Stanford

Jeannette Bohg

Assistant Professor of Computer Science

Bio

BIO

Jeannette Bohg is an Assistant Professor of Computer Science at Stanford University. She was a group leader at the Autonomous Motion Department (AMD) of the MPI for Intelligent Systems until September 2017. Before joining AMD in January 2012, Jeannette Bohg was a PhD student at the Division of Robotics, Perception and Learning (RPL) at KTH in Stockholm. In her thesis, she proposed novel methods towards multi-modal scene understanding for robotic grasping. She also studied at Chalmers in Gothenburg and at the Technical University in Dresden where she received her Master in Art and Technology and her Diploma in Computer Science, respectively. Her research focuses on perception and learning for autonomous robotic manipulation and grasping. She is specifically interesting in developing methods that are goal-directed, real-time and multi-modal such that they can provide meaningful feedback for execution and learning. Jeannette Bohg has received several awards, most notably the 2019 IEEE International Conference on Robotics and Automation (ICRA) Best Paper Award, the 2019 IEEE Robotics and Automation Society Early Career Award and the 2017 IEEE Robotics and Automation Letters (RA-L) Best Paper Award.

ACADEMIC APPOINTMENTS

- Assistant Professor, Computer Science
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)

LINKS

- Personal Page: https://web.stanford.edu/~bohg/
- Interactive Perception and Robot Learning lab: iprl.stanford.edu

Teaching

COURSES

2022-23

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Win)
- Principles of Robot Autonomy I: AA 174A, AA 274A, CS 237A, EE 160A, EE 260A (Aut)
- Principles of Robot Autonomy II: AA 174B, AA 274B, CS 237B, EE 260B (Win)

2021-22

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Win)
- Principles of Robot Autonomy II: AA 174B, AA 274B, CS 237B, EE 260B (Win)
- Robotics and Autonomous Systems Seminar: AA 289, CS 529 (Win, Spr)
- Topics in Advanced Robotic Manipulation: CS 326 (Aut)

2020-21

- Computer Vision: From 3D Reconstruction to Recognition: CS 231A (Win)
- Departmental Lecture Series: CS 300 (Aut)
- Principles of Robot Autonomy II: AA 174B, AA 274B, CS 237B, EE 260B (Win)
- Topics in Advanced Robotic Manipulation: CS 326 (Aut)

2019-20

- Principles of Robot Autonomy II: AA 174B, AA 274B, CS 237B, EE 260B (Win)
- Robot Perception and Decision-Making: Optimal and Learning-based Approaches: CS 336 (Aut)
- Robotics and Autonomous Systems Seminar: AA 289, CS 529 (Aut, Win)
- Topics in Advanced Robotic Manipulation: CS 326 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Shivani Guptasarma, Mengxi Li, Michael Lin, Stephanie Newdick, Davis Rempe, Gadi Sznaier Camps

Postdoctoral Faculty Sponsor

Rika Antonova

Doctoral Dissertation Advisor (AC)

Marion Lepert, Toki Migimatsu

Orals Evaluator

Toki Migimatsu

Master's Program Advisor

MacVincent Agha-Oko, Luke Hansen, Aman Kansal, Amanda Li, Yousef Liang, Paridhi Maheshwari, Ishita Mangla, Michela Marchini, Shoaib Mohammed, Kayla Patterson, Angelica Sun, Micael Edmond Tchapmi

Doctoral Dissertation Co-Advisor (AC)

Claire Chen, Andrey Kurenkov, Millie Salvato, Priya Sundaresan

Doctoral (Program)

Chris Agia, Toki Migimatsu, Krishnan Srinivasan

Publications

PUBLICATIONS

- **A Bayesian Treatment of Real-to-Sim for Deformable Object Manipulation** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Antonova, R., Yang, J., Sundaresan, P., Fox, D., Ramos, F., Bohg, J.
  2022; 7 (3): 5819-5826
- **Predicting Hand-Object Interaction for Improved Haptic Feedback in Mixed Reality** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Salvato, M., Heravi, N., Okamura, A. M., Bohg, J.
  2022; 7 (2): 3851-3857
- **Vision-Only Robot Navigation in a Neural Radiance World** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Adamkiewicz, M., Chen, T., Caccavale, A., Gardner, R., Culbertson, P., Bohg, J., Schwager, M.
  2022; 7 (2): 4606-4613

- **Dynamic multi-robot task allocation under uncertainty and temporal constraints** *AUTONOMOUS ROBOTS*
  Choudhury, S., Gupta, J. K., Kochenderfer, M. J., Sadigh, D., Bohg, J.
  2021
- **Concept2Robot: Learning manipulation concepts from instructions and human demonstrations** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
  Shao, L., Migimatsu, T., Zhang, Q., Yang, K., Bohg, J.
  2021
- **Learning latent actions to control assistive robots** *AUTONOMOUS ROBOTS*
  Losey, D. P., Jeon, H., Li, M., Srinivasan, K., Mandlekar, A., Garg, A., Bohg, J., Sadigh, D.
  2021: 1-33
- **How to train your differentiable filter** *AUTONOMOUS ROBOTS*
  Kloss, A., Martius, G., Bohg, J.
  2021
- **Detect, Reject, Correct: Crossmodal Compensation of Corrupted Sensors**
  Lee, M. A., Tan, M., Zhu, Y., Bohg, J., IEEE
  IEEE.2021: 909-916
- **Differentiable Factor Graph Optimization for Learning Smoothers**
  Yi, B., Lee, M. A., Kloss, A., Martin-Martin, R., Bohg, J., IEEE
  IEEE.2021: 1339-1345
- **TrajectoTree: Trajectory Optimization Meets Tree Search for Planning Multi-contact Dexterous Manipulation** *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
  Chen, C., Culbertson, P., Lepert, M., Schwager, M., Bohg, J.
  IEEE.2021: 8262-8268
- **Probabilistic 3D Multi-Modal, Multi-Object Tracking for Autonomous Driving**
  Chiu, H., Lie, J., Ambrus, R., Bohg, J., IEEE
  IEEE.2021: 14227-14233
- **Interpreting Contact Interactions to Overcome Failure in Robot Assembly Tasks**
  Zachares, P. A., Lee, M. A., Lian, W., Bohg, J., IEEE
  IEEE.2021: 3410-3417
- **OmniHang: Learning to Hang Arbitrary Objects using Contact Point Correspondences and Neural Collision Estimation**
  You, Y., Shao, L., Migimatsu, T., Bohg, J., IEEE
  IEEE.2021: 5921-5927
- **Combining learned and analytical models for predicting action effects from sensory data** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
  Kloss, A., Schaal, S., Bohg, J.
  2020
- **Making Sense of Vision and Touch: Learning Multimodal Representations for Contact-Rich Tasks** *IEEE TRANSACTIONS ON ROBOTICS*
  Lee, M. A., Zhu, Y., Zachares, P., Tan, M., Srinivasan, K., Savarese, S., Fei-Fei, L., Garg, A., Bohg, J.
  2020; 36 (3): 582–96
- **Learning Task-Oriented Grasping From Human Activity Datasets** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Kokic, M., Kragic, D., Bohg, J.
  2020; 5 (2): 3352–59
- **Self-Supervised Learning of State Estimation for Manipulating Deformable Linear Objects** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Yan, M., Zhu, Y., Jin, N., Bohg, J.
  2020; 5 (2): 2372–79
- **Object-Centric Task and Motion Planning in Dynamic Environments** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Migimatsu, T., Bohg, J.
  2020; 5 (2): 844–51

- **UniGrasp: Learning a Unified Model to Grasp With Multifingered Robotic Hands** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Shao, L., Ferreira, F., Jorda, M., Nambiar, V., Luo, J., Solowjow, E., Ojea, J., Khatib, O., Bohg, J.
  2020; 5 (2): 2286–93
- **Concept2Robot: Learning Manipulation Concepts from Instructions and Human Demonstrations**
  Shao, L., Migimatsu, T., Zhang, Q., Yang, K., Bohg, J., Toussaint, M., Bicchi, A., Hermans, T.
  MIT PRESS.2020
- **Accurate Vision-based Manipulation through Contact Reasoning**
  Kloss, A., Bauza, M., Wu, J., Tenenbaum, J. B., Rodriguez, A., Bohg, J., IEEE
  IEEE.2020: 6738-6744
- **Learning Hierarchical Control for Robust In-Hand Manipulation**
  Li, T., Srinivasan, K., Meng, M., Yuan, W., Bohg, J., IEEE
  IEEE.2020: 8855-8862
- **Learning to Scaffold the Development of Robotic Manipulation Skills**
  Shao, L., Migimatsu, T., Bohg, J., IEEE
  IEEE.2020: 5671-5677
- **Learning User-Preferred Mappings for Intuitive Robot Control**
  Li, M., Losey, D. P., Bohg, J., Sadigh, D., IEEE
  IEEE.2020: 10960-10967
- **Learning Topological Motion Primitives for Knot Planning**
  Yan, M., Li, G., Zhu, Y., Bohg, J., IEEE
  IEEE.2020: 9457-9464
- **Multimodal Sensor Fusion with Differentiable Filters**
  Lee, M. A., Yi, B., Martin-Martin, R., Savarese, S., Bohg, J., IEEE
  IEEE.2020: 10444-10451
- **Dynamic Multi-Robot Task Allocation under Uncertainty and Temporal Constraints**
  Choudhury, S., Gupta, J. K., Kochendeefer, M. J., Sadigh, D., Bohg, J., Toussaint, M., Bicchi, A., Hermans, T.
  MIT PRESS.2020
- **Predicting grasp success in the real world - A study of quality metrics and human assessment** *ROBOTICS AND AUTONOMOUS SYSTEMS*
  Rubert, C., Kappler, D., Bohg, J., Morales, A.
  2019; 121
- **Variable Impedance Control in End-Effector Space: An Action Space for Reinforcement Learning in Contact-Rich Tasks**
  Martin-Martin, R., Lee, M. A., Gardner, R., Savarese, S., Bohg, J., Garg, A., IEEE
  IEEE.2019: 1010–17
- **MeteorNet: Deep Learning on Dynamic 3D Point Cloud Sequences**
  Liu, X., Yan, M., Bohg, J., IEEE
  IEEE.2019: 9245–54
- **Leveraging Contact Forces for Learning to Grasp**
  Merzic, H., Bogdanovic, M., Kappler, D., Righetti, L., Bohg, J., IEEE, Howard, A., Althoefer, K., Arai, F., Arrichiello, F., Caputo, B., Castellanos, J., Hauser, K., et al
  IEEE.2019: 3615–21
- **Making Sense of Vision and Touch: Self-Supervised Learning of Multimodal Representations for Contact-Rich Tasks**
  Lee, M. A., Zhu, Y., Srinivasan, K., Shah, P., Savarese, S., Li Fei-Fei, Garg, A., Bohg, J., IEEE, Howard, A., Althoefer, K., Arai, F., Arrichiello, F., Caputo, et al
  IEEE.2019: 8943–50
- **Learning to Estimate Pose and Shape of Hand-Held Objects from RGB Images**
  Kokic, M., Kragic, D., Bohg, J., IEEE
  IEEE.2019: 3980–87

- **Motion-Based Object Segmentation Based on Dense RGB-D Scene Flow** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Shao, L., Shah, P., Dwaracherla, V., Bohg, J.
  2018; 3 (4): 3797–3804

- **Interactive Perception: Leveraging Action in Perception and Perception in Action** *IEEE TRANSACTIONS ON ROBOTICS*
  Bohg, J., Hausman, K., Sankaran, B., Brock, O., Kragic, D., Schaal, S., Sukhatme, G. S.
  2017; 33 (6): 1273–91

- **Reports on the 2017 AAAI Spring Symposium Series** *AI MAGAZINE*
  Bohg, J., Boix, X., Chang, N., Chu, V., Churchill, E. F., Fang, F., Feldman, J., Gonzalez, A. J., Kido, T., Lawless, W. F., Montana, J. L., Ontanon, S., Sinapov, et al
  2017; 38 (4): 99–106

- **Probabilistic Articulated Real-Time Tracking for Robot Manipulation** *IEEE ROBOTICS AND AUTOMATION LETTERS*
  Cifuentes, C., Issac, J., Wuethrich, M., Schaal, S., Bohg, J.
  2017; 2 (2): 577–84

- **On the relevance of grasp metrics for predicting grasp success**
  Rubert, C., Kappler, D., Morales, A., Schaal, S., Bohg, J., Bicchi, A., Okamura, A.
  IEEE.2017: 265–72

- **Big Data on Robotics.** *Big data*
  Bohg, J., Ciocarlie, M., Civera, J., Kavraki, L. E.
  2016; 4 (4): 195-196

- **Automatic LQR Tuning Based on Gaussian Process Global Optimization**
  Marco, A., Hennig, P., Bohg, J., Schaal, S., Trimpe, S., Okamura, A., Menciassi, A., Ude, A., Burschka, D., Lee, D., Arrichiello, F., Liu, H., Moon, et al
  IEEE.2016: 270–77

- **Optimizing for what matters: The Top Grasp Hypothesis**
  Kappler, D., Schaal, S., Bohg, J., Okamura, A., Menciassi, A., Ude, A., Burschka, D., Lee, D., Arrichiello, F., Liu, H., Moon, H., Neira, J., Sycara, et al
  IEEE.2016: 2167–74

- **Exemplar-based Prediction of Global Object Shape from Local Shape Similarity**
  Bohg, J., Kappler, D., Schaal, S., Okamura, A., Menciassi, A., Ude, A., Burschka, D., Lee, D., Arrichiello, F., Liu, H., Moon, H., Neira, J., Sycara, et al
  IEEE.2016: 3398–3405

- **Learning Where to Search Using Visual Attention**
  Kloss, A., Kappler, D., Lensch, H. A., Butz, M. V., Schaal, S., Bohg, J., IEEE
  IEEE.2016: 5238–45

- **Robust Gaussian Filtering using a Pseudo Measurement**
  Wuethrich, M., Cifuentes, C., Trimpe, S., Meier, F., Bohg, J., Issac, J., Schaal, S., IEEE
  IEEE.2016: 3606–13

- **Robot Arm Pose Estimation by Pixel-wise Regression of Joint Angles**
  Widmaier, F., Kappler, D., Schaal, S., Bohg, J., Okamura, A., Menciassi, A., Ude, A., Burschka, D., Lee, D., Arrichiello, F., Liu, H., Moon, H., Neira, et al
  IEEE.2016: 616–23

- **Depth-Based Object Tracking Using a Robust Gaussian Filter**
  Issac, J., Wuethrich, M., Cifuentes, C., Bohg, J., Trimpe, S., Schaal, S., Okamura, A., Menciassi, A., Ude, A., Burschka, D., Lee, D., Arrichiello, F., Liu, et al
  IEEE.2016: 608–15

- **Leveraging Big Data for Grasp Planning**
  Kappler, D., Bohg, J., Schaal, S., IEEE
  IEEE COMPUTER SOC.2015: 4304–11

- **The Coordinate Particle Filter - A novel Particle Filter for High Dimensional Systems**
  Wuethrich, M., Bohg, J., Kappler, D., Pfreundt, C., Schaal, S., IEEE
  IEEE COMPUTER SOC.2015: 2454–61

- **Data-Driven Grasp Synthesis-A Survey** *IEEE TRANSACTIONS ON ROBOTICS*
  Bohg, J., Morales, A., Asfour, T., Kragic, D.
  2014; 30 (2): 289–309
- **Three-dimensional object reconstruction of symmetric objects by fusing visual and tactile sensing** *INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH*
  Ilonen, J., Bohg, J., Kyrki, V.
  2014; 33 (2): 321–41
- **Robot Arm Pose Estimation through Pixel-Wise Part Classification**
  Bohg, J., Romero, J., Herzog, A., Schaal, S., IEEE
  IEEE.2014: 3143–50
- **Dual Execution of Optimized Contact Interaction Trajectories**
  Toussaint, M., Ratliff, N., Bohg, J., Righetti, L., Englert, P., Schaal, S., IEEE
  IEEE.2014: 47–54
- **Fusing Visual and Tactile Sensing for 3-D Object Reconstruction While Grasping**
  Ilonen, J., Bohg, J., Kyrki, V., IEEE
  IEEE.2013: 3547–54
- **Probabilistic Object Tracking using a Range Camera**
  Wuethrich, M., Pastor, P., Kalakrishnan, M., Bohg, J., Schaal, S., Amato, N.
  IEEE.2013: 3195–3202
- **Visual servoing on unknown objects** *MECHATRONICS*
  Gratal, X., Romero, J., Bohg, J., Kragic, D.
  2012; 22 (4): 423–35
- **Mind the Gap - Robotic Grasping under Incomplete Observation** *IEEE International Conference on Robotics and Automation*
  Bohg, J., Johnson-Roberson, M., Leon, B., Felip, J., Gratal, X., Bergstrom, N., Kragic, D., Morales, A.
  2011
- **Enhanced Visual Scene Understanding through Human-Robot Dialog**
  Johnson-Roberson, M., Bohg, J., Skantze, G., Gustafson, J., Carlson, R., Rasolzadeh, B., Kragic, D., IEEE
  IEEE.2011: 3342–48
- **Learning grasping points with shape context** *ROBOTICS AND AUTONOMOUS SYSTEMS*
  Bohg, J., Kragic, D.
  2010; 58 (4): 362–77
- **OpenGRASP: A Toolkit for Robot Grasping Simulation**
  Leon, B., Ulbrich, S., Diankov, R., Puche, G., Przybylski, M., Morales, A., Asfour, T., Moisio, S., Bohg, J., Kuffner, J., Dillmann, R., Ando, N., Balakirsky, et al
  SPRINGER-VERLAG BERLIN.2010: 109–20
- **Strategies for Multi-Modal Scene Exploration**
  Bohg, J., Johnson-Roberson, M., Bjorkman, M., Kragic, D., IEEE
  IEEE.2010: 4509–15
- **Attention-based Active 3D Point Cloud Segmentation**
  Johnson-Roberson, M., Bohg, J., Bjorkman, M., Kragic, D., IEEE
  IEEE.2010: 1165–70
- **TOWARDS GRASP-ORIENTED VISUAL PERCEPTION FOR HUMANOID ROBOTS**
  Bohg, J., Barck-Holst, C., Huebner, K., Ralph, M., Rasolzadeh, B., Song, D., Kragic, D.
  WORLD SCIENTIFIC PUBL CO PTE LTD.2009: 387–434
- **Integration of Visual Cues for Robotic Grasping**
  Bergstrom, N., Bohg, J., Kragic, D., Fritz, M., Schiele, B., Piater, J. H.
  SPRINGER-VERLAG BERLIN.2009: 245–54