



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

PROGRAMME AND ABSTRACTS

2023 Institutional Research Week

Theme: Advancing Human Centric Research, Innovation and Sustainability



Day 1: Tuesday, 07 November

Day 2: Wednesday, 08 November

Day 3: Thursday, 09 November



08:00
(daily)



Auditorium 1, NUST Lower
Campus, Brahms Street,
Windhoek



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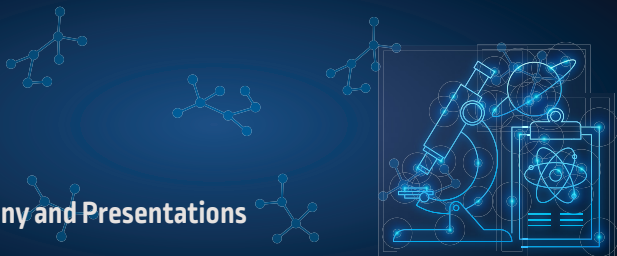




Day 1

Tuesday,
07 November

Opening Ceremony and Presentations



Time	Activity/Topic	Presenter/Responsible
SESSION 1: OPENING CEREMONY		
<i>Chair: Dr Onesmus Shuungula</i>		
<i>Executive Dean, Faculty of Health, Natural Resources and Applied Sciences (FHNRAS)</i>		
08:00	Arrival of Participants	
08:30	Opening Remarks	Dr Eroid Naomab <i>Vice-Chancellor</i> <i>Namibia University of Science and Technology (NUST)</i>
08:45	Pushing the Boundaries of Technology to Serve Wildlife Conservation: A Globally-Noted Multidisciplinary Study	Prof Morgan Hauptfleisch, Mr Gideon Haingura, and Mr Josua Haradoeb
09:00	Guest Speaker Presentation Scientific Innovation and Entrepreneurship in Africa: The H3D Story	Prof Kelly Chibale <i>University of Cape Town (UCT)</i>
10:00	Photo Shoot / Coffee / Tea Break with Refreshments	Lobby in Front of Auditorium 1
SESSION 2		
<i>Chair: Prof Harmony Musiyarira</i>		
<i>Executive Dean: Faculty of Engineering and the Built Environment (FEBE)</i>		
10:30	Mathematical Analysis of Foot and Mouth Disease with Optimal Control: A Case study of FMD in Namibia	Mr Palivamwe M Ndevelo Prof Adetayo S Eegunjobi Dr Nege Chere
10:50	Introduction of Hon Deputy Minister	Dr Eroid Naomab
11:00	Keynote Address	Hon Nathalia /Goagoses <i>Deputy Minister of Higher Education, Technology and Innovation</i>
11:20	NUST's Green Hydrogen Strategy	Prof Samuel John <i>Department of Mechanical, Industrial and Electrical Engineering</i>
11:40	Multi-Year Assessment of Fire Damage in Namibia's Kavango East and West Regions Using Remote Sensing (Online)	Ms Sonya V F Nghoshi, Mr Kaleb Negussie and Dr Oluibukun G Ajayi

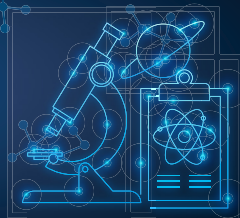
SESSION 3 Chair: Prof Suama Hamunyela <i>Associate Dean: School of Informatics, Journalism and Media Technology</i>		
12:00	Contemporary Domesticity and the Architecture of Urbanising Northern Namibia: Case of the Owambo Homestead	Mr Elao Martin
12:20	The Role of the Mining Industry in the Renewable Energy Transport Sector Transition to Zero Carbon Emissions	Prof Benjamin Mapani, Dr Thabo Falayi and Prof Harmony Musiyarira
12:40	Phytochemical Characterisation and Antimicrobial Activity Of <i>Nigella Sativa</i> Seeds	Mr Festus S. Shafodino, Dr Julien M. Lusilao and Prof Lamech M. Mwapagha
13:00	Lunch	Lobby in Front of Auditorium 1
SESSION 4 Chair: Mr Elao Martin <i>Staff Development Fellow: Department of Architecture, Planning and Construction</i>		
14:00	A Cognitive Stylistics Study of the Nama-Herero Genocide	Prof Linus N Hafeni, Prof Collen Sabao and Prof Haileleul Z. Woldemariam
14:20	Human-Environment Nexus: Evaluating Anthropo-geomorphology and Urban Expansion of the Weija Gbawe Municipality, Ghana	Mr Philip Mensah
14:40	Heritage Values in a Historical Perspective: Re-imagining the Alte Feste in Namibia's Heritage Landscape	Mr Jens Wiedow
SESSION 5 Chair: Dr Leena Kloppers <i>Senior Lecturer: Department of Technical and Vocational Education and Training [TVET]</i>		
15:00	It Only Matters Where You are and Where You Want to Go, An Application of Homogenous Semi-Markov Processes to Art Patients in Namibia	Mr Simon P. Kashihalwa, Dr Josua Mwanyekange and Prof Lilian Pazvakawambwa
15:20	Designing a Framework for Cybersecurity Policy Implementation and Compliance for Organisations in Namibia	Ms Iyaloo N Haitula-Waiganjo, Prof Jude Osakwe and Dr Ambrose Azeta
15:40	A Comparative Analysis of Information Systems Audit and Digital Forensics Processes	Mr Ericko lipumbu, Mr Isaac Nhamu and Dr Mercy Chitauru
16:00	Recap of the Day	Dr Hilma R Amwele <i>Associate Dean: School of Agriculture and Natural Resource Sciences</i>



Day 2

Wednesday,
08 November

- Presentations
- Business Idea Pitches
- Posters and Exhibitions



Time	Activity/Topic	Presenter/Responsible
SESSION 6		
Chair: Prof Efigenia Semente <i>Executive Dean: Faculty of Commerce, Human Sciences and Education</i>		
07:30	Arrival of Participants	
08:15	Welcome Remarks	Dr Colin Stanley <i>Acting Deputy Vice-Chancellor: Research, Innovation and Partnerships</i>
8:30	Guest Speaker Presentation (Online) Intrapreneurial Research, Innovation and Partnerships: Tapping into Your Organization's most Valuable and Under-Utilized Assets	Prof Mjumo Mzyece <i>Northwestern College Orange City, Iowa, USA</i>
09:10	Leadership Practices and Work Engagement for Innovation and Sustainability in Learning Organisations: The Mediating Role of Job Demands-Resources	Ms Elzene Van Wyk and Prof Sulaiman O. Atiku
09:30	The Impact of Spend Analysis on Procurement Efficiency Among Fast Moving Consumer Goods Industry in Harare	Dr Vusumuzi Sibanda
09:50	Assessing Drought Susceptibility and Risk using Dual Multi-Criteria Decision-Making (MCDM) Approaches: A Case Study in Rehoboth	Dr Oluibukun G. Ajayi and Mr Ryan T Benade
10:10	A 2021 Social Accounting Matrix (SAM) for Namibia	Mr Mwala Lubinda
10:30	Coffee / Tea Break with Refreshments	Lobby in Front of Auditorium 1

SESSION 7		
Chair: Prof Rakesh Kumar		
<i>Professor: Statistics: Department of Mathematics, Statistics and Actuarial Science</i>		
11:00	<ol style="list-style-type: none"> 1. Innovation Pathways In The Nust: Namibia Business Innovation Institute (Nbi) and Its Incubation Services 2. Creation of Value Addition in the Fishing Industry: Examining Impact and Hurdles of Startups - A Case of Namibia Fish Consumption Trust and of The Namibia University of Science And Technology 	Mr Edwin Kavihuha
11:30	Supervised Machine Learning Models Towards Tertiary Students Career Guidance	Mr Hage E Angala, Prof Attlee M Gamundani and Mr Simon H Muchinenyika
11:50	Design and Prototyping of an Intelligent Railway Crossing Warning System	Mr Elago Itah
12:10	Application of Robotic Process Automation at Tertiary Institutions: A Case of Namibia University of Science and Technology	Mr Uahengisa L. Katjizuko and Mr Simon H. Muchinenyika
12:30	Developing a Machine Learning Model to Predict Fatigue Levels for Employees at NAMDEB	Mr Samuel N. Nakale, Prof Fungai Bhunu Shava and Prof Gloria Iyawa
13:00	Lunch	Lobby in Front of Auditorium 1
SESSION 8		
Chair: Dr David Iiyambo		
<i>HoD: Mathematics, Statistics and Actuarial Science</i>		
<i>School of Natural and Applied Sciences</i>		
14:00	Business Innovative Idea Competition - (5-Minute elevator pitches by undergraduate/postgraduate students)	Judges
SESSION 9		
Chair: Dr Vusumuzi Sibanda		
<i>Senior Lecturer</i>		
<i>Department of Governance and Management Sciences</i>		
15:00	Poster Presentations Session	
16:15	Announcement of Winners	
16:30	Recap of the Day	Prof Omotayo Awofolu <i>Associate Dean: School of Health Sciences</i>



Day 3

Thursday,
09 November

Professorial Inauguration Ceremony

Director of Ceremonies

Dr Colin Stanley, Acting Deputy Vice-Chancellor:

Research, Innovation and Partnerships

Time	Activity/Topic	Presenter/Responsible
08:00	Arrivals	All
08:15	Academic Procession with Gaudeamus Igitur song	Ms Neriene Hoebes, <i>Act Assistant Registrar, Examinations, Certification and Timetabling, Registrar's Office</i>
08:25	Welcoming Remarks	Dr Eroid Naomab, <i>NUST Vice-Chancellor</i>
08:45	Keynote Speaker	Dr Eino Mvula: <i>Chief Executive Officer, Nambian Standards Institution [NSI]</i>
INAUGURAL LECTURE PRESENTATION		
09:10	Introduction of Candidate	Dr Onesmus Shuungula, <i>Executive Dean, FHNRRAS</i>
09:15	Professor 1	Prof Edosa Omoregie
10:00	Introduction of Candidate	Dr Onesmus Shuungula, <i>Executive Dean, FHNRRAS</i>
10:05	Professor 2	Prof Dipti Ranjan Sahu
10:50	Short break & Refreshments	
11:15	Introduction of Candidate	Ms Miriam Dikuua, <i>DVC: Finance and Operations</i>
11:20	Professor 3	Prof Fungai Bhunu Shava
12:05	Introduction of Candidate	Ms Miriam Dikuua, <i>DVC: Finance and Operations</i>
12:10	Professor 4	Prof Jose Quenum
12:55	Presentation of Certificates	Dr Eroid Naomab, <i>NUST Vice-Chancellor</i>
13:10	Vote of Thanks	Prof Sifiso Nyathi, <i>Registrar, NUST</i>
13:20	Group Photo	Professional Photographer
*EVENING PROGRAMME		
17:30-19:30	Researcher of the Year (RoY) Awards	EXCO members, EDs, E. Dirs., Inaugurates and 1 guest, RoYs recipients and IRW organising committee members

3. About the Guest Presenters

Professor Kelly Chibale

Prof Chibale is a full Professor of Organic Chemistry at the University of Cape Town (UCT) where he holds the Neville Isdell Chair in African-centric Drug Discovery & Development. He is also a Full Member of the UCT Institute of Infectious Disease & Molecular Medicine, founding Director of the South African Medical Research Council Drug Discovery & Development Research Unit at UCT, the Founder and Director of the UCT Holistic Drug Discovery and Development (H3D) Centre, a Johnson and Johnson (J&J) Centre for Global Health Discovery.



Prof Chibale obtained his PhD in Synthetic Organic Chemistry from the University of Cambridge in the UK. This was followed by postdoctoral stints at the University of Liverpool in the UK and at The Scripps Research Institute in the USA. He was a Sandler Sabbatical Fellow at the University of California San Francisco, a US Fulbright Senior Research Scholar at the University of Pennsylvania School of Medicine, and a Visiting Professor at Pfizer in the UK.

Prof Chibale has received many notable awards and honours, which include a South African Medical Research Council Gold Medal (2016), Cheney Visiting Fellowship from the University of Leeds in the UK (2017-2018), and South African Chemical Institute Gold Medal (2018). Kelly was named one of Fortune magazine's World's 50 Greatest Leaders (2018), one of 22 black biotech leaders in honour of Juneteenth in the USA on a list published by the Timmerman Report, which celebrates innovative black leaders who are change-makers in their respective fields (2021), and one of the 25 standout voices in African public health by Harvard University's Public Health magazine (2022). He was recently awarded the Royal Society (UK) Africa Prize 2023 'For exceptional leadership and groundbreaking work in drug discovery for African

endemic diseases. After serving as an Associate Editor for the American Chemical Society (ACS)'s Journal of Medicinal Chemistry, in 2023 Kelly became the first Editor-In-Chief (EIC) from Africa of an ACS publication when he was appointed EIC of ACS Medicinal Chemistry Letters.

Prof Chibale's research interests are in infectious disease drug discovery and the development of preclinical discovery tools and models to contribute to improving treatment outcomes in people of African heritage.

Professor Mjumo Mzyece

Prof Mzyece is a full Professor of Management in the Department of Business and Economics at Northwestern College in Orange City, Iowa, USA, and also has a sessional affiliation at Wits Business School, University of the Witwatersrand, in Johannesburg, South Africa. His research interests include innovation management, business model innovation, technology management, next-generation digital networks, digital operations, and operations in high-tech startups. He has over 25 years of international experience in academia and industry and has played various roles in leading organisations, including IBM (USA), Econet Wireless Group (South Africa), French South African Institute of Technology (South Africa) and Agilent Technologies (UK), among others. He holds a Bachelor of Engineering (BEng) (Honours) in Electronic & Electrical Engineering from the University of Manchester in Manchester, England; a Master of Science (MSc) [Distinction] in Communications Technology & Policy and a PhD in Electronic & Electrical Engineering, both from the University of Strathclyde in Glasgow, Scotland; and an MBA from the Fuqua School of Business, Duke University, in Durham, North Carolina, USA, where he was awarded a prestigious Thomas F. Keller Scholarship.



ABSTRACTS OF THE GUEST SPEAKER:

Day 1

SCIENTIFIC INNOVATION AND ENTREPRENEURSHIP IN AFRICA: THE H3D STORY

Prof Kelly Chibale

*Holistic Drug Discovery and Development (H3D) Centre, Department of Chemistry
and Institute of Infectious Disease and Molecular Medicine,
University of Cape Town, South Africa.
E-mail: Kelly.Chibale@uct.ac.za*

Abstract:

African-led scientific innovation has history been hampered by gaps in infrastructure, enabling technology platforms and a critical mass of talent. Within the context of talent, decades of post-independence training have to an extent facilitated the brain-drain out of Africa. This challenge presents an opportunity to create sustainable capacity building and talent retention models that result in the creation of an absorptive capacity to attract, develop, nurture, and retain talent on the African continent. On the other hand, entrepreneurship as it relates to using science for development, including creating jobs, needs to be encouraged and incentivized in Africa.

This talk will describe the University of Cape Town Holistic Drug Discovery and Development (H3D) Centre, efforts to foster health innovation and entrepreneurship towards addressing gaps in scientific infrastructure, enabling technology platforms and a critical mass of talent.

Reference:

S. Winks, J. G. Woodland, G.C. Pillai and K. Chibale. *Nature Medicine*, 2022, <https://doi.org/10.1038/s41591-022-01885-1>



ABSTRACTS OF THE GUEST SPEAKER:

Day 2

INTRAPRENEURIAL RESEARCH, INNOVATION AND PARTNERSHIPS: TAPPING INTO YOUR ORGANIZATION'S MOST VALUABLE AND UNDER-UTILIZED ASSETS

Prof Mjumo Mzyece

*Department of Business and Economics, Northwestern College,
Orange City, Iowa, 51041, USA.*

E-mail: mjumo.mzyece@nwcsiowa.edu

Abstract:

This talk addresses the theme of “Advancing Human Centric Research, Innovation and Sustainability” from the perspective of intrapreneurship, whereby employees in existing organizations acting as internal entrepreneurs (intrapreneurs) take responsibility for taking their own ideas and converting them into new products, services and processes for the organization. Intrapreneurship is based on the premise that very often organizations’ most valuable and under-utilized assets are the ideas in their employees’ heads. Drawing on the speaker’s recently published book, *The Intrapreneur’s Journey: Empowering Employees to Drive Growth* (2023), the talk presents a comprehensive model of best practices to successfully implement and sustain intrapreneurship in various organizations and discusses specific examples and case studies of successful intrapreneurship in both African and higher education contexts. The talk concludes by sharing a sample action plan towards achieving a cohesive set of short-term, medium-term and long-term intrapreneurial objectives in an organization.

Day 1,
SESSION 2



PUSHING THE BOUNDARIES OF TECHNOLOGY TO SERVE WILDLIFE CONSERVATION: A GLOBALLY- NOTED MULTIDISCIPLINARY STUDY

Prof Morgan Hauptfleisch, Mr Gideon Haingura, and Mr Josua Haradoeb

Department of Natural Resource Sciences, Faculty of Health, Natural Resources and Applied Sciences, Namibia University of Science and Technology, Namibia.

Abstract:

With over 40% of Namibia's land surface being managed for wildlife, there are many benefits but also costs to communities living with wildlife, and threats to the survival of species are increasing. Despite the exponential growth in technology to solve the world's problems, the discipline of wildlife management and conservation has mostly depended on low-tech options. NUST's Biodiversity Research Centre has been exploring the use of game-changing technologies such as Artificial Intelligence, Internet-of-things and real-time satellite tagging to support conservation and human-wildlife conflict management. We will demonstrate a Mechanical Engineering student's elephant recognising Smart-Gate, a Geospatial Sciences graduate's human-wildlife conflict early warning system and an initiative in which we captured and satellite tagged more than 70 wild animals in the Etosha Landscape. We will end by spying on the movements of an elephant and a lion in the Etosha West and South Landscape.



MATHEMATICAL ANALYSIS OF FOOT AND MOUTH DISEASE WITH OPTIMAL CONTROL: A CASE STUDY OF FMD IN NAMIBIA

Mr Palivamwe M. Ndevelo, Prof Adetayo S. Eegunjobi and Dr Nege Chere

*Department of Mathematics, Statistics and Actuarial Science,
Faculty of Health, Natural Resources and Applied Sciences,
Namibia University of Science and Technology, Namibia.*

Abstract:

The study aims to comprehensively analyse Foot and Mouth Disease (FMD) by formulating two mathematical models specifically tailored for confined and unconfined environments in Namibia. The models incorporate essential compartments that capture the intricate dynamics of livestock populations, including their susceptibility to FMD, latent exposure, infectiousness, and recovery. Furthermore, the models account for the implementation of optimal control measures by farmers and the disease control mechanisms employed by national institutions.

The study uses mathematical modelling, stability analysis, historical data integration, and numerical simulations to provide insights into the behaviour and control of FMD in Namibia. The findings contribute to existing epidemiological knowledge of informing decision-making and policy formulation.

Keywords: Foot and Mouth Disease, mathematical modelling, stability analysis, numerical simulations, disease control, livestock populations, Namibia.

MULTI-YEAR ASSESSMENT OF FIRE DAMAGE IN NAMIBIA'S KAVANGO EAST AND WEST REGIONS USING REMOTE SENSING

Ms Sonya V.F. Nghoshi, Mr Kaleb Negussie and Dr Oluibukun G. Ajayi

Department of Land and Spatial Sciences, Faculty of Engineering and the Built Environment, Namibia University of Science and Technology, Namibia.

Abstract:

Fire occurrences and their ecological impacts in southern Africa have been the subject of various studies. The region's fire regimes are influenced by complex interactions between environmental factors, including vegetation type, rainfall patterns, and human activities. Understanding these dynamics is crucial for effective fire management and ecosystem restoration.

This study aimed to assess the extent and severity of fire damage in Namibia's Kavango East and West regions using remote sensing data. By analysing factors such as burned area, Normalized Burn Ratio (NBR), Normalized Difference Vegetation Index (NDVI), and population density, we sought to provide valuable insights into fire damage assessment and post-fire management. The research involved the analysis of satellite imagery, specifically Landsat 8 data, to create a time series of NBR and NDVI for the years 2015 to 2021. We employed an Analytic Hierarchy Process (AHP) to weigh the significance of NBR, NDVI and burned area in the assessment process. Additionally, a regression analysis was conducted to explore the relationship between population density and burned area. The study revealed significant variations in burned areas across different years, with 2017 and 2020 experiencing the highest burned areas. The NBR difference, a measure of vegetation loss due to fires, showed a progressive increase in fire damage over the study period. The NDVI data illustrated seasonal trends in vegetation growth and recovery, highlighting the ecological effects of fires. While the regression analysis did not find a statistically significant correlation between population density and burned area, it emphasized the multifaceted nature of fire damage. The findings have practical implications for post-fire management, ecosystem restoration, and fire management strategies in the Kavango East and West regions. Decision-makers can use this information to allocate resources effectively, plan restoration efforts, and make informed choices regarding fire management.

Keywords: Burn severity mapping, Ecosystem restoration, Fire damage assessment, Remote Sensing, Time series analysis.



Day 1,
SESSION 3

CONTEMPORARY DOMESTICITY AND THE ARCHITECTURE OF URBANISING NORTHERN NAMIBIA: CASE OF THE OWAMBO HOMESTEAD

Mr Elao Martin

*Department of Architecture, Planning and Construction, Faculty of Engineering
and the Built Environment, Namibia University of Science and Technology,
Namibia.*

Abstract:

This research investigates domesticity and socio spatial practices of the Owambo homestead at the nexus of communal and urban land in northern Namibia, within the context of existing urban development practices. An easily observable difference between the homestead in communal land and the urban home model is that whereas the urban home separates the functions of work from dwelling, the homestead is very much a part of its enterprise, the field. There are customary spatial practices, and spaces which have been resilient and are still an identifiable part of the Owambo homestead, its practices, and the how the communal layer of these homesteads work.

The encounter of this typology with contemporary urban planning practice in northern Namibia at the nexus of communal and urban land is unresearched, however, it is observed as a process primarily concerned with the technocratic process which compensates homesteads as per the existing Compensation Policy Guideline for Communal Land. This policy document aims to place the claimant in as near as possible to the same position as he or she was in before the 'acquisition' or 'displacement' through financial compensation. The Owambo homestead and the resources created in it however (social and economic), cannot all be adequately replaced with financial compensation.

Through employing an ethnographic case study and document analysis methods, the analysis of communal homesteads, urban homesteads, and reestablished homesteads at the nexus of the Outapi urban area and Ombalantu Traditional Authority's communal land suggests that they are experienced by residents not just through the sense of *place*, but also as an enterprise, a means of livelihood, and a housing

resource shared by those who partake in the enterprise. While urban homesteads adopt alternative practices, spatiality, and livelihood strategies presented by the urban condition, there is also a case for critical urban practice to engage many who consider the compensation policy as a form of government endorsed displacement. Furthermore, the analysis evinces a dichotomous yet interdependent assemblage relationship between the spatial practices on communal land, with what we have come to define as 'urban'.

Keywords: Architecture, socio-spatial practices, planning, northern Namibia, sustainable development

THE ROLE OF THE MINING INDUSTRY IN THE RENEWABLE ENERGY TRANSPORT SECTOR TRANSITION TO ZERO CARBON EMISSIONS

Prof Benjamin Mapani, Dr Thabo Falayi and Prof Harmony Musiyarira

Department of Civil, Mining and Process Engineering, Faculty of Engineering and the Built Environment, Namibia University of Science and Technology, Namibia.

Abstract:

Greenhouse gas (GHG) emissions from fossil fuels have fuelled the radical increase in CO₂ and other GHGs in the atmosphere. To transition to a carbon neutral transport economy, a substitute would have to be found for fossil fuels since the main driver of GHG emissions and contributing significantly to global warming is CO₂. The burning of fossil fuels within the transport sector contributes almost 30% of the GHG emissions budget. The transport sector is dominated by the motor vehicle industry, air travel, sea travel and in some parts of the world rail travel. CO₂ contributes about 0.6°C, whereas methane contributes 0.4°C in warming, with nitrous oxide following up close at 0.2°C. Other gases contribute much lower values. From these figures, it is apparent that an energy transition from the current fossil fuel-based energy economy, whose economic value is at 1.6 trillion US dollars and dwarfs all mineral commodities in world trade value, such as gold (US\$200 billion), will need a strong political, technical and engineering solutions. A successful energy transition will require the mining, processing and use of new minerals that enable the manufacturing of Electrical Vehicles (EVs); Fuel Cell Vehicles; Hybrid Fuel Cell vehicles and Ammonia run engines. Large trucks will invariably require hydrogen powered motors, while smaller domestic vehicles will take the main share of EVs, Fuel Cell vehicles and Ammonia run engines. The leading GHG emitters, according to the sector, are the



Industrial and manufacturing, thermal power production from coal, the transport sector in all its different forms from combustion engine fossil-based technologies. A search for new minerals will be required to transition the transport sector to climate friendly modes of transportation. New resources of Nd, Pt, Cu, Co, and Ni will have to be mined for the transport sector to move away from the combustion engine. Green hydrogen and its siblings, such as grey and brown hydrogen, will also require specialised steel, with the ability to resist hydrogen embrittlement; and followed by a whole gamut of metals such as Cu, V, Co, Pt, Pd, P, Al and Li for the batteries, fuel cells configuration and cabling. The transport sector is researching battery minerals such as V, Na and Li. These metals will require the operation of new mines and significant improvement in processing techniques for the recovery of minute quantities of Rare Earth Elements (REEs) and associated Platinum Group Metals. The transport sector will need electric vehicles (EVs) whose main stay are batteries with multiple longer cycles of recharging. Hybrid vehicles with fuel cells will also require Al and Cu in much larger quantities than are currently mined today. The mineral and chemical processing sectors will require innovative, transformative solutions to ensure the energy transition takes place before 2050.

Keywords: Minerals, Transport Sector, Electric Vehicles, Fuel Cell Vehicles, Green Hydrogen.

PHYTOCHEMICAL CHARACTERISATION AND ANTIMICROBIAL ACTIVITY OF NIGELLA SATIVA SEEDS

Mr Festus S. Shafodino, Dr Julien M. Lusilao and Dr Lamech M. Mwapagha

Department of Biology, Chemistry and Physics, Faculty of Health, Natural Resources and Applied Sciences, Namibia University of Science and Technology, Namibia

Abstract:

Nigella sativa is one of the medicinal plant species that gained popularity for a wide range of medicinal applications due to its seeds which are rich in phytoconstituents. Continuous scientific investigations on *N. sativa* seeds are needed to better understand its many medicinal potentials. This will also form a composition-based foundation that support several old and/or new case beneficial histories of its seeds. In this study, the antimicrobial activity of *N. sativa* seeds was phytochemically characterised and evaluated. Different extracts of *N. sativa* seeds were obtained

by maceration and soxhlet extraction methods using different extraction solvents. The obtained extracts were tested using UV-Vis, FTIR, TLC, and GCMS techniques. Antimicrobial analysis against pathogenic bacterial strains (*E. coli*, *P. aeruginosa*, *S. aureus* and *B. subtilis*) was carried out by disc diffusion method using different preparations of *N. sativa* seeds. The screening analysis revealed the presence of all the tested phytochemicals. FT-IR analysis of *N. sativa* seeds oil extracted with absolute ethanol revealed functional groups that are associated with active ingredients of medicinal value. The GC-MS chromatograms revealed different chemical constituents whose known bioactivities and/or applications are essential in the management of life-threatening infections. Different extracts of *N. sativa* seeds showed antimicrobial activity with different efficacy against the tested pathogenic bacterial strains. Therefore, this study shows that extracts of *N. sativa* seeds contain a variety of chemical components and functional groups linked to their antimicrobial properties, and they might be natural precursors of nutraceuticals.

Keywords: *Nigella sativa*, phytochemical, antimicrobial activity, pathogenic bacteria

Day 1,
SESSION 4



A COGNITIVE STYLISTICS STUDY OF THE NAMA-HERERO GENOCIDE

Dr Linus N. Hafeni¹, Prof Collen Sabao² and Prof Haileleul Z. Woldemariam³

1. *School Principal at Olulongo Combined School, Oshana Region, Namibia.*
2. *Department of Humanities and Arts: English Section, University of Namibia, Namibia.*
3. *Department of Communication and Languages, Faculty of Commerce, Human Sciences and Education, Namibia University of Science and Technology, Namibia.*

Abstract:

The study examined four Namibian Nama-Herero literary texts about the genocide in Namibia, namely, Lauri Kubuitsile's *The Scattering* (2016), Jasper D. Utley's *Lie of the Land* (2017), Rukee Tjingaete's *The Weeping Graves of our Ancestors* (2017) and Zirk van den Berg's *Parts Unknown* (2018), through the application of the



cognitive stylistics theory as a framework for analysis. The four novels re/present and re/construct the Nama-Herero genocide, which took place from 1904 -1908 in an estimated 65,000 Ovaherero and 10,000 Nama people died in what is known as the first genocide of the twentieth century. The study probed how the usage of the tools of cognitive stylistics can aid the reader in better understanding the construction of narratives of the genocide in these Namibian fictional imaginaries. In doing this, the study promotes new discourses on cognitive stylistics studies of Namibian literary works. Why cognitive stylistics? Cognitive stylistics combines explicit, rigorous and detailed linguistic analysis of literary texts, and argues that a particular situation in a literary text can be interpreted in different ways. Conceptualising and implementing cognitive tools, the study analysed how the Herero and Nama people re-member a dismembered past characterised by the trauma suffered under German colonial administrative rule, culminating from genocide, incarceration, torture, rape and loss of land and livestock. This is achieved through the examination of the literary creativity of the texts through the use of cognitive metaphor, genocidal trauma, and mental and physical oppression. Several creative writing resources were used to project genocidal narratives in the narratology of genocidal fictionalised memory. In addition, the study observes that conceptual metaphors were used to establish a connection between the reader and the connection extends beyond the reader and text to include specific contextual aspects.

Keywords: cognitive metaphor, cognitive stylistics, cognitive tools, fictional narrative, genocide, Nama and Herero

HUMAN-ENVIRONMENT NEXUS: EVALUATING ANTHROPO-GEOMORPHOLOGY AND URBAN EXPANSION OF THE WEIJA GBAWE MUNICIPALITY, GHANA

Mr Philip Mensah

Department of Land and Spatial Sciences, Faculty of Engineering and the Built Environment, Namibia University of Science and Technology, Namibia.

Abstract

The human-environment nexus has gained increasing attention in recent years due to the recognition of its profound influence on the sustainability and resilience of urban areas. Rapid urbanisation, especially in developing nations like Ghana's

Weija Gbawe Municipality, has triggered complex interactions between human activities and the urban landscape (i.e., natural environment). The study employed geospatial analysis, remote sensing and household surveys to explore these complex interactions. The findings revealed that unchecked urban expansion, driven primarily by global population growth, has directly disrupted the natural environment due to poor land use and spatial planning. This has led to the encroachment of settlements into environmentally sensitive areas, thereby increasing the vulnerability to natural disasters like floods and landslides. Additionally, the local topography, including slope and elevation, significantly influences urban expansion patterns, concentrating built-up structures and industrialisation in unplanned areas such as encroachment on water bodies and uplands. The study highlights the indirect influence of the natural environment (i.e., geomorphological predators) on human interaction and urban expansion. To tackle these challenges, the study suggests that policymakers and stakeholders should adopt a holistic approach that incorporates sustainable spatial land-use planning and management practices. Additionally, community engagement is essential for raising awareness and building local capacity to contribute to environmental protection and sustainable development. An integrated approach is crucial for addressing the human-environment relationship in urban areas that ensures a sustainable future for Weija Gbawe Municipality and other similar contexts.

Keywords: Anthro-geomorphology, Human-Environment Nexus, Integrated Approach, Land-use and Spatial Planning, Natural Environment, Sustainable Development

HERITAGE VALUES IN A HISTORICAL PERSPECTIVE: RE-IMAGINING THE ALTE FESTE IN NAMIBIA'S HERITAGE LANDSCAPE

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Abstract

The historical fortification, called the 'Alte Feste' is the oldest extant building in Windhoek and forms a key part of the central historic ensemble. In contemporary Namibia, however, its values as a historic building remain contested as evidenced by its

abandonment and deterioration. This prompts questions surrounding which heritage values were historically identified during the buildings pre-colonial nomination as monument, how dominant historical discourses influenced these values, and which values it can be ascribed in contemporary Namibia. While prior research into the building provides some insights into its construction history, questions surrounding its status in the context of changing heritage conservation approaches during changing political regimes, including our own, remain unanswered.

To address the gap in research, the building's history is mapped to identify important alterations and phases that, on one hand, allow inference into which aspects of the building were accorded historical value, and on another, allow for the identification of previously disregarded values. Data collection is conducted through a combination of archival research, physical survey, and documentation. Textual, photographic and archival sources are assessed to provide the historical background to the building, while a comprehensive survey campaign combines manual and digital methods through which the buildings form, construction, and materiality is surveyed and documented. Finally, archival and survey results are compared, chronologically ordered and evaluated.

The valorization of specific aspects of the building in the two mayor renovation exercises in '61 and '86, show prioritization for its military appearance over other values, in line with the dominant settler historiography of the time, while in post-colonial Namibia, a change in focus on historic narratives surrounding the Independence Struggle reduce the importance of the 'Alte Feste', resulting in its ruin. However, the identification of values related to transnational, environmental and social aspects of the buildings history may allow for the revalorisation of colonial heritage in Namibia as a shared heritage.

Keywords: Architecture History, Colonial Architecture, Heritage Conservation, Historical fortification

Day 1:

SESSION 5

**IT ONLY MATTERS WHERE YOU ARE AND WHERE YOU WANT TO GO, AN
APPLICATION OF HOMOGENOUS SEMI-MARKOV PROCESSES TO ART PATIENTS
IN NAMIBIA**

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Abstract:

The progression of HIV infection to AIDS and then to death can be considered a stochastic process. Disease progression can be broken down into a finite number of intermediate states, based on CD4 counts. The five states of the Markov process of HIV/AIDS progression are commonly defined as: S1: CD4 count > 500 cells/microliter; S2: $350 < \text{CD4 count} \leq 500$ cells/microliter; S3: $200 < \text{CD4 count} \leq 350$ cells/microliter; S4: CD4 count ≤ 200 cells/microliter; and D: Death. The objective of this study was to model the progression of HIV/AIDS disease of patients under ART follow-up in Namibia using homogenous semi-Markov processes, using the data obtained from Ministry of Health and Social Services.

A retrospective study design was used to obtain data on 2422 patients who were observed 11028 times. The semi-Markov model was employed to estimate the transition probabilities and transition intensity rate. Time Homogeneous Semi-Markov model was fitted to assess effectiveness of ART by comparing the forward transition and reverse transitions. As expected, the probabilities of transiting from good states to worse states increased with time [from state 1 to state 3 and 4 after 6 months is 0.023 and 0.004, after 12 months is 0.059 and 0.010 respectively]. As time increase the probabilities of remaining in the same state is decreasing [probabilities of remaining in state 1 after 6, 12 and 18 months is 0.804, 0.698 and 0.633]. As expected, the intensity indicates that the rate of transiting from good states to worst states is decreasing [the intensity of transiting from state 1 to 3 and 4 is $p <$



0.001]. The strongest predictor of transition from state 1 to 2 is TDF/3TC/EFV, which has a hazard ratio of 1.338 (with p value of 0.002). Patients who were prescribed TDF/3TC/EFV, are over 1.338 times more likely to transit from state 1 to state 2 than patients who did not receive TDF/3TC/EFV. A hazard ratio of 0.678 for the predictor variable female shows that females were less likely to transit from state 2 to 3 than their male counterparts. The hazard ratios of females from a bad state to a better state are more than 1, which is an indication that females are less likely to respond to treatment compared to males.

HIV can progress to AIDS without delay if there is no intervention. Early ART initiation is crucial to reduce the probabilities of transiting from good states to worse states.

Keywords: transition probabilities, transition intensity, hazard ratio, clinical states, log likelihood ratio

DESIGNING A FRAMEWORK FOR CYBERSECURITY POLICY IMPLEMENTATION AND COMPLIANCE FOR ORGANISATIONS IN NAMIBIA

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Abstract:

The escalating frequency of cybersecurity threats, driven by the digitalization and interconnection of systems, underscores the pressing need for robust security measures. Many organizations in Namibia find themselves in a position where they must reevaluate their cybersecurity protocols. To effectively thwart potential threats, they must establish a comprehensive cybersecurity strategy. This study is motivated by the observation that numerous Namibian organizations have insufficient strategies and best practices for implementing cybersecurity policies. Additionally, there is dearth in staff adherence to existing policies, leaving them vulnerable to cyberattacks. The non-involvement of top management in the Cybersecurity policy implementation could be as a result of lack of Cybersecurity framework for policy implementation and hence the need for further studies. The objective of this study is

to design a framework for cybersecurity policy implementation and compliance for organisations in Namibia. The research will be guided by two established theories: the Protection Motivation Theory (PMT) and the Theory of Planned Behavior (TPB). By combining these theories, we aim to predict the intentions of policymakers and IT management regarding policy implementation, as well as staff intentions to comply with these policies. A qualitative approach will be employed in this study, adhering to the principles of Design Science Research (DSR). Data will be gathered through semi-structured interviews, focus groups, and document analysis. Subsequently, thematic analysis will be utilized to distill the collected data into meaningful insights. The study's findings would yield valuable information for the development of cybersecurity strategies within business organizations. The framework is intended to be a document that will describe procedures and processes designed for cybersecurity policy implementation and compliance for the purpose of reducing Namibian organisation's vulnerability and threats.

Keywords: Compliance, Cyber-attacks, Cybersecurity, Framework, and Policy Implementation

A COMPARATIVE ANALYSIS OF INFORMATION SYSTEMS AUDIT AND DIGITAL FORENSICS PROCESSES

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Abstract:

This paper provides a comparison of two essential cybersecurity disciplines: Information Systems Audit (ISA) and Digital Forensics (DF) by drawing on a thorough examination of the literature and empirical studies. The security and integrity of digital systems are critical in today's connected and data-driven world. Both ISA and DF play a critical role in protecting digital assets, detecting incidents, and facilitating an effective incident response. This study examines the methodology, goals, tools, and strategies used in these two fields, emphasizing their parallels, contrasts. Organizations can improve their cybersecurity strategy and strengthen their defenses against evolving cyber threats by understanding the unique yet

interconnected nature of ISA and DF. The rapid spread of cyber threats and the potential impact of cyber incidents on organizations underscore the critical importance of comprehensive and effective cyber security measures. Therefore, this paper seeks to make a significant contribution to the topic of cybersecurity by providing an in-depth comparative analysis of two critical areas. The importance of this paper lies in exploring how these disparate but interconnected areas could work together to strengthen an organization's cybersecurity posture. Additionally, it highlights the relative contributions of ISA and DF to protecting digital assets, identifying and responding to incidents, and maintaining regulatory compliance by looking at their approaches, goals, tools, and techniques. Moreover, it will highlight the potential synergies between the two areas and provide insights into how organizations can leverage the strengths of ISA and DF to improve their overall cybersecurity resilience. Organizations can optimize their strategies, streamline procedures, and develop a more coherent and proactive approach to cybersecurity by acknowledging the symbiotic relationship between ISA and DF.

Keywords: Information Systems Audit, Digital Forensics, Cybersecurity, Comparative Analysis, Incident Response



Day 2,
SESSION 6

LEADERSHIP PRACTICES AND WORK ENGAGEMENT FOR INNOVATION AND SUSTAINABILITY IN LEARNING ORGANISATIONS: THE MEDIATING ROLE OF JOB DEMANDS-RESOURCES

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Abstract

There has been extensive research on leadership and work engagement, but little is known concerning leadership practices and work engagement levels for innovation and sustainability in learning organisations operating in Namibia. Hence, this study examines leadership practices and work engagement for innovation and sustainability in learning organisations, as well as the mediating role of job demands and job

resources in the link. A quantitative approach was adopted following an explanatory research design to explain the mediating role of job demands and resources in the interplay between leadership practices and work engagement. A combination of sampling strategies (stratified, convenience, and purposive sampling) was adopted to draw a sample of 450 respondents from different groups of employees within the target population of the study. The primary data was collected through an online survey, which was formatted using a Likert-type rating scale. Quantitative data was analysed using structural equation modelling via SmartPLS Version 3.3.9. Leadership practices have significant relationships with both job demands and resources. On the other hand, job demands have a significant positive relationship with work engagement, but job resources exert no significant effect on work engagement levels for innovation and sustainability in the participating learning organisations. Therefore, the relationship between leadership practices and work engagement was fully mediated by job demands for innovation and sustainability in the learning organisations.

Keywords: Innovation, job demands, job resources, leadership, learning organisations, sustainability, work engagement.

THE IMPACT OF SPEND ANALYSIS ON PROCUREMENT EFFICIENCY AMONG FAST MOVING CONSUMER GOODS INDUSTRY IN HARARE

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Abstract

The Zimbabwean fast-moving consumer goods (FMCGs) industry continues to record a decline in household demand with recent statistics showing that it fell by 11.8% from 2019 to 2020. While demand has been declining for most FMCGs firms over the same period, the costs of procuring the FMCGs, has not responded accordingly. This has also been common even for FMCGs listed on the Zimbabwe Stock Exchange (ZSE). The marginalisation of studies in FMCGs in Zimbabwe has resulted in the growing uncertainties over how best FMCGs firms may strategise to stimulate consumer demand while reducing the procurement costs. This study therefore sought to assess the impact of spend analysis on various dimensions of procurement

efficiency namely, category spend, supplier rationalisation, procurement costs and vendor compliance. The researcher sampled, using proportionate stratified and convenient sampling, 47 procurement personnel from the FMCGs firms listed on the ZSE. Guided by the positivism philosophy and a quantitative approach, the study distributed five-point Likert scaled questionnaires to the respondents using Google forms and WhatsApp. Statistical Package for Social Scientists (SPSS) version 24 was used to analyse the data mainly as mean score, percentages, frequencies, and bar graphs. Pearson correlation was used to find the link between spend analysis and various dimensions of the procurement efficiency. Findings indicated that spend analysis has significant influence on various dimensions of procurement efficiency of the GMCGs firms. A unit change in spend analysis may result in 34% increases in procurement efficiency; stimulate a 35.8% variation in category spend posture; 6.3% positive change in supplier rationalisation; and a 22.2% reduction in procurement costs. Against these findings, it was recommended that FMCGs firms might need to invest in spend analysis capabilities. However, future research might be necessary to explore the effect of different spend analysis platforms on procurement efficiency. The current study contributes to understanding of the relevance of spend analysis among the various existing procurement efficiency strategies.

Keywords: Fast moving consumer goods, Spend data, Spend analytics, Procurement efficiency

ASSESSING DROUGHT SUSCEPTIBILITY AND RISK USING DUAL MULTI-CRITERIA DECISION-MAKING (MCDM) APPROACHES: A CASE STUDY IN REHOBOTH

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Abstract:

Droughts, characterized by insufficient precipitation relative to evaporation, pose significant challenges for disaster preparedness and mitigation. This study investigates the integration of Remote Sensing (RS) and Geographical Information System (GIS) techniques to map drought-prone regions in Rehoboth. It employs two Multi-Criteria Decision-Making (MCDM) methods, namely the Multi-Influencing Factor (MIF) and the Analytical Hierarchical Process (AHP), to assess factors influencing drought severity. Eight key parameters, including rainfall, slope, drainage density, soil type, normalized difference water index, normalized difference

vegetation index, land use land cover, and land surface temperature, serve as input variables for generating thematic maps representing drought-related factors. The study calculates the weightings of these factors using MIF and AHP, facilitating weighted overlay analysis and the creation of drought susceptibility maps. According to the AHP- based model, severe drought-prone areas in Rehoboth cover 0.68%, moderately prone areas encompass 12.24%, and slight-prone areas occupy 87.09% of the region. In contrast, the MIF method indicates severe drought-prone areas at 0.12%, moderately prone areas at 12.8%, and slight-prone areas at 87.08%. A comparative analysis demonstrates the consistency and reliability of results produced by both methods. The findings provide valuable insights for stakeholders and policymakers, aiding the development of effective drought mitigation strategies and sustainable resource management.

Keywords: Drought susceptibility mapping, Risk assessment, Remote Sensing (RS), Geographical Information System (GIS), Analytical Hierarchical Process (AHP), Multi-Influencing Factor (MIF)

A 2021 SOCIAL ACCOUNTING MATRIX (SAM) FOR NAMIBIA

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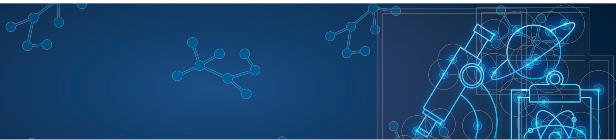
Abstract:

A social accounting matrix (SAMs) is a comprehensive, disaggregated, consistent and complete data system that not only captures the interdependence within an economic system, but also a database of macroeconomic models that widely used in economic policy analysis. However, until now, there have only been two SAMs compiled for the Namibian economy that are publicly available. The last SAM for Namibia was compiled in 2014 based on data and information from the 2000s and has not been updated despite the significance changes in the structure of the Namibian economy as well as the importance of SAMs in economic policy analysis. This paper presents a detailed 2021 SAM for Namibia. The 2021 SAM is compiled using the latest official data and statistics from national and international institutions (e.g., Namibia Statistics Agency, Bank of Namibia, Ministry of Finance and Public Enterprises, World Bank, and United Nations) and complemented with other data and information from industry stakeholders. A top-down approach was followed in the compilation

of the 2021 SAM. Using the top-down approach, official national accounts data was used to build a consistent Macro-SAM, a representation of the Namibian economy at the macro-level. The values in the Macro-SAM were disaggregated into prior Micro-SAM, a representation of the Namibian economy at the meso- and micro-levels. Using a Cross-Entropy Optimization technique, the prior Micro-SAM was balanced to create the 2021 SAM for Namibia, which is composed of 109 accounts: 42 industries; 43 commodities; 5 production factors; 1 representative enterprise; 9 representative household groups; 5 government accounts; 2 accumulation accounts; and 1 foreign account. The 2021 SAM is a reasonable presentation of structure of the Namibian economy. Applying Leontief and graphical/network analysis techniques to the compiled 2021 SAM, the paper presents valuable insights about the Namibian economy. The paper identifies the key sectors of the economy; the inclusive growth sectors; and estimates various multipliers including output, value added, employment, and poverty. All these insights are valuable to the formulation and implementation of policies that can drive effective actions towards realisation of Namibia's development aspirations.

Keywords: Social Accounting Matrix (SAM), Namibian Economy, Policy Analysis, Income Distribution

Day2,
SESSION 7



SUPERVISED MACHINE LEARNING MODELS TOWARDS TERTIARY STUDENTS CAREER GUIDANCE

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Abstract:

Namibia grapples with rising graduate unemployment, a challenge exacerbated by limited awareness of job vacancies. Despite the variety of job advertising mediums – newspapers, flyers, and social media – not all graduates access the information they need. E-recruitment systems have emerged as a promising solution for broadcasting vacancies on a larger scale. However, with technological advancements, it's

imperative to leverage Artificial Intelligence (AI) to simulate human intelligence in the recruitment process. Merging AI with e-recruitment can lead to the development of an advanced system tailored for career guidance, while simultaneously acting as an employment hub. This study employs a qualitative research methodology, encompassing document analysis to explore the potential of supervised machine learning models for guiding tertiary students in their career paths within Namibia. The anticipated outcome of this research is the positive evaluation of a tool that will assist to provide a solution for assisting students in gaining employment, by creating awareness of available vacancies and directing students to their desired career path via career guidance. The potential of a supervised machine learning models in transforming career guidance for tertiary students by harnessing the power of data and technology, employment candidates will have a more personalized, accurate, and engaging career counselling service, ultimately benefiting students as they embark on their career journeys. Based on the findings of this review paper, the next steps in this ongoing research are creation of review articles, completion of the thesis document, the development of the tool.

Keywords: Namibia; Graduate unemployment; E-recruitment systems; Artificial intelligence (AI); Supervised machine learning

DESIGN AND PROTOTYPING OF AN INTELLIGENT RAILWAY CROSSING WARNING SYSTEM

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Abstract:

In many nations, including Namibia, rail transportation has consistently been the preferred means of transportation since it is known for its efficient long-distance transfer of products and passengers. In Namibia, TransNamib is in charge of overseeing the rail networks and is in charge of their upkeep (TransNamib, 2021). However, a worrying rise in deadly incidents along these rail routes has been noted in recent years. While many factors play a role in these rail accidents, the neglect and poor upkeep of railway crossings is the main problem. These crossings occur where railway tracks intersect with roads, posing high risks for both vehicles and trains.



To address these challenges, it is imperative to introduce intelligent systems along the TRANSNAMIB rail tracks, specifically designed to enhance the safety of crossing areas. By implementing such systems, the safety and security of individuals and goods utilizing these railways can be significantly improved.

The research described the design and prototyping of an Arduino-based Intelligent Railway Crossing Warning System. The system includes a number of elements to guarantee the security of railway crossings when trains are approaching. The road is properly blocked off from impediments by using a servo-controlled boom gate. Visual cues are provided by a large LCD display and variously coloured LEDs, and an oncoming train is signalled by a buzzer that makes a warning sound. Additionally, when it is unsafe to do so, an intelligent boom gate stops humans and animals from crossing the railway line. The system also makes use of sensors and GSM technology to send signals to the train operator, warning them of potential track obstructions and allowing them to act.

The prototype of the project was successfully designed, and all the implemented features functioned as intended. The Intelligent Railway Crossing Warning System holds significant potential for improving safety at railroad crossings, providing a robust and efficient solution for mitigating potential accidents and hazards. This project is not completely the only solution but can be further improved, by considering these recommendations for future work, the project can continue to evolve, addressing emerging challenges and opportunities in the field of rail crossing systems and contributing to enhanced safety and efficiency in railway operations.

Keywords: Intelligent Railway Crossing Warning System, GSM technology, LCD Mobility, Transport

APPLICATION OF ROBOTIC PROCESS AUTOMATION AT TERTIARY INSTITUTIONS: A CASE OF NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

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Abstract:

The need to reduce human errors and time-consuming administrative tasks that affect efficiency, quality of work and services is imperative for businesses to remain competitive. Tertiary institutions for example, have been marred by errors

in yearbooks resulting in students working with wrong information to the extent that some of them fail to graduate at the times they expect to. Several manual processes are also involved from the day a student applies for admission to study, registration, and even to the last day of graduation. One approach steadily gaining popularity to reduce such manual error-prone tasks is the application of Robotic Process Automation (RPA). RPA allows one to use software robots to automate routine, repetitive tasks that are often performed by humans. Apart from improving efficiency, RPA has a potential to reduce costs and allow administrative staff to focus on other tasks that cannot be automated. This study investigates how Robotic Process Automation can be integrated into the Namibia University of Science and Technology systems to optimise students' admissions and registration processes. The study follows a mixed methods approach that combines the exploratory and why-why methodologies to gain a better understanding of the topic and how best to implement RPA at NUST. The benefits of the technology will be evaluated through quantitative methods that will be applied to the prototype that will be developed to provide a proof of concept.

Keywords: Automation, Digitalisation, Robotic Process Automation

Developing a Machine Learning Model to Predict Fatigue Levels for Employees at NAMDEB

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Abstract:

Employee fatigue impact negatively on productivity and workplace safety across the different industries. Thus, early and effective fatigue detection systems must be put in place in order to reduce fatigue related incidences and minimise the effect of fatigue on employee wellness and performance. There is a significant body of literature on data driven fatigue detection systems. However, there seem to be no studies that apply machine learning methods to detect employee fatigue in Namibia, particularly for employees in the mining industry, which is an important industry in the Namibian economy. A quantitative cross-sectional study using machine learning techniques was adopted to develop a fatigue detection system for

Namibian mineworkers. The first stage of the proposed system is designed to detect employee fatigue levels using behavioural based techniques. The second stage used various machine learning classifiers including the logistic regression, k-nearest neighbours, decision trees, support vector machines and naïve Bayes to train fatigue prediction models. The proposed system was evaluated on the operational data from NAMDEB. The fatigue detection system developed can be used in developing the fatigue monitoring and mitigation system. Furthermore, the study contributes to the promotion of the eighth Sustainable Development Goal (SDG) of promoting safe working environments.

Keywords: Machine learning, Fatigue prediction, Fatigue classification, Fatigue levels, Mining industry



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