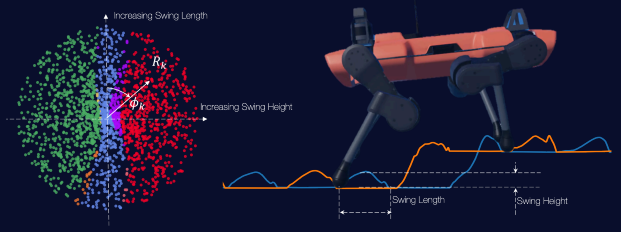
Alexander Luis Mitchell

Robotics Research Scientist



Details

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Site: alexluismitchell.github.io
UK citizen
google-scholar
Github
Linkedin

Skills

Hands-on deployment for robots in the field, including:

- ANYmal B and C
- UR 10e
- Franka Emika Panda
- Dual arm Kinova Gen3 on a Clearpath Ridgeback base

C++, Python, Pytorch, CMake3, Docker, ROS

Mujoco, Gazebo, and Raisim simulators

Solidworks -- design and manufacture of medical devices

Education

University of Oxford,
Oct 2018 - Dec 2023
PhD in Machine Learning and Control
Thesis title: *Learning and Planning in Structured Latent-Spaces for Legged Robot Locomotion*

University of Oxford,
Oct 2014 - June 2018
MEng. Engineering Science
Model Predictive and Adaptive Control through Uncertainty

Research Interests

Control of dual-arm and loco-manipulation for contact-rich tasks in the home, manufacturing, and human interaction

Generative modelling (VAEs, diffusion models) so that robots can autonomously build assemblies for manufacturing

Brain-inspired research for robotics, e.g. planning in structured latent spaces and world modelling

Professional Experience

Post Doctoral Researcher, A2I Group Oxford
Post Doctoral Research Assistant Jan 2024 -- present

Design and implementation of a compliant impedance controller using a model-free friction observer for a dual-arm manipulation system in C++ with real-time guarantees

Deployment of generative models (VAEs) operating in real-time for locomotion and dual-arm manipulation

Supervision of students and experience writing research grants

Design of control algorithms for a novel compliant actuator implemented on a microcontroller

Amazon Robotics, Berlin
Applied Scientist Intern June 2022 - Jan 2023

Implemented novel feature to optimise a pinch grasp-pose given a noisy and segmented point cloud. This innovation enabled the team to grasp an additional 10% of items

Developed and deployed algorithmic packages in C++ and Python to product-level standards, which are integrated and running in Amazon fulfilment centres

Cambridge Consultants, United Kingdom
Technology Scholar, Sep 2013 - June 2014, Summers of 2015, 2016 and 2017

Mechanical design and assembly of a novel and, at the time, world's fastest PCR machine for synthesising DNA

Software designed to medical device standards for smart Bluetooth inhalers

Publications

COMBO-Grasp: Learning Constraint-Based Manipulation for Bimanual Occluded Grasping
J Yamada, **A. Mitchell**, J Collins, I Posner

Offline Adaptation of Quadruped Locomotion using Diffusion Models
Accepted to International Conference on Robotics and Automation (ICRA), 2025
R O'Mahoney, **A. Mitchell**, W Yu, I Posner, I Havoutis

Gaitor: Learning a Unified Representation Across Gaits for Real-World Quadruped Locomotion
Conference of Robot Learning (CoRL), 2024
A. Mitchell, W. Merkt, A. Papatheodorou, I. Havoutis, I. Posner

Constrained Skill Discovery: Quadruped Locomotion with Unsupervised Reinforcement Learning
V Atanassov, W Yu, **A. Mitchell**, MN Finean, I Havoutis

Brain-like latent dynamics emerge in robot systems during walking and reaching
Nature: Science Reports, 2024
O. Parker Jones*, **A. Mitchell***, J. Yamada*, W. Merkt, M. Geisert, I. Havoutis, I. Posner

Towards Agility: A Momentum Aware Trajectory Optimisation Framework using Full-Centroidal Dynamics Implicit Inverse Kinematics
International Conference on Intelligent Robots and Systems (IROS), 2024
A. Papatheodorou, W. Merkt, **A. Mitchell**, I. Havoutis

VAE-Loco: Versatile Quadruped Locomotion by Learning a Disentangled Gait Representation
IEEE Transactions on Robotics (T-RO), 2023
A. Mitchell, W. Merkt, M. Geisert, S. Ganagapurwala, M. Engelcke, O. Parker Jones, I. Havoutis, I. Posner

From Primates to Robots: Emerging Oscillatory Latent-Space Dynamics for Sensorimotor Control
Conference on Cognitive Computational Neuroscience, (CCN) 2023
A. Mitchell, O. Parker Jones, J. Yamada, W. Merkt, I. Havoutis, I. Posner

Next Steps: Learning a Disentangled Gait Representation for Versatile Quadruped Locomotion
International Conference on Robotics and Automation (ICRA), 2022
A. Mitchell, W. Merkt, M. Geisert, S. Ganagapurwala, M. Engelcke, O. Parker Jones, I. Havoutis, I. Posner

First Steps: Latent-Space Control with Semantic Constraints for Quadruped Locomotion
IEEE Intelligent Robots and Systems (IROS), 2020
A. Mitchell, M. Engelcke, O. Parker Jones, S. Ganagapurwala, O. Melon, D. Surovik, I. Havoutis, I. Posner

Guided Constrained Policy Optimization for Dynamic Quadrupedal Robot Locomotion
IEEE Robotics and Automation Letters (RA-L), 2020
S Gangapurwala, **A Mitchell**, I. Havoutis

* Joint first authors