Julen Urain

Robotics & Machine Learning Research Scientist

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↑ robotgradient in Julen Urain
Google Scholar Personal Website

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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 Pais Vasco UPV*, Bilbao (Spain), *GPA 7.3/10*.

Work Experience

- 06/01/2025- **Research Scientist**, FAIR *@META*, Montreal (Canada).
- 22/12/2025 Research Scientist under Jitendra Malik's robotics team. **Working on**: Dexterous Manipulation, Learning from Video, and 3D generative models.
- 01/12/2024- Postdoctoral Researcher, PEARL, TU Darmstadt (Germany).
- 31/12/2024 Responsabilities: Research, paper writting, Ph.D. & master student advisor.

Projects: Grounding Robotics in the 3D world

Particular Accomplishments: worked on an R:SS submission under Georgia Chalvatzaki's advice.

- 01/01/2024- Postdoctoral Researcher, IAS & DFKI, Darmstadt (Germany).
- 31/07/2024 Responsabilities: Research, paper writting, Ph.D. & master student advisor.

Projects: DFKI internal

Particular Accomplishments: three paper submitted. one CoRL paper. two master thesis supervision. One master student starting his Ph.D. in Imperial College.

- 10/31/2022- Research Intern, NVIDIA, ROBOTICS LAB, Seattle (US), Fully Remote.
- 06/09/2023 **Responsabilities:** Research and code in Robot Learning

Projects: Internal NVIDIA project

Particular Accomplishments: Internal code development.

- 01/15/2019- Scientific Researcher Staff, IAS TU DARMSTADT, Darmstadt (Germany).
- 12/31/2023 **Responsabilities:** Research and publish scientific papers in Robot Learning, Teaching, Mentoring Bachelor and Master students.

Projects: Sharework EU Project, Smart-Assistant for Image-guided Needle Insertion (Hessian.AI).

Particular Accomplishments: Selected R:SS Pioneer, Selected finalist for George Girault Ph.D. award, Best Workshop Paper, published papers in top-tier robotic conferences (ICRA, IROS, IJRR, RA-L, R:SS), GitHub open repositories (GraspDiffusion/Stable Vector Fields on Lie Groups)

12/01/2017- Robotics Researcher, IK4 RESEARCH ALLIANCE - TEKNIKER, Eibar, (Spain).

12/31/2018 Responsabilities: Research in Robot Learning, code programming for EU Projects.

Projects: PICK-PLACE EU Project.

Particular Accomplishments: Develop force control for KUKA arm, develop a potential field-based

human avoidance model.

Honors and Awards

2024 Best paper award in Structural Priors as Inductive Biases for Learning Robot Dynamics Workshop at RSS 2024.

ActionFlow: Efficient, Accurate, and Fast Policies with Spatially Symmetric Flow Matching

2024 Selected Finalist for the George Girault Ph.D. award.

Award to the best robotics Ph.D. in Europe (only 5 finalist in whole Europe)

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.
 - o Role: Project and Technical Leader for TU Darmstadt. Pl: Jan Peters
- 2019-2022 Safe and effective human robot cooperation towards a better competiveness on current automation lack manufacturing processes(SHAREWORK), EU PROJECT HORIZON 2020.
 - o Role: Project and Technical Leader for TU Darmstadt. Pl: Jan Peters
- 2018-2019 Flexible, safe and dependable robotic part handling in industrial environments (PICK-PLACE), EU PROJECT HORIZON 2020.
 - o Role: Research Scientist for Tekniker. PI: Iñaki Maurtua

Invited Talks

- 2024 **Deep Generative Models in Robotics**, META AI READING GROUP, Remote.
- 2024 Deep Generative Models meet Geometry meet Robotics, READING GROUP AT ECOLE CENTRALE DE LYON, Remote.
- 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

- 2025 Yixuan Wang, 3D world semantic maps, Research Intern @ FAIR.
- 2025 Irmak Guzey, Dexterity from Aria Glasses, Research Intern @ FAIR.
- 2024 **Anish Diwan**, *NEAR: A Generative Framework for Imitation Learning from Observation*, Master Thesis.
- 2024 **Chen Qian**, Pianomime: Learning a generalist piano playing agent from Internet demonstrations, Master Thesis.
- 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

- Julen Urain, Ajay Mandlekar, Yilun Du, Mahi Shafiullah, Danfei Xu, Katerina Fragkiadaki, Georgia Chalvatzaki, and Jan Peters. A survey on deep generative models for robot learning from multimodal demonstrations. IEEE Transaction on Robotics TR-O, 2025.
- 2025 An T Le, Kay Hansel, João Carvalho, Joe Watson, **Urain, Julen**, Armin Biess, Georgia Chalvatzaki, and Jan Peters. Global tensor motion planning. *IEEE Robotics and Automation Letters*. IEEE, 2025.
- 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

- 2025 Anish Abhijit Diwan, **Urain, Julen**, Jens Kober, and Jan Peters. Noise-conditioned energy-based annealed rewards (near): A generative framework for imitation learning from observation. In *International Conference on Learning Representations (ICLR)*, 2025.
- 2024 Cheng Qian, **Julen Urain**, Kevin Zakka, and Jan Peters. Pianomime: Learning a generalist, dexterous piano player from internet demonstrations. *Conference on Robot Learning (CoRL)*., 2024.
- 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.
- Julen Urain, Anqi Li, Puze Liu, Carlo D'eramo, 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

- 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.

Preprints and Technical reports

- 2026 Irmak Guzey, **Julen Urain**, Haozhi Qi, Akshara Rai, and Homanga Bharadhwaj. Dexterity from smart lenses: Multi-fingered robot manipulation with in-the-wild human demonstrations. *Submited to ICRA*, 2026.
- 2024 Niklas Funk, **Julen Urain**, Joao Carvalho, Vignesh Prasad, Georgia Chalvatzaki, and Jan Peters. Actionflow: Equivariant, accurate, and efficient policies with spatially symmetric flow matching. https://arxiv.org/abd/2409.04576, 2024.
- Joao Carvalho, An T Le, Philipp Jahr, Qiao Sun, Julen Urain, Dorothea Koert, and Jan Peters. Grasp diffusion network: Learning grasp generators from partial point clouds with diffusion models in so (3) xr3. arXiv preprint arXiv:2412.08398, 2024.

Professional Service and Volunteering

WORKSHOP ORGANIZATION

2024 A Future Roadmap for Sensorimotor Skill Learning for Robot Manipulation.

https://icra-manipulation-skill.github.io/

IEEE International Conference on Robotics and Automation 2024 (ICRA)

2024 RSS Pioneers 2024.

https://sites.google.com/view/rsspioneers2024/Robotics: Science and Systems 2024 (R:SS)

2024 Geometric and Algebraic Structure in Robot Learning.

https://sites.google.com/view/gas-rl-rss2024 Robotics: Science and Systems 2024 (R:SS)

REVIEWING

Conferences

International Conference on Intelligent Robots (IROS), Conference on Robot Learning (CORL), International Conference on Robotics and Automation (ICRA), Artificial intelligence and Statitistics 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** C1