Franziska Meier

Research Scientist

✉ fmeier@fb.com
https://fmeier.github.io

Research Agenda

My research agenda is centered around the question of how to enable autonomous and continual learning for robots. Specifically, I'm studying how robots can learn autonomously from humans by observing them, or through self-supervision, and how to do so continuously without forgetting previously learned skills.
h-index:17 i10-index:26 Total number of citations: 846 (source: Google Scholar, 3/15/2021)

Degrees

May 2016 **PhD Computer Science**, *University Of Southern California*, Los Angeles, USA.
Thesis Title: *Probabilistic Machine Learning for Robotics*

December 2010 **Master of Science in Computer Science**, *University of Southern California*, Los Angeles, USA.

April 2009 **Diploma in Computer Science**, *Technische Universität München (TUM)*, Germany.
Thesis Title: *Automatic Segmentation of Human Activities into Motion Subtasks*

Experience

Professional

Since 2018 **Research Scientist**, *Facebook AI Research (FAIR)*, Menlo Park, CA, USA.

2016-2018 **Research Scientist**, *Autonomous Motion Department (AMD), Max Planck Institute for Intelligent Systems (MPI-IS)*, Tübingen, Germany.

2017-2018 **Postdoctoral Researcher**, *Robotics and State Estimation Lab, University of Washington*, Seattle, WA, USA.

2009-2016 **PhD Student**, *University Of Southern California*, Los Angeles, CA, USA.

2015-2016 **Research Fellow**, *Autonomous Motion Department (AMD), Max Planck Institute for Intelligent Systems (MPI-IS)*, Tübingen, Germany.

Summer 2015 **Intern**, *Fyusion Inc*, San Francisco, CA, USA.

Summer 2013 **Intern**, *Bosch Research*, Palo Alto, CA, USA.

Summer 2009 **Intern**, *Disney Research*, Pittsburgh, PA, USA.

2007–2009 **MSc Student**, *Georgia Institute of Technology*, Atlanta, GA, USA.

2008–2009 **Graduate Research Assistant**, *Georgia Institute of Technology*, Atlanta, GA, USA.

2007–2008 **Guest Researcher**, *Georgia Institute of Technology*, Atlanta, GA, USA.

2007 **Student Researcher**, *Technische Universität München (TUM)*, München, Germany.

2005–2006 **Student Researcher**, *Fraunhofer Institute for Solar Energy Systems*, Freiburg, Germany.

Teaching

September 2017 **Workshop on 'How To Read a Paper'**, *Part of the MPI-IS Lecture Series for new PhD students*, Teaching Assistant at Technische Universität München (TUM), responsible for holding tutorial and discussion sessions, homework and exam grading, München, Germany.
Teaching Assistant

Summer 2007 **Introduction to Theoretical Computer Science**, *Teaching Assistant at Technische Universität München (TUM), responsible for holding tutorial and discussion sessions, homework and exam grading*, München, Germany, Teaching Assistant.

Summer 2006 **Fundamentals of Algorithms and Data Structures**, *Teaching Assistant at Technische Universität München (TUM), responsible for holding tutorial and discussion sessions, homework and exam grading*, München, Germany, Teaching Assistant.

Supervision

Since 2018 **Interns and AI residents at Facebook AI Research**, *Lifelong Learning*, Neha Das, Kristen Morse, Behnoosh Parsa.

Since 2017 **Sarah Bechtle - PhD Student**, *Lifelong Learning*.
Co-supervised with Ludovic Righetti

Since 2015 **Giovanni Sutanto - PhD Student**, *Learning Feedback Controllers*, USC, Los Angeles, CA, USA.
Co-supervised with Stefan Schaal.

2018 **Kevin Hitzler - Master Student**, *Extending body schema for tool use*, MPI-IS, Tübingen, Germany.
Co-supervised with Stefan Schaal and Tamim Asfour

2017 **Huaijiang Zhu - Masters Student**, *Associating Sensor Traces with Probabilisc Motion Primitives*, MPI-IS, Tübingen, Germany.
Co-supervised with Jeannette Bohg and Ludovic Righetti

2017 **Katharina Rombach - Intern**, *Sample-Efficient Deep Reinforcement Learning*, MPI-IS, Tübingen, Germany.

2014 **Akshara Rai - Masters Student**, *Learning Feedback Controllers*, MPI-IS, Tübingen, Germany.
Co-supervised with Stefan Schaal.

Service & Diversity

Research Community Service

2020 **Associate Editor**, *International Conference on Learning Representations (ICLR)*.

2020 **Associate Editor**, *Robotics Science and Systems (RSS)*.

2019 **Associate Editor**, *Robotics Science and Systems (RSS)*.

Since 2018 **Associate Editor**, *IEEE Robotics and Automation Letters (RA-L)*.

2020 **Workshop Organizer**, *Robotics Retrospectives @RSS*.

2018 **Workshop Co-Organizer**, *NSF/DOD/NIST Modeling & Simulation in Robotics workshop*.

2018 **Workshop Co-Organizer**, *RSS 2018 Workshop on Women in Robotics*.

2018 **Program Committee**, *Real-World Challenges and New Benchmarks for Deep Learning in Robotic Vision*.

Since 2008 **Reviewer for Conferences**, *ICRA, IROS, RSS, L4DC, Neural Information Processing Systems (NeurIPS), IEEE-RAS International Conference in Humanoid Robots (Humanoids), International Symposium on Robotics Research (ISRR), CVPR, ICML, ICLR, IJCAI, CoRL*.

Since 2013 **Reviewer for Journals**, *IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters (RA-L), Sage International Journal on Robotics Research (IJRR), IEEE Transactions on Cybernetics, International Journal of Advanced Robotic Systems (IJARS), Journal of Machine Learning Research (JLMR)*.

Diversity

since 2019 **Mentoring and Ambassador to female interns, AI residents**, *Mentoring and Supervision of several female interns and AI residents and PostDocs at FAIR*.

2017 **Workshop Co-Organizer**, *RSS 2018 Workshop on Women in Robotics*.

2014-2017 **Mentoring and Supervision**, *Mentoring and Supervision of three female Masters and PhD students*.

2013-2014 **USC PhD WIC group**, *Co-Organization and participation of the USC PhD Women in Computing group*.

2011,2012 **Grace Hopper**, *attending Grace Hopper Conference for two years*.

Invited Talks

December, 2020 **Invited Talk**, *Model-based inverse reinforcement learning*, NeurIPS Real-Life RL workshop, virtual.

December, 2020 **Invited Talk**, *Infusing Structure into Meta-Learning*, NeurIPS Inductive Biases workshop, virtual.

July, 2020 **Invited Talk**, *Learning Loss Functions for Fast Adaptation of Robot Dynamics*, RSS workshop, virtual.

June, 2020 **Invited Talk**, *Learning Loss Functions for Fast Adaptation of Robot Dynamics*, CVPR, Embodied AI workshop, virtual.

January, 2019 **Invited Talk**, *Continuously Learning Robots*, DALI, Deep Reinforcement Learning and Robotics , South Africa.

September, 2018 **Invited Talk**, *Continuously Learning Robots*, IROS workshop: Human/Robot in-the-loop-learning, Spain.

November, 2017 **Invited Talk**, *Continuously Learning Robots*, Stanford University, Palo Alto, CA, USA.

November, 2017 **Invited Talk**, *Continuously Learning Robots*, University of California Los Angeles, Los Angeles, CA, USA.

November, 2017 **Invited Talk**, *Continuously Learning Robots*, Google X, Mountain View, CA, USA.

November, 2017 **Invited Talk**, *Continuously Learning Robots*, University of California Berkeley, Berkeley, CA, USA.

September, 2017 **Invited Talk**, *Learning to Learn While Learning: Meta-Learning for Robotics*, IROS Workshop:Micro-data: the next frontier in robot learning?, Vancouver, Canada.

July, 2017 **Invited Talk**, *Learning for Reactive Motion Generation*, RSS Women in Robotics Workshop, Boston, MA, USA.

March, 2017 **Invited Talk**, *Learning Reactive Motion Plans*, Carnegie Mellon University, Pittsburgh, PA, USA.

November, 2016 **Invited Talk**, *Learning to Execute and Modulate Motion Plans*, University of Washington, Seattle, WA, USA.

December, 2014 **Invited Talk**, *Local Gaussian Regression*, University of Toronto (UTIAS), Toronto, Canada.

Honors

2018 **Best Student Paper Award**, *Meta-Learning via Learned Losses*, Sarah Bechtle, Artem Molchanov, Yevgen Chebotar, Edward Grefenstette, Ludovic Righetti, Gaurav Sukhatme, **Franziska Meier**, ICPR 2021 [1].

2018 **Finalist Best Paper Award**, *Online Learning of a Memory of Learning Rates*, **Franziska Meier**, Daniel Kapper and Stefan Schaal, ICRA 2018 [**?**].

2007–2008 **TUM Exchange Study Abroad Scholarship**, *awarded by the Technical University of Munich*.

2009–2010 **Viterbi Fellowship**, *awarded by the University of Southern California*.

2009–2011 **WISE Fellowship**, *awarded by the University of Southern California*.

Publications

[1] S. Bechtle, A. Molchanov, Y. Chebotar, E. Grefenstette, L. Righetti, G. Sukhatme, and F. Meier, "Meta-learning via learned loss," *accepted at ICPR*, 2020. **[OA]** `https://arxiv.org/abs/1906.05374`.

[2] M. Grundmann, F. Meier, and I. Essa, "3d shape context and distance transform for action recognition," in *2008 19th International Conference on Pattern Recognition*, pp. 1–4, IEEE, 2008.

[3] F. Meier, E. Theodorou, F. Stulp, and S. Schaal, "Movement segmentation using a primitive library," in *2011 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 3407–3412, IEEE, 2011.

[4] R. B. Rusu, J. Bandouch, F. Meier, I. Essa, and M. Beetz, "Human action recognition using global point feature histograms and action shapes," *Advanced Robotics*, vol. 23, no. 14, pp. 1873–1908, 2009.

[5] F. Meier, E. Theodorou, and S. Schaal, "Movement segmentation and recognition for imitation learning," in *Artificial Intelligence and Statistics*, pp. 761–769, 2012. **[OA]** `http://proceedings.mlr.press/v22/meier12/meier12.pdf`.

[6] P. Pastor, M. Kalakrishnan, F. Meier, F. Stulp, J. Buchli, E. Theodorou, and S. Schaal, "From dynamic movement primitives to associative skill memories," *Robotics and Autonomous Systems*, vol. 61, no. 4, pp. 351–361, 2013.

[7] F. Meier, P. Hennig, and S. Schaal, "Local gaussian regression," *arXiv preprint arXiv:1402.0645*, 2014.

[8] F. Meier, P. Hennig, and S. Schaal, "Efficient bayesian local model learning for control," in *2014 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 2244–2249, IEEE, 2014.

[9] F. Meier, P. Hennig, and S. Schaal, "Incremental local gaussian regression," in *Advances in Neural Information Processing Systems*, pp. 972–980, 2014. **[OA]** https://papers.nips.cc/paper/5594-incremental-local-gaussian-regression.pdf.

[10] A. Rai, F. Meier, A. Ijspeert, and S. Schaal, "Learning coupling terms for obstacle avoidance," in *2014 IEEE-RAS International Conference on Humanoid Robots*, pp. 512–518, IEEE, 2014.

[11] F. Meier, A. Globerson, and F. Sha, "The more the merrier: Parameter learning for graphical models with multiple maps," 2013.

[12] F. Birzele, R. Küffner, F. Meier, F. Oefinger, C. Potthast, and R. Zimmer, "Prosas: a database for analyzing alternative splicing in the context of protein structures," *Nucleic acids research*, vol. 36, no. suppl_1, pp. D63–D68, 2007.

[13] F. Meier and S. Schaal, "Drifting gaussian processes with varying neighborhood sizes for online model learning," in *2016 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 264–269, IEEE, 2016.

[14] N. Ratliff, F. Meier, D. Kappler, and S. Schaal, "Doomed: Direct online optimization of modeling errors in dynamics," *Big data*, vol. 4, no. 4, pp. 253–268, 2016.

[15] M. Wüthrich, C. G. Cifuentes, S. Trimpe, F. Meier, J. Bohg, J. Issac, and S. Schaal, "Robust gaussian filtering using a pseudo measurement," in *2016 American Control Conference (ACC)*, pp. 3606–3613, IEEE, 2016.

[16] F. Meier, D. Kappler, N. Ratliff, and S. Schaal, "Towards robust online inverse dynamics learning," in *2016 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4034–4039, IEEE, 2016.

[17] N. Ratliff, D. Kappler, F. Meier, J. Issac, J. Mainprice, M. Wuthrich, C. Garcia-Cifuentes, V. Berenz, D. Fox, J. Bohg, *et al.*, "Reactions and continuous adaptation in collaborative robots,"

[18] F. Meier and S. Schaal, "A probabilistic representation for dynamic movement primitives," *arXiv preprint arXiv:1612.05932*, 2016.

[19] D. Kappler, F. Meier, J. Issac, J. Mainprice, C. G. Cifuentes, M. Wüthrich, V. Berenz, S. Schaal, N. Ratliff, and J. Bohg, "Real-time perception meets reactive motion generation," *IEEE Robotics and Automation Letters*, vol. 3, no. 3, pp. 1864–1871, 2018.

[20] J. Bohg, D. Kappler, F. Meier, N. Ratliff, J. Mainprice, J. Issac, M. Wüthrich, C. Garcia-Cifuentes, V. Berenz, and S. Schaal, "Interlocking perception-action loops at multiple time scales,"

[21] F. Meier, D. Kappler, and S. Schaal, "Online learning of a memory for learning rates," in *2018 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 2425–2432, IEEE, 2018. **[OA]** https://arxiv.org/abs/1709.06709.

[22] D. Kappler, F. Meier, N. Ratliff, and S. Schaal, "A new data source for inverse dynamics learning," in *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4723–4730, IEEE, 2017.

[23] G. Sutanto, Z. Su, S. Schaal, and F. Meier, "Learning sensor feedback models from demonstrations via phase-modulated neural networks," in *2018 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1142–1149, IEEE, 2018.

[24] A. Rai, G. Sutanto, S. Schaal, and F. Meier, "Learning feedback terms for reactive planning and control," in *2017 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 2184–2191, IEEE, 2017.

[25] A. Byravan, F. Leeb, F. Meier, and D. Fox, "Se3-pose-nets: Structured deep dynamics models for visuomotor control," in *2018 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1–8, IEEE, 2018. **[OA]** https://arxiv.org/abs/1710.00489.

[26] A. Rai, R. Antonova, F. Meier, and C. G. Atkeson, "Using simulation to improve sample-efficiency of bayesian optimization for bipedal robots.," *J. Mach. Learn. Res.*, vol. 20, pp. 49–1, 2019. **[OA]** https://jmlr.org/papers/volume20/18-196/18-196.pdf.

[27] J.-A. Ting, S. Vijayakumar, and S. Schaal, "Locally weighted regression for control.," *Encyclopedia of Machine Learning*, vol. 11, pp. 613–624, 2010.

[28] B. Parsa, K. Rajasekaran, F. Meier, and A. G. Banerjee, "A hierarchical bayesian linear regression model with local features for stochastic dynamics approximation," *arXiv preprint arXiv:1807.03931*, 2018.

[29] S. Bechtle, Y. Lin, A. Rai, L. Righetti, and F. Meier, "Curious ilqr: Resolving uncertainty in model-based rl," in *Conference on Robot Learning*, pp. 162–171, 2019. **[OA]** http://proceedings.mlr.press/v100/bechtle20a.html.

[30] T. Li, N. Lambert, R. Calandra, F. Meier, and A. Rai, "Learning generalizable locomotion skills with hierarchical reinforcement learning," in *2020 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 413–419, IEEE, 2020. **[OA]** https://arxiv.org/abs/1909.12324.

[31] E. Grefenstette, B. Amos, D. Yarats, P. M. Htut, A. Molchanov, F. Meier, D. Kiela, K. Cho, and S. Chintala, "Generalized inner loop meta-learning," *arXiv*, 2019. **[OA]** https://arxiv.org/abs/1910.01727.

[32] K. Hitzler, F. Meier, S. Schaal, and T. Asfour, "Learning and adaptation of inverse dynamics models: A comparison," in *2019 IEEE-RAS 19th International Conference on Humanoid Robots (Humanoids)*, pp. 491–498, IEEE, 2019.

[33] G. Sutanto, A. Wang, Y. Lin, M. Mukadam, G. Sukhatme, A. Rai, and F. Meier, "Encoding physical constraints in differentiable newton-euler algorithm," L4DC, Proceedings of Machine Learning Research, 2020. **[OA]** http://proceedings.mlr.press/v120/sutanto20a.html.

[34] K. Morse, N. Das, Y. Lin, A. Wang, A. Rai, and F. Meier, "Learning state-dependent losses for inverse dynamics learning," in *IEEE International Conference on Robots and Systems (IROS)*, 2020. [OA] https://arxiv.org/abs/2003.04947.

[35] S. Ebrahimi, F. Meier, R. Calandra, T. Darrell, and M. Rohrbach, "Adversarial continual learning," *ECCV*, 2020. **[OA]** https://arxiv.org/abs/2003.09553.

[36] E. Grefenstette, B. Amos, D. Yarats, P. M. Htut, A. Molchanov, F. Meier, D. Kiela, K. Cho, and S. Chintala, "higher: A pytorch meta-learning library," *arXiv*, 2020. **[OA]** https://arxiv.org/pdf/1910.01727.

[37] Y. Lin, S. Bechtle, L. Righetti, A. Rai, and F. Meier, "Exploring by exploiting bad models in model-based reinforcement learning," 2019.

[38] G. Sutanto, K. Rombach, Y. Chebotar, Z. Su, S. Schaal, G. S. Sukhatme, and F. Meier, "Supervised learning and reinforcement learning of feedback models for reactive behaviors: Tactile feedback testbed," *submitted to IJRR*, 2020. **[OA]** https://arxiv.org/pdf/2007.00450.

[39] T. Davchev, K. S. Luck, M. Burke, F. Meier, S. Schaal, and S. Ramamoorthy, "Residual learning from demonstration," *arXiv*, 2020. **[OA]** https://arxiv.org/abs/2008.07682.

[40] T. Li, R. Calandra, D. Pathak, Y. Tian, F. Meier, and A. Rai, "Planning in learned latent action spaces for generalizable legged locomotion," *arXiv*, 2020. **[OA]** https://arxiv.org/abs/2008.11867.

[41] N. Das, S. Bechtle, T. Davchev, D. Jayaraman, A. Rai, and F. Meier, "Model-based inverse reinforcement learning from visual demonstrations," 2020. **[OA]** https://arxiv.org/abs/2010.09034.