

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

PhD student, Computer Science and Engineering, GPA: 3.85/4.0
· Advised by Xiaolong Wang and Hao Su. NVIDIA Graduate Fellow.

San Diego, CA, USA

Fall 2021 - present

University of California, Berkeley

Visiting Student, GPA: 4.0/4.0
· Spar Nord Fonden's FinTech scholarship recipient. SCET's Collider Cup finalist.

Berkeley, CA, USA

Spring 2020

Technical University of Denmark

MSc Mathematical Modeling & Computation, GPA: 11.2/12.0
· Special topics in machine learning. Advised by Ole Winther.

Kongens Lyngby, Denmark

Feb 2019 - Jan 2021

Technical University of Denmark

BSc Software Technology, GPA: 8.2/12.0, final year GPA: 10.8/12.0
· **Nanyang Technological University, Singapore** - semester abroad, Fall 2017.

Kongens Lyngby, Denmark

Sep 2015 - Dec 2018

Publications & Preprints (20)

Policy Learning with Large World Models

Under review
Ignat Georgiev, Varun Giridhar, **Nicklas Hansen**, Animesh Garg
To be released

Under review

2024

Hierarchical World Models as Visual Whole-Body Humanoid Controllers

arXiv preprint
Nicklas Hansen, Jyothir S V, Vlad Sobal, Yann LeCun, Xiaolong Wang*, Hao Su*
<https://arxiv.org/abs/2405.18418>

Preprint

2024

A Recipe for Unbounded Data Augmentation in Visual Reinforcement Learning Reinforcement Learning Conference (RLC)

Abdulaziz Almuzairee, **Nicklas Hansen**, Henrik I. Christensen
<https://arxiv.org/abs/2405.17416>

Poster

2024

TD-MPC2: Scalable, Robust World Models for Continuous Control

International Conference on Learning Representations (ICLR)
Nicklas Hansen, Hao Su*, Xiaolong Wang*
<https://arxiv.org/abs/2310.16828>

Spotlight

2024

Open X-Embodiment: Robotic Learning Datasets and RT-X Models

International Conference on Robotics and Automation (ICRA)
Open X-Embodiment Collaboration, [...], **Nicklas Hansen**, [...] (173 authors)
<https://arxiv.org/abs/2310.08864>

Best Conference Paper

2024

- MoDem-V2: Visuo-Motor World Models for Real-World Robot Learning** *Poster*
2024
International Conference on Robotics and Automation (ICRA)
Patrick Lancaster, **Nicklas Hansen**, Aravind Rajeswaran, Vikash Kumar
<https://arxiv.org/abs/2309.14236>
- Finetuning Offline World Models in the Real World** *Oral*
2023
Conference on Robot Learning (CoRL)
Yunhai Feng*, **Nicklas Hansen***, Ziyang Xiong*, Chandramouli Rajagopalan, Xiaolong Wang
<https://arxiv.org/abs/2310.16029>
- Multi-Task Real Robot Learning with Generalizable Neural Feature Fields** *Oral*
2023
Conference on Robot Learning (CoRL)
Yanjie Ze, Ge Yan, Yueh-Hua Wu, Annabella Macaluso, Yuying Ge, Jianglong Ye, **Nicklas Hansen**, Li Erran Li, Xiaolong Wang
<https://arxiv.org/abs/2308.16891>
- On Pre-Training for Visuo-Motor Control: Revisiting a Learning-from-Scratch Baseline** *Poster*
2023
International Conference on Machine Learning (ICML)
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*
2023
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*
2023
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** *Journal & Poster*
2023
IEEE Robotics and Automation Letters (RA-L)
International Conference on Intelligent Robots and Systems (IROS)
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*
2022
International Conference on Machine Learning (ICML)
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** *Journal & Poster*
2022
IEEE Robotics and Automation Letters (RA-L)
International Conference on Robotics and Automation (ICRA)
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*
2022
International Conference on Learning Representations (ICLR)
Ruihan Yang*, Minghao Zhang*, **Nicklas Hansen**, Huazhe 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

University of California, San Diego *Teaching Assistant*
 ECE285 Introduction to Visual Learning *Spring 2024*
 · Making sure that the class runs smoothly by assisting with day-to-day needs of the lecturer and students.

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
Sateesh Kumar (MS, UCSD -> Research Engineer, ByteDance)	2021 - 2023
Jonathan Zamora-Anaya (BS, UCSD -> MS, USC)	2021 - 2023
Sambaran Ghosal (MS, UCSD)	2021 - 2023
Zirui "Colin" Wang (BS, UCSD -> MS, Cornell)	2022 - 2023
Ziyan Xiong (BS, Tsinghua University)	2022 - 2023
Yanjie Ze (BS, SJTU -> PhD, Stanford)	2021 - 2023
Yunhai Feng (MS, UCSD -> PhD, Cornell)	2022 - 2024
Chandramouli Rajagopalan (MS, UCSD)	2022 -
Jyothir S V (MS, NYU)	2023 -

Invited Talks

TILOS Institute	"Large Datasets and Models for Robots in the Real World"	May 2024
Univ. Michigan	"Robot Learning with (Generalist) World Models"	Jan 2024
Georgia Tech	"Building Generalist World Models"	Jan 2024
Tech. Univ. Denmark	"Data-Driven World Models at Scale: Why, What, and How?"	Dec 2023
Tsinghua IIIS	"The Next Generation of World Models"	Mar 2023
MILA/ServiceNow	"World Models with Behavioral Priors"	Feb 2023
Georgia Tech	"Towards Sample-Efficient Robot Learning with World Models"	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
UCSD RoboGrads	"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	"Robots that Generalize"	August 2021
G-Research	"Agents that Generalize and Adapt"	February 2021
Neural AI	"An Introduction to Reinforcement Learning"	June 2019

Academic Service

2024	Conference on Neural Information Processing Systems (NeurIPS)	Reviewer
2024	European Conference on Computer Vision (ECCV)	Reviewer
2024	International Conference on Machine Learning (ICML)	Reviewer
2024	Conference on Computer Vision and Pattern Recognition (CVPR)	Reviewer
2024	International Conference on Learning Representations (ICLR)	Reviewer
2024	IEEE International Conference on Robotics & Automation (ICRA)	Reviewer
2023	Foundation Models for Decision-Making, Workshop @ NeurIPS	Reviewer
2023	Self-Supervised Learning - Theory and Practice, Workshop @ NeurIPS	Reviewer
2023	Journal of Machine Learning Research (JMLR)	Reviewer
2023	International Journal of Computer Vision (IJCV)	Reviewer
2023	Conference on Neural Information Processing Systems (NeurIPS)	Top Reviewer
2023	Learning Dexterous Manipulation, Workshop @ RSS	Reviewer
2023	International Conference on Computer Vision (ICCV)	Reviewer
2023	Structural and Compositional Learning on 3D data, Workshop @ CVPR	Reviewer
2023	IEEE Robotics and Automation Letters (RA-L)	Reviewer
2023	International Conference on Intelligent Robots and Systems (IROS)	Reviewer
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, Workshop @ 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

TD-MPC2: Scalable, Robust World Models for Continuous Control	<i>Poster</i>
Foundation Models for Decision-Making @ NeurIPS	2023
Robot Learning @ NeurIPS	2023
Pre-Training Robot Learning @ CoRL	2023
On Pre-Training for Visuo-Motor Control: Revisiting a Learning-from-Scratch Baseline	<i>Poster</i>
Pre-Training Robot Learning @ CoRL	2022
On the Feasibility of Cross-Task Transfer with Model-Based Reinforcement Learning	<i>Poster</i>
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	<i>Poster</i>
Pre-Training Robot Learning @ CoRL	2022
Deep RL Workshop @ NeurIPS	2022
Look Closer: Bridging Egocentric and Third-Person Views with Transformers for Robotic Manipulation	<i>Poster</i>
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	<i>Poster</i>
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	<i>Poster</i>
Unsupervised RL Workshop @ ICML	2021
Visual Learning and Reasoning for Robotics Workshop @ RSS	2021
Self-Supervised Policy Adaptation During Deployment	<i>Poster</i>
Microsoft Research RL Day	2021
Deep RL Workshop @ NeurIPS	2020
Workshop on Robot Learning @ NeurIPS	2020

Work Experience

Meta AI (FAIR)	<i>Menlo Park, CA, USA</i>
Student Researcher	<i>June 2022 - Dec 2022</i>
· Model-Based Reinforcement Learning. Mentored by Aravind Rajeswaran.	
raffle.ai	<i>Copenhagen, Denmark</i>
Machine Learning Intern	<i>Summer 2019</i>
· I built and open-sourced a cross-domain text-to-SQL parser in PyTorch.	
Retune DSP	<i>Kongens Lyngby, Denmark</i>
Student Assistant	<i>Feb 2019 - Dec 2019</i>
· I helped a team of engineers build and maintain deep learning pipelines for embedded voice control.	
Nordic Transition	<i>Gentofte, Denmark</i>
Student Software Developer	<i>July 2016 - Dec 2019</i>
· I developed and maintained a data management and analysis platform for the HR industry.	

Awards and Scholarships

2023	NVIDIA Graduate Fellowship 2024-25 · An award of \$60,000 to cover stipend and tuition for 1 year (10 recipients worldwide).	<i>Fellowship</i>
2021	Robotics Summer School Scholarship · A scholarship to participate in a two-week summer program in Denmark.	<i>Scholarship</i>
2020	Spar Nord Fond Scholarship · A scholarship to study a semester at UC Berkeley (5 recipients nation-wide).	<i>Scholarship</i>
2020	UC Berkeley's SCET Collider Cup Finalist · Biannual startup competition. Best student project from each class is nominated.	<i>Award</i>
2020	Innovation Center Denmark's SPARK Winner · Best project in a 6-month entrepreneurial program in the Bay Area.	<i>Award</i>
2017	Otto Mønsted Fonds Legat · A grant for students with a GPA ≥ 8.0 who wish to study a semester abroad.	<i>Scholarship</i>

Volunteering

2023	UC San Diego GradAMP Mentor (PhD Applications)	<i>Mentorship</i>
2022	· Supported prospective students through weekly mentor-mentee meetings in Fall.	

Misc. Open-Source Projects

TD-MPC2 Official Implementation (★235) · Public code release for "TD-MPC2: Scalable, Robust World Models for Continuous Control". https://github.com/nicklashansen/tdmpc2	2023
MoDem Official Implementation (★82) · Public code release for "MoDem: Accelerating Visual Model-Based Manipulation with Demonstrations". https://github.com/facebookresearch/modem	2022
TD-MPC Official Implementation (★287) · Public code release for "Temporal Difference Learning for Model Predictive Control". https://github.com/nicklashansen/tdmpc	2022
DMControl Generalization Benchmark (★156) · Benchmark for generalization in continuous control from pixels. https://github.com/nicklashansen/dmcontrol-generalization-benchmark	2020
PAD Official Implementation (★110) · Public code release for "Policy Adaptation During Deployment". https://github.com/nicklashansen/policy-adaptation-during-deployment	2020
Voice Activity Detection in Noisy Environments (★182) · Code for training and running a neural Voice Activity Detector (VAD) in PyTorch. https://github.com/nicklashansen/voice-activity-detection	2019
How to build RNNs and LSTMs from scratch with NumPy (★238) · Educational material on recurrent neural networks. https://github.com/nicklashansen/rnn_lstm_from_scratch	2019