Terence L. van Zyl

Curriculum Vitae

Nationalities: German, South African
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Professor, Nedbank Research Chair, University of Johannesburg

Education

2006–2010. **PhD in Computer Science (Artificial Intelligence)**, *University of Johannesburg*.
Using self-adaptive components to realise agent ontogenesis

2009–2009. **3rd year Applied Mathematics**, *University of South Africa*.
Partial Differential Equations – Numerical Methods – Special Relativity and Riemannian Geometry

2003–2005. **MSc in Computer Science (Cum Laude)**, *University of Johannesburg*.
Integration of secure resource negotiating agents into a telemanufacturing environment

2002–2002. **BSc Honours in Computer Science (Cum Laude)**, *Rand Afrikaans University*.
Artificial Intelligence – Optimisation – Functional Programming – Robotics – Networking – Graphics – Parallel Programming – Ethical, Audit & Legal Aspects of IT

1999–2001. **BSc in Information Technology**, *Rand Afrikaans University*.
Computer Science – Informatics

1994–1998. **Matriculated (Academic Colours)**, *King Edward VII School*.

Academic & Professional Experience

Summary **6 years Academia – 17 years Industry**.

Employment History

2020–present. **University of Johannesburg**, *Institute for Intelligent Systems*.
Professor/Nedbank Research Chair

2016–2020. **University of the Witwatersrand**, *School of Computer Science and Applied Mathematics*.
Associate Professor

2007–2015. **CSIR**, *Meraka Institute*.
Principal Data Scientist/Systems Architect

2005–2007. **Altech Netstar**.
Team Lead/Systems Architect

2005–2005. **Independent Electoral Commission/Motwseni JMR**.
Senior Developer

2003–2005. **Open Source IT Solutions CC**.
Systems Architect

1999–2003. **Spectracare (PTY) Ltd**.
Senior Developer

Other Research Experience

2020–present. **University of the Witwatersrand**, *School of Computer Science and Applied Mathematics*.
Visiting Associate Professor

2019–2020. **University of the Witwatersrand**, *WITS Institute of Data Science*.
Deputy Director

2019–2020. **DSI-NICIS**, *National E-Science Teaching and Training Platform*.
Deputy Director

2014-2015. **University of Johannesburg**, *Academy of Computer Science and Software Engineering*.
Research Associate

Other Industry Experience

2020–present. **Nedbank Group**.
Consultant/Technologist/Specialist/Trainer

2016–2022. **Levingers Dry Cleaning and Shoe Clinic, Woodlands**.
Franchisee – Sold

2016–2019. **Kauai Restaurant, Montana**.
Franchisee – Sold

2008–2009. **Altech Netstar**.
Consultant/Technologist/Specialist

2003–present. **Open Source IT Solutions CC**.
Owner – Dormant

Other Teaching Experience

2011–2015. **University of Johannesburg**, *Academy of Computer Science and Software Engineering*.
Associate Lecturer

Teaching Experience

Summary **11 years teaching experience**.
Four Data Science Programmes Developed – Ten Undergraduate/Honours Courses Designed & Taught – Five Masters Courses Designed & Taught

Programme Development

2019. **MSc by Course Work and Research Report in the field of Artificial Intelligence**.
Developed programme.

2019. **MSc by Course Work and Research Report in the field of Data Science**.
Co-developed programme with a colleague.

2018. **Bachelor of Science in the field of Computer Science**.
Co-restructured programme for a double major.

2017. **Honours in the field of Big Data Analytics**.
Restructured programme to align with industry expectations.

Undergraduate Courses Taught

2018–2019. **Software Design Project**, *BSc*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

2016–2020. **Software Design**, *BSc*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

2016–2017. **Computer Graphics**, *BSc*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

Honours Courses Taught

2023–present. **Advanced AI - Deep Learning**, *BSc Honours*.
University of Johannesburg, Academy for Computer Science and Software Engineering

2022–2022. **Big Data Analytics**, *BSc Honours*.
University of Johannesburg, Academy for Computer Science and Software Engineering

2017–2019. **Intro to Data Visualisation & Exploration**, *BSc Honours*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

2017–2018. **Data Analysis & Exploration**, *BSc Honours*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

2016–2016. **Distributed Computing**, *BSc Honours*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

2014–2015. **Big Data Analytics**, *BSc Honours*.
University of Johannesburg, Academy for Computer Science and Software Engineering

2012–2015. **Parallel Programming**, *BSc Honours*.
University of Johannesburg, Academy for Computer Science and Software Engineering

2011–2013. **Systems Programming**, *BSc Honours*.
University of Johannesburg, Academy for Computer Science and Software Engineering

Masters Courses Taught

2022–present. **Machine Learning**, *Masters Artificial Intelligence*.
University of Johannesburg, Academy for Computer Science and Software Engineering

2019–present. **Applied Big Data and Analytics**, *MBA*.
University of Witwatersrand, WITS Business School

2017–2019. **Data Visualisation & Exploration**, *MSc*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

2017–2018. **Statistical Foundations of Data Science**, *MSc*.
University of Witwatersrand, School of Computer Science and Applied Mathematics

Supervision Experience

PhD & MSc Graduated

Summary **2 PhD – 27 MSc**.

MSc 2023. Nimesh Bhana – Koena Monyai – Faheem Moolla

PhD 2022. Thabang Mathonsi

MSc 2022. Jiahao Huo – Fhulufhelo Mudau – Nkosikhona Dlamini – Nicolaas Cawood – Timilehin Ogundare – Warren Freeborough – Ruan Pretorius – Tarrin Skeepers

PhD 2021. Bolelang Sibolla

MSc 2021. Druv Bhuwan – William Seota – Liezl Stander – Mohamed Vairwa – Nishai Kooverje – Rylan Perumal

MSc 2020. Oluwabamigbe Oni – Bryce Engelbrecht – Zainoolabadien Karim – Witness Maake – Rowan Lange

MSc –2019. Wabu Majavu – Kevin Gray – Wesley Walford – John Atherford – Kellen Mashia

PhD & MSc Currently Supervising

Summary **17 PhD – 16 MSc – 6 MAI**, †*part-time*.

PhD 2023–. Elegbede Mnadawe Oluwatosin† – Marnus Janse van Rensburg† – Liezl Stander† – Leonard Mutembei

MSc 2023–. Mpho Mashika – Fenele Dlamini – Kudzai Kaseke – Sayuri Gooran – Zuhraf Zubair – Mpho Tokwe – Anton-Mari Stott† – Sonia Bulla† – Onesm Mokoena† – khanani Elize – Sinethemba Nongqoto – Samuel Oladejo† – Taeishia Nundlall†

MAI 2023–. Tawanda Lemani† – Elekanyani Siphuma† – Rudzani Nndwa† – Nomfundo Vilakazi† – Banele Mdluli† – Thuli Nkosi†

PhD 2022–. Jiahao Huo – Mohamed Vairwa – Tebogo Mamela† – Sibusiso Mndawe

MSc 2022–. Kudakwashe Nharo† – Mufhumudzi Muthivhi – Siphelo Mwale

PhD 2021–. Samual Nii Odoi Devine† – Zainoolabadien Karim†

PhD 2019–. Gift Khangamwa – Andrew Paskaramoorthy – Thokozile Manaka

PhD 2018–. Stewart Gebbie†

Administrative & Service Experience

Leadership Roles

2023–present. **Associate Editor**, *ACM Transactions on Probabilistic Machine Learning*.

2023–present. **General Co-Chair**, *Southern African Conference for Artificial Intelligence Research*.

2023–present. **Special Sessions Co-Chair**, *International Conference on Information Fusion*.

2022–present. **Editorial Advisory Committee**, *International Journal of Digital Earth (IF 4.606)*.

2021–present. **Vice Chair**, *IEEE South Africa Computational Intelligence Society*.

2019–present. **Representative**, *South Africa Sweden University Forum (SASUF)*.

2022. **Guest Editor**, *MDPI Mathematics*, Special Issue on Advances in Mathematical Finance 2022.

2022. **Track Co-Chair**, *Southern African Conference for Artificial Intelligence Research*.

2022. **General Co-Chair**, *International Conference on Information Fusion*.

2022. **Publications Co-chair**, *International Conference on Soft Computing & Machine Intelligence*.

2008–2022. **Editorial Board**, *International Journal of Digital Earth (IF 4.606)*.

2021–2022. **General Co-Chair**, *Ethics and Explainability for Responsible Data Science*.

2021–2022. **Review Panel**, *National Research Foundation on two occasions*.

2020–2021. **Local Co-Chair**, *International Conference on Information Fusion*.

2010. **Guest Editor**, *IEEE JSTARS*, Special Volume on Sensor Web.

2008–2009. **Representative**, *DSI South Africa, Group on Earth Observation, Architecture Data Committee*.

2008–2009. **Subgroup Chair**, *Committee on Earth Observation Satellites (CEOS) WGISS*.

Administrative Duties

2019–2020. Course Coordinator for MSc in Artificial Intelligence.

2017–2020. Science Faculty Graduate Studies Committee.

2017–2020. Course Coordinator for BSc Honours in Computer Science.

2016–2020. Senate e-Research Committee.

2016–2020. Course Coordinator for BSc Honours in Big Data Analytics.

Society Memberships

2010–present. ACM Member

2019–present. IEEE Member

Additional Activities

2022. Establishment of Applied Representation Learning Lab.

2020. Establishment of WITS Institute of Data Science.

2018. 702 radio interview on Artificial Intelligence on behalf of WITS.

Publications

Summary **28 Journal Articles – 2 Book Chapters – 61 in Proceedings**.
h-index: 13 (Scholar)/9 (Scopus) – **Citations**: 684 (Scholar)/368 (Scopus)

Journal Articles

[1] Huo, J. and **van Zyl, T. L.** 2023. "Incremental class learning using variational autoencoders with similarity learning". In: *Neural Computing and Applications*, pp. 1–16.

[2] **van Zyl, T. L.**, Woolway, M., and Paskaramoorthy, A. 2023. "Pareto Driven Surrogate (ParDen-Sur) Assisted Optimisation of Multi-period Portfolio Backtest Simulations". In: *arXiv preprint arXiv:2209.13528, Submitted to IEEE Access*.

[3] Cawood, P. and **van Zyl, T.** 2022. "Evaluating State of the Art, Forecasting Ensembles-and Meta-learning Strategies for Model Fusion". In: *Forecasting* 4, pp. 732–751.

[4] Freeborough, W. and **van Zyl, T. L.** 2022. "Investigating Explainability Methods in Recurrent Neural Network Architectures for Financial Time Series Data". In: *Applied Sciences* 12.3, p. 1427.

[5] Kooverjee, N., James, S., and **Van Zyl, T.** 2022. "Investigating Transfer Learning in Graph Neural Networks". In: *Electronics* 11.8, p. 1202.

[6] Mathonsi, T. and **van Zyl, T. L.** 2022. "A Statistics and Deep Learning Hybrid Method for Multivariate Time Series Forecasting and Mortality Modeling". In: *Forecasting* 4.1, pp. 1–25.

[7] Mathonsi, T. and **van Zyl, T. L.** 2022. "Multivariate anomaly detection based on prediction intervals constructed using deep learning". In: *Neural Computing and Applications*, pp. 1–15.

[8] Perumal, R. and **van Zyl, T. L.** 2022. "Surrogate-assisted strategies: the parameterisation of an infectious disease agent-based model". In: *Neural Computing and Applications*, pp. 1–12.

[9] Stander, L., Woolway, M., and **Van Zyl, T. L.** 2022. "Surrogate-assisted evolutionary multi-objective optimisation applied to a pressure swing adsorption system". In: *Neural Computing and Applications*, pp. 1–17.

[10] Variawa, M. Z., **Van Zyl, T. L.**, and Woolway, M. 2022. "Transfer learning and deep metric learning for automated galaxy morphology representation". In: *IEEE Access* 10, pp. 19539–19550.

[11] Dlamini, N. and **van Zyl, T. L.** 2021. "Comparing class-aware and pairwise loss functions for deep metric learning in wildlife re-identification". In: *Sensors* 21.18, p. 6109.

[12] Karim, Z. and **van Zyl, T. L.** 2021. "Deep/Transfer Learning with Feature Space Ensemble Networks (FeatSpaceEnsNets) and Average Ensemble Networks (AvgEnsNets) for Change Detection Using DInSAR Sentinel-1 and Optical Sentinel-2 Satellite Data Fusion". In: *Remote Sensing* 13.21, p. 4394.

[13] Seota, S. B.-W., Klein, R., and **van Zyl, T. L.** 2021. "Modeling E-Behaviour, Personality and Academic Performance with Machine Learning". In: *Applied Sciences* 11.22, p. 10546.

[14] Sibolla, B. H., **Van Zyl, T.**, and Coetzee, S. 2021. "Determining real-time patterns of lightning strikes from sensor observations". In: *Journal of Geovisualization and Spatial Analysis* 5, pp. 1–18.

[15] **van Zyl, T. L.** and Celik, T. 2021. "Did we produce more waste during the covid-19 lockdowns? a remote sensing approach to landfill change analysis". In: *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 14, pp. 7349–7358.

[16] Maake, W. and **Van Zyl, T.** 2020. "Applications of Machine Learning to Estimating the Sizes and Market Impact of Hidden Orders in the BRICS Financial Markets". In: *Journal of Advanced Studies in Finance* 11.1(21), pp. 28–64.

[17] Paskaramoorthy, A. B., Gebbie, T. J., and **van Zyl, T. L.** 2020. "A framework for online investment decisions". In: *Investment Analysts Journal* 49.3, pp. 215–231.

[18] Canning, E. A., Muenks, K., Green, D. J., and Murphy, M. C. 2019. "STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes". In: *Science advances* 5.2, eaau4734.

[19] Sibolla, B. H., Coetzee, S., and **Van Zyl, T. L.** 2018. "A framework for visual analytics of spatio-temporal sensor observations from data streams". In: *ISPRS International Journal of Geo-Information* 7.12, p. 475.

[20] Scholes, R., Von Maltitz, G., Archibald, S., Wessels, K., **Van Zyl, T.**, Swanepoel, D., and Steenkamp, K. 2013. "National Carbon Sink Assessment for South Africa: First Estimate of Terrestrial Stocks and Fluxes". In: *CSIR: Pretoria, South Africa*, pp. 1–38.

[21] McFerren, G., **van Zyl, T.**, and Vahed, A. 2012. "FOSS geospatial libraries in scientific workflow environments: experiences and directions". In: *Applied Geomatics* 4, pp. 85–93.

[22] Van Den Bergh, F., Wessels, K. J., Miteff, S., **Van Zyl, T. L.**, Gazendam, A. D., and Bachoo, A. K. 2012. "HiTempo: a platform for time-series analysis of remote-sensing satellite data in a high-performance computing environment". In: *International journal of remote sensing* 33.15, pp. 4720–4740.

[23] Ramsden, S., Richardson, F. M., Josse, G., Thomas, M. S., Ellis, C., Shakeshaft, C., Seghier, M. L., and Price, C. J. 2011. "Verbal and non-verbal intelligence changes in the teenage brain". In: *Nature* 479.7371, pp. 113–116.

[24] **Van Zyl, T.**, McFerren, G., and Vahed, A. 2011. "Earth observation scientific workflows in a distributed computing environment". In: *Transactions in GIS*.

[25] Di, L., Moe, K., and **van Zyl, T. L.** 2010. "Earth observation sensor web: An overview". In: *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 3.4, pp. 415–417.

[26] **Van Zyl, T. L.** and Ehlers, E. M. 2010. "Signal-regulated systems and networks". In: *Complexity* 15.6, pp. 50–63.

[27] **Van Zyl, T. L.**, Ehlers, E. M., and Marais, E. 2010. "An implementation of resource-negotiating agents in telemanufacturing". In: *International Journal of Product Development* 11.1-2, pp. 115–135.

[28] **van Zyl, T.**, Simonis, I., and McFerren, G. 2009. "The sensor web: systems of sensor systems". In: *International Journal of Digital Earth* 2.1, pp. 16–30.

[29] Moodley, D., Vahed, A., Simonis, I., McFerren, G., and **van Zyl, T.** 2008. "Enabling a new era of Earth observation research: scientific workflows for the Sensor Web'". In: *Ecological Circuits* 1, pp. 20–23.

Book Chapters

[30] **Van Zyl, T.** 2014. "Algorithmic design considerations for geospatial and/or temporal big data". In: *Big Data: Techniques and Technologies in Geoinformatics, CRC Press, London, UK*, pp. 117–132.

[31] **van Zyl, T. L.** 2014. "Machine learning on geospatial big data". In: *Big Data: Techniques and Technologies in Geoinformatics*. CRC Press, p. 133.

Refereed Conference Proceedings

[32] **van Zyl, T. L.** 2023. "Late Meta-learning Fusion Using Representation Learning for Time Series Forecasting". In: *2023 26th International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–9.

[33] Baard, N. and **van Zyl, T. L.** 2022. "Twin-Delayed Deep Deterministic Policy Gradient Algorithm for Portfolio Selection". In: *2022 IEEE Symposium on Computational Intelligence for Financial Engineering and Economics (CIFEr)*. IEEE, pp. 1–8.

[34] Khangamwa, G., **van Zyl, T.**, and van Alten, C. J. 2022. "Towards a methodology for addressing missingness in datasets, with an application to demographic health datasets". In: *Artificial Intelligence Research: Third Southern African Conference, SACAIR 2022, Stellenbosch, South Africa, December 5–9, 2022, Proceedings*. Springer Nature Switzerland Cham, pp. 169–186.

[35] Manaka, T., **Van Zyl, T.**, Wade, A. N., and Kar, D. 2022. "Using Machine Learning to Fuse Verbal Autopsy Narratives and Binary Features in the Analysis of Deaths from Hyperglycaemia". In: *Proceedings of SACAIR2021*. Vol. 1. 1, pp. 90–106.

[36] Manaka, T., **van Zyl, T.**, and Kar, D. 2022. "Improving Cause-of-Death Classification from Verbal Autopsy Reports". In: *Artificial Intelligence Research: Third Southern African Conference, SACAIR 2022, Stellenbosch, South Africa, December 5–9, 2022, Proceedings*. Springer Nature Switzerland Cham, pp. 46–59.

[37] Mudau, F., **Van Zyl, T. L.**, Molotsi, A. H., Waldmann, P., Dzama, K., and Marufu, M. C. 2022. "Application of Convolutional Neural Networks to the Quantification of Tick Burdens on Cattle Using Infrared Thermographic Imaging". In: *2022 IST-Africa Conference (IST-Africa)*. IEEE, pp. 1–9.

[38] Muthivhi, M., **van Zyl, T.**, and Wang, H. 2022. "Multi-modal Recommendation System with Auxiliary Information". In: *Artificial Intelligence Research: Third Southern African Conference, SACAIR 2022, Stellenbosch, South Africa, December 5–9, 2022, Proceedings*. Springer Nature Switzerland Cham, pp. 108–122.

[39] Muthivhi, M. and **van Zyl, T. L.** 2022. "Fusion of Sentiment and Asset Price Predictions for Portfolio Optimization". In: *2022 25th International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–8.

[40] Paskaramoorthy, A., **van Zyl, T. L.**, and Gebbie, T. 2022. "An Empirical Comparison of Cross-Validation Procedures for Portfolio Selection". In: *2022 IEEE Symposium on Computational Intelligence for Financial Engineering and Economics (CIFEr)*. IEEE, pp. 1–10.

[41] Suliman, U., **van Zyl, T. L.**, and Paskaramoorthy, A. 2022. "Cryptocurrency Trading Agent Using Deep Reinforcement Learning". In: *2022 9th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 6–10.

[42] **van Zyl, T. L.** 2022. "Full Rotation Hyper-ellipsoid Multivariate Adaptive Bandwidth Kernel Density Estimator". In: *Second Southern African Conference on Artificial Intelligence Research*. Vol. 1342. Southern African Conference for Artifici. Springer, Cham, pp. 287–303.

[43] Cawood, P. and **van Zyl, T. L.** 2021. "Feature-weighted stacking for nonseasonal time series forecasts: A case study of the COVID-19 epidemic curves". In: *2021 8th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 53–59.

[44] Engelbrecht, B. and **van Zyl, T. L.** 2021. "Comparing CNN Architectures for Land Cover Classification on Multispectral Images". In: *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*. IEEE, pp. 5378–5381.

[45] Kruger, M., **van Zyl, T. L.**, and Paskaramoorthy, A. 2021. "AMA-K: Aggressive Multi-temporal Allocation with K Experts for Online Portfolio Selection". In: *2021 8th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 114–119.

[46] Laher, S., Paskaramoorthy, A., and **Van Zyl, T. L.** 2021. "Deep learning for financial time series forecast fusion and optimal portfolio rebalancing". In: *2021 IEEE 24th International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–8.

[47] Paskaramoorthy, A., Gebbie, T., and **Van Zyl, T. L.** 2021. "The efficient frontiers of mean-variance portfolio rules under distribution misspecification". In: *2021 IEEE 24th International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–8.

[48] Skeepers, T., **van Zyl, T. L.**, and Paskaramoorthy, A. 2021. "MA-FDRNN: Multi-asset fuzzy deep recurrent neural network reinforcement learning for portfolio management". In: *2021 8th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 32–37.

[49] Timilehin, O. and **van Zyl, T. L.** 2021. "Surrogate Parameters Optimization for Data and Model Fusion of COVID-19 Time-series Data". In: *2021 IEEE 24th International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–7.

[50] Yazbek, D., Sibindi, J. S., and **Van Zyl, T. L.** 2021. "Deep Similarity Learning for Sports Team Ranking". In: *2021 Southern African Universities Power Engineering Conference/Robotics and Mechatronics/Pattern Recognition Association of South Africa (SAUPEC/RobMech/PRASA)*. IEEE, pp. 1–6.

[51] **van Zyl, T. L.**, Woolway, M., and Paskaramoorthy, A. 2021. "Parden: Surrogate assisted hyper-parameter optimisation for portfolio selection". In: *2021 8th international conference on soft computing & machine intelligence (ISCMI)*. IEEE, pp. 101–107.

[52] Atherfold, J. and **Van Zyl, T. L.** 2020. "A method for dissolved gas forecasting in power transformers using ls-svm". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–8.

[53] Burns, J. and **van Zyl, T. L.** 2020. "Automated Music Recommendations Using Similarity Learning". In: *SACAIR 2020*, p. 288.

[54] Dlamini, N. and **van Zyl, T. L.** 2020. "Automated identification of individuals in wildlife population using siamese neural networks". In: *2020 7th international conference on soft computing & machine intelligence (ISCMI)*. IEEE, pp. 224–228.

[55] Huo, J. and **van Zyl, T. L.** 2020. "Comparative analysis of catastrophic forgetting in metric learning". In: *2020 7th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 68–72.

[56] Huo, J. and **van Zyl, T. L.** 2020. "Unique Faces Recognition in Videos". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*.

[57] Karim, Z. and **van Zyl, T. L.** 2020. "Deep Learning and Transfer Learning applied to Sentinel-1 DInSAR and Sentinel-2 optical satellite imagery for change detection". In: *2020 International SAUPEC/RobMech/PRASA Conference*. IEEE, pp. 1–7.

[58] Keartland, S. and **Van Zyl, T. L.** 2020. "Automating predictive maintenance using oil analysis and machine learning". In: *2020 International SAUPEC/RobMech/PRASA Conference*. IEEE, pp. 1–6.

[59] Kooverjee, N., James, S., and **Van Zyl, T.** 2020. "Inter-and intra-domain knowledge transfer for related tasks in deep character recognition". In: *2020 International SAUPEC/RobMech/PRASA Conference*. IEEE, pp. 1–6.

[60] Lange, R., Lange, T., and **van Zyl, T. L.** 2020. "Predicting particle fineness in a cement mill". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–8.

[61] Manack, H. and **Van Zyl, T. L.** 2020. "Deep similarity learning for soccer team ranking". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–7.

[62] Mathonsi, T. and **van Zyl, T. L.** 2020. "Prediction interval construction for multivariate point forecasts using deep learning". In: *2020 7th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 88–95.

[63] Oni, O. O. and **van Zyl, T. L.** 2020. "A comparative study of ensemble approaches to fact-checking for the fever shared task". In: *2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE)*. IEEE, pp. 1–8.

[64] Otoo-Arthur, D. and **van Zyl, T. L.** 2020. "A scalable heterogeneous big data framework for e-learning systems". In: *2020 international conference on artificial intelligence, big data, computing and data communication systems (icABCD)*. IEEE, pp. 1–15.

[65] Perumal, R. and **van Zyl, T. L.** 2020. "Comparison of recurrent neural network architectures for wildfire spread modelling". In: *2020 International SAUPEC/RobMech/PRASA Conference*. IEEE, pp. 1–6.

[66] Perumal, R. and **van Zyl, T. L.** 2020. "Surrogate Assisted Methods for the Parameterisation of Agent-Based Models". In: *2020 7th International Conference on Soft Computing & Machine Intelligence (ISCMI)*.

[67] Sooklal, S., **van Zyl, T. L.**, and Paskaramoorthy, A. 2020. "DRICORN-K: A Dynamic RIsk CORrelation-driven Non-parametric Algorithm for Online Portfolio Selection". In: *Southern African Conference for Artificial Intelligence Research*. Springer, Cham, pp. 183–196.

[68] Stander, L., Woolway, M., and **van Zyl, T.** 2020. "Extended surrogate assisted continuous process optimisation". In: *2020 7th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 275–279.

[69] Stander, L., Woolway, M., and **van Zyl, T. L.** 2020. "Data-driven evolutionary optimisation for the design parameters of a chemical process: A case study". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–8.

[70] **Van Zyl, T. L.**, Woolway, M., and Engelbrecht, B. 2020. "Unique animal identification using deep transfer learning for data fusion in siamese networks". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–6.

[71] Variawa, M. Z., **van Zyl, T. L.**, and Woolway, M. 2020. "A rules-based and transfer learning approach for deriving the Hubble type of a galaxy from the galaxy zoo data". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*. IEEE, pp. 1–7.

[72] Variawa, M., **van Zyl, T.**, and Woolway, M. 2020. "Comparing generalisation using crowd-sourced vs expert labels for galaxies classification". In: *2020 7th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 158–162.

[73] **van Zyl, T.** and Woolway, M. 2020. "Makespan minimisation for multipurpose batch plants using metaheuristic approaches". In: *2020 7th international conference on soft computing & machine intelligence (ISCMI)*. IEEE, pp. 56–60.

[74] Bowditch, Z., Woolway, M., and **van Zyl, T.** 2019. "Comparative metaheuristic performance for the scheduling of multipurpose batch plants". In: *2019 6th international conference on soft computing & machine intelligence (ISCMI)*. IEEE, pp. 121–125.

[75] Dlamini, N. and **van Zyl, T. L.** 2019. "Author identification from handwritten characters using Siamese CNN". In: *2019 International Multidisciplinary Information Technology and Engineering Conference (IMITEC)*. IEEE, pp. 1–6.

[76] Monyai, K., **van Zyl, T.**, and Stoychev, S. 2019. "Peak Detection, Feature Extraction and Clustering of Peptides Fragments Ions". In: *2019 6th International Conference on Soft Computing & Machine Intelligence (ISCMI)*. IEEE, pp. 144–149.

[77] Otoo-Arthur, D. and **Van Zyl, T.** 2019. "A systematic review on big data analytics frameworks for higher education-Tools and algorithms". In: *Proceedings of the 2019 2nd International Conference on E-Business, Information Management and Computer Science*, pp. 1–9.

[78] McFerren, G. and **Van Zyl, T. L.** 2016. "Geospatial data stream processing in Python using FOSS4G components". In: *ISPRS*.

[79] Sibolla, B., **Van Zyl, T.**, and Coetzee, S. 2016. "Towards The Development Of A Taxonomy For Visualisation Of Streamed Geospatial Data". In: *ISPRS Annals of Photogrammetry, Remote Sensing & Spatial Information Sciences*. Vol. 3. 2.

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[93] **van Zyl, T. L.** and Ehlers, E. M. 2007. "A Need for Biologically Inspired Architectural Description: The Agent Ontogenesis Case". In: *Pacific Rim International Conference on Multi-Agents*. Springer, Berlin, Heidelberg, pp. 146–157.

Invited Talks

2022. **Bridging Domain Knowledge and Machine Learning in Students at Risk Prediction**.
Uppsala University, Sweden

2020–2023. **Neural Networks**, *CODATA-RDA*.
University of Pretoria, São Paulo, Brazil

2019. **Random Neural Networks**, Deep Learning IndabaX.
Durban, South Africa

2018. **Probability & Statistics for Data Science**.
African Institute for Mathematical Sciences, Muizenberg, South Africa

2018. **Cybersecurity Workshop**, BRICS.
Johannesburg, South Africa

2008. **GEOSS From Orbit, A Sensor Web Approach**, *IGARSS 2008*, IEEE.
Boston, USA

Academic Achievements & Recognition

2019 **C3** NRF rating.

2015 Meraka **Innovation Excellence Award**.

2014 **Einstein Award** for CSIR Research and Innovation Core Skills.

2010 **Distinguished Service Medal** from IEEE for contributions to GEO.

Grants & Awards

2023. **Funding Southern African Conference for Artificial Intelligence Research**, *AI Journal*.
EUR 5000

2022-2023. **Postgraduate Accelerator Programme**, *Nedbank*.
ZAR 1.00 Million

2022. **URC**, *University of Johannesburg*.
ZAR 300 000

2022. **Machine Learning in Finance**, *Centre Of Excellence NSGA*.
ZAR 90 000

2021-2022. **GES 4.0 Catalytic**, *University of Johannesburg*.
ZAR 85 000

2020-2022. **SASUF**, *SA Sweden University Forum*.
ZAR 170 000

2021. **GES 4.0 Strategic**, *University of Johannesburg*.
ZAR 120 000

2018-2020. **Postgraduate Bursaries and Lecturer-ships**, *BankSeta*.
ZAR 4.25 Million

2019. **Big Data and Analytics Honours Bursaries**, *Nedbank*.
ZAR 1.00 Million

2017-2018. **Big Data and Analytics Honours Bursaries**, *ABSA Bank*.
ZAR 1.50 Million

2010-2013. **CLimate change and Urban Vulnerability in Africa**, *FP7*, CSIR, Participant in Consortium.
EUR 0.42 of EUR 4.3 Million

2010-2013. **Earth Observation and ENVironmental modelling for the mitigation of HEAlth risks**, *FP7*, CSIR, Participant in Consortium.
EUR 0.48 of EUR 8.5 Million

2010. **GEOSS Sensor Web Enablement**, *Department of Science and Technology*.
ZAR 1.00 Million

2008-2009. **Integrated risk management for Africa**, *FP7*, CSIR, Participant in Consortium.
EUR 0.18 of EUR 3.5 Million

Other Qualifications

2022. Applications of AI for Predictive Maintenance (NVIDIA DLI Instructor)
2022. Applications of AI for Anomaly Detection (NVIDIA DLI Instructor)
2022. Fundamentals of Deep Learning (NVIDIA DLI Instructor)
2017. Postgraduate Supervision
2017. Writing for Peer-reviewed Journals
2017. Professionalisation of the Curriculum
2016. Using Teaching and Course Evaluations to Further Develop Practice
2010. Investment in Excellence
2008. Research Innovation Core Skills Programme
2008. Time Management Course