

# Zerui Wang | Curriculum Vitae

Rm 102, Academic Bldg. No.1, CUHK, Shatin, N.T., Hong Kong | +85239433022 | zerui.j.wang@gmail.com

## SUMMARY

- Solid training in robotics, mechatronics, and control theory with good publication record.
- Experience in researches related to medical robotics with emphasis on both scientific and engineering aspects.
- Efficient individual contributor, team leader, and team player.

## EMPLOYMENT

**Research Assistant Professor — Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong** Mar. 2018 — Present

- Lead intuitive interface development of surgical robot assistants from UI Software and Visual Servoing Control Algorithms.
- Lead system development of a surgical robot assistant from mechanical design, electronics development, and control system.

**Post-Doctoral Fellow — Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong** Sep. 2017 — Feb. 2018

- Conducted researches on vision-based deformable object manipulation, dissection, and suturing.

## EDUCATION

**The Chinese Univ. of Hong Kong — Ph.D. Degree in Mechanical & Automation Engineering** Sep. 2013 — Sep. 2017

- **Supervisor:** Prof. Yun-Hui Liu
- **Overall GPA:** 3.97/4.
- **Skills:** C++, Python, bash, Matlab, Linux, LaTeX, SolidWorks.
- Designed and fabricated a compliant safe joint which has multiple states. The joint works as a normal rigid joint when the working load is smaller than a predefined threshold and becomes compliant when the working load exceeds the threshold. The design was patented in US.
- Proposed a new method to fully control complete 4-image-DoF manipulation of laparoscopic instruments (with RCM mechanism) based on the geometric features of a designed marker in a 2D image.
- Developed a vision-based calibration method for dual remote center-of-motion (RCM) based robot arms. The method does not require any external tracking sensors and directly uses images captured by the endoscopic camera and the robot encoder readings as calibration data.
- Proposed a generic autonomous optimization-based framework for manipulating unknown deformable objects in a constrained environment with unexpected disturbances.

**Johns Hopkins University — Visiting Student in Computer Science** Jan. 2016 — Apr. 2017

- **Supervisors:** Prof. Russell H. Taylor, Prof. Peter Kazanzides
- Proposed a semi-autonomous clinician-in-the-loop strategy to perform the laparoscopic cryoablation of small kidney tumors.
- Proposed a method of controlling a continuum manipulator in free or obstructed environments with no prior knowledge about the deformation behavior of the continuum manipulator and the stiffness and geometry of the interacting obstructed environment.
- Contributed to dvrk-ros and cisst-saw software environment in terms of trajectory generator, Matlab wrapper, joint torque control interface, etc.

**Beihang University — B.Eng. Degree in Quality and Reliability Engineering** Sep. 2009 — Jun. 2013

- **Overall GPA:** 3.84/4 (90.04/100), rank 1st in my school.

## AWARDS AND HONORS

- Best Innovation Prize in Surgical Robot Challenge of Hamlyn Symposium Jul. 2017
- Overseas Research Attachment Programme Scholarship Oct. 2015
- Reaching Out Award (Government Scholarship) Jun. 2015
- Hong Kong PhD Fellowship (Government Scholarship) Aug. 2013
- Champion of Innovative Underwater Robot Design RoboCup Open (China) Nov. 2012
- The 2nd-Prize in National University Mechanical Innovation Competition (10%) Jul. 2012
- The 2nd-Prize in National Undergraduate Physics Competition (7.5%) Dec. 2010
- National Scholarship for University Students (2.6%) Nov. 2010
- Excellent Students Awards of Beijing (1.1%) Nov. 2011
- Elite Student of Beihang University (3%) Nov. 2011
- Outstanding Student Award, Yang Weimin Special Scholarship (0.8%) Mar. 2012
- The 2nd-Prize Scholarship of Academic Contest (3%) Dec. 2011
- The 1st-Prize Scholarship of Science and Engineering Contest (7%) 2010-2012
- The 1st-Prize Scholarship of Academic Performance (3%) 2010-2012

## SELECTED PUBLICATIONS

1. F. Alambeigi\*, **Z. Wang\***, R. Hegeman, Y.-H. Liu, and M. Armand, "*A Robust Data-Driven Approach for Real-Time Learning and Manipulation of Unmodeled 3-D Heterogeneous Compliant Objects*," IEEE Robotics and Automation Letters (RA-L), vol. 3, no. 4, pp. 4140-4147, Oct. 2018.
2. F. Alambeigi\*, **Z. Wang\***, Y.-H. Liu, R. H. Taylor, and M. Armand, "*Toward Semi-Autonomous Laparoscopic Cryoablation of Kidney Tumors Using Collaborative Model-Independent Deformable Tissue Manipulation Technique*," Ann. Biomed. Eng. (ABME), online, 2018.
3. **Z. Wang**, Z. Liu, Q. Ma, A. Cheng, Y.-H. Liu, S. Kim, A. Deguet, A. Reiter, P. Kazanzides, and R.H. Taylor, "*Vision-Based Calibration of Dual RCM-Based Robot Arms in Human-Robot Collaborative Minimally Invasive Surgery*," IEEE Robotics and Automation Letters (RA-L), vol. 3, no. 2, pp. 672-679, Apr. 2018.
4. **Z. Wang**, S. C. Lee, F. Zhong, D. Navarro-Alarcon, Y.-H. Liu, A. Deguet, P. Kazanzides and R. H. Taylor, "*Image-Based Trajectory Tracking of 4-DoF Laparoscopic Instruments Using a Rotation Distinguishing Marker*," IEEE Robotics and Automation Letters (RA-L), vol. 2, no. 3, pp. 1586-1592, Mar. 2017.
5. D. Navarro-Alarcon, H.M. Yip, **Z. Wang**, Y.-H. Liu, F. Zhong, T. Zhang and P. Li, "*Automatic 3D Manipulation of Soft Objects by Robotic Arms with Adaptive Deformation Model*," IEEE Transactions on Robotics (T-RO), vol. 32, no. 2, pp. 429 - 441, Apr. 2016.
6. **Z. Wang**, H.M. Yip, D. Navarro-Alarcon, P. Li, Y.-H. Liu, D. Sun, H. Wang, and T.H. Cheung, "*Design of a Novel Compliant Safe Robot Joint with Multiple Working States*," IEEE/ASME Transactions on Mechatronics (T-MECH), vol. 21, no. 2, pp. 1193-1198, Apr. 2016.
7. F. Alambeigi\*, **Z. Wang\***, Y.-H. Liu, M. Armand, and R. H. Taylor, "*Smart Autonomous Unknown Deformable Object Manipulation Using the da Vinci research Kit: from Soft Tissues to Continuum Robots Manipulation*" Hamlyn Symposium Surgical Robot Challenge, 2017. **Best Innovation Prize**
8. D. Navarro-Alarcon, **Z. Wang**, H.M. Yip, Y.-H. Liu, F. Zhong and T. Zhang, "*Robust Image-based Computation of the 3D Position of Laparoscopic Instruments and its Application to Image-guided Manipulation*," IEEE Int. Conf. Robotics and Automation (ICRA), pp. 4115-4121, 2016.
9. **Z. Wang**, P. Li, D. Navarro-Alarcon, H.M. Yip, Y.-H. Liu, W. Lin and L. Li, "*Design and Control of a Novel Multi-State Compliant Safe Joint for Robotic Surgery*," IEEE Int. Conf. Robotics and Automation (ICRA), pp. 1023-1028, 2015.

## PATENT

1. P. Li, **Z. Wang**, Y.-H. Liu. "*Compliant Safe Joint and Manufacturing Method Thereof*," U.S. Patent, US20160298696, 2016.