

Vongani H. Maluleke

Researcher in 3D Vision and Generative Models for Human Motion and Multi-Agent Interaction

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RESEARCH INTERESTS

I develop generative and sequence models for human motion and multi-agent interaction, with applications in humanoid robotics and digital humans. My work combines diffusion models, transformer-based sequence modeling, and efficient tokenization to predict, generate, and control the motion of interacting agents, with deployment on a real humanoid platform.

EDUCATION

University of California, Berkeley

Ph.D. in Computer Science

Berkeley, CA, USA

2021 – 2026 (Expected)

Advisors: Prof. Jitendra Malik and Prof. Angjoo Kanazawa (Berkeley AI Research / BAIR)

Thesis: Towards human-to-humanoid social interaction

University of Cape Town

M.Sc. in Advanced Analytics (Distinction)

Cape Town, South Africa

2017 – 2019

Advisors: Prof. Sebnem Er and Dr. Quentin Williams

University of Cape Town

B.Bus.Sci. in Analytics

Cape Town, South Africa

2012 – 2016

Advisor: Prof. Ian Durbach

SELECTED PUBLICATIONS

Publications in computer vision, generative modeling, and human motion analysis.

- [1] **Diffusion Forcing for Multi-Agent Interaction Sequence Modeling.** Maluleke, V. H.*, Horiuchi, K.*, Wilken, L., Ng, E., Malik, J., Kanazawa, A. *Under review, 2026.* [Paper](#) · [Project Page](#) · [Code](#)
- [2] **Synergy and Synchrony in Couple Dances.** Maluleke, V. H., Müller, L., Rajasegaran, J., Pavlakos, G., Ginosar, S., Kanazawa, A., Malik, J. *arXiv 2024.* [Paper](#) · [Project Page](#) · [Code](#)
- [3] **Studying Bias in GANs through the Lens of Race.** Maluleke, V. H.*, Thakkar, N.*, Brooks, T., Weber, E., Darrell, T., Efros, A. A., Kanazawa, A., Guillory, D. *ECCV 2022.* [Paper](#) · [Project Page](#)
- [4] **Estimating Poverty Using Aerial Images: South African Application.** Maluleke, V. H., Er, S., Williams, Q. R. *DataSCI, 2018.* [Paper](#)

RESEARCH EXPERIENCE

Berkeley AI Research (BAIR), UC Berkeley

Graduate Researcher — with Jitendra Malik and Angjoo Kanazawa

Berkeley, CA, USA

2021 – Present

- **Human-humanoid interaction (in submission, CoRL 2026):** Led **Social Humanoid**, a hierarchical system that generates and executes socially responsive whole-body motion on a 29-DoF **Unitree G1**, conditioned on a human partner's motion, via a high-level motion-generation policy and a low-level whole-body tracking controller.
- **Cross-embodiment generation:** Designed a **shared-codebook VQ-VAE** that tokenizes human and humanoid motion into a unified latent space, enabling cross-embodiment conditional generation through a **Diffusion Forcing Transformer**.
- **Human-Humanoid Interaction benchmark:** Built a two-phase adaptive retargeting procedure preserving contact dynamics, reachability, and relative body scale; applied it across five motion-capture datasets to create a new **260-hour** benchmark of paired human-humanoid interactions, with coordinated, human-aligned results in simulation and the real world.
- **Multi-agent world model:** Led **MAGNet**, a unified autoregressive diffusion framework (Diffusion Forcing Transformer + VQ-VAE) for multi-agent motion generation, enabling joint prediction, conditional generation, and motion control across interacting agents.
- **Human interaction modeling:** Proposed representations for dyadic interaction that disentangle social synchrony from individual motion style; developed body reconstruction pipeline using SMPL/SMPL-X; curated a 30+ hour motion dataset. Collaborated with researchers across BAIR and industry (Meta, Sony).

- Developed a deep learning pipeline combining satellite imagery and survey data to estimate regional poverty levels in South Africa.
- Deployed models on cloud infrastructure to support data-driven policy analysis; mentored interns and collaborated with multidisciplinary teams.

INDUSTRY EXPERIENCE

Deloitte Consulting

Johannesburg, South Africa

AI Senior Consultant

2020 – 2021

Clients in **media & entertainment** and **telecommunications**:

- **MultiChoice Group (Media)**: Developed ML models and automated training/inference pipelines for Project Vibranium, one of Africa's largest data and analytics transformation programs (140+ engineers and analysts), consolidating customer insights, personalization, and content recommendation across pan-African operations on Azure Synapse.
- **MTN Group (Telecoms)**: Built and deployed ML models (churn prediction, customer segmentation, recommendation) on Project ADAM, a Google Cloud platform processing 4T+ records/month across 270M+ subscribers in 19 markets; contributed to an estimated 15% reduction in customer churn.
- Designed end-to-end ML system architectures from requirements through deployment; mentored junior ML engineers.

Deloitte Consulting

Johannesburg, South Africa

AI Consultant

2019 – 2020

Clients in **telecoms/ICT**, **retail**, and **financial services**:

- Built and deployed ML models and pipelines across four major clients: BCX/Telkom (customer analytics, demand forecasting, churn prediction), Pick n Pay (demand forecasting, supply chain optimization), and Standard Bank (customer targeting, risk assessment).
- Owned Python codebases end-to-end: data ingestion, feature engineering, model training, and deployment on GCP and Azure.

ACADEMIC SERVICE AND MENTORSHIP

- **Ph.D. Admissions Reviewer**: UC Berkeley EECS (2025)
- **Conference Reviewer**: CVPR 2023–2026, NeurIPS 2023–2025, ECCV 2022–2026, ICCV 2023, 3DV 2023–2026
- **Program Facilitator and Mentor**: Black in AI Academic Program (2023–2024) — Reviewed graduate applications, conducted mock interviews, and mentored participants
- **Workshop Organizer**: NeurIPS Black in AI Workshop (2023), NeurIPS AI+HADR Workshop (2021)
- **Data Science Mentor**: Girl Code, South Africa (2020–2021) — Led Python workshops for young women entering data science

TECHNICAL SKILLS

Core AI & Research: Diffusion Models, Transformers, VQ-VAE, Representation Learning, Sequence Modeling, Reinforcement Learning, World models, Action-conditioned generation, VQ-VAE, Multimodal sequence modeling, long-horizon prediction

3D Vision & Embodied AI: Humanoid robotics, Unitree G1, NVIDIA Sonic, RGB-D perception, Motion retargeting, Whole-body control, Human Motion Synthesis (SMPL/SMPL-X), Multi-Agent Interaction Modeling, Motion Prediction, Pose Estimation, HRI

Software & Frameworks: Python, PyTorch, CUDA, R, MATLAB, OpenCV, MuJoCo, Linux, Git, SLURM, Weights & Biases, Real-time Stateful Inference, Latency Profiling, Model Evaluation and Integration, GCP, Azure, AWS, MongoDB, PostgreSQL

HONORS & AWARDS

Berkeley Graduate Fellowship (2021–Present) · Black in AI Best Student Poster, NeurIPS (2019) · Deloitte Consulting Exceptional Performer (2020, 2021)