



Postdoctoral Fellowship

RESEARCH DEVELOPMENT
& POSTGRADUATE STUDIES

Annual Webinar

Impact and Relevance of Research

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1. PROGRAMME

START	TOPIC	PRESENTER
14:00 – 14:10	Opening and facilitation	Ms Edith Sempe Acting Senior Director: RD & PGS
14:10 – 14:20	Welcoming remarks	Prof. Sam S Mashele Acting DVC: RIE
14:20 – 14:30	Postdoctoral Fellows: Statistics	Ms Cecilé Olivier Research Assistant: RD & PGS
14:30 – 15:50	Presentations done by postdoctoral fellows (10 min each)	Postdoctoral fellows: 1. Dr TM Agbaje 2. Dr CE Amaechi 3. Dr CE Manyi-Loh 4. Dr IC Nwafor 5. Dr LT Stephen
16:00	Question and answer session	

2. MESSAGE FROM ADVC: RESEARCH, INNOVATION AND ENGAGEMENT



In our quest to grow our research capacity, postdoctoral fellows play a pivotal role. Our university and the government embrace economic theories of the knowledge economy. We need to move from resource-based economy to the knowledge-based economy with emphasis on the important contribution of the university sector. Knowledge is crucial to national economic growth and increased prosperity and locate the cause of economic growth as novel ideas leading to scientific, technical, organisational, environmental or health innovations. The role of postgraduate fellows is key to reaching these goals. We will continue to expand our research enterprise with the assistance of postdoctoral fellows to address our nation's most difficult and pressing technological problems. The goal of all our research activities is to improve the lives of ordinary people. The challenge is to continue creating an enabling environment that inspires postdoctoral fellows to achieve their ambitions.

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 OLUWAYEMISI A ABISUGA



Dr Abisuga started her postdoctoral research at the Department of Mechanical and Mechatronic Engineering, Central University of Technology, Free State in the Centre for Rapid Prototyping and Manufacturing (CRPM).

She has a Doctoral degree in Business Administration (DBA) from the Tshwane University of Technology, South Africa, and Masters in Personnel Psychology (MPP) from the University of Ibadan, Nigeria. She also has qualifications in multidisciplinary disciplines such as marketing, fashion design, textile production and Jewellery production.

Dr Abisuga's postdoctoral research is funded by the DSI/NRF award for Innovation and Scarce Skills Postdoctoral Fellowship starting in 2021.

MENTOR

Prof. Deon de Beer

RESEARCH FOCUS

Dr Abisuga's research interest has been on Arts, Cultural and Creative Sectors, Cultural Policy, Indigenous Knowledge, Entrepreneurship and Innovation. Among other activities, she has been involved in many community development research and projects in African, on the training and empowerment of rural youths and women in the production of handicrafts. Presently, she is working on prototyping, designing and manufacturing appropriate technology and equipment for the cultural/creative industries.

IMPORTANT OUTCOMES

Category	Engagement to be undertaken and desired outcome	People and Audience
Education and/or training interventions (including both formal and informal education-based initiatives, new curriculum content, product development, etc.)	Handicraft workers use high-level technical skills to apply both traditional and contemporary methods in the design and production of jewellery. The appropriate technology for the production of handicrafts varies from hand tools to industrial machines. Producers require small-scale types of technology. This project gives an	Industrial Professionals

	<p>opportunity to work with Jewellers for a clearer understanding of challenges with production equipment and how to create appropriate materials and equipment in order to make the production process more effective. A Computer Aided Design (CAD) and Additive Manufacturing (AM), should is considered, to reduce the need for expensive own equipment.</p>	
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HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

Job creation and employment opportunities.

5. DR TITILAYO M AGBAJE



Dr Agbaje started her postdoctoral research at the Department of Mathematical and Physical Sciences, Central University of Technology, Free State, in 2021.

She has a Ph.D. in Applied Mathematics from the University of KwaZulu-Natal, South Africa, M.Sc. in Applied Mathematics also from the University of KwaZulu-Natal, South Africa, and B.Tech. Hons in Industrial Mathematics from the Federal University of Technology, Akure, Nigeria.

Dr Agbaje's postdoctoral research is funded by the National Research Foundation (NRF) and Centre of Excellence in Mathematical and Statistical Sciences (CoE-MASS). She is receiving the NRF postdoctoral fellowship award for the second time.

MENTOR

Dr G Makanda

RESEARCH FOCUS

The focus of this research is to explore some recent division in engineering, applied and natural science alongside with recent development and findings in fluid mechanics. In this project, the equations governing different mathematical models will be solved numerically using some novel numerical techniques skin-friction coefficients, Nusselt numbers, Sherwood numbers, isotherms, and iso-concentrations for different values of the flow parameters. After getting the results, a deep analysis will be done regarding the flow pattern, temperature, and concentration fields. This approach of study will open a new front in fluid mechanics thereby helping in science and engineering. The mathematical models developed in this study will be solved using the spectral methods. Spectral methods have good convergence and high accuracy levels and the methods have proved to be efficient in solving coupled nonlinear systems of ordinary and partial differential equations.

IMPORTANT OUTCOMES

Five publications are expected to come out of this research of which one has been submitted and I am currently working on another one.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

No contribution identified.

6. DR CELESTINE E AMAECHI



Dr Amaechi holds Honours Degrees in French/ Education (1996) and Professional Curriculum Studies (2007) from the University of Nigeria Nsukka (UNN) and the University of the Free State (UFS), South Africa respectively. The same UFS awarded him his Master's Degree in Linguistics in 2011. He obtained his Doctor of Education degree from the Central University of Technology, Free State (CUT) in 2018. Dr. Amaechi has also obtained a qualification in Editing from the University of the Free State, South Africa. He is an editor.

MENTOR

Dr J Palmer & Dr B Fredericks

RESEARCH FOCUS

Dr Amaechi has joined a crop of budding and prolific researchers busy in their different fields of academics at CUT. His postdoctoral research topic is "Transformative Leadership and Enhancement of Reading Culture in Multicultural Higher Education Settings".

The study focuses on incorporating the transformative learning strategies to promote a culture of reading especially among the first-year students at CUT.

Transformative learning informed by transformative leadership skills is emphasized at this level (first year) since the students need to bridge the gap between high school and higher education and proceed to self-study modalities. Transformative learning aims to help individuals challenge the current assumptions on which they act and, if they find them wanting, to change them. This includes a mental shift as well as a behavioural one. The hope of transformative learning is that better individuals will build a better world. Hence, transformative leadership will affect an intervention toward an advancement of knowledge of a reading culture through transformative learning.

IMPORTANT OUTCOMES

- The study will develop a creativity to make reading attractive for all students.
- Create innovations beyond traditional libraries in form of culture hub to expand public libraries which will make more people embrace reading as a hobby / part of culture.
- Will add to the value / improved methods of doing research and therefore make new discoveries through transformative learning; scientific writing and other interventions in research will be feasible.
- Will develop students' positive attitude toward school and can create positive self-esteem in their lives; students struggling with literacy will begin to experience success and related positive effects in interpersonal skills.
- Three journal articles have been identified and one abstract is already submitted and its full paper completed while two abstracts are being prepared for presentation.
- It will strengthen researcher's skill to become an independent researcher.

So far, two titles have been developed with the abstracts in progress. The titles are:

1. Academic Literacy Programme at CUT: Using Transformative Learning Theory to Assert its Significance in the Curriculum.

2. Enhancing Students' Reading Culture Across Faculties through Transformative Leadership.

Study number one above, from the onset, develop students' positive attitude toward schooling, making those of them struggling with literacy begin to experience success in their studies.

The second topic strive to reconsider a generic strategy in delivering classroom instructions to avoid the woes of multicultural setting tuitions.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

The research activities are more related to first-year students' Academic Literacy programme and coordinators / lecturers at CUT in which students and facilitators interact face-to-face in classrooms. The global COVID-19 pandemic currently impacted the usual classroom teaching, learning and reading. For example, classroom observation can no longer take place due to social distancing protocol. Transitioning to online lecture delivery requires radical changes in attitude, values and beliefs for all education stakeholders including students. This unprecedented transition has impeded the rate at which research output should have gone. However, the incident seems to be creating innovation, empowerment, involvement and collaboration among staff and institutions of Higher Learning.

Therefore, the project has to resort to using document analysis and technological devices even as data gathering will be a challenge to participants.

7. DR CHRISTY E MANYI-LOH (STEPHEN)



Christy Manyi-Loh (Stephen) is a postdoctoral research fellow attached to the Centre of Applied Food Sustainability and Biotechnology, Central University of Technology, since September 1st, 2021. Dr Manyi-Loh possesses a Doctor of philosophy degree in Microbiology, which she obtained from the University of Fort Hare, Alice, South Africa in 2012. She also has an MSc and a BSc. degrees in Microbiology, from the University of Buea, South West Region, Cameroon in 2007 and 2003, respectively. During this period, she was awarded the senate prize for the best student in microbiology and the best student in research project given by the American Society of Microbiology, respectively.

She has successfully completed two previous postdoctoral tenures in five years, based on multidisciplinary projects, which were funded by Claude Leon Foundation, South Africa (2 years) and National Research Foundation-Green Economy (3 years). As a microbiologist, Dr Manyi-Loh can comfortably handle projects on Medical Microbiology, Applied and Environmental Microbiology as well as Biomass energy. She is a member of the South African Society of

Microbiology (SASM) and Asia Pacific Association of Chemical, Biological and Environmental Engineering Sciences (APCBEEES). Following her research activities, she has authored 18 publications in DHET peer- reviewed journals and 13 conference proceedings.

MENTOR

Prof. JFR Lues

RESEARCH FOCUS

Topic: The implementation of biogas technology as a tool to improve on the energy, environmental and public health status of communal areas in the Mangaung municipality, Bloemfontein, Free State.

It is of certainty that the economy of South Africa depends on agriculture, generating huge volumes of biomass residues as well as the sole source of its energy generation is fossil fuel associated with environmental and air pollution. It is worth mentioning that cattle are the most valued and important livestock, which are involved in both communal and commercial cattle farming. Due to the increased demand of animal products, there is a corresponding increase in the application of antibiotics in animal farming to ensure sustainable production. Animal manure has been reported to be suitable substrates for anaerobic digestion, degrading the organic matter in the biomass to yield methane and other trace gases. On the other hand, pathogenic bacteria causing diarrhoea have been identified in animal manure.

In this light, the study focuses on the utilisation of biogas technology as a valuable tool with a dual purpose, serving as a waste treatment option (waste sanitisation) and for the production of biogas, a renewable energy source. The process will be monitored for biogas production by investigating the microbial and physicochemical

parameters influencing biogas production, characterising the bacterial pathogens of public health significance as well as determining their antibiotic resistance profiles and multidrug resistance phenotypes.

IMPORTANT OUTCOMES

From this research, we anticipate; 1) Biogas technology will be employed to treat wastes producing biogas, a renewable energy which can serve as an alternative energy source for cooking, or further purified and used for other activities (electricity generation). 2) Data will be obtained on the prevalence of antibiotic resistance of bacteria necessary to update existing national and international data on surveillance of antibiotic resistance. 3) A cluster of multiple antibiotic resistance phenotypes added to a pool of antibiotic resistance genes will be generated. 4) Decontamination of the wastes will occur progressively throughout the process, resulting in the decimation /reduction in the viable bacterial counts. 5) Reduction in odour and in greenhouse gas emissions will be achieved as the wastes will be anaerobically treated within the confinement of a bio-digester. Thus, preventing air pollution (climate change / global warming effects). 6) Treatment of the animal wastes in the confinement, will restrain the wastes from being accessed by rainfall, by so doing hinders the pollution of water with bacteria of public health and environmental significance. 6) Data collected, analysed and interpreted into scientific findings, which will be assembled into publishable manuscripts.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

No contribution identified thus far.

8. 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

Prof. P Rambe

This year's research focuses primarily on the impact of Covid- on the tourism industry. The main aim is to establish the impact of COVID-19 on the tourism industry.. Furthermore, the research will examine how the 4th industrial revolution technologies can be used to mitigate the

impact of Covid-19 on the tourism industry. The tourism industry was much affected by the pandemic as travel restrictions and barriers were imposed to help curb the spread of the virus and these restrictions left the tourism industry with a huge dent that needs be covered. Thus, it was deemed necessary to conduct a researcher establishing possible ways of mitigating the impacts of Covid-19 on the tourism industry so that it will remain afloat.

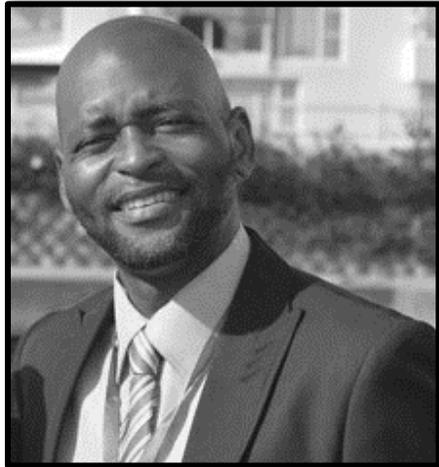
IMPORTANT OUTCOMES

The research fellowship has resulted in publication of 2 journal articles published, 3 conference presentation (ICED 2019, 2021 and SoTL conferences Bloemfontein). Another manuscript has been recently accepted by Development Southern Africa Journal. Furthermore, a manuscript has been submitted to the Journal of Travel & Tourism Research.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

The research specifically focuses on identifying and establishing how 4IR technologies can be used to sustain the tourism industry in the face of the pandemic. A list of technologies that can be adopted was compiled explaining how they can be implemented.

9. DR EMILE S NKWEI



Dr. Nkwei is a statistician and a marketing expert. He obtained a PhD in marketing management in 2020. His thesis examined the contribution of branding in the fight against HIV and AIDS among Generation Y through consistent condom use. He became a postdoctoral fellow at CUT since December 2020.

MENTOR

Prof. Patient Rambe

RESEARCH FOCUS

Topic: The Determinants of Entrepreneurship Intention among Young Adults: The Role of Digital Technology.

Specialisation: Entrepreneurship predispositions among young people.

IMPORTANT OUTCOMES

Given the transformations resulting from the fourth industrial revolution in South Africa, it is important to understand how the new opportunities revealed by digital technology affect the intention of young adults to venture into entrepreneurship. This study particularly investigates the moderating role of perceived benefits of digital technology and digital self-efficacy, coupled with the mediating role of the components of entrepreneurial orientation to predict entrepreneurship intention.

The authors expect publishing at least two papers from this work in two international journals.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

Inequality, poverty, and unemployment have been exacerbated by COVID-19 especially among young adults in South Africa. Promoting a culture of entrepreneurship among young adults will help alleviate the burdens of the three plagues mentioned above. Hence the rationale of investigating the determinant of entrepreneurship intention among young adults.

10. DR IFEOMA C NWAFOR



Dr Nwafor obtained a Doctor of Technology degree in Agriculture (D.Tech.: Agriculture) specializing in Animal Production, from the Central University of Technology, Free State. Her research forte is providing wholesome animal products for consumption and ultimately improving animal welfare. She has been a postdoctoral research fellow in CUT since August 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 possible product development of medicinal plants used traditionally amongst the *Basotho* for the treatment of human and animal ailments/conditions. Her major

interests are – the identification of antiparasitic phytochemicals from indigenous medicinal plants towards developing a natural, non-toxic, and sustainable herbal anthelmintic for small stock ruminants.

IMPORTANT OUTCOME

The identification and documentation 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 her research. Abstracts and full papers from this study have been presented at national and international conferences. One of the presentations won in the “Best Emerging Researcher” category. Two (2) research papers which are centered on the various local processing methods of medicinal plants, and the cultivation of medicinal plants in South Africa have been published. Two (2) other manuscripts have been submitted for publication in DHET accredited journals. Additionally, she is co-supervising, three (3) Master’s students in the Department of Health Sciences and two (2) Master’s students in the Department of Agriculture. She is currently engaged with developing an innovative indigenous vegetable-fortified product for which she was one of the winners of the 2021 *i-Gym* Staff Innovation Challenge.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

The outbreak of the COVID-19 pandemic necessitated a nationwide lockdown and movement restrictions. Field and laboratory studies were kept on hold for months. However, the virtual supervisory approach which would have previously taken months or years to embrace was adopted in a short time. Desktop research, review research and meta-analysis of published data were adopted in place of laboratory or field experiments in some cases. As part of her research mandate, more community partnerships with traditional health practitioners were formed to validate herbal remedies which are purported to cure COVID-19.

11. 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 IPMVP 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.

Journals articles:

1. Tangwe, S. and Kusakana, K., 2021. The employment Of artificial neural network to predict the performance of an air to water heat

- pump. International Journal of Smart Grid and Clean Energy, Impress (ISSN: 2315-4462 Print; 2373-3594 Online).
2. Tangwe, S. and Kusakana, K., 2021. Potential energy optimisation in a domestic air to water heat pump. International Journal of Exergy, Impress (IJEX-304470).
 3. Tangwe, S. and Kusakana, K., 2021. Evaluation of the coefficient of performance of an air source heat pump unit and an air to water heat pump. Journal of Energy in Southern Africa, 32(1), pp.27-40.
 4. Tangwe, S. and Kusakana, K., 2020. A statistical methodology to compare the performance of residential air source heat pump water heaters. International Journal of Sustainable Energy, pp.1-20.
 5. Tangwe, S. and Kusakana, K., 2020. Quantitative Assessment of the Impact of Retrofitting an Electric Boiler with an Air Source Heat Pump Unit at University Campus Students Residence. International Journal of Simulation--Systems, Science & Technology, 21(2).
 6. Tangwe, S. and Kusakana, K., 2020. A Novel Improvement of the Performance Coefficient of a Residential Air Source Heat Pump Water Heater. International Journal of Simulation--Systems, Science & Technology, 21(2).

Conferences Proceedings:

1. Tangwe, S. and Kusakana, K., 2021, January. The economic and environmental impact of replacing geyser with air source heat pump water heater. In 2021 Southern African Universities Power Engineering Conference/Robotics and Mechatronics/Pattern Recognition Association of South Africa (SAUPEC/RobMech/PRASA) (pp. 1-6). IEEE.
2. Tangwe, S. and Kusakana, K., 2020, November. Application of modelling and statistical inferences to compare performance of hot water heating devices in the residence of university campus. In AIUE Congress 2020: International Conference on Use of Energy.

3. Tangwe, S. and Kusakana, K., 2020, October. Qualitative Methodology for comparison of Performance of Air Source Heat Pump Water Heaters. In 2020 International Conference on Smart Grid and Clean Energy Technologies (ICSGCE) (pp. 96-102). IEEE.
4. Tangwe, S. and Kusakana, K., 2021, January. The economic and environmental impact of replacing geyser with air source heat pump water heater. In 2021 Southern African Universities Power Engineering Conference/Robotics and Mechatronics/Pattern Recognition Association of South Africa (SAUPEC/RobMech/PRASA) (pp. 1-6). IEEE.

HOW DOES YOUR RESEARCH CONTRIBUTE TO DEALING WITH THE CHALLENGES CAUSED BY COVID-19?

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.



GENERAL ENQUIRIES

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