

Julen Urain

Robotics & Machine Learning Researcher

Intelligent Autonomous Systems Lab
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🌐 [TheCamusean](#) [in](#) [Julen Urain](#)
[Google Scholar](#) [Personal Website](#)

Robotics & Machine Learning Research Scientist

My research interests are in the interplay of generative modeling, geometry, optimization, robotics, planning & control.

Technical Expertises

- Robot Learning
- Robotics
- Deep Learning
- Optimization
- Generative Models/ Unsupervised Learning
- 3D Computer Vision

Education

- 2019-2023 **PhD. in Computer Science. Advisor: Jan Peters, Technische Universität Darmstadt - TUDA, Darmstadt (Germany), GPA – 1 (Suma Cum Laude).**
- 2017 **M.Sc. Thesis. Advisor: Auke Ijspeert, École Polytechnique Fédérale de Lausanne - EPFL, Lausanne (Switzerland), GPA – 5.5/6.**
- 2015-2017 **M.Sc. in Automatic Control and Robotics, Universitat Politècnica de Catalunya - UPC, Barcelona (Spain), GPA – 8.71/10, Top 3%.**
- 2011-2015 **B.Sc. in Electronical Engineering. Advisor: Josu Jugo, Universidad del País Vasco - UPV, Bilbao (Spain), GPA – 7.3/10.**

Research and Work Experience

- 2024-Present **Postdoctoral Researcher, IAS & DFKI, Darmstadt (Germany).**
Research in Machine Learning and Robotics.
- 2022-2023 **Research Intern, NVIDIA, ROBOTICS LAB, Seattle (US), Fully Remote.**
Research in Learning Generalizable Pointcloud-conditioned Robot Grasping Motion Generator
- 2019-Present **Scientific Researcher Staff, IAS - TU DARMSTADT, Darmstadt (Germany).**
Research in Robot Learning, Generative Models, Geometry, Optimization, Deep Learning
- 2017-2018 **Robotics Researcher, IK4 RESEARCH ALLIANCE - TEKNIKER, Eibar, (Spain).**
Applied Research in Robot Learning.
- 2017 **Research Intern, VOLKSWAGEN DATALAB, Munich (Germany).**
In connection with the Deep Learning and Robotics Challenge
- 2017 **Junior Researcher, BIOROB LAB - EPFL, Lausanne (Switzerland).**
Developing Human intention classifiers for Physical Human Robot Interaction
- 2015 **Voluntary Graduate Researcher, K2M - UPC, Barcelona (Spain).**
Developing Vision based Human Gait tracker for medical analysis

Honors and Awards

- 2023 **Best paper award in Geometric Representations Workshop at ICRA 2023.**
Award earned for the work on SE(3)-Diffusion Models for 6DoF Grasp Generative Models
- 2023 **R:SS Pioneers.**
Selected as a 30 member strong-cohort of top early robotics researchers (%22 acceptance)

- 2020 **Dexterous Manipulation Real Robot Challenge.**
3rd place in the Max Planck Institute (MPI) Real Robot Dexterous Manipulation Challenge
- 2017 **Deep Learning and Robotic Challenge.**
1st place of the jury in the VW:DataLab Deep Learning and Robotic Challenge
- 2017 **MSc. Graduated top of class.**
Top 3% in the MSc. in Automatic Control and Robotics at UPC
- 2015 **Hilbert-Bernays Fellowship.**
in relation with Hilbert-Bernays Summer School on Logic and Computation

Funded Projects

- 2023 **Smart Assistant for Image-guided Needle Insertion, HESSIAN.AI.**
 - Role: Project and Technical Leader for TU Darmstadt. PI: Jan Peters
- 2019-2022 **Safe and effective human robot cooperation towards a better competitiveness on current automation lack manufacturing processes(SHAREWORK), EU PROJECT - HORIZON 2020.**
 - Role: Project and Technical Leader for TU Darmstadt. PI: Jan Peters
- 2018-2019 **Flexible, safe and dependable robotic part handling in industrial environments (PICK-PLACE), EU PROJECT - HORIZON 2020.**
 - Role: Research Scientist for Tekniker. PI: Iñaki Maurtua

Invited Talks

- 2023 **An introduction to Energy Based Models and Diffusion Models, INTERNATIONAL WORKSHOP OF INTELLIGENT AUTONOMOUS LEARNING SYSTEMS 2023, Darmstädter Haus, Kleinwalsertal (Austria).**
- 2023 **Robot Motion Generative Models, DYSON ROBOT LEARNING LAB, London (UK).**
- 2023 **Robot Motion Generative Models, THE ROBOT LEARNING LAB AT IMPERIAL COLLEGE, London (UK).**

Teaching Experience

- 2020-2022 **Robot Learning, TU DARMSTADT.**
Teaching Assistant
- 2020-2021 **Robotics Integrated Projects, TU DARMSTADT.**
Teaching Assistant

Mentoring and Supervision

- 2022 **Mark Baierl, Score-Based Generative Models as Trajectory Priors for Motion Planning, Master Thesis.**
- 2022 **Jascha Hellwig, Residual Reinforcement Learning with Stable Priors, Master Thesis.**
- 2021 **Yifei Wang, Bimanual Control and Learning with Composable Energy Policies, Master Thesis.**
- 2021 **Jiawei Huang, Multi-Objective Reactive Motion Planning in Mobile Manipulators, Master Thesis.**
- 2021 **Hanyu Sun, Can we improve time-series classification with Inverse Reinforcement Learning?, Master Thesis.**
- 2021 **Lanmiao Liu, Detection and Prediction of Human Gestures by Probabilistic Modelling, Master Thesis.**
- 2020 **Zhenhui Zhou, Approximated Policy Search in Black-Box Optimization, Master Thesis.**

Publications

Journal Articles

- 2023 **Julen Urain**, Anqi Li, Puze Liu, Carlo D'Eramo, and Jan Peters. Composable energy policies. *International Journal of Robotics Research (IJRR)*, 2023.
- 2022 **Julen Urain**, Davide Tateo, and Jan Peters. Learning stable vector fields on Lie groups. *IEEE Robotics and Automation Letters (RA-L)*, 2022.
- 2021 Niklas Funk, Charles Schaff, Rishabh Madan, Takuma Yoneda, **Julen Urain**, Joe Watson, Ethan K Gordon, Felix Widmaier, Stefan Bauer, Siddhartha S Srinivasa, et al. Benchmarking structured policies and policy optimization for real-world dexterous object manipulation. *IEEE Robotics and Automation Letters (RA-L)*, 2021.
- 2019 Ander Iriondo, Elena Lazkano, Loreto Susperregi, **Julen Urain**, Ane Fernandez, and Jorge Molina. Pick and place operations in logistics using a mobile manipulator controlled with deep reinforcement learning. *Applied Sciences*. Multidisciplinary Digital Publishing Institute, 2019.
- 2018 Jessica Lanini, Hamed Razavi, **Julen Urain**, and Auke Ijspeert. Human intention detection as a multiclass classification problem: Application in physical human–robot interaction while walking. *IEEE Robotics and Automation Letters (RA-L)*, volume 3, pages 4171–4178. IEEE, 2018.

In Conference Proceedings

- 2023 **Julen Urain**, Niklas Funk, Georgia Chalvatzaki, and Jan Peters. SE(3)-Diffusionfields: Learning smooth cost functions for joint grasp and motion optimization through diffusion. *International Conference on Robotics Automation (ICRA)*, 2023.
- 2023 Kay Hansel, **Julen Urain**, Jan Peters, and Georgia Chalvatzaki. Hierarchical policy blending as inference for reactive robot control. *International Conference on Robotics Automation (ICRA)*, 2023.
- 2022 **Julen Urain**, An T. Le, Alexander Lambert, Georgia Chalvatzaki, Byron Boots, and Jan Peters. Learning implicit priors for motion optimization. *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2022.
- 2021 **Julen Urain**, Anqi Li, Puze Liu, Carlo D'eraimo, and Jan Peters. Composable energy policies for reactive motion generation and reinforcement learning. In *2021 Robotics Science and Systems (R:SS)*, 2021.
- 2020 **Julen Urain**, Michele Ginesi, Davide Tateo, and Jan Peters. Imitationflow: Learning deep stable stochastic dynamic systems by normalizing flows. In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 5231–5237. IEEE, 2020.
- 2019 **Julen Urain** and Jan Peters. Generalized multiple correlation coefficient as a similarity measurement between trajectories. In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 1363–1369. IEEE, 2019.

Workshop Papers

- 2021 **Julen Urain**, Davide Tateo, and Jan Peters. Learning stable vector fields on smooth manifolds. In *R:SS Workshop on on geometry and topology in robotics*, 2021.
- 2020 **Julen Urain**, Davide Tateo, Tianyu Ren, and Jan Peters. Structured policy representation: Imposing stability in arbitrarily conditioned dynamic systems. In *3rd NeurIPS Workshop on Robot Learning, 2020*, 2020.

Professional Service and Volunteering

REVIEWING

Conferences

International Conference on Intelligent Robots (IROS), Conference on Robot Learning (CORL), International Conference on Robotics and Automation (ICRA), Artificial intelligence and Statistics Conference (AISTATS)

Journals

Robotics and Automation Letters (RA-L), The International Journal of Robotics Research (IJRR)

OTHER

MOOC on Robot Learning

Design and prepare a MOOC on Robot Learning for the KI-campus platform

Open-Source Software and Datasets

SE(3) DiffusionFields for Grasp and Motion Planning.

- Diffusion Models in SE(3) for training 6DoF Grasp Generative Models.
- https://github.com/TheCamusean/grasp_diffusion

Stable Vector Fields on Lie Groups.

- A method to learn data-driven globally stable dynamics in in Lie Groups to represent task-space robot policies.
- <https://github.com/TheCamusean/LieFlows>

Languages

Spanish **Mothertongue**
Basque **Mothertongue**
English **Fluent**

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