Teng Li (he/him)

(Updated, April 2024)

PhD, Biomedical Engineering | LinkedIn | Google Scholar
University of Alberta, Edmonton, AB, Canada. E-mail: teng4@ualberta.ca

Aim

Looking for a **postdoctoral** position in the field of **surgical robotics**, **robot learning/vision/control**, **robot reinforcement learning**, **human-robot interaction**, **mobile robots**, or **teleoperation**.

Research Interests

Robot Control Systems, Surgical Robotics, Impedance Control, Compliant Control, Physical Human-Robot Interaction (pHRI), Teleoperation, Machine Learning, and Haptics. Robot RL, Robot Vision/Learning, Mobile Robots, Medical Robots.

Education

2019.09 – 2024.04

University of Alberta (Edmonton, Alberta, Canada)
PhD, Biomedical Engineering
Supervisor: Prof. Mahdi Tavakoli
Thesis: "Developing a Two-Arm Robot-Assisted System for Arthroscopic Surgery" [Presentation Video]

2016.09 – 2017.09

Karolinska Institutet (Stockholm, Sweden)
Visiting PhD Student, Developmental Cognitive Neuroscience
Supervisor: Prof. Torkel Klingberg

2014.09 – 2019.06

Beihang University (Beijing, China)
PhD, Mechanical Design and Theory
Supervisors: Prof. Yuru Zhang, and Prof. Dangxiao Wang
Thesis: "The Measurement of Working Memory and Force Control Ability during Haptic Interaction"

Software Skills

- Image/Data Processing: | MATLAB/Simulink
- Programming language: | C/C++ | Python | Unity 3D
- Statistical Analysis: | R | SPSS | Excel
- Mechanical Designing: | AutoCAD | Pro-E | Creo
- Miscellaneous: | OBS Studio | ROS | Ubuntu | CoppeliaSim

Robotic Control Systems with Hands-on Experience

- ⊙ 7-DOF Franka Emika Panda robot (Franka Emika GmbH, Munich, Germany; ROS, Ubuntu, C++)
- ⊙ 6-DOF HD^2 (High Definition Haptic Device) (Quanser Inc., Markham, ON, Canada; MATLAB/Simulink)
- ⊙ 3-DOF PHANToM Premium 1.5A robot (3D Systems, Inc., Cary, NC, USA; MATLAB/Simulink)
- ⊙ 2-DOF planar Rehabilitation robot 1.0/2.0 (Quanser Inc., Markham, ON, Canada; MATLAB/Simulink)
- ⊙ 6-DOF 3D Systems Touch (aka, Phantom Omni robot) (3D Systems, Inc., Cary, NC, USA; MATLAB/Simulink)

Publications

[1] **Teng Li**, Amir Zakerimanesh, Yafei Ou, Armin Badre, and Mahdi Tavakoli. "**Iterative Learning for Gravity Compensation in Impedance Control**". IEEE/ASME Transactions on Mechatronics, 2024. (with a 3DOF PHANToM Premium 1.5A robot)

[2] **Teng Li**, Hongjun Xing, Ehsan Hashemi, Hamid D. Taghirad, Mahdi Tavakoli. "**A Brief Survey of Observers for Disturbance Estimation and Compensation**". Robotica, 41(12), 3818–3845, 2023. Cambridge University Press. (with a 3DOF PHANToM Premium 1.5A robot) [Robotica OA] [Demo Video]

[3] **Teng Li**, Armin Badre, Farshid Alambeigi, and Mahdi Tavakoli. "**Robotic Systems and Navigation Techniques in Orthopedics: A Historical Review**". Applied Sciences, Section: Robotics and Automation, Special Issue: Surgical Robotics Design and Clinical Applications. 13(17):9768, 2023. [MDPI-applsci]

[4] **Teng Li**, Armin Badre, Hamid D. Taghirad, and Mahdi Tavakoli. "**Point-Based 3D Virtual Fixture Generating for Image-Guided and Robot-Assisted Surgery in Orthopedics**". 2023 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2023), June 28-30, Seattle, Washington, USA, 2023. pp. 179-186. DOI: 10.1109/AIM46323.2023.10196130. (with a 7DOF Franka Emika Panda robot) [IEEE Xplore] [Demo Video]

[5] **Teng Li**, Armin Badre, Hamid D. Taghirad, and Mahdi Tavakoli. "**Neural Network Learning of Robot Dynamic Uncertainties and Observer-Based External Disturbance Estimation for Impedance Control**". 2023 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2023), June 28-30, Seattle, Washington, USA, 2023. pp. 591-597. DOI: 10.1109/AIM46323.2023.10196132. (with a 3DOF PHANToM Premium 1.5A robot) [IEEE Xplore]

[6] **Teng Li**, Armin Badre, Hamid D. Taghirad, and Mahdi Tavakoli. "**Integrating Impedance Control and Nonlinear Disturbance Observer for Robot-Assisted Arthroscope Control in Elbow Arthroscopic Surgery**". In 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022), October 23-27, Kyoto, Japan, 2022, pp. 11172-11179. doi: 10.1109/IROS47612.2022.9981208. (with a 3DOF PHANToM Premium 1.5A robot) [IEEE Xplore] [Demo Video]

[7] **Teng Li**, Hongjun Xing, Hamid D. Taghirad, and Mahdi Tavakoli. "**EMG-Based Hybrid Impedance-Force Control for Human-Robot Collaboration on Ultrasound Imaging**". In 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022), October 23-27, Kyoto, Japan, 2022, pp. 670-675. doi: 10.1109/IROS47612.2022.9981615. (with a 7DOF Franka Emika Panda robot) [IEEE Xplore] [Demo Video]

[8] **Teng Li**, Xiao Meng, and Mahdi Tavakoli. "**Dual Mode pHRI-teleHRI Control System with A Hybrid Admittance-Force Controller for Ultrasound Imaging**". Sensors, Section: Sensors and Robotics, Special Issue: Sensors Technology for Medical Robotics. 22(11):4025, 2022. (with a 7DOF Franka Emika Panda robot) [MDPI] [Demo Video]

[9] **Teng Li**, Ali Torabi, Hongjun Xing, and Mahdi Tavakoli. "**Improving A User's Haptic Perceptual Sensitivity by Optimizing Effective Manipulability of A Redundant User Interface**". In 2021 IEEE International Conference on Autonomous Systems (ICAS 2021), August 11-13, Montreal, QC, Canada, 2021, pp. 1–5. (with a 4DOF planar robot) [IEEE Xplore]

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[10] Dangxiao Wang, **Teng Li**, Naqash Afzal, Jicong Zhang, and Yuru Zhang. "**Haptics-Mediated Approaches for Enhancing Sustained Attention: Framework and Challenges**". SCIENCE CHINA Information Sciences, 62(11): 211101.1-21101.26, 2019. [Springer Link]

[11] **Teng Li**, Dangxiao Wang, Cong Peng, Chun Yu, and Yuru Zhang. "**Speed-Accuracy Tradeoff of Fingertip Force Control with Visual/Audio/Haptic Feedback**". International Journal of Human-Computer Studies, 110: 33-44, 2018. [ScienceDirect]

[12] Dangxiao Wang, **Teng Li**, Gaofeng Yang, and Yuru Zhang. "**Effects of Concurrent and Delayed Visual Feedback on Motor Memory Consolidation**". IEEE Transactions on Haptics, 10(3): 350-357, 2017. DOI: 10.1109/TOH.2017.2672549. [IEEE Xplore]

[13] Dangxiao Wang, **Teng Li**, Yuru Zhang, Jianxia Hou. "**Survey on Multisensory Feedback Virtual Reality Dental Training Systems**". European Journal of Dental Education, 20(4): 248-260, 2016. [Wiley]

[14] **Teng Li**, Dangxiao Wang, Shusheng Zhang, Yuru Zhang, and Chun Yu. "**Speed-Accuracy Tradeoff of Controlling Absolute Magnitude of Fingertip Force**". 2015 IEEE World Haptics Conference (WHC 2015), Northwestern University, Evanston, IL, USA, June 22-26, 2015. pp: 408-414. doi: 10.1109/WHC.2015.7177746. [IEEE Xplore]

[15] Dangxiao Wang, Siming Zhao, **Teng Li**, Yuru Zhang, Xiaoyan Wang. "**Preliminary Evaluation of A Virtual Reality Dental Simulation System on Drilling Operation**". Bio-Medical Materials and Engineering, vol. 26, no. s1, pp. S747-S756, 2015. [IOS Press]

[16] Cong Peng, Dangxiao Wang, Yuru Zhang, **Teng Li**. "**Quantifying Differences Between Five Fingers in Speed-Accuracy Tradeoff for Force Control Tasks**". 2017 IEEE World Haptics Conference (WHC 2017). Fürstenfeldbruck (Munich), Germany, June 6-9, 2017. pp: 275–280. doi: 10.1109/WHC.2017.7989914. [IEEE Xplore]

[17] Dangxiao Wang, Yilei Zheng, **Teng Li**, Cong Peng, Lijun Wang, and Yuru Zhang. "**Multi-Modal Human-Machine Interaction for Human Intelligence Augmentation**". SCIENTIA SINICA Informationis, 2018, 48(04): 449-465. [In Chinese] [SciEngine]

Papers in Preparation

[1] **Teng Li**, Armin Badre, and Mahdi Tavakoli. "**Robotic Assistance and Haptic Feedback in Arthroscopic Procedures: Design and Preliminary Evaluation of a Two-Arm System** ". JMRR - Journal of Medical Robotics Research. (with two HD^2 robots) [Under Review]

[2] **Teng Li**, Armin Badre, and Mahdi Tavakoli. "**Teleoperation System with Impedance Control and Disturbance Observer for Robot-Assisted Rehabilitation**". TMRB - IEEE Transactions on Medical Robotics and Bionics. (with two 2DOF planar Rehabilitation robots) [In Preparation]

Academic Activities

(1) Oral & Poster Presentation, 2023 Autonomous Systems Initiative (ASI) Symposium (ASI Symposium 2023), September 14-15, Edmonton, Alberta, Canada.

(2) Oral Presentation (in-person), 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022), October 23-27, Kyoto, Japan, 2022.

(3) Recorded oral Presentation (virtual), 2021 IEEE International Conference on Autonomous Systems (ICAS 2021), Montreal, Canada, August 11-13, 2021.

(4) Student Volunteer, 2017 IEEE World Haptics Conference (WHC 2017), Fürstenfeldbruck, Munich, Germany, Jun 6-9, 2017.

(5) Attendee, Strat Neuro Retreat 2017, Sånga Säby, Stockholm, Sweden, May 4-5, 2017.

(6) Oral Presenter & Student Volunteer, 2015 IEEE World Haptics Conference (WHC 2015), Northwestern University, Evanston, IL, USA, Jun 22-26, 2015.

Teaching Assistant (TA) Experience

(1) TA, (Win. 2024), on ECE 315 Labs - Computer Interfacing, (C, FreeRTOS, Digilent Zybo Z7 board);

(2) TA, (Win. 2024), on ECE 464 Lec. - Medical Robotics and Computer-Integrated Intervention;

(3) TA, (Fall 2023), on ECE 312 Labs - Embedded System Design, (MPLAB, PICkit5, KiCAD);

(4) TA, (Win. 2023), on ECE 220 Labs - Programming for Electrical Engineering, (C/C++);

(5) LI, (Fall 2022), on ECE 360 Labs - Control Systems I, (Matlab/Simulink);

(6) LI, (Win. 2022), on ECE 360 Labs - Control Systems I, (Matlab/Simulink);

(7) TA, (Fall 2021), on ECE 340 Labs - Discrete Time Signals and Systems, (Matlab/Simulink);

(8) TA, (Win. 2021), on ECE 360 Lec. - Control Systems I;

(9) TA, (Fall 2020), on ECE 360 Labs - Control Systems I, (Matlab/Simulink);

(10) GTLP Level-1, (Oct. 2020), completed the Graduate Teaching and Learning Program Level 1: Foundations;

(11) TA, (Win. 2020), on ENCMP 100 Labs - Computer Programming for Engineers, (Matlab).

Note: TA, teaching assistant; LI, lab instructor; Win., winter term; Lec., Lecture marker.

Languages

☐ Mandarin (first language)

☐ English