





# Terence L. van Zyl

## Curriculum Vitae

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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. **3<sup>rd</sup> 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*.

## Courses

- 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

## 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**.  
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 Teaching Experience

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

#### Other Research Experience

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- 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

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- 2020–present. **Nedbank Group.**  
Consultant/Technologist/Specialist/Trainer
- 2016–2022. **Levings 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

## Publications

Summary **26 Journal Articles – 2 Book Chapters – 61 in Proceedings.**  
**h-index:** 11 (Scholar)/7 (Scopus) – **Citations:** 573 (Scholar)/274 (Scopus)

#### Journal Articles

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- [1] 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.
- [2] 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.
- [3] Kooverjee, N., James, S., and **Van Zyl, T.** 2022. “Investigating Transfer Learning in Graph Neural Networks”. In: *Electronics* 11.8, p. 1202.
- [4] 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.

- [5] 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.
- [6] Perumal, R. and Zyl, T. L. v. 2022. "Surrogate-assisted strategies: the parameterisation of an infectious disease agent-based model". In: *Neural Computing and Applications*, pp. 1–12.
- [7] Pretorius, R. and **van Zyl, T.** 2022. "Deep Reinforcement Learning and Convex Mean-Variance Optimisation for Portfolio Management". In: *arXiv preprint arXiv:2203.11318*.
- [8] 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.
- [9] 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.
- [10] 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.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] **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.
- [15] 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.
- [16] 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.
- [17] 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.
- [18] 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.
- [19] 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.
- [20] 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.
- [21] **Van Zyl, T.**, McFerren, G., and Vahed, A. 2011. "Earth observation scientific workflows in a distributed computing environment". In: *Transactions in GIS*.
- [22] 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.
- [23] **Van Zyl, T. L.** and Ehlers, E. M. 2010. "Signal-regulated systems and networks". In: *Complexity* 15.6, pp. 50–63.
- [24] **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.
- [25] **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.

- [26] 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

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- [27] **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.
- [28] **van Zyl, T. L.** 2014. "Machine learning on geospatial big data". In: *Big Data: Techniques and Technologies in Geoinformatics*. CRC Press, p. 133.

### Conference Proceedings

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- [29] 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.
- [30] 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.
- [31] 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.
- [32] 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.
- [33] 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.
- [34] 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.
- [35] 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.
- [36] 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.
- [37] **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 Artificial Intelligence. Springer, Cham, pp. 287–303.
- [38] 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.
- [39] 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.
- [40] Huo, J. and **van Zyl, T. L.** 2021. "Incremental Class Learning using Variational Autoencoders with Similarity Learning". In: *arXiv preprint arXiv:2110.01303*.
- [41] 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.

- [42] 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.
- [43] 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.
- [44] 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.
- [45] 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.
- [46] 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.
- [47] **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.
- [48] 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.
- [49] Burns, J. and **van Zyl, T. L.** 2020. "Automated Music Recommendations Using Similarity Learning". In: *SACAIR 2020*, p. 288.
- [50] 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.
- [51] 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.
- [52] Huo, J. and **van Zyl, T. L.** 2020. "Unique Faces Recognition in Videos". In: *2020 IEEE 23rd International Conference on Information Fusion (FUSION)*.
- [53] 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.
- [54] 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.
- [55] 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.
- [56] 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.
- [57] 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.
- [58] 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.
- [59] 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.

- [60] 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.
- [61] 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.
- [62] 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)*.
- [63] 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.
- [64] 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.
- [65] 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.
- [66] **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.
- [67] 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.
- [68] 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.
- [69] **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.
- [70] 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.
- [71] 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.
- [72] 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.
- [73] 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.
- [74] McFerren, G. and **Van Zyl, T. L.** 2016. "Geospatial data stream processing in Python using FOSS4G components". In: *ISPRS*.
- [75] 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.
- [76] Butgereit, L., Moonsamy, S., Thomson, T., **Van Zyl, T.**, and McFerren, G. 2014. "Fire hazard notifications via Satellite, Twitter, Citizen Reports, and Android Apps". In: *Proceedings of the African Cyber Citizen Conference*.
- [77] Sibolla, B., **Van Zyl, T.**, McFerren, G., and Hohls, D. 2014. "Adding temporal data enhancements to the advanced spatial data infrastructure platform". In: *AARSE2014*.

- [78] **van Zyl, T. L.** 2014. "A comparison of machine learning techniques for predicting downstream acid mine drainage". In: *IGARRS*.
- [79] **van Zyl, T. L.** and Mcferren, G. 2013. "Applying Sensor Web strategies to Big Data earth observations". In: *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*. IEEE, pp. 798–799.
- [80] Vahed, A., Engelbrecht, F., Simonis, I., Naidoo, M., Sibolla, B., **Van Zyl, T.**, and McFerren, G. 2012. "Harnessing cyber-infrastructure for local scale climate change research in Africa". In: *IST-Africa Conference Proceedings*.
- [81] **Van Zyl, T. L.** 2012. "Beyond GIS with EO4VisTrails: a geospatio-temporal scientific workflow environment". In: *EE Publishers*.
- [82] **Van Zyl, T. L.** and Vahed, A. 2009. "Using SensorML to describe scientific workflows in distributed web service environments". In: *2009 IEEE International Geoscience and Remote Sensing Symposium*. Vol. 5. IEEE, pp. V–375.
- [83] **Van Zyl, T.**, Parbhoo, C., Moodley, D., Cwela, B., Umuhoza, D., Shabangu, P., and Vahed, A. 2009. "IT infrastructure enabling open access for flood risk preparedness in South Africa". In: *6th International ISCRAM 2009 Conference*.
- [84] **van Zyl, T. L.** and Ehlers, E. M. 2009. "Self-organising sensor web using cell-fate optimisation". In: *2009 IEEE International Geoscience and Remote Sensing Symposium*. Vol. 5. IEEE, pp. V–461.
- [85] Majavu, W., **van Zyl, T. L.**, and Marwala, T. 2008. "Classification of web resident sensor resources using Latent Semantic Indexing and ontologies". In: *2008 IEEE International Conference on Systems, Man and Cybernetics*. IEEE, pp. 518–523.
- [86] McFerren, G., **van Zyl, T.**, van der Merwe, M., and du Preez, M. 2008. "User requirements for sensor web based scientific workflows in the Cholera research domain". In: *IGARSS 2008-2008 IEEE International Geoscience and Remote Sensing Symposium*. Vol. 5. IEEE, pp. V–136.
- [87] Nienaber, R., Smith, E., Barnard, A., and **Van Zyl, T.** 2008. "Software Agent Technology supporting Risk Management in SPM". In: *IADIS International Conference on Applied Computing (IADIS 2008), Algarve, Portugal*.
- [88] **van Zyl, T. L.** 2008. "GEOSS from orbit, a sensor web approach". In: *IGARSS 2008-2008 IEEE International Geoscience and Remote Sensing Symposium*. Vol. 1. IEEE, pp. I–134.
- [89] **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.

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## 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.

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## Grants & Awards

- 2022-2024. **Postgraduate Accelerator Programme**, Nedbank.  
ZAR 1.5 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

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## Invited Talks

- 2022. **Bridging Domain Knowledge and Machine Learning in Students at Risk Prediction**.  
Uppsala University, Sweden
- 2020–2022. **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

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## Teaching Experience

### Programme Development

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- 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

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- 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

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- 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

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

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- Summary **2 PhD – 25 MSc**.  
4 Female – 11 Black – 6 Indian/Coloured
- 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

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- Summary **11 PhD – 5 MSc**, † *part-time*.  
2 Female – 9 Black – 5 Indian/Coloured
- PhD 2022–. Jiahao Huo – Mohamed Vairwa – Tebogo Mamela – Sibusiso Mndawe
- MSc 2022–. Mufhumudzi Muthivhi – Siphelo Mwale – Faheem Moolla†

- PhD 2021–. Samuel Nii Odoi Devine<sup>†</sup> – Zainoolabadien Karim<sup>†</sup>  
MSc 2021–. Koena Monyai – Nimesh Bhana  
PhD 2019–. Gift Khangamwa – Andrew Paskaramoorthy – Thokozile Manaka  
PhD 2018–. Stewart Gebbie<sup>†</sup>

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## Service

### Leadership Roles

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- 2022–present. **Editorial Advisory Committee**, *International Journal of Digital Earth (IF 4.606)*.  
2021–present. **Vice Chair**, *IEEE South Africa Computational Intelligence Society*.  
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*.  
2019–2020. **Representative**, *WITS South Africa Sweden University Forum (SASUF)*.  
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

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- 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

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- 2010–present. ACM Member  
2019–present. IEEE Member

### Additional Activities

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2020. Establishment of WITS Institute of Data Science (Research Group).  
2018. 702 radio interview on Artificial Intelligence on behalf of WITS.

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## Referees

### **Prof. Turgay Celik**

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Information Engineering*

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