may mean that smarter approach(es) will have to be designed to ensure that all objectives of the research are met, particularly the fieldwork with farmers.

5. Dr ISRAEL E AGBEHADJI

Dr Agbehadji holds a B.Sc. in Computer Science (2007), M.Sc. in Industrial Mathematics (2011) and Ph.D. in Information Technology (2019) from the Catholic University of Ghana, the Kwame Nkrumah University of Science and Technology in Ghana, and the Durban University of Technology (DUT) in South Africa, respectively.

Currently, he is an Honorary Research Associate in the Faculty of Accounting and Informatics at DUT.

RESEARCH TOPIC

***Topic*:** Leveraging 4IR technologies and meta-heuristic algorithms for Smart and Sustainable University Transitions: The Case of the Central University of Technology. Central University of Technology, Free State, Bloemfontein, South Africa.

***Expertise*:** Modelling custom object detector for solid waste, Optimization algorithms, Nature-inspired algorithms, Internet of Things (IoT), Big data analytics, Mobile application development.

MENTOR

Prof. Alfred B Ngowi

RESEARCH FOCUS

The focus is to create a smart bin equipped with Internet of Things (IoT) sensors. An Artificial intelligence (AI) program was developed to analyze each waste captured. Currently, a prototype design of a smart bin has been proposed which will be tested at the micro-level.

IMPORTANT RESEARCH OUTCOMES

- Review of Big Data Analytics, Artificial Intelligence and Nature-inspired Computing Models towards Accurate Detection of COVID-19 Pandemic Cases and Contact Tracing. International Journal of Environmental Research and Public Health, 2020.
- Agbehadji, I. E., Bankole, A., Ngowi, A. B. and Bui, Khac-Hoai Nam, EdgeIoT-enabled smart bin model for custom waste object detection and classification. Expert Systems with Applications. 2020 (Under review)
- A prototype design of a smart bin has been proposed which will be tested at the micro-level.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

NIL

6. Dr CHIKA I CHUKWUMA

Dr Chukwuma has a Ph.D., M.Sc., and B.Sc. (Hon) in Biochemistry from University of KwaZulu-Natal (UKZN), South Africa. He has 4 years of postdoctoral research experience in researches on the antidiabetic and anti-oxidative potentials on medicinal plant and functional food.

Dr Chukwuma has published more than 34 articles in reputable journals and have more than 300 Google Scholar citations. He is an editorial board member of some journals and have served as an invited reviewer for many reputable journals and several scholarships and competitive grants. He is a registered scientist of the South African Council for Natural Scientific Professions. He joined the Central University of Technology (CUT) in April 2019, where he is currently a postdoctoral researcher and also supervising M.Sc. / Ph.D. projects.

MENTOR

Prof. Samson S. Mashele

RESEARCH FOCUS

Dr Chukwuma is currently conducting researches on the therapeutic potentials of functional foods (zinc mineral complexes, fruit wastes and phytoconstituents), with the goal of developing functional foods for the management of diabetes, oxidative stress and related metabolic disorders. His research aspires to (1) provide a platform for indigenous knowledge systems-based product development and innovations, (2) contribute to bioeconomic growth and (3) improve human health and wellbeing.

IMPORTANT OUTCOME

The following are some of the milestones and highlights of Dr Chukwuma's research:

- Two of his master's students have submitted their thesis for examination.
- Contributed to 12 publications since joining CUT.
- Best oral presentation (emerging researcher career category), 2020 Prestige Research Day, Faculty of Health and Environmental Sciences.
- 2020 Dean's Trophy (best article publication of the year), Faculty of Health and Environmental Sciences, Central University of Technology, Bloemfontein.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

In the period of the Covid-19 pandemic, Dr Chukwuma participated through the following ways to strategically combat the pandemic:

- Manufacturing and donating CUT-branded hand sanitizers to the Free State Department of Health.
- Testing of hand sanitizers for the Central University of Technology and the South African Department of Education.

7. Dr THYWILL CK DZOGBEWU

Dr Dzogbewu is a multidisciplinary applied researcher who has explored the possibility of manufacturing and commercialising high-value engineering and biomedical products using additive manufacturing technology. Dr Dzogbewu holds a D.Eng. in Mechanical Engineering from the Central University of Technology, Free State, South Africa. A B.Sc. and M.Sc. degrees in Physics from Kwame Nkrumah University of Science and Technology, Kumasi, Ghana respectively. As a techno-entrepreneur, he holds Masters in Business Administration from Blekinge Institute of Technology, Karlskrona, Sweden.

MENTOR

Prof. Willie du Preez

RESEARCH FOCUS

Dr Dzogbewu is conducting multidisciplinary research on manufacturing and commercialisation of additively manufactured products under the mentorship of Prof Willie du Preez. The first segment of Dr Dzogbewu's research focused on developing novel Ti-based alloys for high-temperature applications in the aerospace and automobile industries. The second segment focused on the development of Ti-based alloys for biomedical applications. Modifying the surfaces of the biomedical devices (implants) to enhance osseointegration and soft tissue attachments. The last segment focuses on developing business models that would enable the commercialisation of the additively manufactured Ti-based alloys.

IMPORTANT OUTCOME

Using the versatility of additive manufacturing (AM) technologies to manufacture functional near-net-shapes structures would greatly reduce the time spent on manufacturing, reduce assembling and maintenance cost, avoid waste of manufacturing materials, improved performance reliability and weight reduction; which would translate into fuel and emissions reduction, hence cost of manufacturing and operations would greatly reduce in the aerospace and automobile industries. Using the AM technologies to manufacture biomimetic Ti-based implants with modified surfaces would enhance osteointegration and soft tissue attachment which would improve the quality of life of implant patients.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

Covid-19 has emphasised the idea of modifying additive manufactured products surfaces with nano protrusions (nanotextured surfaces) and incorporating inorganic antimicrobial agents in additive manufactured products to kill microorganism on contact. The literature in the past few months have revealed that the is a clarion call to produce additive manufactured products with surfaces that can kill microorganisms on contact while the surface remains not harmful to the human tissue. The clarion call due to the covid-19, have influenced my research on surface modification of additive manufactured products for biomedical applications.

8. Dr GAOFETOGE G LENETHA (NEÉ SETLHARE)

Dr Lenetha is currently busy with her 3rd year of postdoctoral fellowship. Her expertise includes food safety, food hygiene, microbiology and antimicrobial resistance. During her postdoctoral project, she won the Best Presentation by Staff at the Prestige Research Day (PRD) in 218 at the Central University of Technology (CUT). She has also commenced with supervision of students under the guidance with her mentor, Dr NJ Malebo in the Department of Life Science, Central University of Technology, Free State (CUT). Additionally, one of her Master's students, (Miss Malerato Moloi) whom she was co-supervising with Dr Malebo has completed her masters' degree and she will be graduating at the Central University of Technology in March graduation Ceremony 2021.

MENTOR

Dr Ntsoaki J Malebo

RESEARCH FOCUS

Dr Lenetha is currently working on four different projects namely:

- To investigate the activity of various essential oils on foodborne pathogens.
- Assessing insecticidal properties of essential oils using contact toxicity and fumigant toxicity.
- Determining the antimicrobial activity of essential oils in soaps using gas chromatography coupled with mass spectrometry (GC/MS).
- To assess the effect of different essential oils (thyme, peppermint, eucalyptus, chamomile, tea tree, sage and rosemary) on bacterial adhesion and biofilm formation triggered by antibiotic-resistant foodborne pathogens. A collaborative research we passionately and keenly intend to do with Dr TCK Dzogbewu, a postdoctoral fellow in mechanical engineering. Since, biofilms are likely to form on medical implants.

IMPORTANT OUTCOME

Major findings / results obtained in the project:

In the project, new information was provided on the diverse mechanisms of action of different essential oils (thyme, red thyme, lavender, sage, clove, peppermint, etc) against antibiotic resistant bacteria. The project contributes to the field of food safety by providing alternative options to address the antibiotic-resistance challenge.

Furthermore, as growers can potentially benefit from deriving antimicrobial products from essential oils, the project makes a socio-economic contribution in the long term. For the project to continue to expand, there are currently four Master's students working on this project under her and Dr Malebo's supervision in the Department of Life Sciences.

A paper, Assessment of Knowledge, Attitudes and Practices of street vendors in Mangaung Metro South Africa has been accepted for publication in the conference proceedings of 21st International Conference on Food Safety and Food Hygiene in Food Science in

London, 2019. The authors are Dr Gaofetoge Lenetha, Malerato Moloi and Dr Ntsoaki Malebo.

A journal article, Microbial levels on street foods and preparation surfaces at Mangaung Metropolitan Municipality in South Africa has been accepted for publication in the Health SA Gesondheid Journal The authors are Malerato Moloi, Dr Gaofetoge Lenetha and Dr Ntsoaki Malebo.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

The direction that Covid-19 is taking her research is to derive antimicrobial products (soaps) from essential oils. Since she is already working with local farmers in the project and the essential oils come from them, all analytical methods regarding antimicrobial activity of essential oils will be validated in respect of accuracy in the laboratory and the results will be shared with the South African indigenous knowledge holders such as Mr Kobo and his team residing at Reitz, to legally sell their soaps or antimicrobial products as medicinal herbs and eventually fight the Covid-19 pandemic. Therefore, when she analyse the essential oils the local farmers will benefit as they are already making essential oil-based products. Also, these medicinal soaps once been sold to the consumers they will have a great impact in the battle against the Covid-19 virus.

9. Dr ROSEMARY MATIKITI

Dr Matikiti obtained her Ph.D. in 2015 from the North West University (Potchefstroom campus).

RESEARCH TOPIC

***Topic*:** The efficacy of social networks as marketing tools in the South African and Zimbabwean accommodation sector.

***Specialisation*:** Tourism marketing (digital marketing, social media marketing) and consumer behaviour in tourism.

MENTOR

Dr Johan Hattingh

RESEARCH FOCUS

The research focuses primarily on how social media can be used for the holiday destination planning and selection. The aim is to identify what triggers the young generations to use social media when selecting holiday destinations as well as to identify the most used social media sites. It is deemed necessary to conduct such a study as it has some serious implications for destination marketers, tourism businesses as well as social networking sites developers.

IMPORTANT OUTCOMES

Social networks are used at all the trip planning stages (pre-trip, during trip & post-trip) with Facebook being the dominant social networking site and Instagram emerging as one of the most used social networking sites. Social media sites are predominantly used during the trip.

The most important factor which triggers the young generation to use social networks for trip planning and holiday destination selection is perceived enjoyment followed by perceived usefulness and social presence.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

The initial focus for this year was on consumer behaviour in the accommodation sector. However, the lockdown restrictions made it impossible to collect data from the customers. The focus was temporarily shifted to literature-based studies, one manuscript is ready for submission (impact of technologies on teaching and learning), and the second manuscript is still work in progress (4th Industrial Revolution and tourism industry).

The plan is to revert to the initial focus since the lockdown restrictions have been eased and sort the services of a data collection company if finances permits.

10. Dr ANNARI MILNE

Dr Milne obtained her Ph.D. from the University of the Free State in 2008, focusing on the use of mathematical games and gaming principles, in order to make maths more informal and more accessible to learners. She developed some mathematical games, worked in a team on the development of a multi-language maths dictionary as well as being the author of children books published in 7 different languages. She is also responsible for organising and presenting various content and skills Mathematics workshops.

She holds various position, including:

- Senior education specialist in Mathematics in the Free State Department of Education.
- Examiner on national panel for 16 years. Four of these years' chief examiner for Mathematics Paper 1.
- Organiser of Maths Indaba.

MENTOR

Prof. Mike Mhlolo

RESEARCH FOCUS

Dr Milne had the opportunity in 2019 to visit Western Kentucky University (WKU) to experience Gifted Education firsthand. In South Africa attention to gifted sport candidates is natural, however, attention to gifted learners is seen as privileged.

The research is focusing on the structural linkages between all stakeholders in order to develop opportunities for gifted mathematics learners. Differentiating the curriculum already at primary level, will allow all learners to do maths on the appropriate level.

The research is laying the foundation towards the development and implementation of such a curriculum. Economically the rate of return by investing in gifted education will contribute positively to the GDP.

IMPORTANT OUTCOME OF RESEARCH IN GIFTED EDUCATION

General - A Memorandum of Understanding with Western Kentucky University was signed.

The research compared South Africa and Singapore (having had much the same history as South Africa) to identify clear pointers on the way to make differentiated education the order of the day.

The research focused on the perceptions of the real clients about education because in the process of consultation and planning and development of gifted education, they had no say. The research is also looking at the validity of the present combined curriculum in South Africa in comparison with building year courses. All learners must have basic maths courses and further electives available.

Projections: Getting certification as gifted education specialist. The incorporation of thinking dominance of gifted mathematics learners

and how to use it in the training of teachers. The development of a differentiated maths curriculum

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

Virtual communication, completion of questionnaires, research.

11. Dr ALICE M LEPHEANA - MOKOENA

Dr Lepheana obtained her doctorate at the University of the Free State in 2016. She is specialising in educational psychology.

She is a postdoctoral fellow since 2017. The main topic of her research project is: Teaching Life Sciences to female learners for diverse school settings in the rural district of Xhariep for the improved performance and increased participation.

MENTOR

Prof. Gregg Alexander

RESEARCH FOCUS

In her postdoctoral research journey, she participated by presenting in the 2019 CUT 4th SoTL Conference and the 2020 5th SoTL conference. As much as she is a psychology specialist, she was fascinated by the involvement or rather the lack of participation by women in science. She has successfully compiled three full papers, two focusing on girl learner participation in science and one in psychosocial challenges of child headed household learners and published two at Khon Khaen University in the ICER Proceedings and one in 2019 and one 2020.

THE ENVISAGED OUTCOMES ARE:

- Increased participation of girl learners in science.
- Improved achievement by rural girl learners in sciences.
- Contribution to increased women involvement in science in South Africa which will add to world-wide statistics.
- STREGHTHEND research skills as an individual and becoming an independent researcher.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

The aim of the project focusing on women / girl participation in science was to steer it qualitatively, interacting face to face through interviews. All this was negatively affected by Covid-19 since gatherings and close contacts were prohibited. The project had to deviate to document analysis. Going forward it would be good to engage through technological devices though data will be a challenge to participants.

12. Dr LAMECK MUGWAGWA

Dr Lameck Mugwagwa obtained his Ph.D. (Industrial Engineering) from Stellenbosch University in April 2019. He joined the Department of Mechanical and Mechatronic Engineering as a postdoctoral fellow in June 2019. Dr Mugwagwa specialises in Additive manufacturing, Materials processing, CAD modelling, and Manufacturing process optimization, and is currently focusing on in situ stress relief in laser powder bed fusion.

MENTOR

Prof. Ihar Yadroitsau

RESEARCH FOCUS

The postdoctoral research focuses on residual stress relief in laser powder bed fusion, a metal additive manufacturing process. The specific focus is on processing of Ti6Al4V alloy to manufacture crack- and stress-free biomedical implants with high geometric and dimensional accuracy. The research approach includes finite element simulation and experimental investigation around scanning strategy development, baseplate / powder preheating, and optimisation of processing parameters. Both simulation and experimentation are utilised to analyse the effect of the applied techniques on residual stresses and other defects such as distortions.

IMPORTANT OUTCOME

The research fellowship has resulted in publication of 1 journal article (in Metals journal), 1 book chapter (in Fundamentals of powder bed fusion, published by Elsevier – in press), 1 conference presentation (at the 20th International RAPDASA conference, Bloemfontein) and another journal article ready for submission. Additionally, 1 Ph.D. student is currently co-supervised in the area of residual stress investigation for large area additive manufacturing applications.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

Most lab work has been put partially and wholly suspended, directly affecting generation of important data for the current research focus. This has slowed down the realisation of some milestones such as publication of journal articles and conference presentation. However, the pandemic has also opened up opportunities to consolidate literature and experience of the last 1 year into book chapters and review articles.

13. Dr IFEOMA C NWAFOR

Dr Nwafor obtained a Doctor of Technology degree in Agriculture (D.Tech.: Agriculture) from the Central University of Technology, Free State. Her research forte is providing wholesome animal products for consumption and ultimately improving animal welfare. She is a postdoctoral research fellow since 2019.

MENTOR

Dr Idah T Manduna

RESEARCH FOCUS

As an Animal Scientist, Dr Nwafor is presently conducting interdisciplinary research in the fields of Ethnobotany, Ethnoveterinary and Indigenous Knowledge Systems. The title of her postdoctoral research is “Prospects of agro-processing, beneficiation and standardization of Basotho medicinal plants to provide for a biocultural eco-store”. This research is focused on the identification, documentation, validation, and product development of medicinal plants traditionally used amongst the Basotho for the treatment of human and animal ailments/ conditions. Her major interests are – the identification of plant secondary metabolites which possess biological activity against gastrointestinal helminths of ruminants and developing a therapeutic product from the extracts of such medicinal plants.

IMPORTANT OUTCOME

The identification of four (4) medicinal plants which are popularly recommended by Traditional Knowledge Holders and used by livestock farmers either as prophylaxis or therapeutics on livestock is one of the important outcomes of the research. Two (2) abstracts from this study have been accepted for presentation in international conferences. During her Faculty’s Prestige Research Day (PRD) event, I presented a review research paper on the processing methodologies of medicinal plants used for ethnoveterinary purposes in South Africa. This paper, amongst others, is due for submission in an accredited journal. Additionally, she is presently co-supervising three (3) Master’s students in this study area and another two (2) Master’s students from the Department of Agriculture.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

More outcomes of her postdoctoral research have been delayed due to the present COVID-19 pandemic. The unavailability of her research students for the greater part of the period so far and the interruption of a smooth transition from field studies to laboratory experiments has resulted in a delay in achieving set timelines. However, the COVID-19 pandemic, which has been reported to have a zoonotic origin, has informed a possible investigation into the antiviral properties of indigenous medicinal plants towards product development.

14. Dr L TANGWE STEPHEN

Dr Stephen is a full-time postdoctoral research fellow, since September 2019 in the Department of Electrical, Electronic and Computer Engineering. His area of research specialty are energy and sustainability with emphasize on energy efficiency and renewable energy technology. His research project is focused on combining solar thermal and heat pump refrigeration technology. He holds a Ph.D. in Engineering from the University of Sunderland, Faculty of Technology, School of Engineering and Advanced Manufacturing, in the United Kingdom.

Dr Stephen is a registered and designated Chartered Engineer (C.Eng.) with the professional engineering council in the United Kingdom. He is a certified Measurement and Verification professional (CMVP) and a MATLAB application engineer. He has previously worked as an AdHoc Eskom Measurement and Verification Senior Engineer with the University of Fort Hare – Measurement & Verification Team. He is a seasoned author of more than forty-five (45) DHET published papers in accredited peer reviewed journals and conference proceedings. He is a reviewer in a series of accredited peer review journals .

MENTOR

Prof. Kanzumba Kusakana

RESEARCH FOCUS

Dr Stephen's research project is on the field of smart energy conversion systems and energy efficiency in the domain of sanitary hot water heating. The research employs the design, installation and evaluation methodology to predict the performance of an innovative residential hybrid solar assisted air source heat pump water heater. Furthermore, the development of thermofluid physics-based models and machine learning (artificial neural network) models to quantify the techno-economic benefits of the hybrid energy system over a standalone solar water heater, air source heat pump water heater and electric geyser. Finally, the application of conservative measurement and verification protocol guidelines that adhered to the IMPVP standard to determine the savings by the hybrid energy system with reference to counterpart's hot water heating technologies.

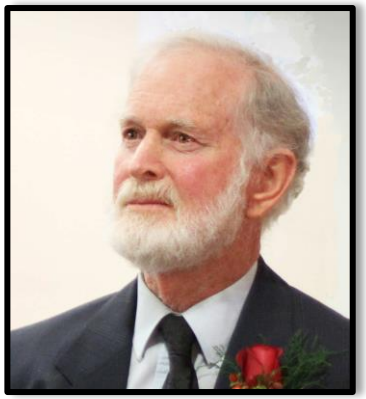
IMPORTANT OUTCOME

The research findings will assist with both energy service companies, heat pump manufacturers and homeowners, to quantify the energy saving and the reduction of greenhouse gases emission when electric geysers, residential air source heat pump water heaters and solar water heaters are retrofitted by the novel integrated hybrid solar and heat pump system. The derived models will be simple and fast to execute, when used to assess the performance of the hybrid energy system and with a very high confidence level. The research will provide sufficient evidence to justify that the technology is energy efficient and sustainable.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

The outbreak of COVID-19 has impacted on the research, but not adversely, as the system design remains unaltered except of the site of deployment of the design hybrid energy system that will change from the installation in a residential home with occupants to a research facility where the occupants hot water consumption will be simulated. This decision for modification of the research design was influenced by the restriction on movement due to the COVID 19 pandemic as it was going to impact the frequency of site visit to the residence where research system will be deployed. Also, the analysis of the occupants' service level comfort of the technology through interview and completion of questionnaires on the system's performance and occupants' satisfaction are suspended.

15. Dr PHILIP STOTT



Dr Stott obtained his D.Eng. from the Central University of Technology, Free State awarded in January 2018. The topic of the study was: “Identification and Assessment of Problematic Expansive Clays”.

During his postdoctoral research he has used the techniques developed in the D.Eng. project to assess probability density functions for many types of soil and some types of rock.

MENTOR

Prof. Lize Theron

RESEARCH FOCUS

A new code of practice for geotechnical engineering is being prepared based on Eurocode 7, which calls for characteristic values for soil properties giving no more than 5% chance of reaching a failure condition. This requires probability density functions for the relevant properties. Soils tests generally involve too much time and expense to determine probability density functions (which require more than 600 tests). Characteristic values are usually estimated based on untested assumptions. This research has produced probability density functions for soils from several construction sites which show the usual assumptions to be invalid in many cases.

IMPORTANT OUTCOMES

Three papers have been presented at international conferences dealing with this work and one paper is being prepared for an international journal. These findings are being considered for the National Addendum to the new geotechnical code of practice. Probability density functions have been found to be relevant to failures in geotechnical practice, bimodal density functions appear to be particularly related to high risk of failure of construction on expansive clay.

IN WHAT DIRECTION IS COVID-19 TAKING YOUR RESEARCH?

Covid-19 led to some delays in laboratory testing but otherwise there has been little interruption of the research.

GENERAL ENQUIRIES
Bloemfontein (051) 507 3911 | Welkom (057) 910 3500
Postal Address
Central University of Technology, Free State
Private Bag X20539
Bloemfontein
9300
www.cut.ac.za

POSTDOCTORAL ENQUIRIES
Ms Cecilé Olivier
olivierc@cut.ac.za
(057) 507 4323

Thinking Beyond