



RESEARCH PRODUCTIVITY 2020

Book and Book Chapter

- [1] A. Panwar, **G. Sharma**, Ibraheem Nasiruddin and R. C. Bansal, "Jaya Evaluated Frequency Control Design for Hydro Electric Power System using RFB and UPFC", Lecture Notes in Electrical Engineering book series (LNEE, volume 607), in *Intelligent Computing Techniques for Smart Energy Systems*, Springer, vol. 607, pp. 863-871, 2020.
- [2] M Kumawat, N Gupta, N Jain, V Shrivastava and **G. Sharma**, "Applications of Meta-heuristics in Renewable Energy Systems", in *Metaheuristic and Evolutionary Computation: Algorithms and Applications*, Studies in Computational Intelligence, Springer, pp. 253-282, 2020.

Keynote Address, Tutorial and Invited Presentations

- [1] **I.E. Davidson**, "Fault Ride-Through of Inverter Based-Microgrids". A Tutorial presented at the 8th International Conference on Smart Grid (icSmartGrid2020) Conference, 17-19 June, 2020, Paris, France

DHET Accredited Journal Articles

- [1] **A.A. Adebisi**, I.J. Lazarus, A.K. Saha, and **E.E. Ojo**, "Performance analysis of grid-tied photovoltaic system under varying weather condition and load," *International Journal of Electrical and Computer Engineering (IJECE)* Vol.11, No.1, pp. 92- 104.
- [2] E. Singh, **I.E. Davidson** and **S.C. Malanda**, "Lightning Performance and Economic Analysis of an Overhead 88 kV Power Delivery Network with Enhanced Protective Systems", *Energies* 2020, 13(24), 6519, 10 Dec 2020. DOI: <https://doi.org/10.3390/en13246519>.
- [3] **G. Sharma**, "MPC Built Frequency Regularization Studies of Multi-Area Electric Power System Base on Short Term Load Forecasting Using ANN," *International Journal of Engineering Research in Africa*, 2020, vol. 50: Trans Tech Publ., pp. 145-161, DOI: <https://doi.org/10.4028/www.scientific.net/JERA.50.145>.

- [4] B.B. Adetokun, **J.O. Ojo** and C.M. Muriithi, "Reactive Power-Voltage-Based Voltage Instability Sensitivity Indices for Power Grid with Increasing Renewable Energy Penetration. *IEEE Access*, vol 8, pp.85401-85410, May 2020.
- [5] A. Akinrinde, A. Swanson and **IE Davidson**, "Investigation and Mitigation of Temporary Overvoltage Caused by De-Energization on an Offshore Wind Farm", *Energies* Vol. 13:4439, Aug 2020. DOI: 10.3390/en13174439
- [6] A.O Aluko, D.G. Dorrell, R Pillay Carpanen and **E.E. Ojo**, "Heuristic Optimization of Virtual Inertia Control in Grid- Connected Wind Energy Conversion Systems for Frequency Support in a Restructured Environment". *Energies* 2020, 13, 564. <https://doi.org/10.3390/en13030564>.
- [7] **G. Sharma**, K. Narayanan, **I. E. Davidson** and **K. T. Akindeji**, "Integration & Enhancement of Load Frequency Control Design for Diverse Sources Power System via DFIG based Wind Power Generation and Interconnected via Parallel HVDC/EHVAC Tie-Lines", *International Journal of Engineering Research in Africa*, Vol. 46, pp 106-124, <https://doi.org/10.4028/www.scientific.net/JERA.46.106>, © 2020 Trans Tech Publications Ltd, Switzerland.
- [8] A.O. Aluko, R.P. Carpanen, D.G. Dorrell and **E.E. Ojo**, "Robust State Estimation Method for Adaptive Load Frequency Control of Interconnected Power System in a Restructured Environment. *IEEE Systems Journal*. 2020 Jul 10.
- [9] **G. Sharma** and **K. Loji**, "Critical Aspects of AGC Emerging from Optimal Control to Machine Learning Techniques," *Indonesian Journal of Electrical Engineering and Informatics*, vol. 8, no. 2, pp. 230-241, 2020.
- [10] **N. Kapidani**, S. Bauk, and **I. E. Davidson**, "Digitalization in Developing Maritime Business Environments towards Ensuring Sustainability," *Sustainability*, vol. 12, no. 21, p. 9235, 2020, DOI: <https://doi.org/10.3390/su12219235>.
- [11] Y. Arya, P. Dahiya, E. Çelik, **G. Sharma**, H. Gözde, and I. Nasiruddin, "AGC performance amelioration in multi-area interconnected thermal and thermal-hydro-gas power systems using a novel controller," *Engineering Science & Technology, an International Journal*, pp. 1-13, Oct 2020. <https://doi.org/10.1016/j.jestch.2020.08.015>.
- [12] **G. Sharma**, "ANN created real time load pattern base frequency normalization studies of linked electric power system", *Electric Power Component and System Journal (SCI Journal)*, Vol. 0, no. 0, pp. 1-11, 2020.
- [13] **G. Sharma**, A. Panwar, Y. Arya and M. Kumavat, "Integrating Layered Recurrent ANN with Robust Control Strategy for Diverse Operating Conditions of AGC of the Power System", *IET-Generation Transmission and Distribution*, IET, vol. 14, no. 18, 3886 –3895, 2020.

Non-DHET Accredited Journal Articles

- [1] V.A. Vatul, A. Aravinth, K. Narayanan, **G. Sharma** and T. Senjyu, "A Novel Demand Side Management by minimizing cost deviation", *Advances in Science, Technology and Engineering Systems Journal (ASTESJ)*, Scopus Index, Vol. 5, no. 5, pp. 262-268, 2020.
- [2] S. Pattabiraman, K. Sampath, M. Kannan, K. Narayanan, **G. Sharma**, G.R. Girish and T. Senjyu, "Reliability improvement in radial distribution system through reconfiguration", *Advances in Science, Technology and Engineering Systems Journal (ASTESJ)*, Scopus Index, Vol. 5, no. 6, pp. 472-480, 2020.
- [3] **G. Sharma**, A. Panwar, M. Kumavat, and K. Narayanan, "Integrating LQR with GRNN for LFC of Energy Delivery System Interconnected via AC/DC Tie-lines", *IET Energy Systems Integration*, IET, Vol. 2, no. 4, pp. 355-361, 2020.

Peer-Refereed Conference Proceedings

- [1] **I.E. Davidson**, "Successes in University - Industry Partnerships - Perspectives from Durban University of technology". In *Proceedings of 2020 International SAUPEC/RobMech/PRASA Conference*, Cape Town, South Africa, 2020, pp. 1-5, doi: 10.1109/SAUPEC/RobMech/PRASA48453.2020.9041128.
- [2] **M. Estrice**, **G. Sharma**, **K.T. Akindeji** and **I.E. Davidson**, "Frequency Regulation Studies of Interconnected PV Thermal Power System". In *Proceedings of 2020 International SAUPEC/RobMech/PRASA Conference*, Cape Town, South Africa, 2020, pp. 1-5, doi: 10.1109/SAUPEC/RobMech/PRASA48453.2020.9041043.
- [3] **V. Chetty** and **I.E. Davidson**, "Challenges of Planning Future High Voltage Power Systems Networks". In *Proceedings of SAUPEC/RobMech/PRASA 2020 Conference*, Cape Town, South Africa, 2020, pp. 1-6, doi: 10.1109/SAUPEC/RobMech/PRASA48453.2020.9041095.
- [4] **M. Joshi**, **G. Sharma**, and **I.E. Davidson**, "Investigation of Diverse Sampling Time for LFC of Hydro Power System using Discrete LQR with UPFC and RFB". *Proceedings of 2020 International SAUPEC/RobMech/PRASA Conference*, Cape Town, South Africa, 2020, pp. 1-6, doi: 10.1109/SAUPEC/RobMech/PRASA48453.2020.9041072.
- [5] **S.C. Malanda**, **I.E. Davidson** and **G.P. Adam**, "Comparison of DC Voltage Control Strategies for Multi-Terminal HVDC Network During AC Faults". In *Proceedings of 2020 International SAUPEC/RobMech/PRASA Conference*, Cape Town, South Africa, 2020, pp. 1-6, doi: 10.1109/SAUPEC/RobMech/PRASA48453.2020.9040990.

- [6] **I.E. Davidson**, "A Review of Long-Distance UHVDC Technology - A future Energy Disrupter," In *Proceedings of the 2020 Clemson University Power Systems Conference (PSC)*, Clemson, SC, USA, 2020, pp. 1-5, doi: 10.1109/PSC50246.2020.9131273.
- [7] O.J. Ayamolowo, **E. Buraimoh** and **I.E. Davidson**, "Short Term Wind Variability Analysis of Afe Babalola University," In *Proceedings of the 2020 Clemson University Power Systems Conference (PSC)*, Clemson, SC, USA, 2020, pp. 1-8, doi: 10.1109/PSC50246.2020.9131311.
- [8] **E. Buraimoh** and **I.E. Davidson**, "Modelling and Assessment of the Fault Ride-Through Capabilities of Grid Supporting Inverter-Based Microgrids," In *Proceedings of the 2020 Clemson University Power Systems Conference (PSC)*, Clemson, SC, USA, 2020, pp. 1-7, doi: 10.1109/PSC50246.2020.9131213.
- [9] **M. Joshi**, **G. Sharma**, and **I.E. Davidson**, "Load Frequency Control of Hydro Electric System using Application of Fuzzy with Particle Swarm Optimization Algorithm," In *Proceedings 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)*, Durban, South Africa, 6-7 Aug. 2020. DOI: 10.1109/icabcd49160.2020.9183829.
- [10] **J.D. Dakora**, **I.E. Davidson** and **G. Sharma**, "Review of Modern Solar Power Satellite and Space Rectenna Systems," In *Proceedings 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems*, Durban, South Africa, 6-7 Aug. 2020. DOI: 10.1109/icabcd49160.2020.9183884.
- [11] **S.B. Masikana**, **G. Sharma**, **K.T. Akindeji** and **I.E. Davidson**, "Voltage Stability Enhancement Studies for Distribution Network with Installation of FACTS," In *Proceedings 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)*, Durban, South Africa, 6-7 Aug. 2020. DOI: 10.1109/icabcd49160.2020.9183809.
- [12] **M. Estrice**, **G. Sharma**, **K.T. Akindeji** and **I.E. Davidson**, "Application of AI for Frequency Normalization of Solar PV-Thermal Electrical Power System," In *Proceedings 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)*, Durban, South Africa, 6-7 Aug. 2020. DOI: 10.1109/icabcd49160.2020.9183885.
- [13] **S. Sewnarain**; **C. Onunka** and **K.T. Akindeji**, "Assessment of Tidal Energy as Alternative Energy Source in South Africa" In *Proceedings 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)*, Durban, South Africa, 6-7 Aug. 2020. DOI: 10.1109/icabcd49160.2020.9183862
- [14] **S.C. Tshikomba**, **M. Estrice**, **E.E. Ojo** and **I.E. Davidson**, "Curbing Electricity Theft Using Wireless Technique with Communication Constraints" In *Proceedings 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)*, Durban, South Africa, 6-7 Aug. 2020. DOI: 10.1109/icabcd49160.2020.9183812.
- [15] **A.A. Adebisi**, **E.E. Ojo** and **I.E. Davidson**, "Performance Evaluation of a Grid-tied PV System in the East Coast of South Africa, In *Proceedings 2020 IEEE PES/IAS Power Africa Conference*, Nairobi, Kenya, 25 – 28 August 2020.
- [16] **E. Buraimoh** and **I.E. Davidson**, "Modeling and Analysis of Standalone Inverter-Based Microgrid with Grid-Supporting Voltage-Source Control under Changing Load", In *Proceedings 2020 IEEE PES/IAS Power Africa Conference*, Nairobi, Kenya, 25 – 28 August 2020.
- [17] **E. Buraimoh**, **A.A. Adebisi**, O.J. Ayamolowo and **I.E. Davidson**, "South Africa Electricity Supply System: The Past, Present and The Future", In *Proceedings 2020 IEEE PES/IAS Power Africa Conference*, Nairobi, Kenya, 25 – 28 August 2020.
- [18] **I.S. Ndaba** and **I.E. Davidson**, "The implementation of smart meters for electric grid improvements and reliable power flow data on electrical power distribution networks", In *Proceedings 2020 IEEE PES/IAS Power Africa Conference*, Nairobi, Kenya, 25 – 28 August 2020.
- [19] **E. Buraimoh** and **I.E. Davidson**, "Overview of Fault Ride-Through Requirements for Photovoltaic Grid Integration, Design and Grid Code Compliance", *9th International Conference on Renewable Energy Research and Applications, ICRERA2020*, September 27-30, Glasgow, UK.
- [20] P. Gbadega and **K.T. Akindeji**, "LQR Technique for Optimal Load Frequency Controller Design of Interconnected Linear Power Systems with Quadratic Performance Index." In *Proceedings of 2020 IEEE PES/IAS PowerAfrica Conference*, Nairobi, Kenya, 25 – 28 August 2020.
- [21] A. O. Aluko, R.P. Carpanen, D. Dorrell, and **E.E Ojo**, "Impact Assessment and Mitigation of Cyber Attacks on Frequency Stability of Isolated Microgrid Using Virtual Inertia Control," In *Proceedings of 2020 IEEE PES/IAS PowerAfrica Conference*, Nairobi, Kenya, 25 – 28 August 2020.
- [22] **J.D. Dakora**, **I.E. Davidson** and **G. Sharma**, "Conceptual Design and Analysis of Modern Space Solar Power Satellite and Rectenna Systems". Paper presented at the *1st International Conference on Maritime Education Development (ICMED 2020)*, 23 - 24th November 2020, Durban, South Africa.
- [23] **B. Madonsela**, **I. E. Davidson**, C. Mulangu, "The analysis of Global Navigation Satellite Systems (GNSS) and the Numerical Estimation of Multipath Propagation". Paper presented at the *1st International Conference on Maritime Education Development (ICMED 2020)*, 23 - 24th November 2020, Durban, South Africa.
- [24] **C.J. Pillay**, **M. Kabeya** and **I.E. Davidson**, "Transmission systems: HVAC vs HVDC", In *Proceedings of the International Conference on Industrial Engineering and Operations Management (IEOM)*, August 10 – 14, 2020, Detroit, Michigan, USA.
- [25] **T.K. Magenuka**, **M. Kabeya** and **K.T. Akindeji**, "Kernel Density Estimation of Solar Radiation and Wind Speed for South Africa", In *Proceedings of the International Conference on Industrial Engineering and Operations Management (IEOM)*, August 10 – 14, 2020, Detroit, Michigan, USA

Other Research Output: Non-Peer Reviewed Conference Proceedings

[1] **B. Madonsela, I.E. Davidson**, and C. Mulangu, "The Analysis of the Satellite Communication for the Electrical Substation Located in Rural Areas". *Paper presented at the 5th Interdisciplinary Research and Innovation Virtual Conference 2020*, Durban, 16th September 2020.

Higher Degrees Graduated Master of Engineering

Nkonyane, Mfanasibili Stanley, *BTech, Electrical Engineering*

Dissertation: The impact of poor power quality and harmonics on the performance of an electrical network. Case Study: DP3 Drillship (2013)

Supervisor: **Dr E E Ojo** and Dr B Rigby.

Gwatidzo, Ngoni, *BTech Electrical Engineering*

Dissertation: Modelling, Testing and Evaluation of HVDC Equipment and components – DC Breaker, DC Transformers and Insulation Coordination in HVDC Systems. (2018)

Supervisor: **Prof IE Davidson**

Thakoardeen, R.R., *BTech, Electrical Engineering*

Dissertation: An Investigation into the Alternative Energy Solutions to Power Desalination Plants and the Storage of Energy using Graphene Supercapacitors Generated from Renewable Sources.

Supervisor: **Dr. E.E. Ojo**

Tshikomba, Salome Busisiwe Jiyane, *BTech BSc (Hons) Electrical Engineering*

Dissertation: Technical Analysis and Mitigation Measures for Illegal Electricity Theft for Domestic and Commercial End Users (2017)

Supervisor: **Prof IE Davidson** and **Dr E.E. Ojo**

Higher Degrees Graduated in other Institutions (UKZN)

Doctor of Philosophy (2020)

Singh, Hariram, *BScEng, MScEng (UKZN) Electrical Engineering*

Dissertation: Utilisation of Line Surge Arrestors to Improve Overhead EHV AC and DC Line Performance under Lightning Conditions

Supervisors: **Professor IE Davidson**

Master of Science in Engineering (2020)

Moodley, Denzil, *BScEng (UKZN) Electrical Engineering*

Dissertation: Evaluation of a Combined Heat and Power (CHP) Retrofit For Supplemental on-site Power Generation at ENGEN oil Refinery

Supervisor: **Prof IE Davidson** and Mr. K. Moodley

Higher Degrees under Examination

Doctor of Engineering

Gumede, Makhosonke, *BTech, MEng, Electrical Engineering*

Dissertation: The extraction of power and fresh water from the ocean off the coast of KZN utilizing ocean thermal energy conversion (OTEC) techniques (2015)
Supervisor: Prof P Naidoo and F. D`Almaine.

Buraimoh, Elutunji, *BTech (LAUTECH), MScEng (OAU), Electrical Engineering*

Dissertation: Modelling and Fault Ride-Through Control of Grid Supporting Inverter Based Micro Grid (2018)
Supervisor: **Prof IE Davidson**

Master of Engineering

Leholo, Sempe, *BTech, Electrical Engineering*

Dissertation: Modelling and Optimization of Hybrid Micro-grid System for LTE Base Station. (2018)
Supervisor: Prof P A Owolawi and **Mr. K.T. Akindeji**

Sewnarain, Shikhar, *BTech, Electrical Engineering*

Dissertation: Harnessing Tidal Energy for Power Generation in South Africa. (2017)
Supervisor: Dr. C. Onunka and **Mr K.T. Akindeji**

Joshi, Milan, *BTech, Electrical Engineering*

Dissertation: Load frequency control of a hydro dominating interconnected power system. (2019)
Supervisor: **Dr G Sharma** and **Prof IE Davidson**

Reddy, Rodney, *BTech Electrical Engineering*

Dissertation: Network Optimization with High Penetration of Roof-top Solar-PV (2018).
Supervisor: **Prof IE Davidson**

Ndaba, Iren Sindi, *BTech Electrical Engineering*

Dissertation: A Technical and Financial Analysis of Smart Prepaid Split Meters on Eskom Electric Power Distribution (2018).
Supervisor: **Prof IE Davidson**

Malanda, Sindisiwe Cindy, *BTech, Electrical Engineering*

Dissertation: Transient Fault Analysis of a VSC-Based Multi-Terminal HVDC Scheme. (2018)
Supervisor: **Prof IE Davidson** and Dr Grain Adam.

Chetty, Nelson, *BTech, Electrical Engineering*

Dissertation: Optimal Control of Power Systems with Renewable Energy Sources. (2019)
Supervisor: **Dr G Sharma** and **Prof IE Davidson**

Masikane, Sboniso B, *BTech, Electrical Engineering*

Dissertation: Voltage stability in distribution network. (2019)
Supervisor: **Dr. G. Sharma** and **Mr. K.T. Akindeji**

Higher Degrees under Supervision

Doctor of Engineering

Adebiyi, Abayomi, *BEng (Hons), MEng, Electrical Engineering*

Dissertation: Investigation of the Impact Photovoltaic System on the Distribution Grid (2017)

Supervisor(s): Assoc. Professor I. Lazarus, Assoc. Professor A. Saha and **Dr E.E. Ojo**

Dakora, Jonas Don-Yelee, *BTech (CPUT), MEng (DUT) Electrical Engineering*

Dissertation: Analysis of Modern Space Solar Power Satellite Systems and Space Rectenna. (2019)

Supervisors: **Professor IE Davidson** and Dr C. Mulangu

Akinyemi, Ayodeji Stephen, *OND, HND, PGD, MSc (UCT) Electrical Engineering*

Dissertation: Voltage rise mitigation at the Point of Common Coupling (PCC) of Large Renewable Distributed Generation (RDG) and Distribution Network. (2019)

Supervisor(s): **Dr M. Kabeya** and **Prof IE Davidson**

Madonsela, Bhengkosi, *BTech MEng (DUT) Electrical Engineering*

Dissertation: Evaluating the Communications, Navigation and DSurveillance (CNS) Capabilities for the Future Air Traffic Controlling Systems (2020)

Supervisor: **Prof IE Davidson** and Dr C. Mulangu.

Rampith, Viren, *BTech, MTech, Electrical Engineering*

Dissertation: A Smart Grid for a Smart City: Technical and Financial Analysis of a Sustainable eThekweni Municipality. (2020)

Supervisor: **Prof IE Davidson**

Chetty, Vasudevan, *BTech, MScEng, Electrical Engineering*

Dissertation: Planning a Smart High Voltage Power System to enabling a Smart City. (2020)

Supervisor: **Prof IE Davidson** and **Dr G Sharma**

Kapidani, Nexhat, *BEng, MPhil, Electrical and Electronic Engineering*

Dissertation: Intelligent use of maritime info-communication systems in developing environments. (2020)

Supervisor: Prof S. Bauk, Prof DS Ilcev and **Prof IE Davidson**

Gwatidzo, Ngoni, *BTech, MEng, Electrical Engineering*

Dissertation: Grid Stability with High Level of RE Penetration and Fault Ride Through Capability of Inverter. (2020)

Supervisor: **Prof IE Davidson**

Doctor of Philosophy (UKZN)

Akindeji, Kayode Timothy, *BScEng, MScEng Electrical Engineering*

Dissertation: Performance and Cost Benefit Analysis of University Campus Microgrid

Supervisors: Dr Remy Tiako and **Professor IE Davidson**

Master of Engineering

Loji, Nomhle, *BTech, Electrical Engineering*

Dissertation: Evaluation of grid-scale battery energy storage system as an enabler of large-scale renewable energy integration (2017)

Supervisor: **Prof IE Davidson** and **Mr. K.T. Akindeji**

Goolam, Hoosen Nadneem, *BTech Electrical Engineering*

Dissertation: Controlled Switching of 11kV Vacuum Circuit Breaker for Fault Interruption. (2018)

Supervisor: **Dr E.E. Ojo** and Prof N.M. Ijumba

Nampoya, Crispin, *BTech, Electrical Engineering*

Dissertation: Performance analysis of industrial traction drive systems. (2018)

Supervisor: **Prof IE Davidson**

Ntombela, Sibusiso Goodenough, *BTech, Electrical Engineering*

Dissertation: Performance Evaluation of a Smart Inverter in Power Distribution Networks with High Solar-PV Penetration. (2018)

Supervisor: **Prof IE Davidson** and **Dr. G Sharma**

Khoza, Nkosinathi S E, *BTech, Electrical Engineering*

Dissertation: Design and Implementation of a Renewable Energy-Based Power Supply System for a Mini Grid. (2018)

Supervisor: **Prof IE Davidson**

Nsibande, Minenhle Errol, *BTech, Electrical Engineering*

Dissertation: Techno-economic and financial analysis of the Pan African Hybrid Super-Grid in 2050. (2018)

Supervisor: **Prof IE Davidson**

Mazibuko, Ntombenhle, *BTech, Electrical Engineering*

Dissertation: Modeling and Performance Analysis of a Universal Motor fed from a Renewable Energy Nano-Grid. (2018)

Supervisor: **Prof IE Davidson** and **Dr G Sharma**

Khumalo, Nkosinathi Emmanuel, *BTech, Electrical Engineering*

Dissertation: Optimal sizing and control of lithium-ion battery energy storage system to be used for maximum demand peak shaving, peak energy utilisation and peak energy export. (2018)

Supervisor: **Prof IE Davidson**

Ndlovu, Ntobeko, *BTech, Electrical Engineering*

Dissertation: Evaluation of Circuit Breakers: Conventional AC CB, Solid-State CB and DC Breaker fro HVDC Transmission ad Distribution Systems. (2018)

Supervisor: **Prof IE Davidson**

Lafleni, Sipho, *BTech, Electrical Engineering*

Dissertation: Performance Analysis of an Induction Motor fed from a Solar-Photovoltaic Supply. (2018)

Supervisor: **Prof IE Davidson** and **Dr M Kabeya**

Khumalo, Nkosinathi Emmanuel, *BTech, Electrical Engineering*

Dissertation: Optimal sizing and control of lithium-ion battery energy storage system to be used for maximum demand peak shaving, peak energy utilisation and peak energy export. (2018)

Supervisor: **Prof IE Davidson** and **Dr M. Kabeya**

Zulu, Musawenkosi L, *BTech, Electrical Engineering*

Dissertation: Power Flow and Fault Analysis of a Hybrid DC Microgrid: PV System and Wind Energy System. (2019)

Supervisor: **Dr E.E. Ojo**

Bahara, R.K., *BTech, Electrical Engineering*

Dissertation: Analytical and Numerical Investigation of the Integration of Wind Energy in Distribution Network. (2019)

Supervisor: **Dr. E.E. Ojo**

Mtukushe, Namhla Faith, *BTech Electrical Engineering*

Dissertation: The analytical study on the establishment of a tidal power plant in South Africa. (2019)

Supervisor: **Dr E.E. Ojo**

Mpana, Zukiswa, *BTech, Electrical Engineering*

Dissertation: Analysis of Mal-operation of Differential Protection Relays Utilized for Busbar Protection. (2019)

Supervisor: **Prof IE Davidson** and Dr Bruce Rigby

Shezi, Siphesihle Brian, *BTech Electrical Engineering*

Dissertation: The study of the upgrade and improvement of power electronics protection system for locomotives. (2019)

Supervisor: **Dr E.E. Ojo**

Moma, Christophe, *BTech Electrical Engineering*

Dissertation: Modern power electronic technology for the grid integration of renewable energy sources. (2019)

Supervisor: **Dr M. Kabeya** and **Prof IE Davidson**

Mhlongo, Sanele P, *BTech, Electrical Engineering*

Dissertation: Power quality enhancement of smart distribution network with high penetration of renewable distributed generation. (2019)

Supervisor: **Prof IE Davidson**

Estrice, Milton, *BTech, Electrical Engineering*

Dissertation: Investigating the mitigation technique of frequency control for load stability of interconnected power system. (2019)

Supervisor: **Dr. G. Sharma** and **Mr K.T. Akindeji**

Ayar, Prenushka, *BTech Electrical Engineering*

Dissertation: Investigation and Mitigation of Temporary Overvoltage caused by Filters, Correcting Harmonics Produced by Motor Drives. (2019)

Supervisor: Dr. O. Akinrinde and **Dr. E.E. Ojo**

Hlatshwayo, Ntokozo Victor, *BTech, Electrical Engineering*

Dissertation: Distributed Hybrid Supercapacitor Network in 48V DC Microgrid. (2020)

Supervisor: **Prof IE Davidson** and Mr. Rathilall Sewsunker.

Pillay, Caleb Jordache, *BTech, Electrical Engineering*

Dissertation: Performance and Cost Evaluation of Multi-Terminal HVAC and HVDC Transmission Systems (2020).

Supervisor: **Dr M. Kabeya** and **Prof IE Davidson**

Nguefack, Louis, *BTech, Electrical Engineering*

Dissertation: Power Quality Enhancement Using DSTATCOM on Grid-tied Photovoltaic System. (2020)

Supervisor: **Prof IE Davidson** and **Mr A. Adebiji**

Ntombela, Mlungisi Eric, *BTech Electrical Engineering*

Dissertation: Algorithm for power losses and efficiency evaluation for power distribution systems. (2020)

Supervisor: **Dr M. Kabeya**

Nel, Jacques j, *BTech Electrical Engineering*

Dissertation: Designing off-grid hybrid renewable power generation system for rural electrification. (2020)

Supervisor: **Dr E.E. Ojo** and **Mr C. Leoaneka**

Khumalo, Simanga Wonder, *BTech Electrical Engineering*

Dissertation: Investigating the impact of induction motor starting techniques on power quality. (2020)

Supervisor: **Dr M. Kabeya** and Dr B. Rigby

Buthelezi, Kwanele M, *BTech Electrical Engineering*

Dissertation: Analysis of Fault Location Algorithms in Transmission Grid Lines. (2020)

Supervisor: **Dr M. Kabeya** and Dr B Rigby

Magenuka, Kenneth Thand'uxolo K, *BTech Electrical Engineering*

Dissertation: Kernel estimation modelling and optimization of hybrid power system for a typical South African rural area (2020).

Supervisor: **Dr M. Kabeya** and **Mr K.T. Akindeji**

Mbaimbai, Nicky Kamwi, *BTech, Electrical Engineering*

Dissertation: Design and integration of African Power Grids into a Smart African Super-Grid. (2020)

Supervisor: **Prof IE Davidson**

Ndlela, Nomihla W, *BTech, Electrical Engineering*

Dissertation: Design and integration of African Power Grids into a Smart African Super-Grid. (2020)

Supervisor: **Prof IE Davidson**

Ntlela, Sinmphwiwe A, *BTech, Electrical Engineering*

Dissertation: Solar Energy-Battery Storage Optimization for Satellite-to-Ground Communication. (2020)

Supervisor: **Prof IE Davidson** and Dr C Mulangu

Mthiyane, Surprise Bongani, *BTech, Electrical Engineering*

Dissertation: Fault Ride Through Capability Assessment and Improvement of PMSG Wind Turbine Using Fuzzy Logic Control (2020).

Supervisor: **Prof IE Davidson** and **Mr E. Buraimoh**

Mhlongo, Phumelele Bridgett, *BTech, Electrical Engineering*

Dissertation: Droop Control Technique for Embedded Distribution Generator in Smart Grid Applications (2020).

Supervisor: **Dr M. Kabeya** and **Mr E. Buraimoh**

Mkhize, Mandisa Portia, *BTech, Electrical Engineering*

Dissertation: Application of smart grid to mitigate non-technical losses in the distribution system: A case study of KZN Operating Unit (2020).
Supervisor: **Prof IE Davidson** and **Mr A.A. Adebisi**

Muland, Steve Musans, *BTech, Computer System Engineering*
Dissertation: Optimal power sharing in a DC microgrid. (2020)
Supervisor: Dr N. Pillay, **Prof IE Davidson** and Mr. Rathilall Sewsunker.

Jiyane, Muziwenkosi, *BTech, Electrical Engineering*
Dissertation: Standalone DC microgrid energy optimization. (2020)
Supervisor: **Prof IE Davidson** and Mr. Rathilall Sewsunker.

Community Service Activities

- [1] Tutorial, Presenter: **Prof IE Davidson**: "Fault Ride-Through of Inverter Based Microgrids", 8th International Conference on Smart Grid (icSmartGrid2020), 17-19 June 2020 in Paris, France.
- [2] Conference Reviewer: **Mr. K T Akindeji**
 - SAUPEC 2020
- [3] Conference Reviewer: **Professor IE Davidson**
 - South African Universities Power Engineering Conference/Robotics & Mechatronics/Pattern Recognition Association of SA (SAUPEC/RobMech/ PRASA)
 - Clemson University Power System Engineering Conference.
 - IEEE ENERGYCon 2020, (6th IEEE International Energy Conference)
 - IEEE Power Africa 2020
- [4] Conference Reviewer: **Dr E.E. Ojo**
 - South African Universities Power Engineering Conference/Robotics & Mechatronics/Pattern Recognition Association of SA (SAUPEC/RobMech/ PRASA)
- [5] Conference Reviewer: **Dr M. Kabeya**
 - South African Universities Power Engineering Conference/Robotics & Mechatronics/Pattern Recognition Association of SA (SAUPEC/RobMech/ PRASA)
- [6] Journal Reviewer: **Mr. K T Akindeji**.
 - International Journal of Renewable Energy Research (IJRER)
- [7] Journal Reviewer: **Professor IE Davidson**
 - IEEE Journal of Emerging and Selected Topics in Power Electronics
 - IEEE Transactions (Power Delivery, Energy Conversion)
 - IEEE Transactions (Power Electronics)
 - IEEE Access
 - Electric Power Systems Research Journal
 - International Journal of Electrical Power and Energy Systems
 - International Journal of Renewable Energy Research (IJRER)

- Frontiers in Energy
- Renewable Energy (Elsevier)
- Journal of Advanced Computational Intelligence and Intelligent Informatics (JACIII)
- Technology and Economics of Smart Grids and Sustainable Energy Journal
- Engineering Science and Technology: An International Journal
- International Journal of Green Energy
- International Journal of Ambient Energy
- Mathematical Problems in Engineering (Hindawi)

[8] Journal Reviewer: **Dr M. Kabeya**

- Energy Storage Journal
- International Journal of Electrical Power and Energy Systems.

[9] Journal Reviewer: **Dr G. Sharma**

- Journal of Energy Research (Wiley), Int. journal of Engineering Research in Africa, Int.
- Transactions on Electrical Energy System (Wiley)
- International Scientific Committee of Electrical & Computer Engineering, World Academy of Science Engineering & Technology Journal.
- IEEE Transactions on Power System
- IET Generation Transmission & Distribution
- Electric Power Component & System Journals, Applied Soft Computing Journal (Elsevier)
- Ain Shams Eng. Journal (Elsevier)
- International Journal of Emerging Electric Power Systems (De-Gruyter), International

[10] External Examiner: **Professor IE Davidson.**

- PhD, MSc Eng. Dissertation: University of KwaZulu-Natal.
- MEng Dissertation: Tshwane University of Technology.

[11] External Examiner: **Mr. K T Akindeji.**

- External examiner for Design Project III(MUT)

Research Grants

- [1] Principal Investigator: Mr K.T. Akindeji: Eskom TESP Grant (Rural Rectification): R50 000.00
- [2] Principal Investigator: Dr M. Kabeya: Eskom TESP Grant: R50 000.00
- [3] Principal Investigator: Prof IE Davidson: Eskom TESP Grant (Smart Grids): R70 000.00
- [4] Principal Investigator: Prof IE Davidson: Eskom TESP Grant (HVDC): R70 000.00
- [5] Principal Investigator: Prof IE Davidson: Eskom TESP Grant (Centre for RTPPS): R70 000.00
- [6] Project Leader / Principal Investigator: Prof IE Davidson: Research and Development Programmes in Space Science and Technology (Satellite Communication and Navigation), funded by the Department of Science and Technology (DST), South Africa. Project Grant: 2018 – 2019: R1 595 000.00
- [7] DHET-Accredited Outputs Research Incentive Award: Prof IE Davidson: Research Rewards for Research: R171 105.98
- [8] Principal Investigator/Research Leader: Prof IE Davidson: DSI-DUT Space Science Program: (Research Proposal: Communications and Navigation Systems (CNS) – Space Science Research) Department of Science and Innovation, Space Science Research Grant: R1 509 250.00.

- [9] Co-Investigator: Prof IE Davidson: Royal Academy of Engineering, United Kingdom (Research Proposal: Enhancing the Role of Engineers in Translational Research and Entrepreneurship, 2020-2021): Grant Amount: £200 000.00.
- [10] DUT Conference Travel Grant: Prof IE Davidson, 2020 Conference Travel Award: R20 000.00
- [11] DUT Conference Travel Grant: Elutunji Buraimoh, DEng Student, 2020 Conference Travel Award: R20 000.00

Honours, Awards and Recognitions

- [1] **2020: Third Place for the Outstanding Conference Paper** - Received the *Third Place Outstanding Paper Award* for the technical paper: '**E. Buraimoh** and **I.E. Davidson**', "*Modelling and Assessment of the Fault Ride-Through Capabilities of Grid Supporting Inverter-Based Microgrids*", Clemson University Power Systems Conference, March 10 - 13, Clemson, SC, USA, 2020
- [2] **2020: Published News Articles:**
"DUT's Prof Davidson and Buraimoh's Paper Wins Third Prize at Clemson University Power System Conference, Clemson, SC, USA, 10-13 March 2020.
<https://www.dut.ac.za/duts-prof-davidson-and-buraimohs-paper-wins-third-prize-at-clemson-university-power-system-conference/>
- [3] **2020: Durban University of Technology Research Awards**
Prof I.E. Davidson, Recipient of the award of "*Top Five Researchers of Impact*", Durban University of Technology's Annual Research & Innovation Awards. Nov 2020.