# Nicklas **Hansen**

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## Research Interest

I am broadly interested in developing intelligent agents that continuously learn, generalize, and adapt.
My work is at the intersection of **reinforcement learning**, **robotics**, and **computer vision**.

## Education

**University of California, San Diego** — *San Diego, CA, USA*
PhD student, Computer Science and Engineering, GPA: 3.85/4.0 — *Fall 2021 - present*
· Advised by Xiaolong Wang and Hao Su.

**University of California, Berkeley** — *Berkeley, CA, USA*
Visiting Student, GPA: 4.0/4.0 — *Spring 2020*
· Spar Nord Fonden's FinTech scholarship recipient, SCET's Collider Cup finalist.

**Technical University of Denmark** — *Kongens Lyngby, Denmark*
MSc Mathematical Modeling & Computation, GPA: 11.2/12.0 — *Feb 2019 - Jan 2021*
· Special topics in machine learning. Advised by Ole Winther.

**Technical University of Denmark** — *Kongens Lyngby, Denmark*
BSc Software Technology, GPA: 8.2/12.0, final year GPA: 10.8/12.0 — *Sep 2015 - Dec 2018*
· **Nanyang Technological University, Singapore** - semester abroad, Fall 2017.

## Publications & Preprints

**On Pre-Training for Visuo-Motor Control: Revisiting a Learning-from-Scratch Baseline** — *Preprint* *2022*
arXiv preprint
**Nicklas Hansen***, Zhechen Yuan*, Yanjie Ze*, Tongzhou Mu*, Aravind Rajeswaran^, Hao Su^, Huazhe Xu^, Xiaolong Wang^
https://arxiv.org/abs/2212.05749

**MoDem: Accelerating Visual Model-Based Manipulation with Demonstrations** — *Poster* *2022*
International Conference on Learning Representations **(ICLR)**
**Nicklas Hansen**, Yixin Lin, Hao Su, Xiaolong Wang, Vikash Kumar, Aravind Rajeswaran
https://arxiv.org/abs/2212.05698

**On the Feasibility of Cross-Task Transfer with Model-Based Reinforcement Learning** — *Poster* *2022*
International Conference on Learning Representations **(ICLR)**
Yifan Xu*, **Nicklas Hansen***, Zirui Wang, Yung-Chieh Chan, Hao Su, Zhouwen Tu
https://arxiv.org/abs/2210.10763

**Visual Reinforcement Learning with Self-Supervised 3D Representations** — *Preprint* *2022*
arXiv preprint
Yanjie Ze*, **Nicklas Hansen***, Yinbo Chen, Mohit Jain, Xiaolong Wang
https://arxiv.org/abs/2210.07241

**Graph Inverse Reinforcement Learning from Diverse Videos** — *Oral* *2022*
Conference on Robot Learning **(CoRL)**
Sateesh Kumar, Jonathan Zamora*, **Nicklas Hansen***, Rishabh Jangir, Xiaolong Wang
https://arxiv.org/abs/2207.14299

**Temporal Difference Learning for Model Predictive Control** *Short Presentation*
International Conference on Machine Learning **(ICML)** *2022*
**Nicklas Hansen**, Xiaolong Wang*, Hao Su*
https://arxiv.org/abs/2203.04955

**Look Closer: Bridging Egocentric and Third-Person Views with Transformers for Robotic Manipulation**
IEEE Robotics and Automation Letters **(RA-L)** *Journal & Poster*
International Conference on Robotics and Automation **(ICRA)** *2022*
Rishabh Jangir*, **Nicklas Hansen***, Sambaran Ghosal, Mohit Jain, Xiaolong Wang
https://arxiv.org/abs/2201.07779

**Learning Vision-Guided Quadrupedal Locomotion with Cross-Modal Transformers** *Spotlight*
International Conference on Learning Representations **(ICLR)** *2022*
Ruihan Yang*, Minghao Zhang*, **Nicklas Hansen**, Hauzhe Xu, Xiaolong Wang
https://arxiv.org/abs/2107.03996

**Stabilizing Deep *Q*-Learning with ConvNets and Vision Transformers under Data Augmentation** *Poster*
Conference on Neural Information Processing Systems **(NeurIPS)** *2021*
**Nicklas Hansen**, Hao Su, Xiaolong Wang
https://arxiv.org/abs/2107.00644

**Generalization in Reinforcement Learning by Soft Data Augmentation** *Poster*
International Conference on Robotics and Automation **(ICRA)** *2021*
**Nicklas Hansen**, Xiaolong Wang
https://arxiv.org/abs/2011.13389

**Self-Supervised Policy Adaptation during Deployment** *Spotlight*
International Conference on Learning Representations **(ICLR)** *2021*
**Nicklas Hansen**, Rishabh Jangir, Yu Sun, Guillem Alenyà, Pieter Abbeel, Alexei A. Efros, Lerrel Pinto, Xiaolong Wang
https://arxiv.org/abs/2007.04309

**Short Term Blood Glucose Prediction Based on Continuous Glucose Monitoring Data** *Poster*
IEEE Engineering in Medicine and Biology Conference **(EMBC)** *2020*
Ali Mohebbi, Alexander R. Johansen, **Nicklas Hansen**, Peter E. Christensen, Jens M. Tarp, Morten L. Jensen, Henrik Bengtsson, Morten Mørup
https://arxiv.org/abs/2002.02805

## Teaching

**Technical University of Denmark** *Co-organizer*
Reinforcement Learning *Jan 2021*
· Special course that I co-organized w/ Prof. Ole Winther for a group of students. Three weeks of full-time study.

**Technical University of Denmark** *Teaching Assistant*
02456 Deep Learning *Fall 2019, Fall 2020*
· Significant course material contributions, **supervised 100+ students' projects** on reinforcement learning.
02454 Introduction to Cognitive Science *Fall 2019*
· Assisted tutorial sessions, corrected assignments.

## Current and Former Mentees

Rishabh Jangir (MS UCSD -> Robotics Engineer, Nimble) *2020 - 2022*
Mohit Jain (MS UCSD -> ML Engineer, Pinterest) *2020 - 2022*
Xinyue Chen (BS NYU Shanghai -> PhD, UC Berkeley) *2021 - 2022*
Chandramouli Rajagopalan (MS UCSD) *2022 -*
Zirui "Colin" Wang (BS UCSD) *2022 -*
Sateesh Kumar (MS UCSD) *2021 -*
Jonathan Zamora-Anaya (BS UCSD) *2021 -*
Yanjie Ze (BS SJTU) *2021 -*

## Invited Talks

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|---|---|---|
| Georgia Tech | "Towards Extreme Sample-Efficiency with Model-Based Reinforcement Learning" | *Jan 2023* |
| Meta AI (FAIR) | "Pretraining for Control: Current Challenges and Solutions" | *Jan 2023* |
| TU Delft | "Model-Based Reinforcement Learning: A Path Towards Generalist Agents?" | *Oct 2022* |
| Generally Intelligent | Podcast: https://generallyintelligent.com/podcast/2022-12-16-podcast-episode-25-nicklas-hansen/ | *September 2022* |
| Intel AI | "Temporal Difference Learning for Model Predictive Control" | *April 2022* |
| Intel AI | "Agents that Generalize" | *August 2021* |
| G-Research | "Agents that Generalize and Adapt" | *February 2021* |
| Neural AI | "An Introduction to Reinforcement Learning" | *June 2019* |

## Academic Service

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|---|---|---|
| 2023 | International Conference on Machine Learning (**ICML**) | *Reviewer* |
| 2023 | Conference on Computer Vision and Pattern Recognition (**CVPR**) | *Reviewer* |
| 2023 | International Conference on Representation Learning (**ICLR**) | *Assisted review* |
| 2023 | IEEE International Conference on Robotics & Automation (**ICRA**) | *Reviewer* |
| 2022 | Self-Supervised Learning - Theory and Practice @ **NeurIPS** | *Reviewer* |
| 2022 | Conference on Neural Information Processing Systems (**NeurIPS**) | *Reviewer* |
| 2022 | European Conference on Computer Vision (**ECCV**) | *Reviewer* |
| 2022 | IEEE Robotics and Automation Letters (**RA-L**) | *Reviewer* |
| 2022 | Generalizable Policy Learning in the Physical World, Workshop @ **ICLR** | *Reviewer* |
| 2022 | International Conference on Machine Learning (**ICML**) | *Reviewer* |
| 2022 | Conference on Computer Vision and Pattern Recognition (**CVPR**) | *Reviewer* |
| 2022 | IEEE Robotics and Automation Letters (**RA-L**) | *Reviewer* |
| 2021 | Association for the Advancement of Artificial Intelligence (**AAAI**) | *Reviewer* |
| 2021 | International Conference on Machine Learning (**ICML**) | *Assisted review* |
| 2020 | Annual Conference of the Association for Computational Linguistics (**ACL**) | *Assisted review* |
| 2020 | SIGNLL Conference on Computational Natural Language Learning (**CoNLL**) | *Assisted review* |

## Workshop Presentations

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|---|---|---|
| **On Pre-Training for Visuo-Motor Control: Revisiting a Learning-from-Scratch Baseline** | | *Poster* |
| Pre-Training Robot Learning @ CoRL | | *2022* |
| **On the Feasibility of Cross-Task Transfer with Model-Based Reinforcement Learning** | | *Poster* |
| Pre-Training Robot Learning @ CoRL | | *2022* |
| Foundation Models for Decision Making @ NeurIPS | | *2022* |
| Deep RL Workshop @ NeurIPS | | *2022* |
| **MoDem: Accelerating Visual Model-Based Reinforcement Learning with Demonstrations** | | *Poster* |
| Pre-Training Robot Learning @ CoRL | | *2022* |
| Deep RL Workshop @ NeurIPS | | *2022* |
| **Look Closer: Bridging Egocentric and Third-Person Views with Transformers for Robotic Manipulation** | | *Poster* |
| Workshop on Deployable Decision Making in Embodied Systems @ NeurIPS | | *2021* |
| Deep RL Workshop @ NeurIPS | | *2021* |
| **Learning Vision-Guided Quadrupedal Locomotion End-to-End with Cross-Modal Transformers** | | *Poster/Oral* |
| Deep RL Workshop @ NeurIPS | | *2021* |
| Visual Learning and Reasoning for Robotics Workshop @ RSS | | *2021* |
| **Stabilizing Deep Q-Learning with ConvNets and Vision Transformers under Data Augmentation** | | *Poster/Oral* |
| Unsupervised RL Workshop @ ICML | | *2021* |
| Visual Learning and Reasoning for Robotics Workshop @ RSS | | *2021* |

**Self-Supervised Policy Adaptation During Deployment** *Poster*
Microsoft Research RL Day *2021*
Deep RL Workshop @ NeurIPS *2020*
Workshop on Robot Learning @ NeurIPS *2020*

## Work Experience

**Meta AI (FAIR)** *Menlo Park, CA, USA*
Student Researcher *June 2022 - Dec 2022*
· Model-Based Reinforcement Learning. Mentored by Aravind Rajeswaran.

**raffle.ai** *Copenhagen, Denmark*
Machine Learning Intern *Summer 2019*
· I built and open-sourced a cross-domain text-to-SQL parser in PyTorch.

**Retune DSP** *Kongens Lyngby, Denmark*
Student Assistant *Feb 2019 - Dec 2019*
· I helped a team of engineers build and maintain deep learning pipelines for embedded voice control.

**Nordic Transition** *Gentofte, Denmark*
Student Software Developer *July 2016 - Dec 2019*
· I developed and maintained a data management and analysis platform for the HR industry.

## Awards and Scholarships

2021 **Robotics Summer School Scholarship** *Scholarship*
· A scholarship to participate in a two-week summer program in Denmark.

2020 **Spar Nord Fond Scholarship** *Scholarship*
· A scholarship to study a semester at UC Berkeley (5 recipients nation-wide).

2020 **UC Berkeley's SCET Collider Cup Finalist** *Award*
· Biannual startup competition. Best student project from each class is nominated.

2020 **Innovation Center Denmark's SPARK Winner** *Award*
· Best project in a 6-month entrepreneurial program in the Bay Area.

2017 **Otto Mønsted Fonds Legat** *Scholarship*
· A grant for high-achieving students (GPA >= 8.0) that wish to study a semester abroad.

## Volunteering

2022 **UC San Diego GradAMP Mentor (PhD Applications)** *Mentorship*
· Supported prospective students through weekly mentor-mentee meetings in Fall.

## Misc. Open-Source Projects

**DMControl Generalization Benchmark** *2020*
· Benchmark for generalization in continuous control from pixels.
https://github.com/nicklashansen/dmcontrol-generalization-benchmark

**Optimization in Deep Learning** *2019*
· Implementation and benchmark of deep learning optimization algorithms.
https://github.com/nicklashansen/neural-net-optimization

**How to build RNNs and LSTMs from scratch with NumPy** *2019*
· Educational material on recurrent neural networks.
https://github.com/nicklashansen/rnn_lstm_from_scratch