Rendani Mbuvha, FIA, CERA, PhD

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Education

University of Johannesburg — Johannesburg, South Africa
Doctor of Philosophy in Electrical and Electronic Engineering — *Feb. 2018 – August 2021*

KTH Royal Institute of Technology — Stockholm, Sweden
MSc in Computer Science and Engineering — *Aug. 2015 – June 2017*

University of Cape Town — Cape Town, South Africa
BSc Honours in Actuarial Science — *Feb. 2011 – Dec 2011*

University of Cape Town — Cape Town, South Africa
BSc Actuarial Science and Statistics — *Feb. 2008 – Dec 2010*

Professional Designations

Fellow of the Institute and Faculty of Actuaries (FIA) — April 2023 – Present
Institute and Faculty of Actuaries, UK

Fellow of the Actuarial Society of South Africa (FASSA) — July 2015 – Present
Actuarial Society of South Africa

Chartered Enterprise Risk Actuary (CERA) — July 2015 – Present
CERA Global Association

Academic Positions

Associate Professor — May 2022 – Present
University of Witwatersrand — *Johannesburg, South Africa*

Google DeepMind Academic Fellow — March 2022 – present
Queen Mary University of London (QMUL) — *London, United Kingdom*

Research Fellow, Artificial Intelligence and Applied Statistics — April 2024 – present
United Nations University Institute for Water, Environment and Health — *Richmond Hill, Ontario, Canada*

Honorary Senior Research Associate — Jan 2022 – present
University College London (UCL) — *London, United Kingdom*

Lecturer — July 2017 – April 2022
University of Witwatersrand — *Johannesburg, South Africa*

Awards and Honours

- Best Paper Award from the International Association of Consulting Actuaries section of the International Actuarial Association Virtual Colloquium, Paris (2020)
- Google PhD Fellowship (2019)
- Mail & Guardian 200 Young South Africans (2019) (2017)
- Awarded Swedish Institute Study Scholarship for Masters Studies (2015 - 2017)
- Science Faculty Scholarship University of Cape Town (2008 - 2009)
- Selected to represent South Africa at the International Summer School for Young Physicists at the Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada (2006)

Selected Peer-reviewed Publications

- **Mbuvha, R.**, Nikraftar, Z. (2024). Machine Learning Approaches to Improve Accuracy in Extreme Seasonal Temperature Forecasts: A Multi-Model Assessment (No. EGU24-19297). Copernicus Meetings.
- **Mbuvha, R.**, Nikraftar, Z., Sadegh, M., Landman, W. (2023). Forecasting the Unpredictable: Evaluating Seasonal forecast Models in Capturing Extreme Events. AGU23.

- Constantinou, A., Kitson, N.K., Liu, Y., Chobtham, K., Amirkhizi, A.H., Nanavati, P.A., **Mbuvha, R.**and Petrungaro, B., 2023. Open problems in causal structure learning: A case study of COVID-19 in the UK. *Expert Systems with Applications, p.121069.*
- **Mbuvha, R.**, Adounkpe, P. J. Y., Houngnibo, M. C. M., and Newlands, N. (2023). A Novel Workflow for Streamflow Prediction in the Presence of Missing Gauge Observations (No. EGU23-5736). Copernicus Meetings.
- **Mbuvha, R.**, Adelani, D. I., Mutavhatsindi, T., Rakhuhu, T., Mauda, A., Maumela, T. J., Masindi,A., Rananga, S., Marivate ,V. and Marwala, T. (2023). MphayaNER: Named Entity Recognition for Tshivenda. *AfricaNLP Workshop at ICLR (2023).*
- Nasejje, J.B., **Mbuvha, R.** and Mwambi, H., 2022. Use of a deep learning and random forest approach to track changes in the predictive nature of socioeconomic drivers of under-5 mortality rates in sub-Saharan Africa. *BMJ open*, 12(2), p.e049786.
- Mongwe, W.T., **Mbuvha, R.** and Marwala, T., 2021. Utilising Partial Momentum Refreshment in Separable Shadow Hamiltonian Hybrid Monte Carlo. *IEEE Access*, 9, pp.151235-151244.
- W. T., **Mbuvha, R.**, & Marwala, T. (2021). Adaptively Setting the Path Length for Separable Shadow Hamiltonian Hybrid Monte Carlo. *IEEE Access.*
- **Mbuvha, R.**, Mongwe, W. T., and Marwala, T. (2021). Separable Shadow Hamiltonian Hybrid Monte Carlo for Bayesian Neural Network Inference in wind speed forecasting. *Energy and AI*, 6, 100108.
- Ngwenduna, K.S. and **Mbuvha, R.**, (2021). Alleviating Class Imbalance in Actuarial Applications Using Generative Adversarial Networks. *Risks*, 9(3), p.49.
- Mutavhatsindi, T., Sigauke, C., and **Mbuvha, R.** (2020). Forecasting Hourly Global Horizontal Solar Irradiance in South Africa Using Machine Learning Models. *IEEE Access*, 8, 198872-198885.
- Cohen, S., **Mbuvha, R.**, Marwala, T., and Deisenroth, M. (2020). Healing products of Gaussian process experts. *In International Conference on Machine Learning* (pp. 2068-2077). PMLR
- **Mbuvha R**, Marwala T (2020) Bayesian inference of COVID-19 spreading rates in South Africa. *Plos One* 15(8): e0237126.
- **Mbuvha, R.**, Boulkaibet, I., Marwala, T., and de Lima Neto, F. B. (2018). A hybrid GA-PSO adaptive neuro-fuzzy inference system for short-term wind power prediction. *In International Conference on Swarm Intelligence* (pp. 498-506). Springer, Cham.
- **Mbuvha, R.**, Boulkaibet, I., and Marwala, T. (2019). Bayesian automatic relevance determination for feature selection in credit default modelling. *In International Conference on Artificial Neural Networks (pp. 420-425).* Springer, Cham
- **Mbuvha, R.**, Jonsson, M., Ehn, N., and Herman, P. (2017). Bayesian neural networks for one-hour ahead wind power forecasting. In 2017 *IEEE 6th International Conference on Renewable Energy Research and Applications (ICRERA)*(pp. 591-596). IEEE.

Books

- Marwala, T., **Mbuvha, R.**, and Mongwe, W. T. (2023). Hamiltonian Monte Carlo Methods in Machine Learning. *Elsevier*

Outreach and Workshop Organisation

- Co-organised workshop on Probabilistic Approaches in Weather and Climate Science at the African Institute of Mathematical Sciences Rwanda in May (2023)
- Co-organised workshop AI and Sustainability at University College London in January (2023)
- Panelist on Pioneering AI for Sustainability Panel at the Google DeepMind Scholar Summit (2023)
- In2ScienceUK STEM placement host for high school students from disadvantaged backgrounds (2023)

Community Service

Co-Founder
AfriClimate AI *Oct. 2023 – Present*
Climate Change Committee Member and Subcommittee Chair
Actuarial Society of South Africa *April. 2023 – Present*