

Julen Urain

PhD candidate / IAS, TU Darmstadt

Intelligent Autonomous Systems Lab
Technische Universität Darmstadt
✉ urain@ias.informatik.tu-darmstadt.de
📄 [thecamusean.github.io](https://github.com/thecamusean)
🌐 TheCamusean in Julen Urain

My research interests are in the interplay of robotics, planning & control, deep learning, optimization, and geometry.

Education

- 2019–Present **PhD. in Computer Science. Advisor: Jan Peters**, Technische Universität Darmstadt - TUDA, Darmstadt (Germany).
- 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 – 8.7/10, Rank – 1/130.
- 2011–2015 **B.Sc. in Electronical Engineering. Advisor: Josu Jugo**, Universidad del País Vasco - UPV, Bilbao (Spain), GPA – 7.5/10.

Research and Work Experience

- 2019–Present **Graduate Researcher Assistant**, Technische Universität Darmstadt - TUDA, Darmstadt, GE.
- Interdisciplinary research in Robotics, Reactive Motion Generation, Reinforcement Learning, Control, Differential Geometry, Task and Motion Planning, Optimization, Probabilistic Representations, Deep Learning
 - Develop Composable Energy Policies. A novel
 - Develop ImitationFlows. A novel deep learning architecture to learn stable vector fields.
 - Develop Operational Space Impedance Controllers for dexterous manipulation in MPI's Trifinger robot.
 - Develop Generalized Multiple Correlation Coefficient metric. A statistical metric to measure similarities between human gestures.
- 2019–Present **Lead Researcher for European Project: Sharework**.
- Develop Active Learning algorithms for Human gesture identification
 - Develop Human occupancy prediction algorithms for Motion planning in Human-Robot scenarios
 - Integrate ROS + Docker to provide a modular approach to integrate machine learning in industry
 - Build modular interface to compose robot skills.
- 2018–2019 **Robotics Researcher**, IK4 RESEARCH ALLIANCE - TEKNIKER, San Sebastian, ES.
- Build Vision based reactive motion generator for Safe Human-Robot Interaction for KUKA-IIWA and UR-10.
 - Research in Replanning methods in OMPL.
 - Build a ROS framework for Mobile Manipulators
 - Research assistant in European project (PICK PLACE)
- 2017 **Graduate Researcher**, BIOROB LAB - EPFL, Lausanne, SW.
- We studied the problem of learning the human arms impedance parameters from data
 - Integrate these impedance parameters in a iCub humanoid robot
 - Run Human-Robot interaction tasks to see how well the robot adapt to the human.
- 2015–2017 **Graduate Researcher**, K2M - UPC, Barcelona, ES.
- We designed computer vision algorithm to detect human gait.
 - Build machine learning prediction algorithm to detect healthy gaits.

Publications

Journal Articles

- 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*, 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*, volume 3, pages 4171–4178. IEEE, 2018.

In Conference Proceedings

- 2021 **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

- 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.

Preprints and Technical reports

- 2022 **Julen Urain**, Davide Tateo, and Jan Peters. Learning stable vector fields on lie groups. In *Under Review: International Conference on Robotics and Automation (ICRA)*. IEEE, 2022.

Honors and Awards

- 2020 **Dexterous Manipulation Real Robot Challenge.**
Our team won the 3rd place in the Max Plank Institute’s Real Robot Dexterous Manipulation Challenge
- 2017 **Deep Learning and Robotic Challenge.**
Our team won the 1st place of the jury in the VW:DataLab Deep Learning and Robotic Challenge held in Munich, Germany
- 2017 **MSc. Graduated top of class.**
Best graduate student in the MSc. in Automatic Control and Robotics at UPC
- 2016 **Erasmus Mundus Fellowship.**
(full tuition and stipend at EPFL)
- 2015 **Hilbert-Bernays Fellowship.**
in relation with Hilbert-Bernays Summer School on Logic and Computation

Invited Talks and Posters

- 2020 **Deep Learning Architectures for Reactive Motion Generation.**
 - o at IRIM Workshop: Task and motion planning for effective human-robot collaboration
 - o at Robotics Colloquium @TUDA
- 2021 **CEP : Parallel Computation for Reactive Motion Generation.**
 - o at ELLIS doctoral Symposium @ Max Planck Institute

Professional Service and Volunteering

- 2019-Present Reviewer for IROS, CoRL, ICRA, NeurIPS
- 2020 Design and prepare a MOOC on Robot Learning for the KI-campus platform

Open-Source Software Releases

ImitationFlow: Repository to learn stable vector fields for motion skills..

Courses (Co-)taught or Assisted

- 2020-2021 **Technische Universitat Darmstadt**, *Robot Learning*, Teaching Assistant.
- 2020-2021 **Technische Universitat Darmstadt**, *Robotics Integrated Projects*, Teaching Assistant.

Students Mentoring

Thesis supervision

- o 8 Master students
- o 2 Bachelor students

Languages

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

C1