ARTHUR ALLSHIRE

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EXPERIENCE

NVIDIA May 2021-December 2022, May 2023-
Intern w/ Gavriel State, Dr. Ankur Handa, Prof. Sanja Fidler *Toronto, Canada / Zürich, Switzerland*

- **Humanoid Manipulation** (Since September 2023) on contract part-time as I complete my studies. Working on large-scale RL training applied to humanoid manipulation under Sanja Fidler with Jason Peng, Kevin Xie.
- **Parkour in Legged Locomotion** (Summer 2023) Worked under Marco Hutter with David Hoeller, Nikita Rudin, and Mayank Mittal on a system to train multiple parcour skills end2end from depth with RL.
- **Hand-Arm Manipulation** Worked on DexPBT showing how scaling up can lead to unprecedented dexterity with hand+arm systems in simulation.
- **In-Hand Manipulation** (Winter-Summer 2022) Co-lead DeXtreme research project with Ankur Handa and Viktor Makoviychuk, showing how we can achieve near human-level dexterity on anthropomorphic hands. Lead efforts on scaling vision and reinforcement learning data generation & training.
- **IsaacGym Development** (Summer-Autumn 2021) Worked on Isaac Gym environment development, and lead refactor effort. Ran experiments and drafted paper. Resulted in successful NeurIPS 2021 benchmarks & datasets workshop, RSS 2021 worshop, and codebase used widely across the community (hundreds of stars on GitHub and $\sim$ 500 academic citations).

Robotic Systems Lab, ETH Zürich May-August 2023
Visiting Researcher under Prof. Marco Hutter *Zürich, Switzerland*

- Applying very large-scale RL to locomotion problems, specifically end2end control from depth in the context of robotic parkour.
- Post-internship, helping advise a master's thesis at RSL on improving sim2real transfer via adversarial reinforcement learning.

University of Toronto, Vector Institute Jul 2020-November 2022
Undergraduate Researcher with Prof. Animesh Garg *Toronto, Canada*

- **In-Hand Manipulation** (Winter 2021 / Spring 2021) Lead Trifinger Real Robot Challenge submission in the PAIR lab (S2R2). Only group to be able to solve the competition via reinforcement learning, a generalisable and scalable approach to the problem. Resulted in successful IROS conference and NeurIPS workshop submissions, talk with thousands of views on YouTube. Policy resulting being used in subsequent real robot challenge by organisers and other teams.
- **RL in Latent Spaces** (Fall 2020 / Winter 2021) Lead LASER work, showing how we can improve sample efficiency in RL via learning in latent spaces.

Flatten.ca Mar 2020 - Sep 2020
Founding Engineer *Toronto, Canada*

- Lead backend, cloud and data pipelines with three other software engineers to build robust symptomatic surveillance tools for the COVID-19 pandemic in Canada and Mogadishu, Somalia.
- Funded by European Union and United Nations and > 500K users and open-sourced the project and is still being used for rapid response efforts.

FRC Team #4774, The Drop Bears Oct 2014 - Nov 2018
Member, Software Lead, and Vice Captain *University of Sydney, Sydney, Australia*

- Management of team activities. Co-ordinated development of software, overall software architecture, testing. Implementation of new approaches for novel control & localization solutions. Under my leadership in software & control systems, the team won awards from the control system every year from 2016-18.

PUBLICATIONS

Geometric Fabrics: a Safe Guiding Medium for Policy Learning - K. Van Wyk, A. Handa, V. Makoviichuk, Y. Guo, **A. Allshire**, N. Ratliff *ICRA 2024* Website

Symmetry Considerations for Learning Task Symmetric Robot Policies - M. Mittal, N. Rudin, V. Klemm, **A. Allshire**, M. Hutter. *ICRA 2024*

DeXtreme: Transfer of Agile In-Hand Manipulation from Simulation to Reality - A. Handa, **A. Allshire**, V. Makoviychuk *et al. ICRA 2023* Website—Paper—Video

DexPBT: Scaling up Dexterous Manipulation for Hand-Arm Systems with Population Based Training - A. Petrenko, **A. Allshire**, G. State, A. Handa, V. Makoviychuk *RSS 2023* Website—Paper

Real Robot Challenge III - Learning Dexterous Manipulation from Offline Data in the Real World - G. Martius, N. Gürtler, C Sancaktar, S. Blaes, P. Kolev, S. Bauer, M. Wuethrich, M. Wulfmeier, M. Riedmiller, **A. Allshire**, A. Buchholz, B. Schölkopf. *NeurIPS 2022 Competition* Website—NeurIPS

Transferring Dexterous Manipulation from GPU Simulation to a Remote Real-World TriFinger - **A. Allshire**, M. Mittal, V. Lodaya, V. Makoviychuk, D. Makoviichuk, F. Widmaier, M. Wuthrich, S. Bauer, A. Handa, A. Garg. *IROS 2022* Website—Paper—Video

Isaac Gym: High Performance GPU-Based Physics Simulation For Robot Learning - V. Makoviychuk, L. Wawrzyniak, Y. Guo, M. Lu, K. Storey, M. Macklin, D. Hoeller, N. Rudin, **A. Allshire**, A. Handa, G. State. *NeurIPS 2021, Datasets and Benchmarks Track* Website—Paper

LASER: Learning a Latent Action Space for Efficient Reinforcement Learning - **A. Allshire**, R. Martín-Martín, C. Lin, S. Manuel, S. Savarese, A. Garg. *ICRA 2021* Website—Paper—Video

EDUCATION

University of Toronto *September 2019 - April 2024 (expected)*
Pursuing B.ASc. in Engineering Science. Majoring in Machine Intelligence.
Higher School Certificate, Redlands, Sydney, NSW, Australia *December 2018*
ATAR: 99.25[1] Valedictorian; top student in school Mathematics, Physics, and Chemistry.

TECHNICAL KNOWLEDGE

Computer Languages	Python, C++, C, Javascript
Control Systems	PID, Kalman filters, State Machines, ROS, state-space, fuzzy controllers, controller tuning, etc.
Machine Learning	Standard frameworks / methods - PyTorch, scikit-learn, Pandas Deep Learning - CNNs, RNNs, Transformers, Reinforcement Learning
Other Tools & Frameworks	ROS, git, vim, Google Cloud Platform, D3JS, React

[1]The Australian grading scale corresponds to a percentile within the state cohort.