Roberto Calandra

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Technical Expertise

- Robotics
- Model-based Control
- Tactile Sensing
- Legged Locomotion
- Machine Learning
- Reinforcement Learning
- Bayesian Optimization
- Deep Learning

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)

Work Experience

Since Oct 2018 **Research Scientist**, *Meta AI (formerly Facebook AI Research)*, United States.

2016 – 2018 **Postdoctoral Scholar**, *University of California: Berkeley*, United States.
with Sergey Levine

Jul–Oct 2015 **Research Intern**, *Microsoft Research*, Cambridge, UK.
Advisors: Andrew Blake, Katja Hofmann

May–Dec 2010 **Research Assistant**, *Bayesian Methodology group*, Aalto University, Finland.
Advisor: Aki Vehtari

Mar–May 2008 **Intern**, *BELTEC s.r.l.*, Italy.

Invited Talks at Scientific Events

04 Jun 2021 **ICRA 2021 ViTac Workshop: Trends and Challenges in Visuo-Tactile Perception**.
Building an Ecosystem for Research on Touch Sensing [Slides][Video]

13 Jul 2020 **RSS Workshop on Visuotactile Sensors for Robust Manipulation**.
Towards a Science of Touch Processing [Slides]

13 Jul 2020 **RSS Workshop on Self-Supervised Robot Learning**.

31 Mar 2020 **ICRA Workshop on Closing the Perception-Action Loop with Vision and Tactile Sensing (ViTac 2020)**.
Towards In-hand Manipulation from Vision and Touch [Slides] [Video]

27 Jul 2019 **Joint Statistical Meetings (JSM) - Bayesian optimization session**, *Denver*, USA.
Bayesian Optimization for Robotics

23 Jun 2019 **RSS Workshop on Aerial Interaction and Manipulation**, *Freiburg*, Germany.
Learning Model-based Control for (Aerial) Manipulation

20 Jun 2019 **Re-Work Deep Reinforcement Learning Summit**, *San Francisco*, USA.
Robots and the Sense of Touch

03 Jan 2019 **Data, Learning and Inference (DALI)**, *George*, South Africa, Workshop on Deep Reinforcement Learning and Robotics.
The Force Awakens: on the Importance of Force Control

08 Dec 2018 **Invited panelist at the NeurIPS workshop on Meta-learning**.

20 Apr 2017 **Data, Learning and Inference (DALI)**, *Tenerife*, Spain, Workshop on Data Efficient Reinforcement Learning.
Goal-Driven Dynamics Learning for Model-Based RL

Invited Talks at Universities and Companies

23 Nov 2021 **Samsung**.
Building an Ecosystem for Research on Touch Sensing [Slides]

18 Oct 2021 **Secondmind research seminar**.
Bayesian Optimization for Robotics [Slides]

11 May 2021 **Naver Labs**, France.
Towards Embodied Intelligence

24 Mar 2021 **Keele University**, UK.
Towards Embodied Intelligence

21 Dec 2020 **TU Dresden**, Germany.
Towards Embodied Intelligence

22 Oct 2020 **University of Stuttgart**, Germany.
Towards Embodied Intelligence

31 Aug 2020 **Max Planck Institute**, Germany.
Towards Embodied Intelligence

27 May 2020 **Columbia University**, USA, **host:** Matei Ciocarlie.
Towards Embodied AI

29 Apr 2020 **University of Edinburgh**, UK, **host:** Michael Mistry.
Rethinking Model-based Reinforcement Learning

23 Oct 2019 **University of California Berkeley**, USA, **host:** Claire Tomlin.
Rethinking Model-based Reinforcement Learning

08 Oct 2019 **Arizona State University**, USA.
Rethinking Model-based Reinforcement Learning

31 May 2019 **Stanford University**, USA.

21 Feb 2018 **Stanford University**, USA.
Model-based Policy Search and Beyond

20 Feb 2018 **NVIDIA**, USA.
Learning to Grasp from Vision and Touch

26 Jan 2018 **TU Darmstadt**, *Darmstadt*, Germany.

25 Jan 2018 **University of Freiburg**, *Freiburg*, Germany, **host:** Frank Hutter.
Learning to Grasp from Vision and Touch

24 Jan 2018 **Max Planck Institute for Intelligent Systems**, *Tuebingen*, Germany.

23 Jan 2018 **ETH**, *Zurich*, Switzerland, **host:** Aude Billard.

22 Jan 2018 **EPFL**, *Lausanne*, Switzerland.

11 Jan 2018 **Università degli Studi di Palermo**, *Palermo*, Italy.

20 Nov 2017 **Facebook AI Research**, *Menlo Park*, US.
Model-based Policy Search and Beyond

08 Oct 2017 **University of Southern California**, *Los Angeles*, US.
Learning to Grasp from Vision and Touch

17 Aug 2016 **Max Planck Institute for Intelligent Systems**, *Tuebingen*, Germany, **host:** Autonomous Motion Department.
Robust Multi-Objective Bayesian Optimization

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 **University of Freiburg**, *Freiburg*, Germany, **host:** Frank Hutter.

31 Mar 2015 **University of 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

22 Feb 2022 **9.357 Special Topics in Perception**, *MIT*.
Invited Lecture on Tactile Sensing for Manipulation: Trends, Challenges, and Opportunities

25 May 2021 **CS159: Advanced Topics in Machine Learning**, *Caltech*.
Invited Lecture on Theory and Practice of Model-based Reinforcement Learning

29 Apr 2021 **CS280: Computer Vision**, *UC Berkeley*.
Invited Lecture on Perceiving, Understanding, and Interacting through Touch

13 Jan 2021 **Mediterranean Machine Learning (M2L) Summer School**.
Invited Lecture on Data-efficient Optimization with Bayesian Optimization

10 Apr 2020 **CS188: Introduction to Artificial Intelligence**, *UC Berkeley*.
Invited Lecture on Introduction to Bayesian Optimization

Spring 2019 **AA203: Optimal and Learning-based Control**, *Stanford University*.
Invited Lectures on Model-based Reinforcement Learning, and Model-free Reinforcement Learning

08 Aug 2018 **CS189: Introduction to Machine Learning**, *UC Berkeley*.
Invited Lecture on Bayesian Optimization

Spring 2015 **Machine Learning I: Statistical Approaches**, *TU Darmstadt*, Teaching Assistant.

Fall 2013 & Fall 2014 **Robot Learning**, *TU Darmstadt*, Teaching Assistant.

Mentorship

Graduate Students

Since 2018 **Nathan Lambert**, UC Berkeley, Supervised jointly with Kris Pister.

Bachelor Theses

2016 **Felix Unverzagt**, *Modeling Robustness for Multi-Objective Optimization*, TU Darmstadt.

2015 **Andreas Schaefer**, *Prediction of Finger Flexion from ECoG Data with Deep Neural Networks*, TU Darmstadt, Supervised jointly with Jan Peters.

2015 **Dominik Pfau**, *Multi-Objective Optimization and Analysis of a Musculoskeletal Robot for Bipedal Locomotion*, TU Darmstadt, Supervised jointly with Katayon Radkhah.

2014 **Melvin Laux**, *Online Feature Learning for Reinforcement Learning*, TU Darmstadt.

2014 **Aaron Hochlaender**, *Reinforcement Learning of PACMAN*, TU Darmstadt, Supervised jointly with Gerhard Neumann.

Research Projects & Internships

Fall 2021 **Cristina Pinneri**, -, Facebook AI Research.

Summer 2021 **Udari Madhushani**, -, Facebook AI Research.

Summer 2020 **Shaoxiong Wang**, -, Facebook AI Research.

2020 **Huazhe Xu**, -, Facebook AI Research.
Supervised jointly with Trevor Darrell

Fall 2019 **Alonso Marco Valle**, *Reinforcement Learning for Locomotion*, Facebook AI Research.

Summer 2019 **Stephen Tian and Brian Yang**, *Learning In-hand Manipulation*, Facebook AI Research.

Summer 2019 **Kurtland Chua**, *Hierarchical Reinforcement Learning*, Facebook AI Research.

Summer 2019 **Nathan Lambert**, *Objective Mismatch*, Facebook AI Research.

Spring 2019 **Kevin Luck**, *Learning Morphologies and Controllers with Deep Reinforcement Learning*, Facebook AI Research.

Fall 2018 – Spring 2019 **Ge Yang**, *Learning Plannable Representations*, Facebook AI Research.

Spring 2018 **Thomas Liao**, *Joint Morphology/Controller Optimization*, UC Berkeley.

Summer 2017 **Brian Yang and Grant Wang**, *Bayesian Optimization for Microrobot Locomotion*, UC Berkeley.

Spring 2017 **Justin Lin**, *Learning from Touch*, UC Berkeley.

Fall 2016 **Kurtland Chua**, *Model-based Reinforcement Learning*, UC Berkeley.

Fall 2016 **Soroush Nasiriany**, *Automatic Reward Shaping*, UC Berkeley.

Fall 2015 – Spring 2016 **F. Treede, P. Konow and M. Bied**, *Design of controllers for the dynamic bipedal walker FaBi*, TU Darmstadt, Supervised jointly with Philipp Beckerle and Alexandra Voloshina.

Fall 2015 **L. Fritsche**, *Learning to walk on rough terrain*, TU Darmstadt.

Fall 2014 – Spring 2015 **L. Fritsche and F. Unverzagt**, *First-Person Tele-Operation of the iCub*, TU Darmstadt.

Fall 2014 **J. Geukes and M. Nakatenus**, *Towards Balancing with the iCub*, TU Darmstadt.

Spring 2015 **G. Leser, J. Hatzenbühler, J. Schwaab and N. Eschner**, *Implementation and Improvement of the bipedal walking robot Fox*, TU Darmstadt, Supervised jointly with Philipp Beckerle.

2014 **S. Luthardt**, *Deep Learning for Artificial Skin*, TU Darmstadt.

Fall 2013 **M. Prediger, F. Schnell and V. Negoescu**, *Advanced Bayesian optimization models*, TU Darmstadt.

Spring 2013 **D. Dittmar and B. Koch**, *Robot learning for ball bouncing*, TU Darmstadt.

Fall 2012 **E. Wolter and T. Baark**, *Learning to bounce a ball with a robotic arm*, TU Darmstadt.

Professional Service

Program Chair, *AISTATS 2020*.

Guest Editor, *JMLR Special Issue on Bayesian Optimization*.

2018, 2019 **Sponsorship Chair**, *CORL*.

2022 **Best Paper Award Chair**, *CORL*.

2021, 2022 **Associate Editor**, *ICRA*.

2017, 2021, 2022 **Associate Editor**, *IROS*.

2020 **Area Chair**, *ICML*.

2021, 2022 **Area Chair**, *ICLR*.

2021 **Area Chair**, *CORL*.

2022 **Area Chair**, *AISTATS*.

2018 **Organizer/co-chair**, *IROS Special session on Deep Learning*.

Organizer Workshops

- *ICRA Workshop on Scaling Robot Learning (2022)*
- *Facebook Workshop on The Future of Tactile Sensing: Applications and Challenges (2021)*
- *NeurIPS Workshop on Robot Learning (2019, 2020)*
- *NeurIPS Workshop on Meta-learning (MetaLearn) (2017, 2019, 2020)*
- *ICLR Workshop on Task-Agnostic Reinforcement Learning (2019)*
- *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)*
- *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)*

Scientific Reviewer

- *Swiss National Supercomputing Centre/ETH Zurich*

Reviewer for Journals

- *Journal of Machine Learning Research (JMLR)*
- *IEEE Transactions on Robotics (T-RO)*
- *International Journal of Robotics Research (IJRR)*
- *Autonomous Robots (AuRo)*
- *IEEE Robotics and Automation Letters (RA-L)*
- *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 (NeurIPS)*
- *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)*
- *AAAI Conference on Artificial Intelligence (AAAI)*
- *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)*
- *IEEE International Conference on Soft Robotics (RoboSoft)*

Outreach & Media Coverage

- *Media outreach for the release of the touch sensing ecosystem and commercialization of the tactile sensor DIGIT [Blog Post]*
- *Media outreach for the launch of the FAIR Robotic Lab [Blog Post] [Fortune] [Wired] [The Verge] [TechCrunch] [Forbes]*
- *Judge for the Pioneers in Engineering 2018 Robotic Competition*
- *Interview about our NeurIPS 2018 paper [Forbes]*
- *Interview about Meta-learning [Wired]*
- *Popular science talk on "Demystifying Robotics and AI":*
  - *Rotary Club of Mill Valley (17 April 2018)*
  - *Rotary Club of Sausalito (24 May 2018)*
  - *Rotary Club of Marin Sunrise (20 June 2018)*
  - *Rotary Club of Menlo Park (22 August 2018)*
- *Popular science talk at the Rotary Club of Menlo Park (08 April 2020) on "The Importance of Touch for Robots"*

Awards & Grants

2018 Finalist IEEE RA-L Best Paper Award

2018 NVIDIA Pioneer Award @NeurIPS

2017 Participated in the writing of the Amazon Research Award awarded to Sergey Levine ($100k)

Miscellaneous

Since 2018 Member of the European Laboratory for Learning and Intelligent Systems (ELLIS) society

Since 2006 Member of IEEE

Since 2021 Member of Global Underwater Explorers (GUE)

2003 – 2009 Proudly volunteer of AFS Italy

Publications

Journals

[1] S. Wang, M. Lambeta, P.-W. Chou, and **R. Calandra**, "TACTO: A fast, flexible, and open-source simulator for high-resolution vision-based tactile sensors," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 2, pp. 3930–3937, 2022. [Online]. Available: https://arxiv.org/abs/2012.08456. DOI:10.1109/LRA.2022.3146945

[2] T. Li, **R. Calandra**, D. Pathak, Y. Tian, F. Meier, and A. Rai, "Planning in learned latent action spaces for generalizable legged locomotion," *IEEE Robotics and Automation Letters (RA-L)*, vol. 6, no. 2, pp. 2682–2689, 2021. [Online]. Available: https://arxiv.org/abs/2008.11867. DOI:10.1109/LRA.2021.3062342

[3] S. Belkhale, R. Li, G. Kahn, R. McAllister, **R. Calandra**, and S. Levine, "Model-based meta-reinforcement learning for flight with suspended payloads," *IEEE Robotics and Automation Letters (RA-L)*, vol. 6, no. 2, pp. 1471–1478, Apr. 2021. [Online]. Available: https://arxiv.org/abs/2004.11345. DOI:10.1109/LRA.2021.3057046

[4] M. Lambeta, P.-W. Chou, S. Tian, B. Yang, B. Maloon, V. R. Most, D. Stroud, R. Santos, A. Byagowi, G. Kammerer, D. Jayaraman, and **R. Calandra**, "DIGIT: A novel design for a low-cost compact high-resolution tactile sensor with application to in-hand manipulation," *IEEE Robotics and Automation Letters (RA-L)*, vol. 5, no. 3, pp. 3838–3845, 2020. [Online]. Available: https://arxiv.org/abs/2005.14679. DOI:10.1109/LRA.2020.2977257

[5] N. O. Lambert, D. S. Drew, J. Yaconelli, S. Levine, **R. Calandra**, and K. S. J. Pister, "Low level control of a quadrotor with deep model-based reinforcement learning," *IEEE Robotics and Automation Letters (RA-L)*, vol. 4, no. 4, pp. 4224–4230, 2019. [Online]. Available: https://arxiv.org/abs/1901.03737. DOI:10.1109/LRA.2019.2930489

[6] 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*, vol. 66, no. 3, pp. 727–739, 2018. DOI:10.1109/TBME.2018.2855404

[7] **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)*, vol. 3, no. 4, pp. 3300–3307, 2018, **IEEE RA-L 2018 Best Paper Award Finalist**. DOI:10.1109/LRA.2018.2852779

[8] D. Buechler, **R. Calandra**, B. Schölkopf, and J. Peters, "Control of musculoskeletal systems using learned dynamics models," *IEEE Robotics and Automation Letters (RA-L)*, vol. 3, no. 4, pp. 3161–3168, 2018. DOI:10.1109/LRA.2018.2849601

[9] 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)*, vol. 3, no. 3, pp. 1904–1911, 2018. DOI:10.1109/LRA.2018.2806083

[10] **R. Calandra**, A. Seyfarth, J. Peters, and M. P. Deisenroth, "Bayesian optimization for learning gaits under uncertainty," *Annals of Mathematics and Artificial Intelligence (AMAI)*, vol. 76, no. 1, pp. 5–23, 2015. DOI:10.1007/s10472-015-9463-9

Conferences

[1] E. J. Smith, D. Meger, L. Pineda, **R. Calandra**, J. Malik, A. Romero, and M. Drozdzal, "Active 3D shape reconstruction from vision and touch," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2021. [Online]. Available: https://arxiv.org/abs/2107.09584

[2] N. Lambert, A. Wilcox, H. Zhang, K. S. J. Pister, and **R. Calandra**, "Learning accurate long-term dynamics for model-based reinforcement learning," in *IEEE Conference on Decision and Control (CDC)*, 2021, pp. 2880–2887. [Online]. Available: https://arxiv.org/abs/2012.09156

[3] M. Lambeta, H. Xu, J. Xu, P.-W. Chou, S. Wang, T. Darrell, and **R. Calandra**, "PyTouch: A machine learning library for touch processing," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2021, pp. 13 208–13 214. [Online]. Available: https://arxiv.org/abs/2105.12791

[4] B. Zhang, R. Rajan, L. Pineda, N. Lambert, A. Biedenkapp, K. Chua, F. Hutter, and **R. Calandra**, "On the importance of hyperparameter optimization for model-based reinforcement learning," in *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2021. [Online]. Available: https://arxiv.org/abs/2102.13651

[5] A. Zhang, R. McAllister, **R. Calandra**, Y. Gal, and S. Levine, "Learning invariant representations for reinforcement learning without reconstruction," in *International Conference on Learning Representations (ICLR)*, 2021, **Oral presentation (1.8% acceptance rate)**. [Online]. Available: https://arxiv.org/abs/2006.10742

[6] B. Letham, **R. Calandra**, A. Rai, and E. Bakshy, "Re-examining linear embeddings for high-dimensional bayesian optimization," *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. [Online]. Available: http://arxiv.org/abs/2001.11659

[7] E. J. Smith, **R. Calandra**, A. Romero, G. Gkioxari, D. Meger, J. Malik, and M. Drozdzal, "3D shape reconstruction from vision and touch," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. [Online]. Available: https://arxiv.org/abs/2007.03778

[8] S. Ebrahimi, F. Meier, **R. Calandra**, T. Darrell, and M. Rohrbach, "Adversarial continual learning," in *European Conference on Computer Vision (ECCV)*, 2020.

[9] L. Pineda, S. Basu, A. Romero, **R. Calandra**, and M. Drozdzal, "Active MR k-space sampling with reinforcement learning," in *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2020, pp. 23–33. [Online]. Available: https://arxiv.org/abs/2007.10469

[10] N. Lambert, B. Amos, O. Yadan, and **R. Calandra**, "Objective mismatch in model-based reinforcement learning," in *Learning for Dynamics and Control (L4DC)*, 2020, pp. 761–770. [Online]. Available: http://arxiv.org/abs/2002.04523

[11] G. Yang, A. Zhang, A. Morcos, J. Pineau, P. Abbeel, and **R. Calandra**, "Plan2Vec: Unsupervised representation learning by latent plans," in *Learning for Dynamics and Control (L4DC)*, 2020, pp. 935–946. [Online]. Available: https://arxiv.org/abs/2005.03648

[12] A. Padmanabha, F. Ebert, S. Tian, **R. Calandra**, C. Finn, and S. Levine, "OmniTact: A multi-directional high-resolution touch sensor," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2020, pp. 618–624. [Online]. Available: https://arxiv.org/abs/2003.06965

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

[14] K. Luck, H. B. Amor, and **R. Calandra**, "Data-efficient co-adaptation of morphology and behaviour with deep reinforcement learning," in *Conference on Robot Learning (CORL)*, 2019. [Online]. Available: https://arxiv.org/abs/1911.06832

[15] S. Tian, F. Ebert, D. Jayaraman, M. Mudigonda, C. Finn, **R. Calandra**, and S. Levine, "Manipulation by feel: Touch-based control with deep predictive models," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2019, pp. 818–824.

[16] T. Liao, G. Wang, B. Yang, R. Lee, K. Pister, S. Levine, and **R. Calandra**, "Data-efficient learning of morphology and controller for a microrobot," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2019, pp. 2488–2494.

[17] J. Lin, **R. Calandra**, and S. Levine, "Learning to identify object instances by touch: Tactile recognition via multimodal matching," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2019, pp. 3644–3650.

[18] K. Chua, **R. Calandra**, R. McAllister, and S. Levine, "Deep reinforcement learning in a handful of trials using probabilistic dynamics models," in *Advances in Neural Information Processing Systems (NIPS)*, 2018, pp. 4754–4765, **Spotlight presentation (3.5% acceptance rate)**. [Online]. Available: https://arxiv.org/abs/1805.12114

[19] **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?" in *Conference on Robot Learning (CORL)*, 2017, pp. 314–323.

[20] 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)*, 2017, pp. 5168–5173.

[21] 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*, vol. 40, 2017, pp. 2155–2160.

[22] **R. Calandra**, J. Peters, C. E. Rasmussen, and M. P. Deisenroth, "Manifold Gaussian processes for regression," in *International Joint Conference on Neural Networks (IJCNN)*, 2016, pp. 3338–3345, **Nominated for the best student paper award at WCCI 2016**. [Online]. Available: https://arxiv.org/abs/1402.5876

[23] 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.

[24] 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)*, 2016, pp. 4925–4930.

[25] **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)*, Nov 2015, pp. 690–695.

[26] **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)*, 2015, pp. 3186–3191.

[27] 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)*, Nov 2015, pp. 997–1002.

[28] **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)*, 2014, pp. 274–290.

[29] **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)*, May 2014, pp. 1951–1958.

[30] 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)*, Oct 2012, pp. 1787–1792.

[31] **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)*, 2012, pp. 379–386.

Pre-prints

[1] D. Buchler, S. Guist, **R. Calandra**, V. Berenz, B. Scholkopf, and J. Peters, "Learning to play table tennis from scratch using muscular robots," *Under review*, 2021. [Online]. Available: https://arxiv.org/abs/2006.05935

[2] L. Pineda, B. Amos, A. Zhang, N. O. Lambert, and **R. Calandra**, "MBRL-Lib: A modular library for model-based reinforcement learning," *Arxiv*, 2021. [Online]. Available: https://arxiv.org/abs/2104.10159

[3] H. Xu, Y. Luo, S. Wang, T. Darrell, and **R. Calandra**, "Towards learning to play piano with dexterous hands and touch," *Under Review*, 2021. [Online]. Available: https://arxiv.org/abs/2106.02040

[4] D. Buchler, **R. Calandra**, and J. Peters, "Learning to control highly accelerated ballistic movements on muscular robots," *Under review*, 2019. [Online]. Available: http://arxiv.org/abs/1904.03665