Miao Li

Associate Professor, Wuhan University
Power and Mechanical Engineering (room 9508)
430074, Wuhan, China
miao.li@whu.edu.cn •(086)155-2757-6906
https://sites.google.com/view/miaoli
Founder, COBOT Technology

Research Interests

My research interests are in robotics, machine learning and applied nonlinear control. They encompass **robot learning and control, object grasping and manipulation, human-robot interaction, robotic hand and tactile sensing, and neuroscience**. I am particularly interested in finding the deep connections between dynamics of intelligent systems and learning algorithms (learning from humans or from optimizations), which enables adaptive, efficient and robust control design for complex systems. The goal of my research is to enable robots to perform skills with the level of dexterity and flexibility that human demonstrates in similar tasks.

Education

2011-2015.12 Ph.D Student, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland.
Thesis: **Dynamic grasp adaptation – from humans to robots**.
Supervisor: Prof. Aude Billard
Jury member: Alberto Rodriguez (MIT), Kenji Tahara (Kyushu University), Jose del R. Millan (EPFL), Jamie Paik (EPFL).

2008-2011 M.S. ME, Huazhong University of Science and Technology, China
Thesis: Grasping force distribution and uncertainty analysis, Supervisor: Prof. Wenyu Yang

2004-2008 B.S. ME, Huazhong University of Science and Technology, China
Thesis: A compliant end-effector for robot polishing, Supervisor: Prof. Wenyu Yang

Research Experience

Dec 2016 - now Associate Professor, Wuhan University, School of Power and Mechanical Engineering, China

Jan 2017 Visiting Researcher Human-Centered Robotics Laboratory (Prof. Kenji Tahara), Kyushu University, Japan

2016 Postdoctoral fellow at LASA, EPFL

2013-2015 Lecturer for Robotic Practicals (Master Course), EPFL
Topic: Teaching robots to accomplish a manipulation task

2011-2015 Research Assistant at LASA, EPFL, working on EU project RoboHow
Topic: Planning, control and learning on grasping and manipulation
* Developed an optimization-based grasp synthesis method
* Development of a learning-based adaptive control strategy for robust grasping

June 2008 Research Intern, HUAHENG WELDING, China
Topic: Stiffness identification and calibration for an industrial manipulator
* Developed a joint stiffness identification method for FANUC painting robot

Award

2016 IROS Competition on Grasping and Manipulation, Team: Dorabot & Cobot, **Autonomous Track: 2nd, Simulation Track: 2nd**

2015 PhD thesis, **nominated for EPFL prize and ABB automation award**.

2010 Excellent Master Paper Award, HUST.

2008 Scholarship for Distinguished Graduate Student, HUST.

2008 Outstanding Graduation of HUST.

2005, 2006 Scholarship for Distinguished Students.

Publications

Journal Articles

1 **M. Li**, K. Tahara, A. Billard, Learning task manifold for constrained object manipulation, *Autonomous Robots*, 2017, DOI: 10.1007/s10514-017-9643-z.

2 K. Hang **M. Li**, J. A. Stork, Y. Bekiroglu, F. T. Pokorny, A. Billard and D. Kragic. Hierarchical fingertip space: a unified framework for grasp planning and in-hand grasp adaptation. *IEEE Transactions on Robotics*, 32(4), 960-972, 2016. **Selected for oral presentation (15 papers per year) at IEEE ICRA, Singapore, 2017**

3 **M. Li**, K. Hang, D. Kragic, A. Billard. Dexterous grasping under shape uncertainty. *Robotics and Autonomous Systems*, 2015.

4 B. Huang, **M. Li**, R. D. Souza, J. J. Bryson and A. Billard. A modular approach to learning manipulation strategies from human demonstration. *Autonomous Robots*, 2015.

5 S. El-Khoury, **M. Li**, A. Billard. On the generation of a variety of grasps. *Robotics and Autonomous Systems*, 61(12), 1335-1349, 2013.

6 **M. Li**, W. Yang, X. Zhang. Robust actuator force analysis of a heavy-duty manipulator using GMM/GMR. *International Journal of Robotics and Automation*, 28(4), 349-356, 2013.

Conference Proceedings

1 X. Gao, J. Ling, X. Xiao, **M. Li**, Learning Force-dominant Skills from Human Demonstration, submitted to IROS 2018.

2 Y. Liu, S. Zhang, X. Xiao, and **M. Li**, A Robotized Data Collection Approach for Convolutional Neural Networks. In *International conference on Intelligent Robotics and Applications (ICIRA)*, 2017.

3 **M. Li**, Learning partial power grasp with task-specific contact, *IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2016. **Finalist of T. J. Tarn Best Paper**

4 K. Hang, J.A. Haustein, **M. Li**, A. Billard, C. Smith and D. Kragic, On the evolution of fingertip grasping manifolds, In *IEEE International Conference on Robotics and Automation (ICRA)*, 2016.

5 **M. Li**, Y. Bekiroglu, D. Kragic, A. Billard. Learning of grasp adaptation through experience and tactile sensing. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2014.

6 **M. Li**, H. Yin, K. Tahara, A. Billard. Learning object-level impedance control for robust grasping and dexterous manipulation. In *IEEE International Conference on Robotics and Automation (ICRA)*, 2014.

7 N. Sommer, **M. Li**, A. Billard. Bimanual compliant tactile exploration for grasping unknown objects. In *IEEE International Conference on Robotics and Automation (ICRA)*, 2014.

8 B. Huang, S. El-Khoury, **M. Li**, J. J Bryson, A. Billard. Learning a real time grasping strategy. In *IEEE International Conference on Robotics and Automation (ICRA)*, 2013.

9 S. El Khoury, **M. Li**, A. Billard. Bridging the gap: one shot grasp synthesis approach. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2012.

10 **M. Li**, W. Yang, X. Zhang. Analysis of indeterminate force in multi-contact friction grasp based on potential energy minimization. In *International Conference on Modelling, Identification and Control (ICMIC)*, 2010.

11 W. Yang, **M. Li**, X. Zhang. Robust robotic grasping force optimization with uncertainty. In *International conference on Intelligent Robotics and Applications (ICIRA)*, 2010.

12 **M. Li**, W. Yang, X. Zhang. Projection on convex set and its application in testing force closure properties of robotic grasping. In *International conference on Intelligent Robotics and Applications (ICIRA)*, 2010.

13 X. Zhang, W. Yang, **M. Li**. An uncertainty approach for fixture layout optimization using Monte Carlo method. In *International conference on Intelligent Robotics and Applications (ICIRA)*, 2010.

14 X. Zhang, W. Yang, **M. Li**. Fixture layout and clamping force optimization for large-scale workpiece using augmented Lagrangian method. Applied Mechanics and Materials, page 560-565, 2010.

Workshop

1 Y. Zhou, **M. Li**, A. Billard, Learning to organise objects in cluttered environments, Workshop on Dynamic Locomotion and Manipulation With Complex Robotic Systems in the Real World, 2016.

2 K. Hang, **M. Li**, J. A Stork, Y. Bekiroglu, A. Billard, D. Kragic. Hierarchical fingertip space for synthesizing adaptable fingertip grasps. *Autonomous Grasping and Manipulation: An Open Challenge.* ICRA, 2014.

3 **M. Li**, S. El Khoury, A. Billard. Synergy-level grasp synthesis learning. *Hand synergies - how to tame the complexity of grasping.* ICRA, 2013.

Organized Workshops

1 Examining Sensing Modalities for Robust and Dexterous Object Manipulation, submitted to workshop at IROS, Spain, 2018 (Kaiyu Hang, Hao Ding, **Miao Li**, Danica Kragic, Aaron Dollar)

2 Sensor-Based Object Manipulation for Collaborative Assembly, workshop at ICRA, Singapore, 2017 (**Miao Li**, Hao Ding, Qiang Li, Zhaopeng Chen).

3 Closed-loop Grasping and Manipulation: Challenges and Progress, workshop at IROS, Korea, 2016 (Yasemin Bekiroglu, **Miao Li**, Robert Krug, Florian Pokorny, Aude Billard).

4 The 1st Collaborative Robots Workshop, Guangzhou, China, August, 2016.

Invited Talks

1 Machine Intelligence in Manufacturing, China University of Geosciences, Wuhan, 2018.

2 Learning Force-dominant Skills from Human Demonstrations, South China University of Technology, Hosted by Prof. Chenguang Yang, 2018.

3 Close the Loop for Robotic Grasping with Learning-based Approach, Cross Modal Learning summer school at Hamburg University, Germany, Aug. 2017.

4 Bridge The Gap - From Humans To Robots, **keynote speaker** at the 49th International Symposium on Robotics (ISR), Shanghai, 2017

5 Dynamic Grasp Adaptation - From Humans To Robots, Tsinghua University, Beijing, Oct. 2016

6 Machine Intelligence in Manufacturing, Wuhan University of Science and Technology, Host by Huasong Min, Wuhan, Oct. 2016

7 Sensor-Based Object Manipulation for Collaborative Applications, workshop of Safety-Related Sensing for Collaborative Applications, Korea, IROS 2016

8 Dynamic Grasp Adaptation - From Humans To Robots, Hebei University of Technology, Tianjin, Oct. 2016

9 Next Generation Robots - Advance and Challenges, Hubei Robot Innovation Forum, Wuhan, Sept. 2016

10 Dynamic Grasp Adaptation - From Humans To Robots, Wuhan University, Wuhan, Sept. 2016

11 Collaborative Robots and Flexible Manufacturing, Huawei Automation Department, Dongguan, August 2016

12 A Learning-Based Approach for Dynamic Grasp Adaptation, workshop on Robotic Hand Technologies and Performance Benchmarking, organized by NIST, CASE, USA, August 2016

13 Dynamic Grasp Adaptation with Simulated Database and Human-guided Demonstration, The 1st China-Germany Robotics Forum, Bad Herrenalb, Germany, 2016

14 Sensor-based Object Manipulation for Collaborative Tasks – Design, Control and Learning, The 1st Collaborative Robots Workshop, Guangzhou, China, August 2016.

15 Robotic Grasping and Manipulation in Human-centered Environments, Huazhong University of Science and Technology, China, December, 2015.

16 Vision and Haptic-Guided Fine Manipulation of Objects, Bath University, UK, July, 2014.

17 Vision and Haptic-Guided Fine Manipulation of Objects, workshop of the British Machine Vision Association (BMVA) on Vision for Language and Manipulation, UK, July, 2014.

Professional Service

Co-Chair of IEEE Technical Committee - Collaborative Automation for Flexible Manufacturing. (Hao Ding, Andrea Maria Zanchettin, **Miao Li**, Julie Shah)

Editor

1 Guest Editor for Special Issue on Robotics & Automation Magazine, 2017.

2 Guest Editor for International Journal of Robotics, 2017.

Reviewer and Program Committee
IEEE Transactions on Robotics, IEEE Transactions on Automation Science and Engineering, Autonomous Robots, Robotics and Autonomous Systems, RSS, ICRA, RAL, IROS, CoRL, Humanoids, Ubiquitous Robot, International Journal of Humanoid Robots, IEEE Sensors Journal, Journal of Intelligent and Robotic Systems, International Journal of Advanced Robotic Systems, Journal of Robotics, Information Science, Elsevier Book on Safe Sensing, Advances in Mechanical Engineering.

Student supervised:
Xiao Gao, Learn force-based skill from human demonstration, 2017.
Yiming Liu, Robotized data collection for deep learning, 2016, 2017.
Vermot Bertrand Claude Daniel, Learning tactile signals in object manipulation task, 2014.
Zijin Yu, Object shape estimation with active touch sensing, 2012.

Membership
IEEE Member, IEEE RAS Technical Committee of Robot Hand, Grasping and Manipulation, British Machine Vision Association (BMVA), Committee of Robots in China (CMES).

Skills

Robotics: robot learning, grasping, robot manipulation and control, robotic hand, tactile sensing, human robot interaction, signal processing, optimal control;

Machine Learning: GP, SVM, kernel methods, deep learning;

Programming: C++, MATLAB, Python

Language: Chinese(native), English(fluent)

Robots used: KUKA LWR, iiwa, Yaskawa, iCub, Katana, UR, Barrett hand, Allegro hand;

Other robotics related experience: ROS, OptiTrack, OpenRAVE, AMPL, ATI, OptoForce, BioTac;

Courses: machine learning, applied machine learning, optimal control, statistical sequence processing, model predictive control (attend);

Referees

Aude Billard, professor at EPFL, Switzerland, Email: aude.billard@epfl.ch
—Supervisor of my PhD thesis

Danica Kragic Jensfelt, professor at KTH, Sweden, Email: dani@kth.se
— Collaboration on several joint papers under EU project RoboHow

Kenji Tahara, professor at Kyushu University, Japan, Email: tahara@mech.kyushu-u.ac.jp
— Long-term collaboration on design and control of robotic hand

Personal

Born on Dec 17, 1986, Hubei, China. Married with Hong Zhang and have a lovely son Noah.

Last updated: April 12, 2018
http://lasa.epfl.ch/people/member.php?SCIPER=207200