Karl Pertsch

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Research Interests

My goal is to build intelligent agents that help humans in their everyday tasks, both in the physical and virtual world. To enable this, I am working on approaches that use large and diverse datasets of prior experience to facilitate the learning of complex, long-horizon behaviors. In my research, I explore approaches that learn world models, representations of the environment or reusable skills and transfer them to new tasks.

Education

University of Southern California, Los Angeles, CA — Aug 2018 - Present
Ph.D. in Computer Science (Advisor: Joseph J. Lim), GPA: 4.0 / 4.0

University of Pennsylvania, Philadelphia, PA — Aug 2017 - Aug 2018
Fulbright Visiting Scholar, GPA: 4.0 / 4.0

TU Dresden, Dresden, Germany — Sept 2012 - Aug 2017
Diploma in Electrical Engineering, GPA: 4.0 / 4.0 (with distinction)

Professional Experience

Google Brain Robotics, Mountain View, CA — May 2022 - Present
Student Researcher with Karol Hausman
- Research in robot learning from large scale robot and human video data

Facebook AI Research, Menlo Park, CA — Aug 2021 - Mar 2022
Research Intern with Akshara Rai and Dhruv Batra
- Research in robot learning from cross-domain demonstrations, e.g. from human videos

RAIL Lab, UC Berkeley, Berkeley, CA — Feb 2019 - Jul 2019
Visiting Researcher with Sergey Levine
- Research on hierarchical prediction models for visual planning

GRASP Lab, UPenn, Philadelphia, PA — Aug 2017 - May 2018
Fulbright Visiting Scholar with Kostas Daniilidis
- Research in unsupervised learning of action representations

Computer Vision Lab, TU Dresden, Germany — Apr 2017 - Aug 2017
Diploma Thesis with Carsten Rother
- Research on 6DoF object pose estimation

Institute of Automotive Engineering, TU Dresden, Germany — Apr 2016 - Jan 2017
Research Assistant with Bernard Bäker
- Research in RL for learning energy-optimal driving strategies for hybrid electric vehicles

BMW Research, Munich, Germany — Sept 2015 - Mar 2016
Research Intern with Lawrence Louis and Moritz Werling
- Research in predictive models for autonomous vehicle control

Conference Papers

[C10] **Karl Pertsch**, Ruta Desai, Vikash Kumar, Franziska Meier, Joseph J. Lim, Dhruv Batra, and Akshara Rai. "Cross-Domain Transfer via Semantic Skill Imitation", *Conference on Robot Learning (CoRL)*, 2022

[C9] Jun Yamada, **Karl Pertsch**, Anisha Gunjal, and Joseph J. Lim. "Task-Induced Representation Learning", *International Conference on Learning Representations (ICLR)*, 2022

[C8] Taewook Nam, Shao-Hua Sun, **Karl Pertsch**, Sung Ju Hwang, and Joseph J. Lim. "Skill-based Meta-Reinforcement Learning", *International Conference on Learning Representations (ICLR)*, 2022

[C7] **Karl Pertsch**, Youngwoon Lee, Yue Wu, and Joseph J. Lim. "Demonstration-Guided Reinforcement Learning with Learned Skills", *Conference on Robot Learning (CoRL)*, 2021

[C6] **Karl Pertsch**, Youngwoon Lee, and Joseph J. Lim. "Accelerating Reinforcement Learning with Learned Skill Priors", *Conference on Robot Learning (CoRL)*, 2020

[C5] Jun Yamada*, Youngwoon Lee*, Gautam Salhotra, **Karl Pertsch**, Max Pflueger, Gaurav S. Sukhatme, Joseph J. Lim, and Peter Englert. "Motion Planner Augmented Reinforcement Learning for Robot Manipulation in Obstructed Environments", *Conference on Robot Learning (CoRL)*, 2020

[C4] **Karl Pertsch***, Oleh Rybkin*, Frederik Ebert, Chelsea Finn, Dinesh Jayaraman, and Sergey Levine. "Long-Horizon Visual Planning with Goal-Conditioned Hierarchical Predictors", *Neural Information Processing Systems (NeurIPS)*, 2020

[C3] **Karl Pertsch***, Oleh Rybkin*, Jingyun Yang, Shenghao Zhou, Kosta Derpanis, Joseph J. Lim, Kostas Daniilidis, and Andrew Jaegle. "KeyIn: Keyframing for Visual Planning", *Conference on Learning for Dynamics and Control (L4DC)*, 2020

[C2] Oleh Rybkin*, **Karl Pertsch***, Konstantinos G. Derpanis, Kostas Daniilidis, and Andrew Jaegle. "Learning what you can do before doing anything", *International Conference on Learning Representations (ICLR)*, 2019

[C1] Omid Hosseini Jafari*, Siva Karthik Mustikovela*, **Karl Pertsch**, Eric Brachmann, and Carsten Rother. "iPose: Instance-Aware 6D Pose Estimation of Partly Occluded Objects", *Asian Conference on Computer Vision (ACCV)*, 2018

Technical Reports

[T4] Shivin Dass*, **Karl Pertsch***, Hejia Zhang, Youngwoon Lee, Joseph J. Lim, and Stefanos Nikolaidis. "Assisted Teleoperation for Scalable Robot Data Collection", *CoRL Workshop on Pretraining Robot Learning*, 2022

[T3] Anthony Liang, Ishika Singh, **Karl Pertsch**, and Jesse Thomason. "Transformer Adapters for Robot Learning", *CoRL Workshop on Pretraining Robot Learning*, 2022

[T2] Jesse Zhang*, **Karl Pertsch***, Jiahui Zhang, Taewook Nam, Sung Ju Hwang, Xiang Ren, and Joseph J. Lim. "Scalable Semantic Policy Pre-Training via Language Instruction Relabeling", *CoRL Workshop on Language in RL*, 2022

[T1] Jesse Zhang*, **Karl Pertsch***, Jiefan Yang, and Joseph J. Lim. "Minimum Description Length Skills for Accelerating Reinforcement Learning", *NeurIPS Workshop on Self-Supervised Learning in RL*, 2021

Honors and Awards

- Best Paper Presentation Award, CoRL — 2020
- Best Paper Runner-up, NeurIPS Workshop on Robot Learning — 2020
- Fulbright Scholarship — 2017
- TU Dresden Best Diploma in Electrical Engineering Award — 2017
- TU Dresden Best Pre-Diploma Award — 2014
- Deutschlandstipendium — 2013 - 2017
  - German national scholarship for outstanding academic achievements

Invited Talks

Accelerating Reinforcement Learning and Imitation with Learned Skills

- MILA, Invited talk in Glen Berseth's lab — Nov 2022

A Scalable Framework for Skill-based Learning with Offline Data

- Stanford University, Invited talk at Vision & Learning Lab — Jul 2021
- University of Pennsylvania, Invited talk at PAL Lab — Jun 2021

Teaching

Teaching Assistant, USC — Spring 2019, Fall 2019, Fall 2020
CSCI-566 Deep Learning and its Application (Joseph J. Lim)

Teaching Assistant, TU Dresden — Spring 2016, Fall 2016
Department of Electrical Engineering General Tutoring

Teaching Assistant, TU Dresden — Fall 2014, Spring 2015
Math 1 & 2 for Electrical Engineering (Jörg Wensch)

Student Mentoring

Ph.D. Students

- Jesse Zhang (USC) — Language+Skills in RL (in-progress)
- Anthony Liang (USC) — Language in RL (in-progress)
- Taewook Nam (KAIST) — ICLR 2022

Master's Students

- Shivin Dass (USC) — Robot Teleoperation (in-progress)
- Jullian Yapeter (USC) — Deep Reinforcement Learning (in-progress)

Undergraduate Students

- Yue Wu (USC) — CoRL 2021
- Jingyun Yang (USC → Master's student at CMU → Ph.D. student at Stanford) — L4DC 2020

Visiting Scholars

- Jun Yamada (USC → Ph.D. student at Oxford) — CoRL 2020, ICLR 2022
- Anisha Gunjal (USC → M.S. student at UT Austin) — ICLR 2022

Services

Reviewer (Top Reviewer Awards Underlined)

- **ICLR**: 2020, 2021, 2022
- **ICML**: 2020, 2021, 2022
- **NeurIPS**: 2020
- **CoRL**: 2021
- **ICRA**: 2021, 2022
- **T-RO**: 2022
- **TMLR**: 2022
- **ICCV**: 2019
- **CVPR**: 2019

Last Update : November 28, 2022