

## Professor Tshilidzi Marwala

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**PLACE OF BIRTH:** Duthuni, Venda, Republic of South Africa

**DATE OF BIRTH:** 28 July 1971

**CITIZENSHIP:** South African

**SPOUSE:** Dr Jabulile Vuyiswa Manana BSc (UP<sup>1</sup>) BSc (Hons) (UP) MSc (UP) MBBCh (Wits<sup>2</sup>)

**CHILDREN:** Nhlonipho Khathutshelo Marwala (Son) and Thendo Lwazi Marwala (Son)

### PROFESSIONAL EXPERIENCE

- Dean of Engineering and the Built Environment, University of Johannesburg (01/01/2009)
- SARChI Chair of Systems Engineering, University of the Witwatersrand (01/01/2007-01/01/2008)
- Carl and Emily Carl Fuchs Chair of Control and Systems Engineering, University of the Witwatersrand (01/03/2006-01/01/2008)
- Personal Professor of Electrical and Information Engineering, University of the Witwatersrand (01/12/2005-31/12/2008)
- Associate Professor of Electrical and Information Engineering, University of the Witwatersrand (04/01/2003-11/30/2005)
- Head of Control and Systems Group: School of Electrical and Information Engineering, University of the Witwatersrand (04/01/2003-31/12/2008)
- Executive Assistant: Technical Director: South African Breweries (01/09/2001-30/03/2003)
- Post-Doctoral Research Associate: Imperial College of Science, Technology and Medicine (University of London) (01/05/2000-30/08/2001)
- Project Engineer: Council for Scientific and Industrial Research – Mining Technology Division (01/06/1995-31/12/1995)

### CAREER HIGHLIGHTS:

- Elected a Fellow of TWAS, The Academy of Sciences for the Developing World (2010)
- ACM<sup>3</sup> Distinguished Scientist (ACM)<sup>4</sup> (2010)
- Rated Researcher by the NRF (P-Rating [2004-2008]; C2 [2009-Present])
- Merged the Departments of Power and Control Engineering with the Department of Electronic and Computer Engineering Technology to form the Department of Electrical Engineering Technology [University of Johannesburg]
- Introduced the Faculty of Engineering and the Built Environment Industrial Advisory Board [University of Johannesburg]

<sup>1</sup> University of Pretoria

<sup>2</sup> University of the Witwatersrand

<sup>3</sup> Association for Computing Machinery

<sup>4</sup> “ACM Distinguished Membership recognizes up to 10% of Association for Computing Machinery’s top members who have had significant accomplishments or impact on the computing field”

- Introduced the Performance Management System for all Heads of Departments and Vice-Deans [University of Johannesburg]
- Introduced the School of Electrical Engineering, School of Civil Engineering and the Built Environment, School of Mechanical and Industrial Engineering, and School of Mining, Metallurgy and Chemical Engineering at the University of Johannesburg
- Leader of a team of 8 experts that developed a strategy on how to unbundle the local loop of the fixed line telecommunication company Telkom (Listed in the New York Stock Exchange at the time)
- Leader of a delegation that met various stakeholders including the Telecommunication Regulator (ICASSA) and the executive team of Telkom.
- Participated in the Presidential International Advisory Council on Information Technology (PIAC). Delegates included global CEOs of HP and Alcatel.
- Leader of a delegation that negotiated the exit of the Chief Executive Officer of City Power Johannesburg in 2006
- Leader of a delegation that negotiated with the Municipal Workers Union of South Africa on matters pertaining to wages at City Power Johannesburg
- Leader of a delegation to the South African Parliament Portfolio Committee on Science and technology to present the annual business plan.
- Chairman of the Oversight Committee of City Power Johannesburg
- Member of the Procurement Committee of City Power Johannesburg
- Member of the Pricing and Regulation Committee of City Power Johannesburg
- Chair of the Finance Committee of the Limpopo Business Support Agency
- Member of the strategic committee of Statistics South Africa
- Developed the following techniques: neuro-rough model, pseudo-modal energy and Bayesian based genetic programming
- Published the first book on the use of computational intelligence for missing data estimation
- Published the first book on the use of computational intelligence for finite element model updating
- Authored 3 books, 200 papers in refereed international journals, proceedings and book chapters and registered 3 patents.
- Supervised 5 PhD's and 35 master's theses to completion. Some of these graduates have proceeded to universities such as Harvard, Oxford, Cambridge, Rutgers and Purdue to further their research careers.
- Hosted 5 visiting professors from Japan, USA, India, Poland and United Kingdom at the University of the Witwatersrand in South Africa
- Involved in many leadership activities at international conferences, the South African parliament and industrial organizations.
- Raised approximately US\$1.8 million worth of grant funding.
- Chaired sessions in more than 10 international conferences held in countries such as the USA, Botswana, Japan, China.
- Elected Visiting Fellow at Harvard University and Wolfson College at the University of Cambridge as well as Visiting Scholar at University of California (Berkeley)
- Lectured the following courses at both the undergraduate and graduate levels at the University of the Witwatersrand: Control and Systems, Information Engineering Techniques, Electrical Engineering Design, Optimization and Artificial Intelligence.

- Consulted for the following companies: Grintek on Information Security, Council for Scientific and Industrial Research on multi-agent systems, Kentron for medical imaging and ESKOM for fault detection in the electrical cable transmission lines.
- Secretary of the Cambridge United Nations Society
- Treasurer of the Cambridge Southern African Society
- Developed strategies to promote safety in the mines at CSIR Mining Technology Division
- Identified and assessed deserving candidate and the approved funding for PhD studies at St. John's College, University of Cambridge for the Bradlow Foundation.
- Identified and approved funding for many community based organizations for the Carl and Emily Fuchs Foundations

## EDUCATION

- Programme for Leadership Development (2006-2007), Harvard Business School, USA.
- Post-Doctoral Research Associate (2000-2001), Imperial College (University of London)
- Ph.D. Engineering (1997-2000), University of Cambridge (St. John's College), United Kingdom
- M.Eng. Mechanical Engineering (1996-1997), University of Pretoria, South Africa
- B.S. Mechanical Engineering, *Magna Cum Laude*, (1991-1995), Case Western Reserve University, USA
- Post-Matriculation Studies (1990), St. John's College, Johannesburg
- Matriculation in the top 100 in South Africa (Department of Education and Training) (1989), Mbilwi Secondary School, Venda, Limpopo Province

## Member of Board of Directors/Trustees/Committees

- Chairman: Dean's Committee of Engineering Faculties of South Africa (2010)
- Member of South Africa's Department of Higher Education and Training Research Output Committee (2010)
- Member of the Limpopo Premier's Employment Growth and Development Strategy Advisory Council (Limpopo Province) (2010)
  - Deputy Chairperson: Knowledge Enabled Industry Technical Working Group
- Non-Executive Director, EOH (Pty) Ltd. (2006)
- Non-Executive Director, City Power Johannesburg (Pty) Ltd. (2005)
- Non-Executive Director, Denel (Pty) Ltd. (2010)
- Trustee: The Bradlow Foundation (2006)
- Executive Committee Member: South African Academy of Engineering (2008)
- Trustee: Carl and Emily Fuchs Foundation (2006)
- Board Member: South African Statistics Council (01/03/2005-31/07/2008)
- Non-Executive Director, State Information Technology Agency (2005-2008)
- Board Member: South African Statistics Council (01/03/2005-31/07/2008)
- Board Member: National Advisory Council on Innovation (01/04/2005-01/01/2008)
- Board Member: Johannesburg Centre for Software Engineering (01/01/2008-31/12/2008)
- Board Member: South African National Council of Scientific Professions (01/03/2006-31/02/2007)
- Deputy Chairman: Limpopo Business Support Agency (01/01/2006-01/06/2010)
- Chairman: Local Loop Unbundling Committee (2006 to 2007)

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## SELECTED AWARDS, HONOURS AND ACHIEVEMENTS

- NSTF-BHP Billiton Awards: Eskom Research Capacity Award (over the last 5 to 10 years) (2011)
- Speaker: Science and Technology in Society Forum Representative for the African Continent, Kyoto, Japan (2010)<sup>5</sup>
- Paper Co-Authored was Featured in the MIT Technology Review (2009)<sup>6</sup>
- TWAS-AAS-Microsoft Award for Young Scientists (2009)
- Visiting Scholar The Center for Studies in Higher Education University of California at Berkeley (November 2009)<sup>7</sup>
- Best Paper Award: Proceedings of the 12th World Multi-Conference on Systemics, Cybernetics and Informatics, 2008, June 29th –July 2nd, Orlando, Florida, USA.
- 2008 SAIEE Premium Best Paper Award.
- Visiting Fellow Wolfson College, University of Cambridge (2007-2008)
- National Science and Technology Forum (NSTF) Award: Individual through research and its outputs (over the last five years or less) (2007)
- Visiting Fellow Harvard University (2006-2007)
- Bronze Order of Mapungubwe – President of South Africa (2004)
- Invited Talk: Asia-Pacific Workshop on Structural Health Monitoring, Yokohama, Japan (2006)
- Technology and Human Resources for Industry Programme (THRIP) Technology Awards: Outstanding Project Leader (2007)
- Best Presentation Award: World Congress of Computational Intelligence (2006)
- Council of City of Johannesburg: Motion of Congratulations for Contribution to Science Adopted (2004)
- WhosWho in Southern Africa (2005)
- National Research Foundation President's Award (P-Rating) (2003)
- Mail and Guardian: 100 Future Leaders in (2005)
- The Star Newspaper: Top 100 of 2004
- Mail and Guardian: 20 Future Leaders (2005)
- NRF Rated<sup>8</sup>
- Tuksalumni Laureate Award (2004)
- Marquis Who'sWho in the World (2004, 2005, 2006)
- WhosWho in Computational Science and Engineering (2005)
- National Science and Technology Forum (NSTF) Award: Dr. T.W. Kambule Research Award (2004)
- CSIR Fellowship (2004)
- Friedel Sellschop Award (2004)

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<sup>5</sup> Invited speaker as a Future Leader at the forum entitled “*The Lights and Shadows of Science and Technology*,” by the Science and Technology in Society (SPS) forum and The New York Academy of Sciences and sponsored by the Japan Society for the Promotion of Science nominated by Dr. Peter McGrath, Program Officer of the Third World Academy of Sciences

<sup>6</sup> <http://www.technologyreview.com/biomedicine/24051/>

<sup>7</sup> The position not taken due to busy schedule

<sup>8</sup> Rated P from 2004 to 2008 and C2 from 2009-2013 by the NRF

- South African Broadcasting Corporation (SABC2) - Tribute Achievers Award (Winner: Science and Technology) (2003)
- Extraordinary Professor - University of Pretoria (2003)
- Represented Business South Africa - United Nations World Summit on Sustainable Development (2002)
- Extraordinary Lecturer - University of Pretoria (2002)
- Best Paper Award - International Symposia on Soft Computing and Intelligent Systems for Industry (2002)
- Charles Hesterman Merz Fund Award (2000)
- Paper Awarded a Bronze Medal-South African Institution of Mechanical Engineers (1999)
- Ford of Britain Trust Award (1999)
- Fellow of the Cambridge Philosophical Society (1998)
- Fellow of the Cambridge Commonwealth Trust (1997)
- Honorary Cambridge Malaysian Scholar (1997)
- Honorary Cambridge Mandela Scholar (1997)
- Bradlow Foundation Scholarship (1997-2000)
- Overseas Research Award (1997-2000)
- Foundation for Research and Development Prestige/Equity Scholarship (1996-1997)
- AECI Post-graduate Fellowship (1996-2000)
- Institute of International Education Scholarship (1991-1995)
- Shell Merit Scholarship (1990)
- Winner of the 1989 South African National Youth Science Olympiad (1989)
- 1989 London International Youth Science Fortnight South African Delegate (1989)
- Merit Certificate: Foundation for Education, Science and Technology (FEST) (1987)

## **RESEARCH INTERESTS**

Computational Intelligence  
System Identification  
Finite Element Models  
Multi-Agent Systems  
Missing Data Estimation

## **MEMBERSHIP/FELLOWSHIPS/PROFESSIONAL REGISTRATION**

- Fellow of TWAS, The Academy of Sciences for the Developing World (2010)
- ACM<sup>9</sup> Distinguished Scientist (ACM)<sup>10</sup> (2010)
- Fellow of the African Scientific Institute (2009)
- Fellow of the Royal Statistical Society (2008)
- Fellow of the Academy of Science of South Africa (2007)
- Fellow of the South African Academy of Engineering (2007)
- Fellow of the Royal Society for the Encouragement of Arts, Manufactures and Commerce (RSA) (2007)
- Fellow of the Council for Scientific and Industrial Research (2004)

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<sup>9</sup> Association for Computing Machinery

<sup>10</sup> “ACM Distinguished Membership recognizes up to 10% of ACM’s top members who have had significant accomplishments or impact on the computing field”

- Fellow of the Cambridge Philosophical Society (1998)
- Fellow of the Cambridge Commonwealth Trust (1998)
- Senior Member of the IEEE (2008)<sup>11</sup>
- Registered Professional Engineer (2005)
- Senior Member of the ACM<sup>12</sup> (2009)

### Editorial Responsibilities:

- Associate Editor: International Journal of Systems Science (2007-)
- Associate Editor: Journal of Computers (2008-)
- Associate Editor: South African Journal of Science (2009-2010)
- Associate Editor: International Journal on Advances in Information Sciences and Service Sciences (2010-)
- Associate Editor: ICIC Express Letters (*An International Journal of Research and Surveys*) (2007-)
- Associate Editor: ICIC Express Letters, *Part B: Applications* (*An International Journal of Research and Surveys*) (2010-)
- Editorial Board: Open Aerospace Engineering Journal (2007-)
- Editorial Advisory Board: International Journal of Engineering Research in Africa (JERA) (2009-)
- Editor: International Journal of Intelligent Information Processing (2010-)

### PUBLICATIONS

#### Patents:

- P-1. D.M. Starfield, D.M. Rubin and **T. Marwala**. (United States Patent: 7915590 B2) “Method and Apparatus for Radiation Imaging”
- P-2. D.M. Starfield, D.M. Rubin and **T. Marwala**. (PCT/IB2008/001278) “Coded Aperture Masks for Radiation-Based Medical Imaging”.
- P-3. M.J. Russell, D.M. Rubin, B. Wigdorowitz and **T. Marwala**. (PCT/IB2009/006125) “An artificial larynx”

#### Books:

- B-1. **T. Marwala**. Condition Monitoring Using Computational Intelligence Methods *Springer-Verlag* London (proposal accepted)
- B-2. **T. Marwala** and Monica Lagazio. Militarized Conflict Modeling Using Computational Intelligence Techniques *Springer-Verlag* London, UK ISBN: 978-0857297891 (to appear). Foreword by Professor Bruce Russett (Yale University, USA).
- B-3. **T. Marwala**. Finite Element Model Updating Using Computational Intelligence Techniques. *Springer-Verlag*, London, UK, 2010, ISBN: 978-1-84996-322-0. Foreword by Prof. Snehashish Chakraverty (National Institute of Technology, Rourkela, India).

<sup>11</sup> “The Senior Member Grade recognizes those IEEE members with at least 10 years of professional experience who have demonstrated significant performance over a period of 5 years”

<sup>12</sup> “The Senior Member Grade recognizes those ACM members with at least 10 years of professional experience and 5 years of continuous Professional Membership who have demonstrated performance that sets them apart from their peers”

- B-4. **T. Marwala**. Computational Intelligence for Missing Data Imputation, Estimation and Management: Knowledge Optimization Techniques. *IGI Global Publications, Information Science Reference Imprint, IGI Global Publications, New York*, ISBN: 1-60566-336-0, April 2009. Foreword by Prof. F.V. Nelwamondo (Harvard, USA).
- B-5. **T. Marwala** (Ed.). Computational Intelligence for Modelling Complex Systems. *Research India Publications*, 2007, ISBN: 978-81-904362-1-2.
- B-6. N. Callaos, W. Lesso, C.D. Zinn, J. Baralt, J. Boukachour, C. White, **T. Marwala** and F.V. Nelwamondo (Editors). The Proceedings of the 12<sup>th</sup> World Multi Conference on Systemics, Cybernetics and Informatics, Florida *International Institute of Informatics and Systematics Publication*, Vol. 5, 2008, ISBN: 13:978-1-934272-35-0.

### Peer-Reviewed Book Chapters and Monographs:

1. **T. Marwala** and H.E.M. Hunt. Fault identification using a committee of neural networks. *Identification in Engineering Systems* 102-111 (1999), Swansea Wales, UK., (Eds.) M.I. Friswell, J.E. Mottershead and A.W. Lees
2. **T. Marwala** and H.E.M. Hunt. Comparison between maximum likelihood and Bayesian networks for fault identification. *Advanced Problems in Vibration Theory and Applications* 255-261 (2000), X'ian, Peoples Republic of China (Ed. Z. Zhang).
3. J.M. Spiller and **T. Marwala**. Medical Image Segmentation and Localization using Deformable Templates. *In Imaging the Future Medicine*, Proceedings of the IFMBE, 2006, Vol. 14, pp. 3581-3585, Springer-Verlag, Berlin Heidelberg. Eds. Sun I. Kim and Tae Suk Sah, ISBN: 978-3-540-36839-7.
4. D.L. Falk, D.M. Rubin and **T. Marwala**. Enhancement of Noisy Planar Nuclear Medicine Images using Mean Field Annealing. *In Imaging the Future Medicine*, Proceedings of the IFMBE, 2006, Vol. 14, pp. 3581-3585, Springer-Verlag, Berlin Heidelberg. Eds. Sun I. Kim and Tae Suk Sah, ISBN: 978-3-540-36839-7.
5. T.N. Tim and **T. Marwala**. Computational Intelligence Methods for Risk Assessment of HIV. *In Imaging the Future Medicine*, Proceedings of the IFMBE, 2006, Vol. 14, pp. 3581-3585, Springer-Verlag, Berlin Heidelberg. Eds. Sun I. Kim and Tae Suk Sah, ISBN: 978-3-540-36839-7.
6. D.M. Starfield, D.M. Rubin and **T. Marwala**. Near-Field Artifact Reduction using Realistic Limited-Field-of-View Coded Apertures in Planar Nuclear Medicine Imaging. *In Imaging the Future Medicine*, Proceedings of the IFMBE, 2006, Vol. 14, pp. 3581-3585, Springer-Verlag, Berlin Heidelberg. Eds. Sun I. Kim and Tae Suk Sah, ISBN: 978-3-540-36839-7.
7. D.M. Starfield, D.M. Rubin and **T. Marwala**. Sampling Considerations and Resolution Enhancement in Ideal Planar Coded Aperture Nuclear Medicine Imaging, pp. 806-809. 11th Mediterranean Conference on Medical and Biological Engineering June 2007, Ljubljana, Slovenia (IFMBE Proceedings vol. 16) (Paperback) and Computing 2007: MEDICON 2007, 26-30 by Tomaz Jarm (Editor), Peter Kramar (Editor), Anze Zupanic (Editor) Springer, ISBN-10: 3540730435.
8. T. Tettey **T. Marwala** Neuro-fuzzy modeling and fuzzy rule extraction applied to conflict management. *Lecture Notes in Computer Science*, Volume 4234, 2006, pp. 1087-1094, Springer-Verlag, Berlin Heidelberg.
9. F. Soares, J. Burken, **T. Marwala**. Neural network applications in advanced aircraft flight control system, a hybrid system, a flight test demonstration. *Lecture Notes in Computer Science*, Volume 4234, 2006, pp. 684-691, Springer-Verlag, Berlin Heidelberg.

10. P. Patel and **T. Marwala**. Neural networks, fuzzy inference systems and adaptive-neuro fuzzy inference systems for financial decision making. *Lecture Notes in Computer Science*, Volume 4234, 2006, pp. 430-439, Springer-Verlag, Berlin Heidelberg.
11. D. Lunga, **T. Marwala**. Online forecasting of stock market movement direction using the improved incremental algorithm. *Lecture Notes in Computer Science*, Volume 4234, 2006, pp. 440-449, Springer-Verlag, Berlin Heidelberg.
12. D. Lunga and **T. Marwala**. Time Series Analysis Using Fractal Theory and Online Ensemble Classifiers. *Lectures Notes in Artificial Intelligence*, 2006, Volume 4304/2006, pp. 312-321, Springer-Verlag, Berlin Heidelberg.
13. F.V. Nelwamondo and **T. Marwala**. Handling Missing Data from Heteroskedastic and Nonstationary Data. *Lecture Notes in Computer Science*, 2007, vol. 4491, no. 1, pp. 1297-1306, Springer-Verlag, Berlin Heidelberg.
14. B. Vilakazi and **T. Marwala**. Incremental Learning and Its Application to Bushing Condition Monitoring. *Lecture Notes in Computer Science*, 2007, vol. 4491, no. 1, pp. 1241-1250, Springer-Verlag, Berlin Heidelberg.
15. Bodie Crossingham, **T. Marwala**. Using Genetic Algorithms to Optimise Rough Set Partition Sizes for HIV Data Analysis. *Advances in Intelligent and Distributed Computing, Studies in Computational Intelligence*, 2008, Volume 78/2008, 245-250, DOI: 10.1007/978-3-540-74930-1\_25
16. **T. Marwala** and B.C. Vilakazi. Condition Monitoring using Computational Intelligence, *Handbook on Computational Intelligence in Manufacturing and Production Management*, IGI Publishers Chapter 6, 2007, pp. 106-143, ISBN 1599045826.
17. D.M. Starfield, D.M. Rubin and **T. Marwala**. Design of an ultra-near-field system for planar coded aperture nuclear medicine imaging. 2008, *Proceedings of the International Federation for Medical and Biological Engineering*, 2008, vol. 20, pp. 590-593, Springer, ISBN: 978-3-540-69366-6, Editors: Yuri Dekhtyar, Alexei Katashev and Janis Spigulis.
18. Megan J. Russell, David M. Rubin, Brian Wigdorowitz and **T. Marwala**. The artificial larynx: A review of current technology and a proposal for future development. *Proceedings of the International Federation for Medical and Biological Engineering*, 2008, vol. 20, pp. 160-163, Springer, ISBN: 978-3-540-69366-6, Editors: Yuri Dekhtyar, Alexei Katashev and Janis Spigulis.
19. B.C. Vilakazi and **T. Marwala**. Computational Intelligence Approach to Bushing Condition Monitoring: Incremental learning and its Application. *In Intelligent Engineering Systems and Computational Cybernetics*, Springer-Verlag, Machado, J.A. Tenreiro; Pátkai, Béla; Rudas, Imre J. (Eds.) 2008, ISBN: 978-1-4020-8677-9.
20. **T. Marwala** and Evan Hurwitz A Multi-Agent Approach to Bluffing. Chapter 11: *Multiagent Systems*, Book edited by: Salman Ahmed and Mohd Noh Karsiti, ISBN 978-3-902613-51-6, pp. 233-246, February 2009, I-Tech, Vienna, Austria.
21. Pretesh Patel and **T. Marwala**. Caller behaviour classification a Comparison of SVM and FIS Techniques. *Lecture Notes in Computer Science Springer, Advances in Intelligent and Soft Computing*, Editor-in-chief: Kacprzyk, J., Book Series Advances in Soft Computing, Publisher Springer Berlin / Heidelberg, ISSN 1615-3871 (Print) 1860-0794 (Online), Volume 116/2009, Book, DOI 10.1007/978-3-642-03156-4, ISBN 978-3-642-03155-7, Pages 199-208
22. Adam Pantanowitz and **T. Marwala**. Missing Data Imputation Through the Use of the Random Forest Algorithm. *Lecture Notes in Computer Science Springer, Advances in Intelligent and Soft Computing*, Editor-in-chief: Kacprzyk, J., Book Series Advances in Soft Computing, Publisher Springer Berlin / Heidelberg, ISSN 1615-3871 (Print) 1860-

- 0794 (Online), Volume 116/2009, Book, DOI 10.1007/978-3-642-03156-4, ISBN 978-3-642-03155-7, Pages 53-62.
23. Adam Pantanowitz and **T. Marwala**. Evaluating the Impact of Missing Data Imputation. Lecture Notes in Computer Science Springer, Book Series Lecture Notes in Computer Science, Publisher Springer Berlin / Heidelberg , ISSN 0302-9743 (Print) 1611-3349, Volume 5678/2009, Book: Advanced Data Mining and Applications.
  24. L.M. Masisi, F.V. Nelwamondo and **T. Marwala** Investigating Ensemble Weight and the Certainty Distributions for Indicating Structural Diversity, Book Series Lecture Notes in Computer Science, Volume 5507/2009, Publisher Springer Berlin / Heidelberg, Book Advances in Neuro Information Processing, Pages 517-524.
  25. P. Patel and **T. Marwala** Caller Interaction Classification: A Comparison of Real and Binary Coded GA-MLP Techniques, Book Series Lecture Notes in Computer Science, Volume 5507/2009, Publisher Springer Berlin / Heidelberg, Book Advances in Neuro Information Processing, Pages 728-735.
  26. J. Mistry, F.V. Nelwamondo and **T. Marwala** Investigating Demographic Influences for HIV Classification Using Bayesian Autoassociative Neural Networks, Book Series Lecture Notes in Computer Science, Volume 5507/2009, Publisher Springer Berlin / Heidelberg, Book Advances in Neuro Information Processing Pages 752-759.
  27. N. Hlalele, F.V. Nelwamondo and **T. Marwala** Imputation of Missing Data Using PCA, Neuro-Fuzzy and Genetic Algorithms, Book Series Lecture Notes in Computer Science, Volume 5507/2009, Publisher Springer Berlin / Heidelberg, Book Advances in Neuro Information Processing Pages 485-492.
  28. Megan J Russell, David M Rubin, **T. Marwala**, Brian Wigdorowitz, Pattern Recognition and Feature Selection for the Development of a New Artificial Larynx. *11<sup>th</sup> World Congress on Medical Physics and Biomedical Engineering*, September 7-12, 2009 in Munich, Germany Dössel and W C. Schlegel. (Eds.): WC 2009, IFMBE Proceedings 25/IV, pp. 736–739, 2009.
  29. Bo Xing, Wen-Jing Gao, Fulufhelo V. Nelwamondo, Kimberly Battle and **Tshilidzi Marwala** Part-Machine Clustering: The Comparison between Adaptive Resonance Theory Neural Network and Ant Colony System 2010 Book Series Lecture: Notes in Electrical Engineering, ISSN 1876-1100 Volume 67, Book Advances in Neural Network Research and Applications, Publisher Springer Berlin Heidelberg. DOI 10.1007/978-3-642-12990-2 ISBN 978-3-642-12990-2 (Online), Pages 747-755 .
  30. Bo Xing, Wen-Jing Gao, Fulufhelo V. Nelwamondo, Kimberly Battle and **Tshilidzi Marwala** Two-Stage Inter-Cell Layout Design for Cellular Manufacturing by Using Ant Colony Optimization Algorithms Lecture Notes in Computer Science, Advances in Swarm Intelligence. DOI: 10.1007/978-3-642-13495-1\_35, ISBN 978-3-642-13494-4, Pages 281-289
  31. Perez, M. Rubin, D.M. **Marwala**, T. Scott, L.E. Featherston, J. Stevens, W. The Fuzzy Gene Filter: An Adaptive Fuzzy Inference System for Expression Array Feature Lecture Notes in Computer Science 2010, NUMB 6098, pages 62-71 Publisher Springer-Verlag, ISSN 0302-9743
  32. Linda Mthembu, **Tshilidzi Marwala**, Michael I. Friswell and Sondipon Adhikari Finite element model selection using Particle Swarm Optimization Conference Proceedings of the Society for Experimental Mechanics Series, 1, Volume 13, Dynamics of Civil Structures, Volume 4, Springer London, Pages 41-52 Tom Proulx (Editor) ISBN 978-1-4419-9830-9
  33. IS Msiza, J Mistry, B.B. Leke, FV Nelwamondo and **T. Marwala**. On the introduction of secondary fingerprint classification. ITEC Book Chapter. (accepted)

**Peer-Reviewed Journal Publications:**

34. **T. Marwala** and P.S. Heyns. A multiple criterion method for detecting damage on structures. *American Institute of Aeronautics and Astronautics Journal*, 195 (1998), 1494-1501.
35. **T. Marwala** and P.S. Heyns. New criteria for comparing frequency response functions. *Research & Development Journal*, 14 (1998), 49-55. **Bronze Medal from the SAIME.**
36. **T. Marwala** and H.E.M. Hunt. Fault identification using finite element models and neural networks. *Mechanical Systems and Signal Processing*, 13 (1999), 475-490.
37. **T. Marwala**. On damage identification using a committee of neural networks. *American Society of Civil Engineers, Journal of Engineering Mechanics*, 126 (2000), 43-50.
38. **T. Marwala** and H.E.M. Hunt. Is damage identification using vibration data in a population of cylinders feasible? *Journal of Sound and Vibration*, 237 (2000), 727-732.
39. **T. Marwala**. Probabilistic fault identification using a committee of neural networks and vibration data. *American Institute of Aeronautics and Astronautics, Journal of Aircraft*, 38 (2001) 138-146.
40. **T. Marwala**. Scaled conjugate gradient and Bayesian training of neural networks for fault identification in cylinders. *Computers and Structures*, 79/32 (2001), 2793-2803.
41. **T. Marwala**. On fault identification using pseudo-modal-energies and modal properties. *American Institute of Aeronautics and Astronautics Journal*, 39 (2001), 1608-1617.
42. **T. Marwala**. Probabilistic fault identification using vibration data and neural networks. *Mechanical Systems and Signal Processing*, 15 (2001), 1109-1128. ISSN: 0888-3270.
43. **T. Marwala**. Finite element updating using wavelet data and genetic algorithm. *American Institute of Aeronautics and Astronautics, Journal of Aircraft*, 39 (2002), 709-711.
44. **T. Marwala**. Fault classification using pseudo modal energies and neural networks. *American Institute of Aeronautics and Astronautics Journal*, 2003, 41(1), 82-89.
45. **T. Marwala**. Control of complex systems using Bayesian neural networks and genetic algorithm, *International Journal of Engineering Simulation*, 2004, 5(2), 28-37.
46. **T. Marwala**. Fault classification using pseudo modal energies and probabilistic neural networks. *American Society of Civil Engineers, Journal of Engineering Mechanics*, 2004, 130(11), pp. 1346-1355.
47. **T. Marwala** and S. Sibisi. Finite element updating using Bayesian framework and modal properties *American Institute of Aeronautics and Astronautics, Journal of Aircraft*, 2005, 42(1), pp. 275-278.
48. **T. Marwala**. Finite element model updating using particle swarm optimization. *International Journal of Engineering Simulation*, 2005, 6(2), pp. 25-30.
49. M. Lagazio and **T. Marwala**. Assessing different Bayesian neural network models for militarized interstate dispute. *Social Science Computer Review*, 2005, 24(1), pp. 1-12.
50. L.A. Machowski and **T. Marwala**. Using object oriented calculation process framework and neural networks for classification of image shapes. *International Journal of Innovative Computing, Information and Control*, 2005, 1(4), pp. 609-623.
51. M. Abdella and **T. Marwala**. The use of genetic algorithms and neural networks to approximate missing data in database. *Computing and Informatics*, 2006, 24, pp. 1001-1013.
52. N. Mohamed, D. Rubin and **T. Marwala**. Detection of epileptiform activity in human EEG signals using Bayesian neural networks. *Neural Information Processing – Letters and Reviews*, 2006, 10(1), pp. 1-10.

53. S. Chakraverty, **T. Marwala** and P. Gupta: Response prediction of structural system subject to earthquake motions using artificial neural network. *Asian Journal of Civil Engineering*, 2006, 7(3), pp. 301-308.
54. **T. Marwala** and S. Chakraverty. Fault classification in structures with incomplete measured data using autoassociative neural networks and genetic algorithm. *Current Science*, 2006, 90(4), pp. 542-548.
55. **T. Marwala**, S. Chakraverty, U. Mahola. Fault classification using multi-layer perceptrons and support vector machines. *International Journal of Engineering Simulation*, 2006, vol. 7, no. 1, pp. 29-35.
56. S.M. Dhlamini, F.V. Nelwamondo and **T. Marwala**. Condition monitoring of HV bushings in the presence of missing data using evolutionary computing. *Transactions on Power Systems*, 2006, 1(2), pp. 296-302.
57. Fulufhelo V. Nelwamondo, **T. Marwala** and Unathi Mahola Early Classifications of bearing faults using hidden Markov models, Gaussian mixture models, Mel-frequency Cepstral coefficients and fractals. *International Journal of Innovative Computing, Information and Control*, 2006, Vol. 2, No. 6, pp. 1281-1299.
58. Brain Betechuoh Leke, **T. Marwala** and Thando Tettey. Autoencoder networks for HIV classification. *Current Science*, 2006, vol. 91, no. 11, pp. 1467-1473.
59. F.V. Nelwamondo, U. Mahola and **T. Marwala**. Multi-scale fractal dimension for speaker identification system. *Transactions on Systems*, 2006, 5(5), pp. 1152-1157.
60. B. Leke, **T. Marwala**, T. Tim and M. Lagazio. Using genetic algorithms versus line search optimization for HIV Predictions. *Transactions on Information Science and Applications*, 2006, 4(3), pp. 684-690.
61. B. Leke, **T. Marwala**, T. Tettey. Using inverse neural network for HIV adaptive control. *International Journal of Computational Intelligence Research*, 2007, Vol.3, No. 1, pp. 11-15.
62. **T. Marwala**. Bayesian training of neural network using genetic programming. *Pattern Recognition Letters*, 2007, 28, pp. 452-458.
63. **T. Marwala**, U. Mahola and S. Chakraverty. Fault classification in cylinders using multi-layer perceptrons, support vector machines and Gaussian mixture models. *Computer Assisted Mechanics and Engineering Sciences*, Vol. 14, No. 2, pp. 307-316, 2007.
64. S. Mohamed, **T. Marwala** and D. Rubin. (2007). Adaptive GPCR Classification Based on Incremental Learning. *SAIEE Africa Research Journal*, vol. 98, no. 3, pp. 71-80 (ArXiv: 0704.3453).
65. F. Nelwamondo and **T. Marwala**. (2007). Fuzzy ARTMAP and Neural Network Approach to Online Processing of Inputs with Missing Values. *SAIEE Africa Research Journal*, vol. 98, No. 2, pp. 45-51 (ArXiv: 0705.1031). **2008 SAIEE Premium Best Paper Award.**
66. F.V. Nelwamondo, S. Mohamed and **T. Marwala**. Missing Data: A Comparison of Neural Network and Expectation Maximisation Techniques. *Current Science*, 2007, vol. 93, no. 11, pp. 1514-1521.
67. F. Nelwamondo and **T. Marwala**. Techniques for handling missing data: applications to online condition monitoring. *International Journal of Innovative Computing, Information and Control*, vol. 4, no. 6, 2008, pp. 1507-1526.
68. M. A. Herzog, **T. Marwala**, T. and P.S. Heyns, Machine and Component Residual Life Estimation through the Application of Neural Networks. *Reliability Engineering & System Safety*, Volume 94, Issue 2, February 2009, Pages 479-489.

69. **T. Marwala** and B. Crossingham. HIV status estimation using optimization, rough sets and demographic data. *Current Science*, Vol. 95 No. 9 10 November 2008, pp. 1123-1124.
70. B. Crossingham and **T. Marwala**. Using optimisation techniques for discretizing rough set partitions. *International Journal of Hybrid Intelligent Systems* Volume 5, Issue 4 (December 2008), pp. 219-236.
71. I.S. Msiza, F.V. Nelwamondo, **T. Marwala**. Water demand prediction using artificial neural networks and support vector regression. *Journal of Computers* Vol. 3, No. 11, November 2008.
72. **T. Marwala** and B. Crossingham. Bayesian rough sets. *ICIC Express Letters*, Volume 3, Number 2, June 2009, pp. 115-120.
73. Crossingham, B., **Marwala, T.**, Lagazio, M. Evolutionarily optimized rough sets partitions (2009) *ICIC Express Letters*, 3 (3), pp. 241-246.
74. Marivate, V.N., **Marwala, T.** Introduction of social learning in board games (2009) *ICIC Express Letters*, 3 (3), pp. 253-258.
75. **T. Marwala**, M. Lagazio and T. Tettey. An integrated human-computer system for controlling interstate disputes. *International Journal of Computers and Applications*, Vol. 31, No. 4, 2009, DOI: 10.2316/Journal.202.2009.4.202-2410.
76. Jaisheel Mistry, Fulufhelo V. Nelwamondo, **Tshilidzi Marwala** Missing Data Estimation using Principal Component Analysis and Autoassociative Neural Networks *Journal of Systemics, Cybernetics and Informatics* 7(3), 2009, pp. 72-79
77. Fulufhelo V Nelwamondo, Dan Golding, **Tshilidzi Marwala** A Dynamic Programming Approach to Missing Data Estimation Using Neural Networks. *Information Sciences* (2009), doi:10.1016/j.ins.2009.10.008.
78. P.B. Patel and **T. Marwala**. Caller behaviour classification using computational intelligencer methods. *International Journal of Neural Systems*, (2010) doi: 10.1142/S0129065710002255 pp. 87-93
79. Linda Mthembu, **Tshilidzi Marwala**, Michael I. Friswell and Sondipon Adhikari Model selection in finite element model updating using the Bayesian evidence statistic. *Mechanical Systems and Signal Processing*, (2011) doi: 10.1016/j.ymsp.2011.04.001.
80. Ishmael S. Msiza, Mmamolatelo E. Mathekga, Fulufhelo V. Nelwamondo and **Tshilidzi Marwala** Fingerprint segmentation: An investigation of various techniques and a parameter study of a variance-based method. *International Journal of Innovative Computing, Information and Control* (accepted)

### Peer-Reviewed Conference Proceedings

81. **T. Marwala**, S. Adhikari and P.S. Heyns. Dynamic model updating using pseudo modal energies. In *Proceedings of the 19<sup>th</sup> International Modal Analysis Conference*, Kissimmee, 2001, pp. 207-213.
82. P. Mariano, R. L. Correia, Ribeiro, V. Abramov, N. Szirbik, J. Goossenaerts, **T. Marwala**, P. de Wilde. Simulation of a trading multi-agent system, In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, Tucson, Arizona, USA, 2001, pp. 3378-3384.
83. V.A. Abramov, N.B. Szirbik, J.B.M. Goossenaerts, **T. Marwala**, P. De Wilde, L. Correia, P. Mariano, R. Ribeiro Ontological basis for open distributed multi-agent system, In *Proceedings of the Symposium on Adaptive Agents and Multi-Agent Systems*, York, U.K., 2001, pp. 33-43.

84. **T. Marwala**, P. de Wilde, L. Correia, P. Mariano, R. Ribeiro, V. Abramov, N. Szirbik, J. Goossenaerts, Scalability and optimisation of a committee of agents using genetic algorithm In *Proceedings of the International Symposia on Soft Computing and Intelligent Systems for Industry*, Scotland, 2001. **Best Paper Award**.
85. L. Mdlazi, **T. Marwala**, C. Stander, C. Scheffer and P.S. Heyns, Principal component analysis and automatic relevance determination for damage identification in structures. In *Proceedings of the 21<sup>st</sup> International Modal Analysis Conference*, San Antonio, 2003, pp. 37-42.
86. **T. Marwala**. Finite element model updating using response surface method. In *Proceedings of the 45th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference*, Palm Springs, California, USA, April 2004, AIAA Paper 2004-2005, pp. 5165-5173.
87. **T. Marwala** and M. Lagazio. Modelling and controlling interstate conflict. In *Proceedings of the IEEE International Joint Conference on Neural Networks*, 2004, July 25-29, 2004, Budapest, Hungary, pp. 1233-1238.
88. L.A. Machowski and **T. Marwala**. Representing and matching 2D shapes of natural objects using neural networks, In *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, The Hague, Nederland, 2004, pp. 6366-6372.
89. M.M. Pires and **T. Marwala**. Option pricing using neural networks and support vector machines, In *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, The Hague, Nederland, 2004, pp. 1279-1285.
90. Z.A. Dindar and **T. Marwala**. Option pricing using a committee of neural networks. In *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, The Hague, Nederland, 2004, pp. 434-438.
91. S.M. Dhlamini and **T. Marwala**. Bushing monitoring using MLP and RBF. In *Proceedings of the IEEE Africon 2004*, Gaborone, Botswana, 2004, pp. 613-617.
92. B. van Aardt and **T. Marwala**. Reducing inter-agent communication due to negotiation in multi-agent systems through learning. *Proceedings of the Annual Symposium of the Pattern Recognition Association of South Africa*, Cape Town, 2004, pp. 149-154. ISBN: 0-7992-2278-X.
93. E. Marais and **T. Marwala**. Predicting global Internet instability caused by worms using neural networks. *Proceedings of the Annual Symposium of the Pattern Recognition Association of South Africa*. 2004, Cape Town, pp. 81-85. ISBN: 0-7992-2278-X.
94. S.M. Dhlamini and **T. Marwala**. An application of SVM, RBM and MLP with ARD on bushings. In *Proceedings of the IEEE Conference on Cybernetics and Intelligent Systems (CIS)*, Singapore, 2004, pp. 1254-1259.
95. L. Mdlazi, C.J. Stander, P.S. Heyns, **T. Marwala**. Using artificial intelligence for data reduction in mechanical engineering. *Proceedings of the Annual Symposium of the Pattern Recognition Association of South Africa 2004*, Cape Town, pp. 69-74. ISBN: 0-7992-2278-X.
96. **T. Marwala**. Evolutionary optimization methods in finite element model updating. In *Proceedings of the International Modal Analysis Conference*, Orlando, Florida, USA, 2005.
97. E. Teweldemedhin, **T. Marwala** and C. Mueller Agent-based modelling: A case study in HIV Epidemic. In *Proceedings of the IEEE 4<sup>th</sup> International Conference in Hybrid Intelligent Systems*, 2004, Japan, pp. 154-159.
98. B. van Aardt and **T. Marwala**. A study in a hybrid centralised-swarm agent community. In *Proceedings of the IEEE 3<sup>rd</sup> International Conference on Computational Cybernetics*, 2005, Mauritius, pp. 169-174.

99. M. Abdella and **T. Marwala**. The use of genetic algorithms and neural networks to approximate missing data in database. In *Proceedings of the IEEE 3<sup>rd</sup> International Conference on Computational Cybernetics*, 2005, Mauritius, pp. 207-212.
100. M.M. Pires and **T. Marwala**. American option pricing using Bayesian multi-layer perceptrons and Bayesian support vector machines. In *Proceedings of the IEEE 3<sup>rd</sup> International Conference on Computational Cybernetics*, 2005, Mauritius, pp. 219-224.
101. L.A. Machowski and **T. Marwala**. An object oriented calculation process framework. In *Proceedings of the IEEE 3<sup>rd</sup> International Conference on Computational Cybernetics*, 2005, Mauritius, pp. 201-206.
102. C.B. Vilakazi, R.P. Mautla, E.M. Moloto and **T. Marwala**. On-Line Bushing Condition Monitoring. In *Proceedings of the 5th WSEAS / IASME International Conference on Electric Power Systems, High Voltages, Electric Machines* Editors M.I. Garcia-Planas et al., 2005, pp. 406-411. ISBN: 960-8457-38-6.
103. S. Dhlamini, F.V. Nelwamondo and **T. Marwala**. Sensor failure compensation techniques for HV bushing monitoring using evolutionary computing. In *Proceedings of the 5th WSEAS / IASME International Conference on Electric Power Systems, High Voltages, Electric Machines*, Editors M.I. Garcia-Planas et al., 2005, pp. 430-435. ISBN: 960-8457-38-6.
104. U. Mahola, F.V. Nelwamondo, **T. Marwala**. HMM sub-band based speaker identification. In *Proceedings of the 16<sup>th</sup> Annual Symposium of the Pattern Recognition Society of South Africa*. 2005, Langebaan, South Africa, pp. 123-128. ISBN: 0-7992-2264-X.
105. S. Mohamed, **T. Marwala**. Neural network based techniques for estimating missing data in databases. In *Proceedings of the 16<sup>th</sup> Annual Symposium of the Pattern Recognition Society of South Africa*, 2005, Langebaan, South Africa, pp. 27-32. ISBN: 0-7992-2264-X.
106. N. Mohamed, D.M. Rubin and **T. Marwala**. Detection of epileptiform activity in human EEG signals using Bayesian neural networks. In *Proceedings of the IEEE 3<sup>rd</sup> International Conference on Computational Cybernetics*, 2005, Mauritius, pp. 231-237.
107. T.M. Ransome, D.M. Rubin and **T. Marwala** and E.A. de Kok. Optimising the verification of patient positioning in proton beam therapy. In *Proceedings of the IEEE 3<sup>rd</sup> International Conference on Computational Cybernetics*, 2005, Mauritius, pp. 279-284.
108. E. Habtemariam, **T. Marwala** and M. Lagazio. Artificial intelligence for conflict management. In *Proceedings of the IEEE International Joint Conference on Neural Networks*, Montreal, Canada, 2005, pp. 2583-2588.
109. M. Abdella and **T. Marwala**. Treatment of missing data using neural networks. In *Proceedings of the IEEE International Joint Conference on Neural Networks*, Montreal, Canada, 2005, pp. 598-603.<sup>13</sup>
110. B. Leke and **T. Marwala**. Optimization of the stock market input time-window using Bayesian neural networks. In *Proceedings of the IEEE International Conference on Service Operations, Logistics and Informatics*, Beijing, China, 2005, pp. 883-894.
111. S.M. Dhlamini, T Marwala, Bushing diagnostics using an ensemble of parallel neural networks. In *Proceedings of the IEEEJ-IEEE Symposium on Electrical Insulating*

<sup>13</sup> Top Accessed Articles July 2010 Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on

- Materials (ISEIM05)*, Fukuoka (Japan), 5-9 June 2005, pp. 289-292. ISBN: 4-88686-063-X C
112. **T. Marwala**, S. Chakraverty, U. Mahola. Neural networks and support vector machines for fault identification in cylinders. *In Proceedings of International Symposium on Neural Networks and Soft Computing in Structural Engineering*, Krakow, Poland, 2005.
  113. S.M. Dhlamini, T Marwala. Cost benefit of using a committee of parallel neural networks for bushing diagnostics. *In Proceedings of the IEEE Power Engineering Society Conference (PES05)*, Durban, July 11-15, 2005, pp. 485-488.
  114. S. Dhlamini, **T. Marwala** and J van Coller. Modelling inaccuracies from simulators for HV polymer bushings. *In Proceedings of the XIV<sup>th</sup> International Symposium on High Voltage Engineering*, Tsinghua University, Beijing, China, 2005, Paper A18.
  115. E. Hurwitz and **T. Marwala**. Optimising reinforcement learning for neural networks. *In Proceedings of the 6<sup>th</sup> Annual European on Intelligent Games and Simulation*, Leicester, UK, 2005, pp. 13-18.
  116. D. Starfield, D. Rubin and **T. Marwala**, A geometric method for near-field artefact reduction in planar coded aperture nuclear medicine imaging. *In Proceedings of the 3<sup>rd</sup> European Medical and Biological Engineering Conference*, Prague Czech Republic 2005. ISSN: 1727-1984.
  117. C.B. Vilakazi, **T. Marwala**. Bushing fault detection and diagnosis using extension neural network. *In Proceedings of the 10<sup>th</sup> IEEE International Conference on Intelligent Engineering Systems*, 2006, pp. 170-174.
  118. T. Tettey, **T. Marwala** Controlling interstate conflict using neuro-fuzzy modeling and genetic algorithms. *In Proceedings of the 10<sup>th</sup> IEEE International Conference on Intelligent Engineering Systems*, 2006, pp. 30-44.
  119. **T. Marwala**. Genetic approach to Bayesian training of neural networks. *In Proceedings of the IEEE International Joint Conference on Neural Networks*, BC, Canada, 2006, pp. 7013-7017.
  120. **T. Marwala**, U. Mahola and F. Nelwamondo Hidden Markov models and Gaussian mixture models for bearing fault detection using fractals. *In the Proceedings of the IEEE International Joint Conference on Neural Networks*, BC, Canada, 2006, pp. 5876-5881, ISBN: 0-7803-9489-5. **Best Presentation Award**.
  121. F. Nelwamondo, U. Mahola and **T. Marwala**. Improving speaker identification rate using fractals *In the Proceedings of the IEEE International Joint Conference on Neural Networks*, BC, Canada, 2006, pp. 5870-5875.
  122. S. Mohamed, T. Tettey and **T. Marwala** An extension neural network and genetic algorithm for bearing fault classification *In the Proceedings of the IEEE International Joint Conference on Neural Networks*, BC, Canada, 2006, pp. 7673-7679, ISBN: 0-7803-9489-5. **Best Presentation Award**.
  123. Lukasz A. Machowski, and **T. Marwala**. Using images to create a hierarchical grid spatial index. *In Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 1974-1979.
  124. S.M. Dhlamini, **T. Marwala**, and T. Majozi. Fuzzy and multilayer perceptron for evaluation of HV bushings. *In Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 1331-1336.
  125. B. Betechouh Leke and **T. Marwala**. Ant Colony Optimization for Missing Data Estimation. *In Proceeding of the Pattern Recognition of South Africa*, 2006, pp. 183-188, ISBN 10: 0-620-37384-9.

126. F. Nelwamondo and **T. Marwala**. Fault detection using Gaussian mixture models, mel-frequency cepstral coefficient and kurtosis. *In Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 290-295.
127. B.C. Vilakazi and **T. Marwala**. Application of feature selection and fuzzy ARTMAP to intrusion detection. *In Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 4880-4885.
128. B.B. Leke, **T. Marwala**, T. Tim, M. Lagazio. Prediction of HIV Status from Demographic Data Using Neural Networks. *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 2339-2344.
129. S. Mohamed, D. Rubin and **T. Marwala**. Multi-class Protein Sequence Classification Using Fuzzy ARTMAP. *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 1676-1681.
130. P.B. Patel and **T. Marwala**. Forecasting closing price indices using neural networks. *In Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Taiwan, 2006, pp. 2351-2356.
131. **T. Marwala**, T. Tettey and S. Chakraverty. Fault classification in structures using pseudomodal energies and neuro-fuzzy modelling. *In Proceedings of the Asia-Pacific Workshop on Structural Health Monitoring*, Yokohama, Japan, 2006. Invited Paper.
132. T. Tettey, F. V. Nelwamondo and **T. Marwala**, HIV data analysis via rule extraction using rough sets, *In Proceedings of the 11<sup>th</sup> IEEE International Conference on Intelligent Engineering Systems*, 29 June-1July 2007, Budapest, Hungary, pp. 105-110.
133. Thando Tettey and **T. Marwala**. Conflict modelling and knowledge extraction using computational intelligence methods. *In Proceedings of the 11<sup>th</sup> IEEE International Conference on Intelligent Engineering Systems*, 29 June-1July 2007, Budapest, Hungary, pp. 161-166.
134. F.V. Nelwamondo and **T. Marwala**. Rough set theory for the treatment of incomplete data. *In Proceedings of the IEEE Conference on Fuzzy Systems*, 2007 pp. 338-343.
135. I.S. Msiza, F.V. Nelwamondo and **T. Marwala**. Water demand forecasting using multi-layer perceptron and radial basis functions. *In the IEEE Proceedings of the International Joint Conference on Neural Networks*, 2007, 13-18.
136. Shakir Mohamed, David Rubin and **T. Marwala**. Incremental learning for classification of protein sequences. *In Proceedings of the IEEE International Joint Conference on Neural Networks*, 2007, pp. 19-24.
137. C.B. Vilakazi and **T. Marwala**. Online incremental learning for high voltage bushing condition monitoring. *In Proceedings of the IEEE International Joint Conference on Neural Networks*, 2007, pp. 2521-2526.
138. D. Starfield, D.M. Rubin, **T. Marwala**. High transparency coded apertures in planar nuclear medicine imaging. *29th International Conference of the IEEE Engineering in Medicine and Biology Society*, Lyon, France 2007, pp. 4468-4471.
139. D.M., Starfield, D.M. Rubin, **T. Marwala**, R.J. Eddy. High-transparency coded apertures in planar nuclear medicine imaging: Experimental results. *Proceedings of the IEEE Nuclear Science Symposium Conference Volume 4*, pp. 3151 - 3154
140. Sizwe M. Dhlamini, Michael O. Kachienga, **T. Marwala**. Artificial intelligence as an aide in management of security technology. *IEEE 2007 Africon Conference*, pp. 1-5.<sup>14</sup>

<sup>14</sup> Top Accessed Article in July 2010 from the AFRICON 2007

141. Jonathan Michael Spiller, **T. Marwala**. Evolutionary algorithms for warp control point placement. *The 2<sup>nd</sup> International Symposium on Intelligence Computation and Applications (ISICA 2007)* Wuhan, China, pp. 327-331.
142. Gregory Hulley and **T. Marwala**. Genetic algorithm based incremental learning for optimal weight and classifier selection. In *Computational Models for Life Sciences. American Institute of Physics Series*, **952**, 2007, pp. 258-267 doi: 10.1063/1.2816630, ISSN: 0094243X.
143. Bodie Crossingham and **T. Marwala**. Using optimisation techniques to granulise rough set partitions. In *Computational Models for Life Sciences, American Institute of Physics 952*, 2007, pp. 248-257, doi: 10.1063/1.2816629, ISSN: 0094243X.
144. Jonathan Michael Spiller, **T. Marwala**. Object localization in aerial images using deformable templates. *First International Symposium on Information and Computer Elements, ISICE, 2007*, Kitakyushu, Japan, pp. 343-347.
145. D. Surajpal and **T. Marwala**. An Independent Evaluation of Subspace Face Recognition Algorithms. *Proceedings of the 18th Annual Pattern Recognition Association of South Africa*, 2007, ISBN: 978-86840-656-2, ArXiv: 0705.0952.
146. S. Scurrall, D.M. Rubin and **T. Marwala**. Automatic Detection of Pulmonary Embolism using Computational Intelligence Techniques, *Proceedings of the 18<sup>th</sup> Annual Pattern Recognition Association of South Africa*, 2007, ISBN: 978-86840-656-2.
147. Evan Hurwitz and **T. Marwala**. Learning to bluff: A multi-agent approach. *IEEE International Conference on Systems, Man and Cybernetics*, 2007, Montreal, Canada, pp. 1188-1193.
148. Msiza, F.V. Nelwamondo and **T. Marwala**. Artificial neural networks and support vector machines for water demand time series forecasting. *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, Montreal, Canada, 2007, pp. 638-643.
149. Gidudu, G. Hulley and **T. Marwala**. Image classification using SVMs: One-against-one vs One-against-all. *Proceeding of the 28<sup>th</sup> Asian Conference on Remote Sensing*, 2007, Malaysia, ISBN: 978-983-43550-0-5.
150. Gidudu, G. Hulley and **T. Marwala**. An SVM multiclassifier approach to land cover mapping. ASPRS 2008 Annual Conference Portland, Oregon ♦ April 28 – May 2, 2008.
151. E. Hurwitz and **T. Marwala**. Multi-agent modeling of interaction-based card games. *In the Proceedings of the 3<sup>rd</sup> International North American Conference on Intelligent Games and Simulation*, 2007, University of Florida, USA, pp. 23-28.
152. B.B. Leke, **T. Marwala** and J.V. Manana. Computational intelligence for HIV modelling. *Proceedings of the IEEE Conference on Intelligent Engineering Systems*, 2008, pp. 127-132.
153. V. Marivate, G. Ssali, **T. Marwala**. An intelligent multi-agent recommender system for human capacity building. *Proceedings of the 14th IEEE Mediterranean Electrotechnical Conference*, 2008, pp. 909 – 915.
154. V.N. Marivate, V. F. Nelwamondo, **T. Marwala**, Investigation into the use of Autoencoder Neural Networks, Principal Component Analysis and Support Vector Regression in estimating missing HIV data, *Proceedings of the 17th World Congress of The International Federation of Automatic Control*, Seoul, Korea, July 6-11, 2008, pp 682-689.

155. George Ssali and **T. Marwala**. Estimation of missing data using computational intelligence and decision trees. *Proceedings of the IEEE International Joint Conference on Neural Networks*, 2008, pp. 201-207.
156. B.B.E. Kiremile and **T. Marwala**. Non-stationarity detection: A stationarity index approach. *Proceedings of the IEEE International Congress on Image and Signal Processing*, 2008, pp. 373-378.
157. F. V. Nelwamondo and **T. Marwala**, Key issues on computational intelligence techniques for missing data imputation- A review, *Proceedings of the 12th World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2008*, June 29th –July 2nd, Orlando, Florida, USA, pp. 36-41.
158. J. Mistry, F. V. Nelwamondo and **T. Marwala**, Using principal component analysis and autoassociative neural networks to estimate missing data in a database, *Proceedings of the 12th World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2008*, June 29th –July 2nd, Orlando, Florida, USA, pp. 24-29. **Best Paper Award**.
159. A.K. Mohamed, F. V. Nelwamondo and **T. Marwala**. Estimation of missing data: Neural networks, principal component analysis and genetic algorithms. *Proceedings of the 12th World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2008*, June 29th –July 2nd, Orlando, Florida, USA, pp. 36-41.
160. V. Marivate and **T. Marwala**. Relational networks for HIV classification. *Proceedings of the IASTED Africa Conference on Modelling and Simulation*, Editor: F.J. Ogwu, pp. 275-279.
161. N. Hlalele, F.V. Nelwamondo and **T. Marwala**. Estimation of missing data using a neuro-fuzzy architecture. *Proceedings of the IASTED Africa Conference on Modelling and Simulation*, Editor: F.J. Ogwu, pp. 24-29.
162. L. Masisi. F.V. Nelwamondo and **T. Marwala**. The effect of structural diversity of an ensemble of classifiers on classification accuracy *Proceedings of the IASTED Africa Conference on Modelling and Simulation*, Editor: F.J. Ogwu, pp. 135-140.
163. J. Mistry, F.V. Nelwamondo and **T. Marwala**. Investigation of autoencoder neural network accuracy for computational intelligence methods to estimate missing data. *Proceedings of the IASTED Africa Conference on Modelling and Simulation*, Editor: F.J. Ogwu, pp. 275-279.
164. M. Perez, D. Rubin and **T. Marwala**. Simulation of Retinal Function: A fuzzy-linear approach. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, pp. 1079 - 1084.
165. W.S. Miya, L.J. Mpanza, F.V. Nelwamondo and **T. Marwala**. Condition monitoring of oil-impregnated paper bushings using extension neural network, Gaussian mixture models and hidden Markov models. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, pp. 1954 - 1959.
166. **T. Marwala** and B. Crossingham. Neuro-rough models for modelling HIV. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, pp. 3089 - 3095.
167. Pretesh Patel and **T. Marwala**. Interactive voice response field classifiers. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, pp. 3425 - 3430.
168. Crossingham, **T. Marwala**, and M. Lagazio. Optimized rough sets for modelling interstate conflict. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, pp. 1198 - 1204.

169. W. Majavu, T. van Zyl and **T. Marwala**. Classification of web resident sensor resources using latent semantic indexing and ontologies. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, pp. 518 - 523.
170. P.B. Patel and **T. Marwala**. Interactive voice response field classifiers. *Proceedings of the IEEE International Conference on Man, Systems and Cybernetics*, 2008, Page 3425 - 3430.
171. L. Mthembu and **T. Marwala**, M.I. Friswell and S. Adhikari. Bayesian evidence for finite element model updating. *Proceedings of the IMAC XXVII*, Orlando, Florida, 9-12 February 2009.
172. M. Perez, D.M Rubin, **T. Marwala**, L.E Scott, W. Stevens. A hybrid fuzzy-SVM classifier, applied to gene expression profiling for automated leukaemia diagnosis. *Proceedings of the IEEE Conference Israel*, 2008, pp. 041 - 045.
173. J. Mistry, F.V. Nelwamondo and **T. Marwala**. Estimating missing data and determining the confidence of the estimate data. *Proceedings of the 2008 International Conference on Machine Learning and Applications (ICMLA'08)*, 752 - 755.
174. V.N. Marivate and **T. Marwala**. Social learning methods in board game agents. *Proceedings of the 2008 IEEE Symposium on Computational Intelligence and Games*, Australia, Pages 323 - 328.
175. Masisi, L.; Nelwamondo, V.; **Marwala, T.** The use of entropy to measure structural diversity. *Proceedings of the IEEE International Conference on Computational Cybernetics*, 2008, pp. 41 – 45.
176. Gidudu, Abe, B., and **T. Marwala**, 2008. Ensemble Feature Selection for Hyperspectral Imagery. In *Proceedings of the 19th Annual Symposium of the Pattern Recognition Association of South Africa*. Cape Town, South Africa 27th – 29th November 2008.
177. Kiremire, Bunty B. E.; **Marwala, Tshilidzi**. Nonstationarity Detection: The Use of the Cross Correlation Integral in ECG, and EEG Profile Analysis. *IEEE Congress on Image and Signal Processing*, 2008. CISP '08. , Volume 5, 27-30 May 2008 pp. 373 - 378.
178. Mistry, J.; Nelwamondo, F.V.; **Marwala, T.** Investigating a Predictive Certainty measure for Ensemble Based HIV Classification. *IEEE International Conference on Systems, Computational Cybernetics*, 2008. ICCS 2008, 27-29 Nov. 2008 pp. 231 - 236.
179. **T. Marwala** and Meir Perez. Stochastic optimization approaches for solving Sudoku. *Proceedings of SAGO*, 2008, ArXiv: 0805.0697.
180. T.C. Malumedzha and T. Marwala Classification of Satellite Sensed Data using Genetically Optimized Auto-Associative Cellular Neural Networks. *Intelligent Systems and Control (ISC 2008) Symposia: Computational Biology and Bioinformatics Environmental Modelling and Simulation Modern Nonlinear Theory* (2008)
181. Abe, A. Jimoh and **T. Marwala**. Optimization of Radio Frequency Usage. *IEEE Africon 2009*, Digital Object Identifier 10.1109/AFRCON.2009.5308110.
182. P.B. Patel and **T. Marwala**. Genetic Algorithms, Neural Networks, Fuzzy Inference System, Support Vector Machines for Call performance classification. *IEEE ICMLA 2009*, 415-420.
183. M. Perez, J. Featherston, **T. Marwala**, L.E. Scott, W. Stevens, D.M. Rubin Differentially Expressed Gene Identification based on Separability Index. *IEEE ICMLA 2009*, 429-434.

184. M. J. Russell, D. M. Rubin, **T. Marwala** and B. Wigdorowitz A Voting and Predictive Neural Network System for use in a New Artificial Larynx. IEEE ICBPE 2009, Digital Object Identifier 10.1109/ICBPE.2009.5384105.
185. Gidudu, Anthony; Bolanle, Abe T.; **Marwala, Tshilidzi**; Random ensemble feature selection for land cover mapping. Geoscience and Remote Sensing Symposium,2009 IEEE International, IGARSS 2009, Volume: 2, Digital Object Identifier: 10.1109/IGARSS.2009.5418226, Publication Year: 2009 , Page(s): II-840 - II-842
186. Bo Xing, Fulufhelo V. Nelwamondo, Kimberly Battle, Wenjing Gao and **Tshilidzi Marwala** Application of Artificial Intelligence (AI) Methods for Designing and Analysis of Reconfigurable Cellular Manufacturing System (RCMS) 2nd IEEE International Conference on. Adaptive Science & Technology Catching Up With Technology14-16 December 2009 - Accra, GHANA, pp. 402 - 409.
187. Bo Xing, Wenjing Gao, Fulufhelo V. Nelwamondo, Kimberly Battle and **Tshilidzi Marwala**. Cellular Manufacturing System Scheduling under Fuzzy Constraints: a Group Technology Perspective. FUZZ-IEEE 2010, pp. 887-894.
188. Bo Xing, Wenjing Gao, Fulufhelo V. Nelwamondo, Kimberly Battle and **Tshilidzi Marwala**. Ant Colony Optimization for Automated Storage and Retrieval System. IEEE CEC 2010, pp. 1133-1139.
189. G.G. Anderson, FV Nelwamondo and **T. Marwala**. A Response Surface Methodology Approach to Operating System Scheduler Tuning. IEEE SMC, pp. 2684-2689.
190. B. Abe, A. Gidudu and **T. Marwala** Investigating the effects of ensemble classification on remotely sensed data for land cover mapping. IEEE IGARSS (accepted)
191. C.D. Boesack, **T. Marwala** and F.V. Nelwamondo Application of GA-Fuzzy Controller Design to Automatic Generation Control. IEEE IWACI2010, Digital Object Identifier: 10.1109/IWACI.2010.5585127, 2010 , Page(s): 227 – 232
192. Bo Xing, Wen-Jing Gao, Kimberly Battle, Fulufhelo V. Nelwamondo and **Tshilidzi Marwala** Ant Stigmergy Shop Floor Control Architecture for Intelligent Product Oriented Manufacturing System IEEE SMC, pp. 4182-4189.
193. Bo Xing, Wen-Jing Gao, Kimberly Battle, Fulufhelo V. Nelwamondo and **Tshilidzi Marwala** Intelligent Travel Route Planning for Bridge Crane Type of Material Handling Equipment in Cellular Manufacturing. IEEE SMC, pp. 2795-2799.
194. Bo Xing, Wen-Jing Gao, Kimberly Battle, Fulufhelo V. Nelwamondo and **Tshilidzi Marwala** Can Ant Algorithms Make Automated Guided Vehicle System More Intelligent? IEEE SMC, pp. 3226-3234.
195. G.G. Anderson, FV Nelwamondo and **T. Marwala**. Application of Global and One-Dimensional Local Optimization to Operating System Scheduler Tuning. Proceedings of PRASA, pp. 7-11.
196. Bo Xing, Wen-Jing Gao, Kimberly Battle, **Tshilidzi Marwala** and Fulufhelo V. Nelwamondo. Artificial Intelligence in Reverse Supply Chain Management: The State of the Art. Proceedings of PRASA, pp. 305-310.
197. Omar F Hamad and **Tshilidzi Marwala**. Enhanced-Delivery Overlay Multicasting Scheme by Optimizing Bandwidth and Latency Discrepancy Ratios. Proceedings of the ICCET, Amsterdam, The Netherlands, September 28-30, 2010, pp. 534-542.
198. Mlungisi Duma, Bhakisipho Twala, **Tshilidzi Marwala** and Fulufhelo V. Nelwamondo Classification Performance Measure Using Missing Insurance Data: A Comparison Between Supervised Learning Models. 2010 International Conference on Computer and Computational Intelligence, pp.550 - 555, Nanning, China.

199. Lindokuhle Justice Mpanza and **Tshilidzi Marwala**, Rough Set Theory for HV Bushings Fault Detection Trade-off between accuracy and transparency. Proceedings of the 3rd International Conference on Machine Learning and Computing (ICMLC 2011), Volume 2, pp. 121-125.
200. M. Perez, J. Featherston, **T. Marwala**, L.E. Scott, W. Stevens, D.M. A population-based incremental learning approach to microarray gene expression feature selection. IEEE 26<sup>th</sup> Convention of Electrical and Electronics Engineers, Israel (accepted).
201. Mlungisi Duma, Bhakisipho Twala, **Tshilidzi Marwala** and Fulufhelo V. Nelwamondo Predicting Risk using Missing Insurance Data: A Comparison between Decision Trees and Artificial Neural Networks. The 2010 International Congress on Computer Applications and Computational Science (accepted).
202. Mlungisi Duma, Bhakisipho Twala, **Tshilidzi Marwala** and Fulufhelo V. Nelwamondo Improving the classification performance of Ripper using feature selection: A comparative study. ICINCO 2011 : 8th International Conference on Informatics in Control, Automation and Robotics (accepted).
203. G.G. Anderson, FV Nelwamondo and **T. Marwala**. Comparison of Bootstrapping and Finite State Machine Simulations of a Scheduling Benchmark. International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering (CISSE 10) (accepted)
204. Ishmael Msiza, Michal Szewczyk, Adrian Halinka, Jan-Harm Pretorius, Pawel Sowa, and Tshilidzi Marwala. Neural Networks on Transformer Fault Detection: Evaluating the Relevance of the Input Space Parameters. 2011 IEEE PES Power Systems Conference & Exposition , March 20 - 23, 2011, Phoenix, Arizona, USA, (accepted).
205. Tshegofatso Thejane, Fulufhelo V. Nelwamondo, Tendani C. Malumedzha, **Tshilidzi Marwala**. Otoacoustics emissions: A review on existing human auditory system modelling approaches. IASTED Conference on Modelling and Simulation (accepted)
206. Meir Perez, **Tshilidzi Marwala** The fuzzy gene filter: A classifier performance assessment. IASTED Conference, Cambridge from July 11 to July 13 (accepted)
207. L.J. Mpanza and **T. Marwala** Artificial Neural Network and Rough Set for HV Bushings Condition Monitoring IEEE INES (accepted)

#### **Selected Papers in Local/Popular Journals/Magazines/Archives:**

208. **T. Marwala**. Relevance of artificial intelligence in South African technology arena. In BIT Forum Supplement Enterprise May 2002. 10-11.
209. **T. Marwala**. Using computers to monitor the health of structures. *Science in Africa*, Issue. 27, June 2003.
210. **T. Marwala**. *Column*: Moulding leaders for 21<sup>st</sup>-century challenges. *City Press*, 24 April 2005, p. 18.
211. **T. Marwala**. Condition monitoring of mechanical systems. *Electricity + Control*, January 2005, pp. 33-35.
212. **T. Marwala**. The artificial beer taster. *Electricity + Control*, May 2005, pp. 22-23.
213. **T. Marwala**. The national democratic revolution, technology and a developed economy. *Umrabulo*, Vol. 22, 2005, pp. 58-60.
214. **T. Marwala**. Mobilising the cadre to defeat the challenges of the 21st century. *Umrabulo*, Vol. 23, 2005, pp. 80-82.
215. **T. Marwala**. Strategies and tactics for increasing economic participation. *Umrabulo*, Vol. 24, 2005, pp. 41-43.

216. **T. Marwala.** Bridging the digital divide. *South Africa: The Quarterly Journal for Trade Partners and Investors*. Vol. 3, No. 4, 2006, pp. 19-22.
217. **T. Marwala.** *Column:* Power blackouts can be beaten. *City Press*, 5 March 2006, p. 22.
218. **T. Marwala.** Local Loop Unbundling. *EngineerIT* April 2007, page. 8.
219. E. Marais, **T. Marwala.** Predicting the presence of internet worms using novelty detection. *ArXiv: 0705.1288*.
220. **T. Marwala.** *Column:* South Africa's economy can be revolutionised. *City Press*, 30 April 2006, pp. 22.
221. **T. Marwala.** Die kragonderbrekings hou 'n paar lesse in. *Rapport* 4 March, 2006.
222. **T. Marwala.** Skills necessary for the advancement of South Africa. *Umrabulo*, Vol. 26, 2006, pp. 60-61.
223. **T. Marwala.** Prospects for improved skills capacity. *Umrabulo*, Vol. 28, 2007, pp. 6-8.
224. **T. Marwala.** The anatomy of capital and the National Democratic Revolution. In *Umrabulo*, Vol. 29, 2007, pp. 57-59.
225. **T. Marwala.** Local loop unbundling recommendations - What does it mean for an ordinary person? *EngineerIT*, p. 10, June 2007.
226. **T. Marwala.** Letters: The Chinese Century. *Time Magazine*. February 2007, Vol. 169, No. 6, p. 10.
227. **T. Marwala.** Building human capital in South Africa. *Acumen 3<sup>rd</sup> Quarter* 2007, pp. 22-29.
228. **T. Marwala.** Letters: A South African success story. *Time Magazine*, 22 September 2008, p.8.
229. **T. Marwala.** Letters: Democracy in South Africa. *Time Magazine*, 30 April 2009, p.8.
230. **T. Marwala.** Letters: First amongst equals. *The Economist* 16 May 2009, p. 20.
231. Baruch Lubinsky, Bakir Genc and **T. Marwala.** Dynamically Weighted Mixture of Experts for the Prediction of Platinum Prices. arXiv:0812.2785 (December 2008).
232. Sarah Wright, **T. Marwala.** Artificial Intelligence Techniques for Steam Generator Modelling. 2006, arXiv:0811.1711.
233. Dan Golding, Linda Wilson, **T. Marwala.** Emergency Centre Organization and Automated Triage System. 2008, arXiv:0810.3671.
234. Darren Blend and **T. Marwala.** Comparison of Data Imputation Techniques and their Impact. 2008, arXiv:0812.1539.
235. D. Moon and **T. Marwala.** Missing Data using Decision Forest and Computational Intelligence. 2008, arXiv:0812.1615.
236. **T. Marwala.** Foundations for a Developmental State: A case for technical education, 2009, arXiv:0907.2019.
237. Evan Hurwitz and **Tshilidzi Marwala** Machine Learning Techniques to Portfolio Optimisation. arXiv:0910.2276
238. **T. Marwala.** Telecoms unbundling will be good for consumers. *City Press* 8 July 2007, pp. 22.
239. **T. Marwala.** Foundations of the developmental state, the case for engineering education. *Umrabulo*, Number 33, 2nd Quarter 2010.
240. **T. Marwala.** Work Integrated Learning and the National Democratic Revolution. *ANC Today*, Vol. 10, No. 23 • 25 June - 1 July 2010.
241. G.G. Anderson, FV Nelwamondo and **T. Marwala.** Use of Data Mining in Scheduler Optimization. arXiv:1011.1735.
242. **T. Marwala.** Reflections on industrial strategy. *Umrabulo*, Number 35, 1<sup>st</sup> Quarter 2011, pp. 10-13.

243. **T. Marwala.** The platinum group metals and the national democratic society. The Thinker, Vol. 28, pp. 28-30.

### Theses:

- T-1. **T. Marwala.** Fault identification using neural networks and vibration data. Doctor of Philosophy Topic, *University of Cambridge*, 2001. (Supervisor: Dr. HEM Hunt)
- T-2. **T. Marwala.** Multi-criteria method for determining damage on structures. Masters of Engineering Topic, *University of Pretoria*, 1997. (Supervisor: Prof. PS Heyns)

### LEADERSHIP EXPERIENCE:

- International Committee: World Congress Automation Congress, Mexico, 2012.
- Programme Committee: The First International Symposium on Information Management (SIKM2010) Venue/Country: Dalian, China (2010)
- Programme Committee: The 14<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2010.
- International Advisory Committee: International Conference on 'Challenges and Applications of Mathematics in Science and Technology (CAMIST)' (11-Jan-2010 to 13-Jan-2010 ), Orissa, India.
- International Program Committee: The Third IASTED African Conference on Modelling and Simulation, Botswana, (2010).
- Conference Committee: GAMEON'2009, November 26-28, 2009, Media design Hochschule, Duesseldorf, Germany.
- Program Committee: Invention 2009, Poland.
- International Committee: 8<sup>th</sup> International Symposium on Soft Computing for Industry (ISSCI), Kobe, Japan (2010).
- Program Committee: Symposium on Intelligent Informatics (ISII2009), QinHuangDao, China, (2009).
- Program Committee: The 13<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2009, Orlando, USA (2009)
- International Program Technical Committee: Africon 2009, Kenya, (2009).
- Organizing Committee: International Workshop on Stochastic and Applied Global Optimization, Johannesburg, South Africa, (2008).
- International Program Committee: IASTED International Conference on Modelling and Simulation (Africa-MS ), Botswana, (2007)
- Invited Talk: Asia-Pacific Workshop on Structural Health Monitoring, Japan, (2006)
- Member of the Technical Committee: World Congress in Computational Intelligence (WCCI2008) Hong Kong, China
- Member of the Steering Committee: 19<sup>th</sup> World Congress of the International Federation of Automatic Control, Cape Town, South Africa 2014.
- International Technical Committee: BIONETICS 2007, Hungary.
- Scientific Committee: GAMEON-NA 2007, University of Florida, USA.
- Scientific Committee: GAMEON 2007, University of Bologna, Italy.
- Moderator: Science and Technology Policy Forum, Tokyo, Japan (2005)
- Chair of 5 Sessions: IEEE International Conference on Systems, Man and Cybernetics, Taiwan, (2006)

- Chair of 2 Sessions: World Congress on Computational Intelligence, Vancouver, Canada (2006)
- Member of Scientific Committee: The 2006 IASME/WSEAS International Conference on Energy and Environmental Systems, 2006, Chalkis, Evia Island, Greece, Portugal (2006)
- Member of Scientific Committee: The 6<sup>th</sup> WSEAS International Conference on Power Systems, 2006, Lisbon, Portugal (2006)
- Chair of Session: International Symposium on Neural Networks and Soft Computing, Krakow, Poland, (2005)
- Chair of Session: International Conference on Computational Cybernetics, Mauritius (2005)
- Chairman of Delegation of City Power Johannesburg: Negotiations with the Municipal Workers Union of South Africa (2005)
- Chairman of the National Advisory Council on Innovation Delegation: Parliament of the Republic of South Africa Portfolio Committee on Science and Technology – Annual Report (2005) and Business Plan (2006)
- Chair of Session: International Symposia on Soft Computing & Intelligent Systems for Industry, Scotland (2001).

## **STUDENT SUPERVISION**

### **Master's Supervision:**

1. Mr. Lungile Mndileki Zanoxolo Mdlazi, 2003, M.Eng. (Mechanical Engineering), Completed with distinction in Thesis, University of Pretoria. Topic: A synchronous filter for gear vibration monitoring using computational intelligence. Where last tracked? Senior Engineer at Anglo American Corporation
2. Mr. Nadim Mohamed, 2003, M.Sc. (Electrical Engineering) – Completed with a distinction University of the Witwatersrand Topic: Detection of Epileptic Activity in the EEG Using Artificial Neural Networks Where last tracked? Consultant at Accenture
3. Brain Betechuoh Leke, 2005, M.Sc. (Electrical Engineering) – Completed with a distinction University of the Witwatersrand. Topic: Optimal Selection of Stocks Using Computational Intelligence Methods. Where last tracked? Systems Engineer in a Johannesburg based company
4. Mr. Zaheer Ahmed Dindar, 2005, M.Sc (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Artificial Neural Networks Applied to Option Pricing. Where last tracked? IT Engineer in London England
5. Mr. Michael M. Pires, 2005, M.Sc. (Electrical Engineering) – Completed with a distinction, University of the Witwatersrand. Topic: Option Pricing Using Support Vector Machines and Neural Networks. Where last tracked? IT Engineer at Standard Bank
6. Mr. Bradley van Aardt, 2005, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Multi-Agent Communication and Collaboration. Where last tracked? IT Engineer at Entelect Solutions
7. Mr. Lukasz A. Machowski, 2005, M.Sc. (Electrical Engineering) – Completed with a distinction, University of the Witwatersrand. Topic: Image shape classification using computational intelligence and object orientation. Where last tracked? IT Engineer in Johannesburg
8. Mr. Mussa Abdella, 2006, M.Sc. (Electrical Engineering)–Completed with distinction in Topic, University of the Witwatersrand. Topic: The use of genetic algorithms and neural networks to approximate missing data in database. Where last tracked? IT Engineer in Norway

9. Mr. E Habtemariam, 2006, M.Sc. (Electrical Engineering)–Completed with distinction in thesis, University of the Witwatersrand. Topic: Artificial intelligence for conflict management. Where last tracked? IT Engineer in Johannesburg
10. Mr. Elbert Marais, 2006, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Predicting global internet instability caused by worms using neural networks. Where last tracked? Manager in a Johannesburg based company
11. Mr. Trevor Ransome, 2006, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Automatic minimization of patient setup errors in proton beam therapy. Where last tracked? IT Engineer in Cape Town
12. Mr. Gareth Setati, 2007, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Machine learning for decision-support in distributed networks. Where last tracked? IT Engineer at SAP in Germany
13. Ms. Morongwe Malebye, 2007, M.B.A. – Completed. University of the Witwatersrand. Topic: Forecasting the JSE All Index share using neural network techniques. Where last tracked? CEO of a Johannesburg based company
14. Mr. T. Djonon Hypolyte, 2007, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Machine condition monitoring using neural networks: feature selection using genetic algorithm . Where last tracked? IT Engineer in Johannesburg
15. Ms. Taryn Tim, 2007, M.Sc. (Electrical Engineering) – Completed with Distinction, University of the Witwatersrand. Topic: Predicting HIV status using neural networks and demographic factors. Where last tracked? Systems Engineer at SABMiller
16. Mr. Pretesh Patel, 2007, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: A forecasting of indices and corresponding investment decision making application. Where last tracked? Engineer in Johannesburg based company
17. Mr. Simon Scurrall, 2007, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Automatic detection of pulmonary embolism using computational intelligence. Where last tracked? Engineer in London England
18. Mr. Evan Hurwitz, 2007, .Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Multi-Agent Modelling using Intelligent Agents in Competitive Games. Where last tracked? Engineer at EOH (Pty) Ltd
19. Mr. Lunga Dalton, 2007, M.Sc. (Electrical Engineering) – Completed with Distinction, University of the Witwatersrand. Topic: Time series analysis using fractal theory and ensemble classifiers with application to stock portfolio optimization. Where last tracked? Researcher at Purdue University, USA
20. Mr. Dhires Surajpal, 2007, M.Sc. (Electrical Engineering) – Completed with Distinction, University of the Witwatersrand. Topic: An independent evaluation of subspace facial recognition algorithms. Where last tracked? Consultant at Accenture
21. Mr. Thando Tettey, 2007, M.Sc. (Electrical Engineering) – Completed with Distinction, University of the Witwatersrand. Topic: A computational intelligence approach to modelling interstate conflict: Conflict and causal interpretations. Where last tracked? Engineer at a Defense Industry
22. Mr. Shakir Mohamed, 2007, M.Sc. (Electrical Engineering) – Completed with Distinction, University of the Witwatersrand. Topic: Dynamic protein classification: adaptive models based on incremental learning strategies. Where last tracked? Researcher at the University of Cambridge
23. Mr. Michael Herzog, 2007, MEng (Mechanical Engineering) – Completed with Distinction, University of Pretoria. Topic: Machine and component residual life estimation through the application of neural networks. Where last tracked? Engineer in Johannesburg

24. Ms. Busisiwe Vilakazi, 2007, M.Sc. (Electrical Engineering) – Completed with Distinction, University of the Witwatersrand. Topic: Machine condition monitoring using artificial intelligence: The incremental learning and multi-agent system approach. Where last tracked? Researcher at Oxford University
25. Mr. Daniyel Falk, 2007, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Enhancement of Noisy Planar Nuclear Medicine Images using Mean Field Annealing. Where last tracked? IT Engineer in Johannesburg
26. Mr. Jonathan Spiller, 2007, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Object localization using deformable templates. Where last tracked? Engineer in London England
27. Mr. Bodie Crossingham, 2008, M.Sc. (Electrical Engineering) – Completed with Distinction. University of the Witwatersrand. Topic: Rough Set Partitioning Using Computational Intelligence Approach. Where last tracked? Consultant Accenture
28. Mr. Greg Hulley, 2008, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Incremental Learning Algorithms Applied to Flow Cytometry Data for Multi-Class Diagnosis of Leukemia. Where last tracked? F.L. Schmidt Minerals
29. Mr. Buntj Kiremile, 2008, M.Sc. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Non-stationarity Detection
30. Nthabiseng Unathi Hlalele, 2009, MSc (Electrical Engineering) – Completed with Distinction. University of the Witwatersrand. Topic: The impact of missing data imputation on HIV classification
31. Vukosi Marivate, 2009, MSc (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Investigation into the effect of social learning in reinforcement learning board game playing agents PhD Student at Rutgers University
32. Jaisheel Mistry, 2009, MSc (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Estimating Missing Data with Confidence Intervals
33. Lesedi Masisi, 2009, MSc (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Investigating the structural diversity within a committee of classifiers and their generalization performance. PhD Student at Concordia University in Canada
34. Tendani Malumedzha, 2009, MSc (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Modeling Multiple Object Scenarios for Feature Recognition and Classification Using Cellular Neural Networks
35. Wabo Majavu, 2009, MSc (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Classification of web resident sensor resources using latent semantic indexing and ontologies. Works for Accenture
36. Miguel Fernandes, 2011, MSc (Electrical Engineering) (completed subject to corrections) University of the Witwatersrand – SVM to automatically detect epileptic patterns in EEG.
37. A.K. Mohamed, (Electrical Engineering) (completed subject to corrections) University of the Witwatersrand – The use of The improved EEG interpretation in a sensorimotor BCI for the control of prosthetic hand.

**Doctoral Supervision:**

1. Dr. Sizwe M. Dhlamini, 2007, Ph.D. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Bushing diagnosis using artificial intelligence and dissolved gas analysis. Where last tracked? Senior Engineering Manager at Sondolo IT
2. Dr. Fulufhelo Vincent Nelwamondo, 2008, Ph.D. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Computational intelligence techniques for missing data imputation. Where last tracked? Post-Doctoral Fellowship at Harvard University

3. Dr. Brain Betechuoh Leke, 2008, Ph.D. (Electrical Engineering) – Completed. University of the Witwatersrand. Topic: Computational intelligence for modelling HIV. Where last tracked? IT Engineer in Johannesburg
4. David Starfield, Ph.D. (Electrical Engineering), 2009, Completed. University of the Witwatersrand. Topic: Towards clinically useful coded apertures for planar nuclear medicine imaging. Where last tracked? Engineer in Texas, USA
5. Pretesh Bhoola Patel, Ph.D. (Electrical Engineering), 2010, Completed. University of the Witwatersrand. Topic: An IVR Call performance classification system using computational intelligence techniques. Where last tracked? Engineer in Johannesburg
6. Megan Jill Russell, Ph.D. (Electrical Engineering), 2011 (Completed), Topic: Towards speech recognition using paleto-lingual contact for voice restoration

**Other Research Students Supervised:**

1. Lindokuhle Mpanza
2. W.S. Miya
3. Unathi Mahola
4. Ishmael Msiza
5. Adam Pantanowitz
6. Daniel Golding
7. Baruch Lubinsky
8. Sarah Wright
9. Linda Wilson
10. Darren Blend
11. D. Moon

**Students Currently Under Supervision:**

12. Evan Hurwitz, Ph.D.
13. Linda Mthembu, Ph.D.
14. Meir Perez, Ph.D.
15. George Anderson, Ph.D.
16. Mlungisi Duma, Ph.D.
17. Bolanle Abe, Ph.D.
18. Bo Xing, D.Eng.
19. Msizi Khoza, MIng
20. Lindokuhle Mpanza MIng

**Post-Doctoral Fellowship Supervision:**

- Dr. Anthony Gidudu PhD (UCT) Remote Sensing, University of the Witwatersrand
- Dr. Omar Hamad PhD (South Korea) Telecommunication, University of Johannesburg
- Dr. Megan Russell PhD (Wits) Biomedical Engineering, University of the Witwatersrand

**Selected Journal, Conference and Grant Reviewer:**

- Engineering Applications of Artificial Intelligence
- Industrial & Engineering Chemistry Research
- Information Sciences
- IEEE Transactions on Systems, Man and Cybernetics

- IEEE Transactions on Neural Networks
- Mechanical Systems and Signal Processing
- European Journal of Operations Research
- European Journal of Mechanics
- Engineering Structures
- Journal of Sound and Vibration
- Smart Materials and Structures
- Pattern Recognition Letters
- International Journal of Pattern Recognition
- Pattern Recognition
- Neural Computing and Applications
- Mathematical Problems in Engineering
- AutoSoft: Intelligent Automation & Soft Computing
- Applied Artificial Intelligence
- Annals of Biomedical Engineering
- ASCE Journal of Bridge Engineering
- Computer Methods and Programs in Biomedicine
- Fuzzy Sets and Systems; Fuzzy Economic Review
- Measurement Science and Technology
- Indian Journal of Mathematics (IJM)/BAMS
- Journal of Mechanical Engineering Research (JMER)
- International Journal on Advances in Information Sciences and Service Sciences
- South African Transactions of Electrical Engineering
- South African Journal of Science
- Journal of the South African Institute of Mining and Metallurgy
- Botswana Journal of Technology
- 2005 IEEE International Conference on Service Operations and Logistics, and Informatics;
- 2007 IEEE International Symposium on Industrial Electronics
- 2007 The 33<sup>rd</sup> Annual Conference of the IEEE Industrial Electronics Society
- 2008 IEEE International Conference on Industrial Technology
- 2008 IFAC World Congress
- 2008 IEEE International Conference on Systems, Man and Cybernetics
- Handbook of Computational Intelligence in Manufacturing and Production Management- IGI Global Publishers.

**Major Conference Attendance and Presentation:**

- Invited Speaker: Theories of Social Change after 1989, The South African Debate – has Socialism Failed? ANC National Political School 10<sup>th</sup> December 2010
- Tutorial Chair: "Impact of Missing Data Estimation" The Third IASTED African Conference on Modelling and Simulation 2010, Science and Technology Applications for Health and Sustainable Development, September 6 – 8, 2010, Gaborone, Botswana
- Invited Keynote Speaker: The South African Conference on Applied Mechanics (SACAM), 2010.
- Invited Keynote Speaker: IASTED Conference on Modelling and Simulation 2008, Gaborone, Botswana

- Invited Speaker: 2007 India Calling (Indian Merchants of Commerce and Business Unity South Africa), Sandton, South Africa.
- Invited Speaker: 2007 Wolfson College, University of Cambridge. Title: “Modelling of complex systems using computational intelligence techniques”
- Invited Speaker: 2007 IBSA (India, Brazil South Africa) Summit
- Invited Plenary Speaker: GovTech 2007, Cape Town, South Africa
- Invited Keynote Speaker: CESPAM Executive Training Programme “Combating Cybercrime in the SADC Region” 23<sup>rd</sup>-26<sup>th</sup> April, 2007, Cape Town, South Africa
- Member of the Bid Committee of the 19<sup>th</sup> World Congress of International Federation of Automatic Control, Toulouse, France.
- Invited to attend the World Bank Conference on Knowledge for Africa’s Development, Johannesburg, 2006.
- Invited by the Presidency of South Africa to attend the 6<sup>th</sup> Presidential International Advisory Council on Information Society and Development 2006
- Invited as a Special Guest at the US-Japan Workshop on Bio-Inspired Sensor Networks: Learning from Life, Yokohama, Japan, 2006.
- Invited Speaker: Asia-Pacific Workshop on Structural Health Monitoring, Yokohama, Japan (2006)
- Invited Researcher: International Workshop on Scientific and Technological Manufacturing Research January 31-February 4, 2005 University of Johannesburg, South Africa
- Invited by the South African Embassy in Japan to attend the Science and Technology Policy Forum, Tokyo, Japan, 2005<sup>15</sup>.
- Invited Delegate at the South African Public Management Conversation, Fancourt, George, 2005.
- Invited Delegate by IBM to attend the Executive Conference on Building the Information Society in Europe – 2004, Paris, France, May 2004.
- Invited Delegate Johannesburg + 2 Sustainable Development Conference, Sandton, 2004.
- Invited Researcher in the Microsoft Research Academic Conference, Cape Town, 2003.
- Invited Delegate at the United Nations World Summit on Sustainable Development, Johannesburg, 2002.

#### **Visiting Professors/Researchers Hosted:**

- Prof. Akira Mita, Keio University, Japan (2005)
- Prof. Rosalyn Hobson, Virginia Commonwealth University, USA (2005, 2006)
- Dr. Fola Soares, Contek Research, U.S.A. (2005)
- Dr. Snehashish Chakraverty, India (2005, 2006)

#### **International and National Collaborations:**

- Virginia Commonwealth University, Virginia, USA, (2004-2008). Speech recognition (collaborator Prof. Rosalyn Hobson)
- University of Windsor, Ontario, Canada,(2006-2007). Bioinformatics (collaborator Dr. Alioune Ngom)
- Contek Research, El Segundo, California, U.S.A. (2005-2008). Control methods for flight test (collaborator Dr. Fola Soares)

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<sup>15</sup> Invited by the South African Embassy in Japan

- NASA Dryden Flight Research Center, Edwards, CA, U.S.A, (2005-2007). Control methods for flight test (collaborator Dr. John Burken)
- Universities of Bristol/University of Swansea, U.K., (2000-2007). Finite element model updating (collaborator Dr. Sondipon Adhikari)
- Central Building Research Institute, Roorkee, India (2003-2006). Structural Health Monitoring (collaborator Dr. Snehashish Chakraverty)
- University of Kent, UK (2004-2006). Interstate Conflict (collaborator Dr. Monica Lagazio)
- Keio University, Japan (2005). Condition Monitoring (collaborator Prof. Akira Mita)
- Council for Scientific and Industrial Research (CSIR) (2003-2005). Finite element model updating (collaborator: Dr. Sibusiso Sibisi President of CSIR)
- University of Pretoria (2003-2008). Fault identification (collaborator: Prof. P.S. Heyns)
- University of Swansea (2008-present). Finite Element Updating (Collaborators: Profs. M.I. Friswell and S. Adhikari)

#### Research Grant Received:

- |  |               |             |
|--|---------------|-------------|
| • National Research Foundation<br>Modelling of financial markets         | ZAR 243 000   | (2004-2006) |
| • Armscor/Kentron<br>Automatic target recognition                        | ZAR 212 000   | (2004-2005) |
| • Armscor/CSIR DefenceTek<br>Information warfare                         | ZAR1 137 000  | (2004-2006) |
| • Friedel Sellschop Award<br>Financial modelling                         | ZAR 75 000    | (2004)      |
| • Dr. T.W. Kambule Research Awards                                       | ZAR 50 000    | (2004)      |
| • CSIR Fellowship  | ZAR 70 000    | (2004)      |
| • Indo-South Africa Research Collaboration<br>Condition monitoring       | ZAR 120 000   | (2004-2006) |
| • Swedish/South Africa Research Collaboration<br>Condition monitoring    | ZAR 120 000   | (2004-2006) |
| • National Research Foundation<br>Condition monitoring                   | ZAR 479 000   | (2005-2007) |
| • THRIP  | ZAR 315 000   | (2005)      |
| • THRIP  | ZAR 390 000   | (2006)      |
| • DST/NRF Chair  | ZAR10 million | (2007-2012) |
| • Eskom  | ZAR 500 000   | (2004-2008) |
| • South Africa/Poland Research<br>Cooperation Programme                  | ZAR 200 000   | (2010-2012) |
| • NRF Grant: Competitive Programme<br>For Rated Researchers              | ZAR 1291 000  | (2010-2012) |
| • NRF/HESA IBSA Cooperation in Higher Education<br>For Rated Researchers | ZAR 80 000    | (2010)      |

#### Visiting Professorship/Researcher/Fellow:

- New University of Lisbon, Portugal, 2001
- Central Building Institute, CSIR, India, 2005

- Keio University, Japan, 2005
- Harvard University, 2006
- Wolfson College, University of Cambridge, 2007

**External Examination**

- Uttar Pradesh Technical University, Lucknow, India
  - PhD (Computer Science)
- University of Pisa, Italy
  - PhD (Computer Science)
- Rand Afrikaans University
  - Masters of Engineering (Electrical Engineering)
  - Master of Engineering (Electrical Engineering)
- University of Pretoria
  - Master of Engineering (Mechanical Engineering)
- North-West University
  - PhD in Engineering
  - Master of Engineering
- University of Cape Town
  - M.Sc. (Electrical Engineering)
  - M.Sc. (Civil Engineering)
  - M.Sc. (Physics)
- Tshwane University of Technology
  - Master of Technology (Electrical Engineering)
  - Master of Engineering (Electrical Engineering)
- University of the Witwatersrand
  - Master of Science (Electrical Engineering)
  - Master of Science (Mechanical Engineering)

**Charitable Initiatives:**

- Personal Donation to Tshivhambe Lower Primary School – R30,000.00 – Computers (2007)
- Raised funds from the Carl and Emily Fuchs Foundation for Mbilwi Secondary School, an SET school – R130,000.00 – Science Labs (2006-2010)
- Raised funds from the Carl and Emily Fuchs Foundation for Tshilidzini Special School for the disabled people. – R25,000.00 (2008)
- Raised funds from the Carl and Emily Fuchs Foundation Ligege Secondary School – R15,000.00 (2009)
- Raised funds from the Carl and Emily Fuchs Foundation Dimani Agricultural High School – R10,000.00 (2010)

**Reference:**

Available upon request