ALLEGATO B

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Davide Tateo

Curriculum Vitae

Personal Data

Current position: **Research Group Leader**, *Technische Universität Darmstadt*, Intelligent Autonomous Systems Group, Darmstadt.

Research Interests

Robot Learning: Learning to Plan, Robot Skill Learning, Structured Exploration, Motion Primitives.

Robotics: Robotic manipulators, Legged Robots, High-speed Movements, System Identification and Control.

Reinforcement Learning: Safe Reinforcement Learning, Interpretable Reinforcement Learning, Deep Reinforcement Learning, Inverse Reinforcement Learning, Multi-task Reinforcement Learning.

Scientific Productivity

Productivity and Impact Metrics

17 publications and **33** co-authors according to Scopus

Author of **5** top-ranked Q1 journal (based on SCIMAGO).

Author of **9** scientific publications on peer-reviewed conferences, including xx top-level A/A* CORE ranking

two best-paper nomination awards, one outstanding presentation award

Publication Impact

Scopus: h-index: **7**, citations **150**

Google Scholar: h-index: **11**, citations **447**

Highlights

Research Group leader at the IAS lab of Prof. Jan Peters at TU Darmstadt. Coordinating the work on many international and national research and industry projects.

Organizer of the Robot Air Hockey challenge at NeurIPS 2023

Active collaborations with several research groups: Università degli Studi di Milano, Poznan University of Technology, IDEAS NCBR, Idiap Research Institute, Huawei Noah's Ark lab

Lecturer for three years of the Reinforcement Learning course of TU Darmstadt, including development of the syllabus of the course.

Academic age: 10 years, 5 after Ph.D. graduation.

Education

2014–2019   **Ph.D. in *Information Technology***, *Politecnico di Milano*, Milano, Italy.
advisor: Andrea Bonarini and Marcello Restelli
thesis title: Building structured hierarchical agents
topics: Machine Learning, Reinforcement Learning, Robotics, Deep Learning

2012–2014   **M.Sc. Degree in *Computer Engineering***, *Politecnico di Milano*, Milano, Italy, *110/110 cum laude*.
advisor: Andrea Bonarini
thesis title: Cognitive SLAM: knowledge-based simultaneous localization and mapping
topics: Artificial Intelligence, Robotics
average grade: 29.85/30

2009–2012   **B.Sc. Degree in *Computer Engineering***, *Politecnico di Milano*, Milano, Italy, *108/110*.
topics: Fundamentals of Computer Science, Software Engineering, Robotics, Embedded Systems

2004–2009   **Maturità Scientifica**, *Istituto Istruzione Superiore V. Bachelet*, Abbiategrasso, Italy, *100/100*.

Teaching

Lecturer   **Reinforcement Learning: From Foundations to Deep Approaches**, *Lecturers: Prof. Georgia Chalvatzaki and Davide Tateo, Ph.D*, Technische Universität Darmstadt, Summer semester 2024.
Course organization, definition of the syllabus, development of slides and content, teaching, 24 hours

Lecturer   **Reinforcement Learning: From Foundations to Deep Approaches**, *Lecturers: Prof. Georgia Chalvatzaki and Davide Tateo, Ph.D*, Technische Universität Darmstadt, Summer semester 2023.
Course organization, definition of the syllabus, development of slides and content, teaching, 18 hours

Lecturer   **Reinforcement Learning: From Foundations to Deep Approaches**, *Lecturers: Prof. Jan Peters, Prof. Georgia Chalvatzaki, Prof. Carlo D'Eramo and Davide Tateo, Ph.D*, Technische Universität Darmstadt, Summer semester 2022.
Course organization, definition of the syllabus, development of slides and content, teaching, 6 hours

Teaching Assistant   **Foundations of Computer Science ("Informatica")**, *prof. Andrea Bonarini*, Politecnico di Milano, 2016-2017.
Teaching of C programming language, 30 hours

Laboratory tutor   **Laboratory – Foundations of Computer Science ("Informatica")**, *prof. Andrea Bonarini*, Politecnico di Milano, 2016-2017.
Didactic Laboratory on C programming Language 10 hours

Teaching Assistant   **Foundations of Computer Science ("Informatica")**, *prof. Andrea Bonarini*, Politecnico di Milano, 2017-2018.
Teaching of C programming language, 30 hours

Professional Experience

December 2022 –   **Research Group Leader**, *Intelligent Autonomous Systems (IAS)*, Technische Universität Darmstadt, Darmstadt, Germany.
Reinforcement Learning, Robotics

April 2019 – December 2022   **Postdoctoral Researcher**, *Intelligent Autonomous Systems (IAS)*, Technische Universität Darmstadt, Darmstadt, Germany.
Reinforcement Learning, Robotics

July 2007 – May 2012   **Vocational Training in Industrial Machine Operation**, *Ficem di Giuliano Tateo & C. S.A.S.*, Vigano di Gaggiano, Italy.
CNC Machine operation, CAD designer

Research Grants

2021   **DFG Research Grant PE 2315/14-1**, *Improving the understanding of neuromuscular gait control using deep reinforcement learning (DeepWalking): €542.090*, TU Darmstadt.
I contributed to the development of the proposal and I led the writing on the machine learning part of the proposal

2022   **NCN-DFG (Weave) Research Grant PE 2315/17-1**, *Learning Versatile Legged Locomotion with Active Perception (INTENTION): €654.700*, Poznan University of Technology, TU Darmstadt.
I developed the proposal and led the writing on the TU Darmstadt side

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Awards & Scholarships

2023	**Outstanding Presentation Award**, *Robot Learning Workshop @ NeurIPS*, New Orleans, Lousian, USA. "LocoMuJoCo: A Comprehensive Imitation Learning Benchmark for Locomotion"
2022	**Top Reviewer**, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, Online.
2021	**Best Paper Award Finalist**, *Conference on Robot Learning (CoRL)*, London, United Kindgom. "Robot reinforcement learning on the constraint manifold"
2021	**Best Entertainment and Amusement Paper Award Finalist**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, Online. "Efficient and Reactive Planning for High Speed Robot Air Hockey"
2014	**Ph.D. scholarship**, *Italian Ministry of Education*.

Talks

2024	**Invited Talk**, *Politecnico di Torino*, Torino, Italy. "Robots learning and acting safely in the real world"
2023	**Invited talk**, *Karlsruher Institut für Technologie*, Karlsruhe, Germany. "Robot Learning: acting under safety constraints"
2022	**Invited talk**, *Università degli Studi Di Milano*, Milano, Italy. "Robot Learning: acting under safety constraints"
2019	**Conference Presentation**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, Macau, China. paper presentation "Graph-Based Design of Hierarchical Reinforcement Learning Agents"
2018	**Spotlight presentation**, *Thirty-Second AAAI Conference on Artificial Intelligence (AAAI-18)*, New Orleans, Louisiana, USA. paper presentation "Multiagent Connected Path Planning: PSPACE-Completeness and How to Deal with It"
2017	**Conference Presentation**, *IEEE Symposium Series On Computational Intelligence (SSCI-ADPRL)*, Honolulu, Hawaii, USA. "Gradient-based minimization for multi-expert inverse reinforcement learning"

Editorial activities

Workshops organization

2023	**Challenge Workshop**, *2023 Conference on Neural Information Processing Systems*, New Orleans, Louisiana, USA. "The Robot Air Hockey Challenge: Robust, Reliable, and Safe Learning Techniques for Real-world Robotics"

As Area Chair/Associate Editor

2022-2024	Conference on Robot Learning (CoRL)
2024	IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

As Reviewer

Journals	IEEE Robotics and Automation Letters, IEEE Transactions on Robotics, Autonomous Robots, Journal of Machine Learning Research
Conferences	Conference on Robot Learning (CoRL), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE International Conference on Robotics and Automation (ICRA), International Conference on Artificial Intelligence and Statistics (AISTATS), International Joint Conference on Artificial Intelligence (IJCAI), International Conference on Learning Representations (ICLR)

Thesis Supervision

ongoing	**M.Sc. co-supervisor**, *Lorenzo Tozzi*, visiting student, Politecnico di Torino. Dynamic Tiles for Deep Reinforcement Learning
	M.Sc. supervisor, *Jonas Günster*, TUDa. Safe Reinforcement learning with stochastic constraints
	B.Sc. supervisor, *Noah Farr*, TUDa. Designing reward functions for robotic tasks

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B.Sc. supervisor, *Killian Fees*, TUDa.
Learning advanced manipulation skills with Lie Groups

2023 **M.Sc. supervisor**, *Johannes Heeg*, TUDa.
Task Space Exploration in Robot Reinforcement Learning

B.Sc. co-supervisor, *Rolf Gattung*, in collaboration with Prof. Georgia Chalvatzaki and Prof. Marija Popović, TUDa.
Active volumetric scene understanding for robotics

B.Sc. supervisor, *Tim Althaus*, TUDa.
Inverse Reinforcement Learning from Observation for Locomotion on the Unitree A1 Robot

M.Sc. supervisor, *Bane Janjus*, TUDa.
Genetic Programming for Intepretable Reinfrocement Learning

2022 **M.Sc. supervisor**, *Kuo Zhang*, TUDa.
Learning human models for safe human-robot handovers

B.Sc. supervisor, *Jonas Günster*, TUDa.
Learning the Low-level Policy for Robot Air Hockey

M.Sc. supervisor, *Verena Sieburger*, TUDa.
Building up the Baseline Agent for Robot Air Hockey

2021 **B.Sc. supervisor**, *Felix Helfenstein*, TUDa.
Benchmarking Deep Reinforcement Learning Algorithms

2018 **M.Sc. co-supervisor**, *Carolina Beretta, Cecilia Brizzolari*, PoliMI, with Prof. Francesco Amigoni.
Smooth sample-based path planning for non-holonomic mobile robots in real 2D environments: algorithms and results
M.Sc. co-supervisor, *İdil Su Erdenliğ*, with Prof. Andrea Bonarini, PoliMI.
A Control Theory Framework for Hierarchical Reinforcement Learning

Other Supervision

2023 **Student project Supervision**, *Yuheng Ouyang*, TUDa.
Self-Play Reinforcement Learning for High-Level Tactics in Robot Air Hockey

Student project Supervision, *Lu Liu*, TUDa.
Control and System identification for the Unitree A1

Student Project supervisor, *Jonas Günster*, TUDa.
Robot Air Hockey challenge

Student Project supervisor, *Kilian Feess*, TUDa.
System identification and control for Telemax manipulator

Student Project supervisor, *Felix Herrmann, Sebastian Zach*, TUDa.
Learning Deep Probability Fields for Planning and Control

Student Project supervisor, *Henri Geiss*, TUDa.
Combining RL/IL with CPGs for Humanoid Locomotion

2022 **Student Project supervisor**, *Patrick Vimr*, TUDa.
Interpretable Reinforcement Learning

Student Project supervisor, *Joshua Johannson, Andreas Seidl Fernandez*, TUDa.
Learning the Gait for Legged Robot via Safe Reinforcement Learning

2021 **Online Internship supervisor**, *Shrey Verma*.
Puck reset system for Air Hockey

Student Project supervisor, *Marius Memmel*, TUDa.
Guided Dimensionality Reduction for Black-Box Optimization

Student Project supervisor, *Chen Xue., Verena Sieburger*, TUDa.
Bayesian Optimization for System Identification in Robot Air Hockey

2020 **Student Project supervisor**, *Benedikt Volker*, TUDa.
Benchmarking Deep Reinforcement Learning

2019 **Erasmus Internship supervisor**, *António Manuel Moreira Pereira, Manuel de Castro Palermo*, TUDa.
Gait Learning: Biped walking using DeepReinforcement Learning Algorithms

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Student Project supervisor, *Patrick Lutz*, TUDa.
Robot Air-Hockey

Co-supervision of Ph.D. students

Under the "Safe and Reliable Robot Learning" research group

ongoing **Puze Liu**, *TUDa*, Prof. Jan Peters.
Robot Air hockey, Safe Reinforcement Learning

Firas Al-Hafez, *TUDa*, Prof. Jan Peters.
Inverse Reinforcement Learning, Locomotion, Policy Gradient for stateful policies

Junning Huang, *TUDa*, Prof. Jan Peters.
System identification, Active disturbance rejection control

Nico Bohlinger, *TUDa*, Prof. Jan Peters.
Locomotion, Multitask Reinforcement Learning

Collaborations with visiting students

2024 **Stefano Menchetti**, *Scuola IMT Alti Studi Lucca*.
State estimation

2023 **Elizabeth Palacios**, *Universitat Politècnica de València*.
Curriculum learning, Robot Air Hockey

2022 **Piotr Kicki**, *Poznan University of Technology*.
Learning to Plan, Robot Air hockey

Projects

National Projects

2023- **NCN-DFG collaborative grant**, *"learnINg versaTile lEgged locomotioN wiTh actIve perceptiON" (IN-TENTION)*, €654.700, PI: Jan Peters.
Role: coordinator of the project for all tasks (TU Darmstadt side), in charge of the international cooperation efforts.

2022-2024 **BMBF collaborative grant**, *"KI-Assistenz zur roboterunterstützten Aufklärung und Abwehr akuter radi-ologischer Gefahrenlagen" (KIARA)*, €841.848,00.
Role: leader of task 4.3.

2021-2024 **DFG Project**, *Improving the understanding of neuromuscular gait control using deep reinforcement learn-ing (DeepWalking)*, €542.090, PI: Jan Peters.
Role: Leader of WP2 and WP4.

International Projects

2020-2021 **ERC proof of concept**, *"Acquiring assembly skills by robot learning" (AssemblySkills)*, €150.000, PI: Jan Peters.
Role: coordinator on all task.

2020 **H2020 project**, *"Goal-based Open-ended Autonomous Learning Robots" (GOAL-Robots)*, €3.481.874,75, PI: Jan Peters.
Role: working on task 2.3

2019-2021 **ERC Starting grant**, *"Policy Learning of Motor Skills for Humanoid Robots" (SKILLS4ROBOTS)*, €1.405.572,50, PI: Jan Peters.
Role: working for WP3 and WP4.

Industrial Projects

2023 **Huawei Technologies Duesseldorf GmbH**, *"Robot Air Hockey Competition"*, €95.000,00, PI: Jan Peters.
Role: coordinator of the project and leader of all tasks.

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Languages

Italian	Mother tongue	
Spanish	Mother tongue	*(only basic writing skills)*
English	B2	*First Certificate in English - B (FCE)*

References

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Via Celoria 18, 20133 Milano, Italy
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Davide Tateo

Publication List

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Conference papers

[1] Firas Al-Hafez, Guoping Zhao, Jan Peters, and **Davide Tateo**. Time-efficient reinforcement learning with stochastic stateful policies. In *International Conference on Learning Representations (ICLR)*, 2024.

[2] Firas Al-Hafez, **Davide Tateo**, Oleg Arenz, Guoping Zhao, and Jan Peters. LS-IQ: Implicit reward regularization for inverse reinforcement learning. In *International Conference on Learning Representations (ICLR)*, 2023.

[3] Puze Liu, Kuo Zhang, **Davide Tateo**, Snehal Jauhri, Zhiyuan Hu, Jan Peters, and Georgia Chalvatzaki. Safe reinforcement learning of dynamic high-dimensional robotic tasks: navigation, manipulation, interaction. In *2023 IEEE International Conference on Robotics and Automation (ICRA)*, pages 9449–9456. IEEE, 2023.

[4] Puze Liu, Kuo Zhang, **Davide Tateo**, Snehal Jauhri, Jan Peters, and Georgia Chalvatzaki. Regularized deep signed distance fields for reactive motion generation. In *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 6673–6680. IEEE, 2022.

[5] Marius Memmel, Puze Liu, **Davide Tateo**, and Jan Peters. Dimensionality reduction and prioritized exploration for policy search. In *International Conference on Artificial Intelligence and Statistics*, pages 2134–2157. PMLR, 2022.

[6] Puze Liu, **Davide Tateo**, Haitham Bou-Ammar, and Jan Peters. Efficient and reactive planning for high speed robot air hockey. *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2021.

[7] Puze Liu, **Davide Tateo**, Haitham Bou Ammar, and Jan Peters. Robot reinforcement learning on the constraint manifold. In *Conference on Robot Learning*, pages 1357–1366. PMLR, 2022.

[8] João Carvalho, **Davide Tateo**, Fabio Muratore, and Jan Peters. An empirical analysis of measure-valued derivatives for policy gradients. In *2021 International Joint Conference on Neural Networks (IJCNN)*, pages 1–10. IEEE, 2021.

[9] 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.

[10] Carlo D'Eramo, **Davide Tateo**, Andrea Bonarini, Marcello Restelli, and Jan Peters. Sharing knowledge in multi-task deep reinforcement learning. In *International Conference on Learning Representations (ICLR)*, 2020.

[11] Carolina Beretta, Cecilia Brizzolari, **Davide Tateo**, Alessandro Riva, and Francesco Amigoni. A sampling-based algorithm for planning smooth nonholonomic paths. In *2019 European Conference on Mobile Robots (ECMR)*, pages 1–7. IEEE, 2019.

[12] **Davide Tateo**, İdil Su Erdenliğ, and Andrea Bonarini. Graph-based design of hierarchical reinforcement learning agents. In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 1003–1009. IEEE, 2019.

[13] **Davide Tateo**, Jacopo Banfi, Alessandro Riva, Francesco Amigoni, and Andrea Bonarini. Multiagent connected path planning: Pspace-completeness and how to deal with it. In *Thirty-Second AAAI Conference on Artificial Intelligence (AAAI)*, pages 4735–4742, 2018.

[14] **Davide Tateo**, Carlo D'Eramo, Alessandro Nuara, Marcello Restelli, and Andrea Bonarini. Exploiting structure and uncertainty of bellman updates in markov decision processes. In *Computational Intelligence (SSCI), 2017 IEEE Symposium Series on*, pages 1–8. IEEE, 2017.

[15] **Davide Tateo**, Matteo Pirotta, Marcello Restelli, and Andrea Bonarini. Gradient-based minimization for multi-expert inverse reinforcement learning. In *Computational Intelligence (SSCI), 2017 IEEE Symposium Series on*, pages 1–8. IEEE, 2017.

Journals

[16] Piotr Kicki, Puze Liu, **Davide Tateo**, Haitham Bou-Ammar, Krzysztof Walas, Piotr Skrzypczyński, and Jan Peters. Fast kinodynamic planning on the constraint manifold with deep neural networks. *IEEE Transactions on Robotics*, 40:277–297, 2024.

[17] Filip Bjelonic, Joonho Lee, Philip Arm, Dhionis Sako, **Davide Tateo**, Jan Peters, and Marco Hutter. Learning-based design and control for quadrupedal robots with parallel-elastic actuators. *IEEE Robotics and Automation Letters*, 8(3):1611–1618, 2023.

[18] Julen Urain, **Davide Tateo**, and Jan Peters. Learning stable vector fields on lie groups. *IEEE Robotics and Automation Letters*, 7(4):12569–12576, 2022.

[19] Simone Parisi, **Davide Tateo**, Maximilian Hensel, Carlo D'Eramo, Jan Peters, and Joni Pajarinen. Long-term visitation value for deep exploration in sparse-reward reinforcement learning. *Algorithms*, 15(3):81, 2022.

[20] Riad Akrour, **Davide Tateo**, and Jan Peters. Continuous action reinforcement learning from a mixture of interpretable experts. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 44(10):6795–6806, 2021.

[21] Carlo D'Eramo, **Davide Tateo**, Andrea Bonarini, Marcello Restelli, and Jan Peters. Mushroomrl: Simplifying reinforcement learning research. *Journal of Machine Learning Research*, 22(131):1–5, 2021.

Preprints

[22] Puze Liu, Haitham Bou-Ammar, Jan Peters, and **Davide Tateo**. Safe reinforcement learning on the constraint manifold: Theory and applications. *arXiv preprint arXiv:2404.09080*, 2024.

[23] **Davide Tateo**, Davide Antonio Cucci, Matteo Matteucci, and Andrea Bonarini. Object structural points representation for graph-based semantic monocular localization and mapping. *arXiv preprint arXiv:2206.10263*, 2022.

Workshops

[24] Firas Al-Hafez, Guoping Zhao, Jan Peters, and **Davide Tateo**. Locomujoco: A comprehensive imitation learning benchmark for locomotion. In *NeurIPS 6th Robot Learning Workshop*, 2023.

[25] Luca Michael Lach, Robert Haschke, **Davide Tateo**, Jan Peters, Helge Ritter, Júlia Borras, and Carme Torras. Transferring tactile-based continuous force control policies from simulation to robot. In *NeurIPS TouchProcessing workshop*, 2023.

[26] Firas Al-Hafez, **Davide Tateo**, Oleg Arenz, Guoping Zhao, and Jan Peters. Least squares inverse Q-learning. In *Sixteenth European Workshop on Reinforcement Learning*, 2023.

[27] Piotr Kicki, Puze Liu, **Davide Tateo**, Haitham Bou-Ammar, Krzysztof Walas, Piotr Skrzypczyński, and Jan Peters. Towards fast kinodynamic planning on the constraint manifold. In *ICRA 2023 Workshop on Agile Movements: Animal Behavior, Biomechanics, and Robot Devices*, 2023.

[28] **Davide Tateo**, Riad Akrour, and Jan Peters. Mixture of interpretable experts for continuous control. In *15th European Workshop on Reinforcement Learning (EWRL 2022)*, 2022.

[29] Puze Liu, Kuo Zhang, **Davide Tateo**, Snehal Jauhri, Jan Peters, and Georgia Chalvatzaki. ReDSDF: Regularized deep signed distance fields for robotics. In *ICRA 2022 Full Day Workshop: Motion Planning with Implicit Neural Representations of Geometry*, 2022.

[30] Julen Urain, **Davide Tateo**, Tianyu Ren, and Jan Peters. Structured policy representation: Imposing stability in arbitrarily conditioned dynamic systems. In *NeurIPS 3rd Robot Learning Workshop: Grounding Machine Learning Development in the Real World*, 2020.

[31] Riad Akrour, **Davide Tateo**, and Jan Peters. Towards reinforcement learning of human readable policies. In *ECML/PKDD Workshop on Deep Continuous-Discrete Machine Learning*, 2019.

▬▬▬ Thesis

[32] **Davide Tateo**. *Building structured hierarchical agents*. PhD thesis, Politecnico di Milano, 2019.

[33] **Davide Tateo**. Cognitive slam: knowledge-based simultaneous localization and mapping. Master's thesis, Politecnico di Milano, 2014.