Sicelukwanda Zwane

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London, United Kingdom

Final-year PhD candidate in robotics with experience in solving constrained manipulation and safe robot navigation problems with machine learning.

Education

PhD Robotics and Artificial Intelligence, *University College London* 2020 - Present
Research Topic: Safety-aware Learning in Real-world Robotics with Gaussian Processes

MSc Computer Science, *Wits University* 2017 - 2019
Research Topic: Using Mixture Density Networks to Model Continuous Action Priors

BSc (Hons) Computer Science (*With Distinction*), *Wits University* 2013 - 2016
Project: Developing a Mobile Telepresence Robot

Work Experience

Research Intern - Mobile Robotics, *AIST – Tokyo, Japan* Jan 2024 - Mar 2024

- Applying Bayesian optimization to motion planning problems in mobile robots in crowded spaces.

CTO and Co-founder, *Amathambo AI – London, UK* 2023 - Present

- Leading the development of an AI software tool for generating medical staff rosters, which won the Mandela-Rhodes Äänit Prize (valued at $38 000 USD) in 2023.
- Product management and full-stack development for company website and other software offerings.

Data Scientist, *Explore AI, South Africa* 2019 - 2020

- Developed a data-science training course which compressed machine learning into 6 months.
- Led a team that developed a Twitter sentiment analysis tool and accompanying dashboard for a big South African bank.

Research Intern - Field Robotics, *CSIR – Pretoria, South Africa* 2017 - 2019

- Developed and maintained software for control and perception of a mobile manipulator robot.

Select Publications

Learning Dynamic Tasks on a Large-scale Soft Robot in a Handful of Trials, IROS 2024
Zwane S, Cheney D, Johnson CC, Luo Y, Bekiroğlu Y, Killpack MD, Deisenroth MP
Developed a data-efficient learning-based controller for a large-scale soft robot using Bayesian optimization. Evaluated on hammering and throwing tasks in simulation (Mujoco) as well as on a physical soft robot.

Safe Trajectory Sampling in Model-based Reinforcement Learning, CASE 2023
Zwane S, Hadjivelichkov D, Luo Y, Bekiroglu Y, Kanoulas D, and Deisenroth MP
Introduced a novel method for learning a constraint-aware Gaussian process dynamics model and deployed the resulting safe policy on a physical robot arm.

One-Shot Transfer of Affordance Regions? AffCorrs!, CoRL 2022
Hadjivelichkov D, Zwane S, Agapito L, Deisenroth MP, and Kanoulas D
Unsupervised method for one-shot transfer of robot affordance regions to novel scenes without fine-tuning, with semantic one-to-many part correspondence. Evaluated on a real robot arm with an RGB-D camera.

Skills

Robotics:	Motion Planning, Model Predictive Control, Robot Vision, Grasping
Simulation:	Mujoco (and dm-control), Pybullet, Nvidia Isaac Sim
Machine Learning:	Generative modelling, Imitation Learning, Bayesian optimization, Reinforcement learning
Cluster & Compute:	High Performance Computing, GCP, Weights and Biases, Containerization (Singularity)
Software:	Python, C/C++, PyTorch, Mujoco, Tensorflow, ROS, Moveit!, Jax (basic)
Languages:	Zulu (Native), English (Full proficiency), Japanese (basic)

Honors and Awards

DeepMind Scholarship for PhD in Foundational AI University College London
Awarded £125 000 full funding towards the pursuit of PhD in Robotics and AI 2020

Most Innovative Honours Research Project School of Computer Science, Wits University
Built a semi-autonomous mobile telepresence robot with face-tracking and autonomous navigation. 2016

Community and Outreach

Non-profit work for the Deep Learning Indaba - organizing annual machine learning workshops for African ML researchers. Organiser for the first African Robot Learning workshop in Ghana (2023) and Senegal (2024).