Mbithe Nzomo

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Research summary: My PhD explores the integration of data-driven and knowledge-driven AI in an architecture for personal health and wellness monitoring using wearable sensors. I look at two use cases: atrial fibrillation and stress.

Research interests: machine learning, ontologies, hybrid AI, sensor data, health monitoring, ethics of AI

EDUCATION

University of Cape Town, Cape Town, South Africa — 2021 - Present
PhD, Computer Science
Supervisor: Deshen Moodley. Title: "A Hybrid AI Framework for Data Fusion, Situation Analysis, and Decision Support Towards Precision Health"

University of Manchester, Manchester, United Kingdom — 2018 - 2019
MSc, Advanced Computer Science (Distinction)
Supervisor: Angelo Cangelosi. Title: "Hello, Goodbye : Training Social Robots to Manage Interactions with Humans"

Strathmore University, Nairobi, Kenya — 2012 - 2016
BSc, Informatics (2:1)

WORK EXPERIENCE

Research Assistant (part-time) — 2023 - Present
Adaptive and Cognitive Systems Lab at the Centre for Artificial Intelligence Research (CAIR) — Cape Town, South Africa
- Building a generalisable platform and workflow for deep learning projects within the lab.
- Consolidating and documenting codebases, datasets, and other research outputs.
- Developing a set of tutorials for technologies, libraries, and frameworks used in the lab.

Teaching Assistant, Data Science (part-time) — 2021 - 2022
iXperience — Remote
- Contributed to curriculum development, assisted in delivering lectures, and held office hours.
- Managed student internship projects with South Africa-based companies.

Senior Technology Consultant — 2019 - 2021
EY — Nairobi, Kenya
- Executed end-to-end client engagements, including research, analysis, proposal development and implementation of emerging technologies in different organisations across a variety of sectors.
- Led data analytics team in client engagement involving financial data from the 2018/2019 financial year collected from 220 government facilities across 25 counties in Kenya.

Software Engineer — 2016 - 2018
Andela — Nairobi, Kenya
- Built web apps and RESTful APIs. Primarily focused on back-end development using Python, including Flask and Django.
- Guided and mentored more than 50 developers by serving as a Technical Team Lead for simulated projects, as well as a Learning Facilitator for programming bootcamps.
- Engaged in remote and culturally diverse teams with team members distributed across Africa and the US.
- Invited to speak at multiple technology conferences, including the 2017 Propelify Innovation Festival in Hoboken, NJ, and the 2017 ASU+GSV Summit in Salt Lake City, UT.

FELLOWSHIPS AND SCHOLARSHIPS

Mawazo Fellowship, Mawazo Institute — 2023
Generation Google Scholarship (Europe, Middle East, and Africa), Google — 2022
Hasso Plattner Institute (HPI) Fellowship, HPI Research School at UCT — 2021
CAIR Scholarship, Centre for Artificial Intelligence Research, South Africa — 2021
Grace Hopper Celebration Student Scholarship, AnitaB.org — 2019
Chevening Scholarship, Foreign, Commonwealth and Development Office, United Kingdom — 2018

PUBLICATIONS AND PREPRINTS

Nzomo, M.; Moodley, D. 2024. A Semantic Architecture for Health Risk Prediction and Decision Making Using Heterogeneous Data: The Case of Atrial Fibrillation. Accepted for presentation at the 8th Health Intelligence Workshop (W3PHIAI-24) to be held in conjunction with the 38th AAAI Conference on Artificial Intelligence (AAAI 2024).

Nzomo, M.; Moodley, D. 2023. Semantic Technologies in Sensor-Based Personal Health Monitoring Systems: A Systematic Mapping Study. Under review at the Semantic Web Journal. Preprint available: doi.org/10.48550/arXiv.2306.04335

Wanyana, T.; **Nzomo, M.**; Price, C. and Moodley, D. 2023. A Personal Health Agent for Decision Support in Arrhythmia Diagnosis. In Information and Communication Technologies for Ageing Well and e-Health. ICT4AWE ICT4AWE 2021 2022. Communications in Computer and Information Science, vol 1856. doi.org/10.1007/978-3-031-37496-8_20

Wanyana, T.; **Nzomo, M.;** Price, C. and Moodley, D. 2022. Combining Machine Learning and Bayesian Networks for ECG Interpretation and Explanation. In Proceedings of the 8th International Conference on Information and Communication Technologies for Ageing Well and e-Health (ICT4AWE 2022), pages 81-92. doi.org/10.5220/0011046100003188

SELECTED CONFERENCES, WORKSHOPS, AND EVENTS

AAAI Conference on Artificial Intelligence (AAAI 2024)	Feb 2024
Extended abstract accepted for presentation at the Doctoral Consortium	*Vancouver, Canada*
International Joint Conference on Artificial Intelligence (IJCAI 2023)	Aug 2023
Poster presentation, Africa Spotlight Poster Session	*Macau, S.A.R.*
Code for Science and Society (CS&S) Co-Design Workshop	May 2023
Participant, Climate-Sensitive Infectious Disease Open Source Software Community of Practice	*Cape Town, South Africa*
Hasso Plattner Institute (HPI) Research Symposium 2023	Apr 2023
Poster and oral presentation	*Potsdam, Germany*
Southern African Conference for Artificial Intelligence Research (SACAIR 2022)	Dec 2022
Unconference presentation	*Stellenbosch, South Africa*
Deep Learning Indaba 2022	Aug 2022
Poster presentation; selected in a competitive application process	*Tunis, Tunisia*
International Conference on ICT for Ageing Well and e-Health (ICT4AWE 2022)	Feb 2022
Paper presentation	*Virtual*
Oxford Machine Learning Summer School (OxML 2021)	Aug 2021
Participant; selected in a competitive application process	*Virtual*
Grace Hopper Celebration (GHC) 2019	Oct 2019
Participant; awarded the competitive GHC student scholarship to attend	*Orlando, Florida*

SERVICE, VOLUNTEERING, AND OUTREACH

Event Fund Selection Committee member - **Code for Science and Society**	Oct 2023 - Present
Short paper reviewer - **Deep Learning Indaba**	Aug - Sep 2023
Data Science track mentor - **KamiLimu**	Oct 2022 - May 2023
Professional mentor; scholarship application mentor - **KamiLimu**	Mar 2020 - May 2023
Application reviewer - **Deep Learning Indaba**	Mar - Apr 2023
Responsible Computer Science Challenge Judge - **Mozilla Foundation**	Jan - Mar 2023
Paper reviewer (Shadow PC) - **ACM Conference on Computing and Sustainable Societies (COMPASS)**	Apr - Jun 2021
Technical writer (programming tutorials) - **RealPython.org**	May - Sep 2018
Technical writer (programming tutorials) - **Scotch.io (since acquired by Digital Ocean)**	Oct 2016 - Jan 2017
Co-organiser and coach - **Django Girls (Nairobi, Mombasa, and Manchester)**	May 2016 - Feb 2019

ACADEMIC TEACHING AND SUPERVISION

Teaching Assistant — 2022 - Present
Department of Computer Science, University of Cape Town — *Cape Town, South Africa*
I am/have been a Teaching Assistant for the following first-year Python programming courses: CSC1015F, CSC1017F, CSC1019F, CSC1010H, and CSC1011H.

Honours Project Co-Supervisor — 2022
Department of Computer Science, University of Cape Town — *Cape Town, South Africa*
I co-supervised a team of honours (fourth-year) students as part of the year-long CSC4002W (Computer Science Honours Project) course. The project was titled "Deep Learning Algorithms in the Detection of Cardiovascular Diseases Using Electrocardiogram Data".