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 (18)

A Recipe for Unbounded Data Augmentation in Visual Reinforcement Learning — *Poster*
Reinforcement Learning Conference **(RLC)** — *2024*
Abdulaziz Almuzairee, **Nicklas Hansen**, Henrik I. Christensen
To be released

TD-MPC2: Scalable, Robust World Models for Continuous Control — ***Spotlight***
International Conference on Learning Representations **(ICLR)** — *2024*
Nicklas Hansen, Hao Su*, Xiaolong Wang*
https://arxiv.org/abs/2310.16828

Open X-Embodiment: Robotic Learning Datasets and RT-X Models — ***Best Conference Paper***
International Conference on Robotics and Automation **(ICRA)** — *2024*
Open X-Embodiment Collaboration, [...], **Nicklas Hansen**, [...] (173 authors)
https://arxiv.org/abs/2310.08864

MoDem-V2: Visuo-Motor World Models for Real-World Robot Learning — *Poster*
International Conference on Robotics and Automation **(ICRA)** — *2024*
Patrick Lancaster, **Nicklas Hansen**, Aravind Rajeswaran, Vikash Kumar
https://arxiv.org/abs/2309.14236

Finetuning Offline World Models in the Real World — ***Oral***
Conference on Robot Learning **(CoRL)** — *2023*
Yunhai Feng*, **Nicklas Hansen***, Ziyan Xiong*, Chandramouli Rajagopalan, Xiaolong Wang
https://arxiv.org/abs/2310.16029

Multi-Task Real Robot Learning with Generalizable Neural Feature Fields — *Oral*
Conference on Robot Learning **(CoRL)** — *2023*
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*
International Conference on Machine Learning **(ICML)** — *2023*
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*
International Conference on Learning Representations **(ICLR)** — *2023*
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*
International Conference on Learning Representations **(ICLR)** — *2023*
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*
IEEE Robotics and Automation Letters **(RA-L)** — *2023*
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*
Conference on Robot Learning **(CoRL)** — *2022*
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

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 -> PhD, Cornell)	*2022 - 2023*
Ziyan Xiong (BS, Tsinghua University)	*2022 - 2023*
Yanjie Ze (BS, SJTU)	*2021 - 2023*
Yunhai Feng (MS, UCSD)	*2022 -*
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	Foundation Models for Decision-Making, Workshop @ **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	*Poster*
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	*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*
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*
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

2023 **NVIDIA Graduate Fellowship 2024-25** *Fellowship*
· An award of $60,000 to cover stipend and tuition for 1 year (10 recipients worldwide).
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 students with a GPA >= 8.0 who wish to study a semester abroad.

Volunteering

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

Misc. Open-Source Projects

TD-MPC2 Official Implementation (⭐231) *2023*
· Public code release for "TD-MPC2: Scalable, Robust World Models for Continuous Control".
https://github.com/nicklashansen/tdmpc2

MoDem Official Implementation (⭐82) *2022*
· Public code release for "MoDem: Accelerating Visual Model-Based Manipulation with Demonstrations".
https://github.com/facebookresearch/modem

TD-MPC Official Implementation (⭐286) *2022*
· Public code release for "Temporal Difference Learning for Model Predictive Control".
https://github.com/nicklashansen/tdmpc

DMControl Generalization Benchmark (⭐156) *2020*
· Benchmark for generalization in continuous control from pixels.
https://github.com/nicklashansen/dmcontrol-generalization-benchmark

PAD Official Implementation (⭐110) *2020*
· Public code release for "Policy Adaptation During Deployment".
https://github.com/nicklashansen/policy-adaptation-during-deployment

Voice Activity Detection in Noisy Environments (⭐182) *2019*
· Code for training and running a neural Voice Activity Detector (VAD) in PyTorch.
https://github.com/nicklashansen/voice-activity-detection

How to build RNNs and LSTMs from scratch with NumPy (⭐236) *2019*
· Educational material on recurrent neural networks.
https://github.com/nicklashansen/rnn_lstm_from_scratch