

Roberto Calandra

Technical Expertise

- Robot Learning
- Robotics
- Dynamics Modeling
- Bayesian Optimization
- Reinforcement Learning
- Deep Learning
- Tactile Sensing
- Gaussian Processes

Work Experience

- Since Oct 2018 **Research Scientist**, *Facebook AI Research*, United States.
- 2016 – 2018 **Postdoctoral Scholar**, *University of California: Berkeley*, United States.
with Sergey Levine

Education

- 03 Aug 2016 **Ph.D. in Computer Science**, *Technische Universität Darmstadt*, Germany.
Thesis topic: Bayesian Modeling for Optimization and Control in Robotics
Advisor: Jan Peters (TU Darmstadt)
Instructor: Marc P. Deisenroth (Imperial College London)
- 19 Oct 2011 **M.Sc. in Machine Learning and Data Mining**, *Aalto University*, Finland.
Thesis topic: An Exploration of Deep Belief Networks toward Adaptive Learning
Advisor: Olli Simula (Aalto University)
Instructors: Federico Montesino Pouzols (University of Helsinki), Tapani Raiko (Aalto University)
- 21 Jul 2009 **B.Sc. in Computer Science Engineering**, *Università degli Studi di Palermo*, Italy.
Thesis topic: Design and Building of a Robotics Mobile Platform
Advisor: Haris Dindo (Università degli Studi di Palermo)

Invited Presentations

- 21 Feb 2018 **Stanford University**, USA.
- 26 Jan 2018 **TU Darmstadt**, *Darmstadt*, Germany.
- 25 Jan 2018 **TU Freiburg**, *Freiburg*, Germany, **host**: Frank Hutter.
- 24 Jan 2018 **Max Planck Institute for Intelligent Systems**, *Tuebingen*, Germany.
- 23 Jan 2018 **ETH**, *Zurich*, Switzerland.
- 22 Jan 2018 **EPFL**, *Lausanne*, Switzerland.
- 11 Jan 2018 **Università degli Studi di Palermo**, *Palermo*, Italy.
- 08 Oct 2017 **University of Southern California**, *Los Angeles*, US.
- 20 Apr 2017 **DALI 2017 - Data Learning and Inference**, *Tenerife*, Spain, Workshop on Data Efficient Reinforcement Learning.
- 17 Aug 2016 **Max Planck Institute for Intelligent Systems**, *Tuebingen*, Germany, **host**: Autonomous Motion Department.
- 02 May 2016 **Universität Stuttgart**, *Stuttgart*, Germany, **host**: Marc Toussaint.
- 16 Oct 2015 **University College London**, *London*, UK, **host**: Guy Lever.
- 14 Oct 2015 **University of Oxford**, *Oxford*, UK, **host**: Michael Osborne.

- 13 Oct 2015 **Imperial College London**, *London*, UK, **host:** Stefan Leutenegger, Dyson Robotics Lab.
- 03 Jun 2015 **University of British Columbia**, *Vancouver*, Canada.
- 02 Jun 2015 **University of Washington**, *Seattle*, US, **host:** Dieter Fox.
- 01 Apr 2015 **TU Freiburg**, *Freiburg*, Germany, **host:** Frank Hutter.
- 31 Mar 2015 **TU Freiburg**, *Freiburg*, Germany, **host:** Wolfram Burgard.
- 22 Dec 2014 **Università degli Studi di Palermo**, *Palermo*, Italy.
- 24 Apr 2014 **Bosch Research**, *Stuttgart*, Germany.
- 13 Nov 2013 **Imperial College London**, *London*, UK.

Teaching

- 08 Aug 2018 **CS189: Introduction to Machine Learning**, *Guest Lecture on Bayesian optimization*, UC Berkeley.
- Spring 2015 **Machine Learning I: Statistical Approaches Lectures**, *Teaching Assistant*, TU Darmstadt.
- Fall 2013 & Fall 2014 **Robot Learning Lectures**, *Teaching Assistant*, TU Darmstadt.

Professional Service

- Guest Editor**, *JMLR Special Issue on Bayesian Optimization*.
- 2018 **Sponsorship Chair**, *CORL*.
- 2018 **Organizer/co-chair**, *IROS Special session on Deep Learning*.
- 2017 **Associate Editor**, *IROS*.

Organizer Workshops

- *IROS Workshop on Closing the loop on Human Robot Symbiosis: Human/Robot in-the-loop Machine Learning (2018)*
- *RSS Workshop on Multi-Modal Perception and Control (2018)*
- *ICML Workshop on Prediction and Generative Modeling in Reinforcement Learning (2018)*
- *NIPS Workshop on Meta-learning (MetaLearn) (2017)*
- *RSS Workshop on Tactile Sensing for Manipulation: Hardware, Modeling, and Learning (2017)*
- *RSS Workshop on Learning from Demonstration in High-Dimensional Feature Spaces (2017)*
- *NIPS Workshop on Bayesian optimization (BayesOpt) (2015, 2016)*

Reviewer for Journals

- *Journal of Machine Learning Research (JMLR)*
- *IEEE Transactions on Robotics (TRO)*
- *International Journal of Robotics Research (IJRR)*
- *Autonomous Robots (AuRo)*
- *IEEE Robotics and Automation Letters (RAL)*
- *Neurocomputing*
- *Robotics and Autonomous Systems*
- *IEEE Transactions on Cybernetics*
- *IEEE Transactions on Systems, Man, and Cybernetics - Part B: Cybernetics*
- *IEEE Transactions on Evolutionary Computation*
- *Optimization and Engineering (OPTE)*

Reviewer for Conferences

- *Neural Information Processing Systems (NIPS)*
- *Robotics: Science and Systems (RSS)*
- *International Conference on Machine Learning (ICML)*

- *Conference on Robot Learning (CORL)*
- *International Conference on Learning Representations (ICLR)*
- *IEEE International Conference on Robotics and Automation (ICRA)*
- *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
- *International Conference on Artificial Intelligence and Statistics (AISTATS)*
- *IEEE/RAS International Conference on Humanoid Robots (HUMANOIDS)*
- *International Conference on Artificial Neural Networks (ICANN)*
- *International Joint Conference on Artificial Intelligence (IJCAI)*
- *IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*
- *IEEE International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EPIROB)*

Publications

Journals

- [1] B. Yang, G. Wang, **R. Calandra**, D. Contreras, S. Levine, and K. Pister. Learning flexible and reusable locomotion primitives for a microrobot. *IEEE Robotics and Automation Letters (RA-L)*, 3(3):1904–1911, 2018.
- [2] S. Olofsson, M. Mehrian, **R. Calandra**, L. Geris, M. Deisenroth, and R. Misener. Bayesian multi-objective optimisation with mixed analytical and black-box functions: Application to tissue engineering. *IEEE Transactions on Biomedical Engineering*, 2018.
- [3] **R. Calandra**, A. Owens, D. Jayaraman, W. Yuan, J. Lin, J. Malik, E. H. Adelson, and S. Levine. More than a feeling: Learning to grasp and regrasp using vision and touch. *IEEE Robotics and Automation Letters (RA-L)*, 3(4):3300–3307, 2018.
- [4] D. Buechler, **R. Calandra**, B. Schölkopf, and J. Peters. Control of musculoskeletal systems using learned dynamics models. *IEEE Robotics and Automation Letters (RA-L)*, 3(4):3161–3168, 2018.
- [5] **R. Calandra**, A. Seyfarth, J. Peters, and M. P. Deisenroth. Bayesian optimization for learning gaits under uncertainty. *Annals of Mathematics and Artificial Intelligence (AMAI)*, 76(1):5–23, 2015.

Conferences

- [1] K. Chua, **R. Calandra**, R. McAllister, and S. Levine. Deep reinforcement learning in a handful of trials using probabilistic dynamics models. *Advances in Neural Information Processing Systems (NIPS)*, 2018. **Spotlight presentation (~ 4% acceptance rate).**
- [2] S. Olofsson, M. Mehrian, L. Geris, **R. Calandra**, M. Deisenroth, and R. Misener. Bayesian multi-objective optimisation of neotissue growth in a perfusion bioreactor set-up. In *European Symposium on Computer Aided Process Engineering*, volume 40, pp. 2155–2160, 2017.
- [3] **R. Calandra**, A. Owens, M. Upadhyaya, W. Yuan, J. Lin, E. H. Adelson, and S. Levine. The feeling of success: Does touch sensing help predict grasp outcomes? *Conference on Robot Learning (CORL)*, 2017.
- [4] S. Bansal, **R. Calandra**, T. Xiao, S. Levine, and C. J. Tomlin. Goal-driven dynamics learning via Bayesian optimization. In *IEEE Conference on Decision and Control (CDC)*, pp. 5168–5173, 2017.
- [5] Z. Yi, **R. Calandra**, F. F. Veiga, H. van Hoof, T. Hermans, Y. Zhang, and J. Peters. Active tactile object exploration with Gaussian processes. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4925–4930, 2016.
- [6] P. Weber, E. Rueckert, **R. Calandra**, J. Peters, and P. Beckerle. A low-cost sensor glove with vibrotactile feedback and multiple finger joint and hand motion sensing for human-robot interaction. In *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*, 2016.
- [7] **R. Calandra**, J. Peters, C. E. Rasmussen, and M. P. Deisenroth. Manifold Gaussian processes for regression. In *International Joint Conference on Neural Networks (IJCNN)*, pp. 3338–3345, 2016.
- [8] L. Fritsche, F. Unverzagt, J. Peters, and **R. Calandra**. First-person tele-operation of a humanoid robot. In *IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS)*, pp. 997–1002, Nov 2015.
- [9] **R. Calandra**, S. Ivaldi, M. P. Deisenroth, E. Rueckert, and J. Peters. Learning inverse dynamics models with contacts. In *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3186–3191, 2015.

- [10] **R. Calandra**, S. Ivaldi, M. P. Deisenroth, and J. Peters. Learning torque control in presence of contacts using tactile sensing from robot skin. In *IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS)*, pp. 690–695, Nov 2015.
- [11] **R. Calandra**, A. Seyfarth, J. Peters, and M. P. Deisenroth. An experimental comparison of Bayesian optimization for bipedal locomotion. In *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1951–1958, May 2014.
- [12] **R. Calandra**, N. Gopalan, A. Seyfarth, J. Peters, and M. P. Deisenroth. Bayesian gait optimization for bipedal locomotion. In *Learning and Intelligent Optimization Conference (LION)*, pp. 274–290, 2014.
- [13] M. P. Deisenroth, **R. Calandra**, A. Seyfarth, and J. Peters. Toward fast policy search for learning legged locomotion. In *International Conference on Intelligent Robots and Systems (IROS)*, pp. 1787–1792, Oct 2012.
- [14] **R. Calandra**, T. Raiko, M. P. Deisenroth, and F. Montesino Pouzols. Learning deep belief networks from non-stationary streams. In *International Conference on Artificial Neural Networks (ICANN)*, pp. 379–386, 2012.