

# Vongani H. Maluleke

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

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## Research Interests

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I develop generative models for human motion and multi-agent interaction, with applications in humanoid robotics and digital humans. My research combines diffusion models, learned motion representations, and embodied AI to enable socially intelligent behavior in autonomous agents, bridging motion synthesis, social interaction modeling, simulation, and real-world deployment on humanoid platforms.

## Education

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### University of California, Berkeley

*Ph.D. in Computer Science (4.0 GPA)*

*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

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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

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### Berkeley AI Research (BAIR), UC Berkeley

*Graduate Researcher — with Jitendra Malik and Angjoo Kanazawa*

*Berkeley, CA, USA*

2021 – Present

- **Ongoing:** Building a hierarchical RL framework (**ArcHumanoid**) for socially intelligent **human–humanoid interaction**, using a learned diffusion motion prior fine-tuned with PPO, deployed on a Unitree G1 humanoid robot.
- Led development of **MAGNet**, a unified generative framework for multi-agent motion enabling joint prediction, conditional generation, and controllable motion across interacting agents, outperforming task-specific baselines.
- Proposed novel representations for **dyadic human interaction** that disentangle social synchrony from individual motion style; curated a 30+ hour dataset ([SynNSync](#)) of dyadic SMPL motion.
- Collaborated with researchers across BAIR and industry (Meta and Sony) on generative modeling, human motion analysis, and socially-aware AI systems.

## Council for Scientific and Industrial Research (CSIR)

Graduate Researcher

Pretoria, South Africa

2017 – 2019

- 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

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### Deloitte Consulting

AI Senior Consultant

Johannesburg, South Africa

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

AI Consultant

Johannesburg, South Africa

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

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- **Ph.D. Admissions Reviewer:** UC Berkeley EECS (2025)
- **Conference Reviewer:** CVPR 2023–2026, NeurIPS 2023–2025, ECCV 2022–2024, 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

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**Core AI & Research:** Diffusion Models, Transformers, VQ-VAE, Representation Learning, Sequence Modeling, Reinforcement Learning (PPO)

**3D Vision & Embodied AI:** Human Motion Synthesis (SMPL/SMPL-X), Multi-Agent Interaction Modeling, Motion Prediction, Pose Estimation, Socially Responsive AI

**Simulation & Deployment:** MuJoCo, Unitree Robotics SDK

**Software & Frameworks:** Python, PyTorch, CUDA, R, MATLAB, OpenCV, MuJoCo

**Infrastructure & Scaling:** Linux, Git, Distributed Training, GCP, Azure, Weights & Biases

## Honors & Awards

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