Gao Huxin

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● EDUCATION BACKGROUND

09/2014-06/2018 **Wuhan University**
BEng in Mechanical Design Manufacturing and Automation
GPA: **3.75/4.0** Ranking: **3/148**

01/2019-Present **National University of Singapore**
Pursuing PhD in Biomedical Engineering
CAP: **4.70/5.0**

● RESEARCH INTEREST

Medical Robot, Reinforcement Learning, Visual Servoing, Attention

● RESEARCH EXPERIENCE

06/2020-Present **Minimally Invasive Surgical Robot for Gastrointestinal Endoscopy (国家重点研发专项)**
1. Design a modular flexible manipulator system with variable stiffness
2. Analyze robotic kinematics and model the stiffness
3. Establish robotic simulation platform

06/2019-Present **AI Application in Brain Intervention Robot**
1. Preoperative motion planning (RCM recommendation) using deep reinforcement learning
2. Intraoperative cable-driven robot control (cable modelling, OCT-based visual servoing)

12/2020-Present **Surgical Action-driven Visual Attention for Autonomous Endoscope Control**
1. Obtain visual attention point on surgical video combining surgical action
2. Visual servoing control for daVinci System using surgical action-driven attention

07/2018-02/2019 **Prostate Biopsy Robot**
1. Design a robot for the prostate biopsy
2. Analyze robotic kinematics

10/2017-06/2018 **Cable-driven Exoskeleton for Upper Extremity**
1. Design the portable, wearable upper extremity exoskeleton

● RESEARCH PUBLICATIONS

Journal

[1] Z. Yi, **H. Gao**, X. Ji, S.Y. Chong, Y. Mao, B. Luo, C. Shen, S. Han, J.W. Wang, S. Jung, P. Shi, H. Ren, X. Liu, "Mapping Drug-Induced Neuropathy through In-Situ Motor Protein Tracking and Supervised Learning", **Nature Biotechnology**, 2021.

[2] C. Li, Y. Yan, X. Xiao, X. Gu, **H. Gao**, X. Duan, X. Zuo, Y. Li and H. Ren, "A miniature manipulator with variable stiffness towards minimally invasive transluminal endoscopic surgery," IEEE Robotics and Automation Letters, 2021.

[3] L. Zhang, K.S. Kumar, H. Hao, C. J. Cai, H. He, **H. Gao**, S. Yue, C. Li, R.C. Seet, H. Ren and J. Ouyang, "Fully organic compliant dry electrodes self-adhesive to skin for long-term motion-robust epidermal biopotential monitoring," **Nature Communication**, 2020.

[4] B.S. Yeow, H. Yang, M.S. Kalairaj, **H. Gao**, C.J. Cai, S. Xu, P. Chen and H. Ren, "Deployable serial and parallel structures by untethered magnetic deformations of programmable domain folding and cutting," Advanced Materials Technologies, 2020.

[5] X. Xiao, **H. Gao**, C. Li, L. Qiu, K. S. Kumar, C. J. Cai, B. S. Bhola, N. K. K. King, and H. Ren, "Portable body-attached positioning mecha- nism towards robotic needle intervention," IEEE/ASME Transactions on Mechatronics, vol. 25, pp. 1105–1116, April 2020.

Conference

[1] **H. Gao**, Z. Zhang, C. Li, X. Xiao, L. Qiu, X. Yang, R. Hao, X. Zuo, Y. Li, and H. Ren, "GESRsim: Gastrointestinal Endoscopic Surgical Robot Simulator," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.

[2] **H. Gao**, X. Xiao, L. Qiu, M.Q. Meng, N.K.K. King and H. Ren, "Remote-center-of-motion recommendation toward brain needle intervention using deep reinforcement learning," IEEE International Conference on Robotics and Automation (ICRA), 2021.

[3] X. Xiao, S. Xu, C. Li, X. Gu, **H Gao**, M.Q.Meng, H. Ren, "Magnetically-connected modular reconfigurable mini-robotic system with bilateral isokinematic mapping and fast on-site assembly towards minimally invasive procedures," IEEE International Conference on Robotics and Automation (ICRA), 2021.

Workshop

[1] **H. Gao**, X. Xiao, X. Yang, T. Zhang, X. Zuo, Y. Li, H. Ren, "A Miniature 3-DoF Flexible Parallel Robotic Wrist Using NiTi Wires for Gastrointestinal Endoscopic Surgery," IEEE International Conference on Robotics and Automation (ICRA) workshop – Frontiers of Endoluminal Intervention: Clinical opportunities and technical challenges, 2022.

● REVIEWS

Journal: TASE, Journal of Robotics, Frontiers of Mechanical Engineering, Biomimetic Intelligence and Robotics

Conference: ICRA, IROS, ROBIO, ICRAM

● SKILLS

Robotic Software: Autodesk CAD, SolidWorks, ROS, Gazebo, V-rep

Programming: Python, Matlab, Lua, C++, C

Machine Learning Architecture: Pytorch, Tensorflow, Matlab AI toolbox, Spinningup, Baseline