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Ka-Wai Kwok, PhD

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Professional Appointments

The University of Hong Kong (HKU)

Aug 2020 – present **Associate Professor**, Department of Mechanical Engineering (ME)

Aug 2014 – Aug 2020 **Assistant Professor**, Department of Mechanical Engineering (ME)

Harvard Medical School (HMS) and University of Georgia (UGA)

Aug 2013 – Aug 2014 **Croucher Postdoctoral Fellow** in the Brigham and Women's Hospital (BWH),
HMS and UGA

Advisors: Dr. Ehud Schmidt (BWH) and Dr. Zion Tse (UGA)

Imperial College London

Sep 2011 – May 2013 **Research Assistant** and **Postdoctoral Research Associate** in the Hamlyn Centre
for Robotic Surgery, Department of Computing

Advisors: Prof. Guang-Zhong Yang

Academic Qualifications

Imperial College London

Oct 2007 – Mar 2012 **PhD** in the Hamlyn Centre for Robotic Surgery,
The Institute of Global Health Innovation, Department of Computing
Supervisor: Prof. Guang-Zhong Yang

The Chinese University of Hong Kong (CUHK)

Aug 2003 – Sep 2005 **MPhil** in Automation and Computer-Aided Engineering (ACAE),
Supervisor: Prof. Yeung Yam

Sep 2000 – Jul 2003 **BEng** in Automation and Computer-Aided Engineering (ACAE)
Final year project supervisor: Prof. Yun-Hui Liu

Summary

- Principle investigator: **Group for Interventional Robotic and Imaging Systems (IRIS)** at HKU:
<http://web.hku.hk/~kwokkw/index.html>, currently comprising members:
3 postdoctoral fellows, **10** PhD, **2** MPhil students and **4** research assistants.
- Research interest: 1) **Surgical robotics**; 2) **MR-safe/conditional robotic devices**; 3) **Human-robot control interface**; 4) **Intra-operative medical image processing**;
5) **Healthcare intelligent system**.
- Publications/patents Co-authored **2** book chapters, **43** journal papers,
(e.g. *SoRo*, *TRO*, *RA-L*, *CYB*, *TMech*, *TIE*, *TAC*, *ABME*, *MedIA*, *Neuroimage*),
60 conference papers with **>50** clinicians and **>90** engineering scientists
Two (out of 9) patented inventions licensed by or transferred to industrial partners
- Selected Awards: **Best Conference Award** in 2018 IEEE International Conference on Robotics and
Automation (ICRA) + **Seven** IEEE conference/journal paper awards in top tier.
Early Career Award, Research Grants Council (RGC) of HK;
- Research grants: **>HK\$27M~US\$3.6M** granted in capacity as PI, including industrial funds and
external grants, e.g. from RGC and Innovation and Technology Commission (ITC)
of HK.

Awards and Honours

IEEE International Conference/Journal Awards

- May 2019 **Best Poster Paper Award (2nd place)** in 2019 IEEE International Conference on Robotics and Automation (ICRA) workshop on **Surgical Robots**
[sponsored by Intuitive Surgical Inc.]
- Sep 2018 **First Place Prize Paper Award** in 2017 IEEE Transactions on Power Electronics (TPEL).
[Selected out of 789 papers published by this top tier journal in power electronics]
- May 2018 **Best Conference Paper Award** in 2018 IEEE International Conference on Robotics and Automation (ICRA), in capacity of last and corresponding author.
[Selected out of 2,539 papers accepted by this largest conference in robotics]
[Through the same paper topic, the 1st author, Ziyang Guo (my first PhD graduate), was also elected **Innovators Under 35 for the Asia Pacific Region** by **MIT Technology Review**]
- May 2018 **ICRA Best Medical Robotics Paper Award Finalist** in 2018 IEEE International Conference on Robotics and Automation (ICRA)
[sponsored by Intuitive Surgical Inc.]
- Jul 2017 **Best Conference Paper Award** in 2017 IEEE International Conference on Real-time Computing and Robotics (RCAR).
- Jun 2017 **Best Poster Paper Award (Merit prize)** in 2017 IEEE International Conference on Robotics and Automation (ICRA) workshop on **Surgical Robots**, sponsored by Intuitive Surgical Inc.
- Jun 2014 **ICRA Best Medical Robotics Paper Award Finalist** in 2014 IEEE International Conference on Robotics and Automation (ICRA)
[sponsored by Intuitive Surgical]
- Nov 2013 **Best IROS Application Paper Award Finalist**
in 2013 IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS)

Other International Conference Awards

- Jun 2016 **Best Live Demonstration Prize – Surgical Robot Challenge 2016**, organised by EPSRC UK-RAS Network. Project topic: *MR-conditional Catheter Robot for MRI-guided Cardiac Electrophysiological Intervention*
[The team comprising 6 research students of my group]
- Jul 2012 **Best Oral Paper Award for the paper** “*Improved Visualisation with Shape Instantiation for Robot Assisted Catheter Navigation,*” in 2012 Hamlyn Symposium for Medical Robotics (HSMR)
- May 2011 **HiPEAC (High-Performance and Embedded Architecture and Compilation) Paper Award for the paper** “*Mixed Precision Processing in Reconfigurable System*”, in 2011 IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM)[Paper acceptance rate: 16.9%]
- May 2008 **Best Poster Award (1st prizes) in Inaugural Workshop for The Hamlyn Centre for Robotic Surgery**

Other Research/Academic-related Awards

- May 2016 **King's/HKU Fellowship Awards 2016/17** – supporting my collaborative research at King's College London
- Oct 2015 **Early Career Award 2015-2016**, Research Grants Council of Hong Kong
- Sep 2014 **Outstanding Alumni Award** in the 20th Anniversary of Department of Mechanical and Automation Engineering, CUHK
- Apr 2013 **Croucher Foundation Postdoctoral Fellowships 2013/2014** – supporting my research at the Harvard Medical School and the University of Georgia.
- May 2008 **Overseas PhD Scholarship, Department of Computing, Imperial College (2008-2010)**
- 2002–03 New Asia College **Dean's List – Merit**

2002–03 **Dean's List** of the Faculty of Engineering, CUHK

Other Teaching-related Awards

- Jun 2019 **First Runner-up Award** in the Robocon 2019 Hong Kong Contest “Great Urtuu”
(in the role of team coach)
- Sep 2006 **Merit in the Solar Rechargeable Robot Contest of 2006 Hong Kong Youths Skills Competition (Robotics)**
[Position: team leader]
- Sep 2006 **Merit in the Solar Rechargeable Robot Contest of 2006 Hong Kong Youths Skills Competition (Robotics)**
[Position: team leader]
- Jul 2004 **Champion** in the Micro Robot Maze Contest of the 2004 Hong Kong Youths Skills Competition (Robotics) (in the role of team leader)
- Jun 2004 **Second Runner-up Award** in the Robocon 2004 Hong Kong Contest “Lovers’ Reunion”
(in the role of team leader)
- 2004–05 **Excellent Tutor Award** in Dept. of ACAE, CUHK
- 2003–04 **Excellent Tutor Award** in Dept. of ACAE, CUHK

Consultancy Services

APTORUM Therapeutics Limited

Oct 2016 – Present **Scientific Assessment Committee** for licensing and acquisition of early stage preclinical assets

Signate Life Sciences (HK) Limited

Feb 2018 – Present **Scientific Advisory Committee** for R&D of products and drug candidates

Shenzhen ROBO Medical Technology Co., Ltd

Apr 2018 – Dec 2019 **Consultant** for R&D of surgical instrumentation

Bio-Medical Engineering (HK) Limited

Feb 2015 – Feb 2017 **Consultant** of Non-Invasive Surgical Innovations (NISI)

The Chinese University of Hong Kong, Shenzhen (CUHK, SZ)

Oct 2016 – Aug 2019 **Adjunct Assistant Professor**, School of Science and Engineering

Professional Qualifications

IEEE Senior Member [2018 – Present]

IEEE RAS Member [2015 - Present]

MICCAI Member [2019 - Present]

iMech Associate Member [May 2020 - Present]

ASME Member [Jul 2020 - Present]

Publications

To date, total number of Google Scholar citation reaches 1,342, with *h*-index: 21 (i10-index: 45)

♦Students primarily supervised, *Corresponding author, #Postdoctoral fellow and research staff recruited

Book Chapters

- [1] Z. Guo♦, M.C.W. Leong♦, H. Su, K.W. Kwok, D.T.M. Chan, W.S. Poon., “*Prospective Techniques for Magnetic Resonance Imaging Stereotactic Neurosurgery*,” in **Handbook of Robotic and Image-Guided Surgery**, Elsevier, 2019, pp.585-598.

- [2] V. Vitiello, K.W Kwok, G.Z. Yang, "Introduction to robot assisted minimally invasive surgery (MIS)," in **Medical robotics: Minimally invasive surgery**, ed: Woodhead Publishing Ltd., P. Gomes, Ed, UK: Cambridge Consultants, 2012, pp.1-40.

Journal Papers

- [3] X. Xie[#], C. Fan, Ka-Wai Kwok, J. Lam^{*}, "A Bernstein Polynomial Approach to Estimating Reachable Set of Periodic Piecewise Polynomial Systems", **IEEE Transactions on Automatic Control (TAC)** (Early Access) [IF: 5.625]
- [4] Y.L. Ng[♦], C.K. Lo[♦], K.H. Lee[♦], X. Xie[#], T. N.Y. Kwong, M. Ip, L. Zhang, J. Yu, J. J.Y. Sung, W.K.K. Wu, S. H. Wong^{*}, Ka-Wai Kwok^{*}, "Development of an open-access and explainable machine learning prediction system to assess the mortality and recurrence risk factors of *Clostridioides difficile* infection patients," **Advanced Intelligent Systems** (Accepted) [IF: N/A]
- [5] J. Liu[#], K.W. Kwok, Y. Cui^{*}, J. Shen, J. Lam, "Consensus of Positive Networked Systems on Directed Graphs," **IEEE Transactions on Neural Networks and Learning Systems (TNNLS)** (Accepted) [IF: 8.793]
- [6] W. Yang, W.S. Choi, M. Wong, W. Powcharoen, W. Zhu, J.K.H. Tsoi, M. Chow, K.W. Kwok, Y. Su^{*}, "Three-Dimensional Printed Patient-Specific Surgical Plates Increase Accuracy of Oncological Head and Neck Reconstruction Versus Conventional Surgical Plates: A Comparative Study," **Annals of Surgical Oncology**, 2020 (In Press) [IF: 4.061]
- [7] C.L. Cheung[♦], J.D.L. Ho[♦], V. Vardhanabhuti, H.C. Chang, K.W. Kwok^{*}, "Design and Fabrication of Wireless Multilayer Tracking Marker for Intraoperative MRI-guided Interventions," **IEEE/ASME Transactions on Mechatronics (TMech)**, 25(2):1016-1025, 2020 [IF: 5.673]
- [8] Z. He[♦], Z. Dong[♦], G. Fang[♦], J.D.L. Ho[♦], C.L. Cheung[♦], H.C. Chang, C.N. Chong, Y.K. Chan, T.M. Chan, K.W. Kwok^{*}, "Design of a Percutaneous MRI-guided Needle Robot with Soft Fluid-driven Actuator," **IEEE Robotics and Automation Letters (RA-L)**, 5(2):2100-2107, 2020 [IF: 3.608]
- [9] X. Wang[♦], G. Fang[♦], K. Wang[♦], X. Xie[#], K.H. Lee[#], J.D.L. Ho[♦], W.L. Tang[#], J. Lam, K.W. Kwok^{*}, "Eye-in-hand Visual Servoing Enhanced with Sparse Strain Measurement for Soft Continuum Robots," **IEEE Robotics and Automation Letters (RA-L)**, 5(2):2162-2168, 2020 [IF: 3.608]
- [10] X. Xie[#], J. Lam, K.W. Kwok^{*}, "A novel scheme of non-fragile controller design for periodic piecewise LTV systems," **IEEE Transactions on Industrial Electronics (TIE)**, 2020 [IF: 7.515]
- [11] Y. Chen[#], C. Zhao^{*}, J. Lam, Y. Cui, K.W. Kwok, "Stability and l_1 -Gain Analysis for Positive 2-D Markov Jump Systems," **International Journal of Systems Science**, 50(11):2077-2087, 2019 [IF: 2.149]
- [12] H.C. Fu[♦], J.D.L. Ho[♦], K.H. Lee[♦], Y.C. Hu, S.K.W. Au, K.J. Cho, K.Y. Sze, K.W. Kwok^{*}, "Interfacing soft and hard: a spring reinforced actuator," **Soft Robotics (SoRo)**, 7(1):44-58, 2020 [IF: 5.543]
- [13] W. Jiang, Z. Liu[♦], K.H. Lee[♦], S. Chen, Y.L. Ng[♦], Q. Dou, H.C. Chang, K.W. Kwok^{*}, "Respiratory Motion Correction in Abdominal MRI using a Densely Connected U-Net with GAN-guided Training," **arXiv preprint**, arXiv: 1906.09745, 2019. [IF: N/A]
- [14] G. Fang[♦], X. Wang[♦], K. Wang[♦], K.H. Lee[♦], J.D.L. Ho[♦], H.C. Fu[♦], D.K.C. Fu[#], K.W. Kwok^{*}, "Vision-based Online Learning Kinematic Control for Soft Robots using Local Gaussian Process Regression," **IEEE Robotics and Automation Letters (RA-L)**, 4(2):1194-1201, 2019 [IF: 3.608]
- [15] J. Li, T. Kong, J. Yu, K.H. Lee[♦], Y.H. Tang, K.W. Kwok, J.T. Kim, H.C. Shum^{*}, "Electrocoiling-guided Printing of Multiscale Architectures at Single-wavelength Resolution," **Lab on a Chip**, 19(11):1953-1960, 2019 [IF: 6.744]
- [16] T.L.T. Lun[♦], K. Wang[♦], J.D.L. Ho[♦], K.H. Lee[♦], K.Y. Sze, K.W. Kwok^{*}, "Real-time Surface Shape Sensing for Soft and Flexible Structures using Fiber Bragg Gratings," **IEEE Robotics and Automation Letters (RA-L)**, 4(2):1454-1461, 2019 [IF: 3.608]
- [17] P. Li[#], J. Lam^{*}, R. Lu, K.W. Kwok, "Stability and L_2 Synthesis of A Class of Periodic Piecewise Time-varying Systems," **IEEE Transactions on Automatic Control (TAC)**, 64(8):3378-3384, 2019

[IF: 5.625]

- [18] Y. Fan, F. Yang, G.S.H. Cheung, A.K.Y. Chan, D.D. Wang, Y.Y. Lam, M.C.K. Chow[♦], M.C.W. Leong[♦], K.K.H. Kam, K.C.Y. So, G. Tse, E. Fung, Z. Qiao, B. He, K.W. Kwok, A.P.W. Lee*, “*Device sizing guided by echocardiography-based three-dimensional printing is associated with superior outcome after percutaneous left atrial appendage occlusion,*” **Journal of the American Society of Echocardiography**, 32(6):708-719, 2019 [IF:5.508]
- [19] M. Liu^{#*}, J. Lam, B. Zhu, K.W. Kwok, “*On Positive Realness, Negative Imaginariness, and H_∞ Control of State-space Symmetric Systems*”, **Automatica**, 101:190-196, 2019 [IF: 5.541]
- [20] Y. Chen[#], J. Lam, Y. Cui*, J. Shen, K.W. Kwok, “*Reachable Set Estimation and Synthesis for Periodic Positive Systems,*” **IEEE Transactions on Cybernetics (TCYB)**, pp.1-22, 2019 [IF: 11.079]
- [21] Y. Chen[#], J. Lam, Y. Cui*, K.W. Kwok, “*Switched Systems Approach to State Bounding for Time Delay Systems,*” **Information Sciences**, 465:191-201, 2018, [IF: 5.910]
- [22] Z. Tang, Y. Fan, Y. Wang, C.N. Jin, K.W. Kwok, A.P.W. Lee*, “*Mitral Annular and Left Ventricular Dynamics in Atrial Functional Mitral Regurgitation: A Three-Dimensional and Speckle-Tracking Echocardiographic Study,*” **Journal of the American Society of Echocardiography**, 32(4):503-513, 2019 [IF: 5.508]
- [23] J.D.L. Ho[♦], K.H. Lee[♦], W. L. Tang[♦], K.M. Hui[#], K. Althoefer, J. Lam, K.W. Kwok*, “*Localised Online Learning-Based Control of a Soft Redundant Manipulator Under Variable Loading,*” **Advanced Robotics**, 32(21):1168-1183, 2018 [IF: 1.247]
- [24] Z. Dong[♦], Z. Guo[♦], K.H. Lee[♦], G. Fang[♦], W.L. Tang[♦], H.C. Chang, D.T.M. Chan and K.W. Kwok*, “*High-performance Continuous Hydraulic Motor for MR Safe Robotic Teleoperation,*” **IEEE Robotics and Automation Letters (RA-L)**, 4(2):1964-1971, 2019 [IF: 3.608]
- [25] A.J. Taylor*, R. Montayre*, Z. Zhao, K.W. Kwok, Z.T.H. Tse, “*Modular force approximating soft robotic pneumatic actuator,*” **International Journal of Computer Assisted Radiology and Surgery (IJCARs)**, 13(11):1819-1827, 2018 [IF: 2.473]
- [26] S. Fan[#], A. Chan, S. Au, M.C.W. Leong[♦], M.C.K. Chow[♦], Y. Fan, R. Wong, S. Chan, S.K. Ng, A.P.W. Lee*, K.W. Kwok, “*Personalised Anaesthesia: 3D Printing in Patient with Facial Deformity and Difficult Airway,*” **British Journal of Anaesthesia**, 121(3):675-678, 2018 [IF: 6.880]
- [27] Z. Guo[♦], M.C.W. Leong[♦], H. Su, K.W. Kwok*, D.T.M. Chan, W.S.Poon, “*Techniques for Stereotactic Neurosurgery: Beyond the "Frame", Towards the Intraoperative Magnetic Resonance Imaging-guided and Robot-assisted Approaches,*” **World Neurosurgery**, 116:77-87, 2018 [IF: 1.829]
- [28] X. Wang[♦], K.H. Lee[♦], D.K.C. Fu[#], Z. Dong[♦], K. Wang[♦], G. Fang[♦], S.L. Lee, A.P.W. Lee, K.W. Kwok*, “*Experimental Validation of Robot-assisted Cardiovascular Catheterization: Model-based versus Model-free Control,*” **International Journal of Computer Assisted Radiology and Surgery**, 13(6):797-804, 2018 [IF: 2.473]
- [29] Z. Guo[♦], Z. Dong[♦], K.H. Lee[♦], C.L. Cheung[♦], H.C. Fu[♦], J.D.L., Ho[♦], H. He[♦], W.S. Poon, D.T.M. Chan, K.W. Kwok*, “*Compact Design of a Hydraulic Driving Robot for Intra-operative MRI-guided Bilateral Stereotactic Neurosurgery,*” **IEEE Robotics and Automation Letters (RA-L)**, 3(3):2515-2522, 2018 [IF: 3.608]
- [ICRA 2018 Best Conference Paper Award (out of 2,539 papers)]
[ICRA 2018 Best Medical Robotics Paper Award Finalist]
- [30] K.H. Lee[♦], D.K.C. Fu[#], Z. Guo[♦], Z. Dong[♦], M.C.W. Leong[♦], C.L. Cheung[♦], A.P.W. Lee, K.W. Kwok*, “*MR Safe Robotic Manipulator for MRI-guided Intra-cardiac Catheterization*” **IEEE/ASME Transactions on Mechatronics (TMeCh)**, 23(2):586-595, 2018 [IF: 5.673]
- [31] P. Li[#], J. Lam, K.W. Kwok, R. Lu*, “*Stability and Stabilization of Periodic Piecewise Linear Systems: A Matrix Polynomial Approach,*” **Automatica**, 94:1-8, 2018 [IF: 5.541]
- [32] K.H. Lee[♦], D.K.C. Fu[#], M.C.W. Leong[♦], M.C.K. Chow[♦], H.C. Fu[♦], K. Althoefer, K.Y. Sze, C.K. Yeung, K.W. Kwok*, “*Nonparametric Online Learning Control for Soft Continuum Robot: An Enabling Technique for Effective Endoscopic Navigation,*” **Soft Robotics (SoRo)**, 4(4):324-337, 2017

[IF: 5.543]

- [33] Y. Feng, Z. Guo[♦], Z. Dong[♦], X.Y. Zhou, K.W. Kwok^{*}, S. Ernst, S.L. Lee, “An Efficient Cardiac Mapping Strategy for Radiofrequency Catheter Ablation with Active Learning,” **International Journal of Computer Assisted Radiology and Surgery (IJCARS)**, 12(7):1199-1207, 2017 [IF: 2.473]
- [34] H. Rafii-Tari^{*}, C. Payne, K.W. Kwok, G.Z. Yang, “Objective Assessment of Endovascular Navigation Skills with Force Sensing,” **Annals of Biomedical Engineering (ABME)**, 45(5):1315-1327, 2017 [IF: 3.324]
- [35] S.C. Tang^{*}, T.L.T. Lun[♦], Z. Guo[♦], K.W. Kwok, N. McDannold, “Intermediate Range Wireless Power Transfer with Segmented Coil Transmitters for Implantable Heart Pumps,” **IEEE Transactions on Power Electronics (TPEL)**, 32(5):3844-3857, 2017 [IF: 6.373]
- [First Place Prize Paper Award (out of 789 papers published in 2017)]
- [36] J. Ge^{*}, A.E. James, L. Xu, Y. Chen, K.W. Kwok, M.P. Fok “Bidirectional Soft Silicone Curvature Sensor based on Off-centered Embedded Fiber Bragg Grating,” **IEEE Photonics Technology Letters**, 28(20):2237-2240, 2016, [IF: 2.451]
- [37] Z. Zhang, Y. Xin, B. Liu, W.X.Y. Li, K.H. Lee[♦], C.F. Ng, D. Stoyanov, R.C.C. Cheung, K.W. Kwok^{*}, “FPGA-based High-Performance Collision Detection: An Enabling Technique for Image-Guided Robotic Surgery,” **Frontiers in Robotics and AI**, 3(5):article 51, 2016 [IF: N/A]
- [38] Y. Chen, W. Wang, E. J. Schmidt^{*}, K.W. Kwok, A. N. Viswanathan, R. Cormack, and Z. T. H. Tse, “Design and Fabrication of MR-Tracked Metallic Stylet for Gynecologic Brachytherapy,” **IEEE/ASME Transactions on Mechatronics (TMech)**, 21(2):956-962, 2015 [IF: 5.673]
- [39] D.R. Leff, D.R.C. James, F. Orihuela-Espina, K.W. Kwok, L.W. Sun, G.P. Mylonas, T. Athanasiou, A. Darzi, G.Z. Yang^{*}, “The Impact of Expert Visual Guidance on Trainee Visual Search Strategy, Visual Attention and Motor Skills,” **Frontiers in Human Neuroscience**, 9(526):1-11, 2015 [IF: 2.673]
- [40] Y. Chen[#], K.W. Kwok^{*} (co-1st author) and Z.T.H. Tse, “An MR-conditional High-torque Pneumatic Stepper Motor for MRI-guided and Robot-assisted Intervention,” **Annals of Biomedical Engineering (ABME)**, 42(9):1823-1833, 2014 [IF: 3.324]
- [41] K.W. Kwok^{*}, K.H. Tsoi, V. Vitiello, J. Clark, G.C.T. Chow, Wayne Luk, G.Z. Yang, “Dimensionality Reduction in Controlling Articulated Snake Robot for Endoscopy under Dynamic Active Constraints,” **IEEE Transactions on Robotics (TRO)**, 29(1):15-31, 2013 [IF: 6.123]
- Featured in Wellcome Trust News, Jul 2011 *i-Snake®: Surgery Evolved | A film by the Wellcome Trust:* <http://www.youtube.com/watch?v=5UxuNHb9ehg>
- [42] S.L. Lee^{*}, K.W. Kwok, C. Riga, C. Bicknell and G.Z. Yang, “Motion-adapted catheter navigation with real-time instantiation and improved visualisation,” **Journal of Robotic Surgery**, 7(3):251-260, 2013 [IF: 1.64]
- [43] D.R.C. James, D.R. Leff, F. Orihuela-Espina, K.W. Kwok, G.P. Mylonas, T. Athanasiou, L.W. Sun, A. Darzi and G.Z. Yang^{*}, “Enhanced Frontoparietal Network Architectures Following 'Gaze-Contingent' Versus 'Free-Hand' Motor Learning,” **Neuroimage**, 64:267-276, 2013 [IF: 5.902]
- [44] K.W. Kwok^{*}, L.W. Sun (co-1st author), D.R.C. James, F. Orihuela-Espina, G.P. Mylonas and G.Z. Yang, “Collaborative Gaze Channelling for Improved Cooperation During Robotic Assisted Surgery,” **Annals of Biomedical Engineering (ABME)**, 40(10):2156-2167, 2012 [IF: 3.324]
- [45] G.P. Mylonas^{*}, K.W. Kwok, D.R.C. James, D. Leff, F. Orihuela-Espina, A. Darzi, G.Z. Yang, “Gaze-Contingent Motor Channelling Haptic Constraints and associated Cognitive Demand for Robotic MIS,” **Medical Image Analysis (MedIA)**, 16(3):612-631, 2012 [IF: 11.148]
- [46] A. Chetwood^{*}, K.W. Kwok, L.W. Sun, G.P. Mylonas, J. Clark, A. Darzi and G.Z. Yang, “Collaborative Eye Tracking: A Potential Training Tool in Laparoscopic Surgery,” **Surgical Endoscopy**, 26(7):2003-2009, 2012 [IF: 3.149]
- [47] S.L. Lee, M. Lerotic, V. Vitiello, S. Giannarou, K.W. Kwok, M. Visentini-Scarzanella, G.Z. Yang^{*}, “From Medical Images to Minimally Invasive Intervention: Computer Assistance for Robotic Surgery,” **Computerized Medical Imaging and Graphics**, 34(1):33-45, 2010 [IF: 3.750]

Full Conference Papers

[Particular proceedings of interest: **MICCAI**, **IROS**, **ICRA** and **FCCM**, which are the top conferences in their corresponding fields. All the papers below have been externally refereed]

- [48] Z. Liu[♦], W. Jiang[♦], K.H. Lee[♦], Y.L. Lo[♦], Y.L. NG[#], Q. Dou, V. Vardhanabhuti, and K.W. Kwok, “A Two-Stage Approach for Automated Prostate Lesion Detection and Classification with Mask R-CNN and Weakly Supervised Deep Neural Network,” **Medical Image Computing and Computer-Assisted Intervention (MICCAI) Workshop – Modelling and Monitoring of Computer Assisted Intervention**, 2019 (accepted)
- [49] Z. Dong[♦], X. Wang[♦], Z. He[♦], J.D.L. Ho[♦], W.L. Tang[#], Y. Tao[♦], A.P.W. Lee, K.W. Kwok, “Experimental Validation of Autonomous Motion Control with Standard Cardiac Electrophysiology Catheter”, **IEEE International Conference on Robotics and Automation (ICRA) Workshop – Open Challenges and State-of-the-Art in Control System Design and Technology Development for Surgical Robotic Systems**, 2019 [Best Poster Paper Award (2nd place)]
- [50] Z. Li[♦], G. Fang[♦], J.D.L. Ho[♦], C.I. Lam, Y.W. Yim[#], J.Y.K. Chan, K.W. Kwok, “Augmented Reality-Guided Visual Servoing for Flexible Endoscope Control”, **IEEE International Conference on Robotics and Automation (ICRA) Workshop – Open Challenges and State-of-the-Art in Control System Design and Technology Development for Surgical Robotic Systems**, 2019
- [51] M. Yin[♦], Y. Chen[#], K.H. Lee[♦], D.K.C. Fu[#], Z.T.H. Tse, K.W. Kwok, “Dynamic Modeling and Characterization of the Core-XY Cartesian Motion System,” **IEEE International Conference on Real-time Computing and Robotics (RCAR)**, pp.206-211, 2018
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- [108] J. Liu[#], X. Gong, Y. Cui, J. Lam, K.W. Kwok, “Further Improvements on Nonnegative Edge Consensus of Networked Systems,” **IEEE Transactions on Cybernetics (TCYB)** (Under review) [IF: 11.079]
- [109] M.C.W. Leong[♦], K.H. Lee[♦], B.P.Y. Kwan, J.K.M. Hui[#], N. Navab, W. Luk, K.W. Kwok^{*}, “Performance-aware Programming for Intraoperative Intensity-based Image Registration on Graphics Processing Units,” **International Journal for Computer Assisted Radiology and Surgery (IJCARS)** (Under review) [IF: 2.473]
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- [111] G. Fang[♦], X. Wang[♦], J.D.L. Ho[♦], K. Wang[♦], C.K. Chow[♦], K.H. Lee[♦], X. Xie[#], W.L. Tang[#], L. Liang, H.C. Chang, C.J. Juan, Y.H. Liu, K.W. Kwok^{*}, “Visual Servoing of an MR-safe Soft Manipulator for Transoral Laser Microsurgeries,” **IEEE Transactions on Robotics (TRO)** (Under the 1st revision) [IF: 6.123]
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Patents for Inventions

♦Students primarily supervised, #Postdoctoral fellow and research staff recruited, ^Research Partner in projects

- [1] “*Optical Soft Skin System for Multimodal Sensing*”
US Provisional Pat.: **US 63/109,530** [Filed on 4 Nov 2020]
Inventors: Ka Wai KWOK, Kui WANG♦, Chi Hin MAK♦, Zhi Yu LIU♦, Justin Di-Lang HO♦
- [2] “*3D Physical Replica Of A Cardiac Structure And A Method For Manufacturing The Same*”
US Provisional Pat.: **US 63/079,592** [Filed on 17 Sep 2020]
Inventors: Pui Wai LEE^, Ka Wai KWOK, Kwok Leung CHAN^
- [3] “*Fluid-driven Robotic Needle Positioner for Image-Guided Percutaneous Interventions*”
US Provisional Pat.: **US 63/053,798** [Filed on 24 Jul 2020]
Inventors: Ka Wai KWOK, Zhuoliang HE♦, Ziyang DONG♦, Justin Di-Lang HO♦, Ge FANG♦
- [4] “*Visual Servoing of An MR-safe Soft Manipulator for Transoral Laser Microsurgeries*”
US Provisional Pat: US 63/021,692 [Filed on 8 May 2020]
Inventors: Ka Wai KWOK, Jason Ying Kuen^ CHAN, Hing-Chiu CHANG^, Ge FANG♦, Xiaomei WANG♦, Justin Di-Lang HO♦, Chun Kit CHOW♦
- [5] “*Enhanced Magnetic Resonance Imaging Guidance for Robotic Transoral Surgery*”,
US Provisional Pat.: US 62/898,072 [Filed on 10 Sep 2019]
Research Translation: My IRIS group applied soft robotics in developing a world-first MRI-guided transoral laser therapy, of which the IP was protected under a collaboration agreement with Signate Life Sciences Ltd via the HKU Technology Transfer Office (TTO).
Inventors: Ka Wai KWOK, Jason Ying Kuen CHAN^, Ziyang GUO♦, Chun Kit CHOW♦, Justin Di-Lang HO♦, Kit-Hang LEE♦
- [6] “*Real-time Surface Shape Sensing for Flexible Structures Using Fiber Bragg Gratings*”,
US Pat.: **US 16/449,063** [Filed on 21 Jun 2019];
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Inventors: Ka Wai KWOK, Tian Le Tim LUN♦, Justin Di-Lang HO, ♦ Kit-Hang LEE♦, Kin-Yip Kenneth WONG^
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US Provisional Pat: **US 62/640,798** [Filed on 9 Mar, 2018];
PCT Pat: **PCT/IB2019/051945** [Filed on Mar 11, 2019];
CN Pat.: **CN 201980015259.4** [Filed on 25 Aug 2020]
Inventors: Ka Wai KWOK, Chim Lee CHEUNG♦, Justin Di-Lang HO♦, Ziyang GUO♦, Hing Chiu CHANG^, Varut VARDHANABHUTI^
- [8] “*Fluid Powered Master-Slave Actuation for MRI-Guided Interventions*”,
US Provisional Pat: **US 62/640,302** [Filed on 8 Mar, 2018];
PCT Pat: **PCT/IB2019/051877** [Filed on Mar 8, 2019];
Inventors: Ziyang DONG♦, Ka Wai KWOK, Ziyang GUO♦, Kit Hang LEE♦

- [9] “*Robotic Stereotactic System for MRI-Guided Neurosurgery*”,
US Provisional Pat: **US 62/623,280** [Filed on 29 Jan, 2018]
PCT Pat: **PCT/CN2019/072961** [Filed on Jan 24, 2019]
Inventors: Ziyang GUO[♦], Ka Wai KWOK, Ziyang DONG[♦], Kit Hang LEE[♦], Hing Choi FU[♦], Chim Lee CHEUNG[♦]
- [10] “*Robotic Catheter System for MRI-guided Cardiovascular Interventions*”,
US Non-Provisional Pat: **US 15/630,406** [pending];
US Provisional Pat: **US 15/630,406** [Filed on Jun 24, 2016];
PCT Pat: **PCT/CN2017/089701** [Filed on Jun 23, 2017];
Research Translation: The catheter robot was also IP-protected with US and PCT patents, and exclusively licensed to Aptorum Therapeutics Limited. Pre-clinical trials are undertaken in collaboration with A*Star of Singapore to evaluate the system’s safety and efficacy.
Inventors: Ka Wai KWOK, Ziyang DONG[♦], Ziyang GUO[♦], Denny Kin Chung FU[#], Kit Hang LEE[♦]
- [11] “*Endoscopic Systems, Devices, and Methods for Performing in VIVO Procedures*”,
US Provisional Pat: **US 14/985,587** [Filed on Dec 31, 2015];
PCT Pat: **PCT/CN2016/070906** [Filed on Jan 14, 2016];
PRC Pat: **201610147810.9** [Filed on March 15, 2016];
Research Translation: Technology relevant to the use in colonoscopy has been were patented and transferred to Non-Invasive Surgical Innovations (NISI), Bio-Medical Engineering Ltd, which is a biomedical company specializing in the development of surgical and diagnostic innovations. Since the license transferal to NISI, the development of their endoscopic system has reached the stages of human trials, which targets at colonoscopy associated with huge patient market, particularly in Asia.
Inventors: Chung-Kwong YEUNG[^], Wai-Lun LAW[^], Ka-Wai KWOK

Research Grants [**>HK\$27M≈US\$3.6M granted in capacity as PI**]

External Peer-Reviewed Competitive Research Grants

(**Total: HK\$20,857,157≈US\$2.7M in the capacity of PI**)

In the capacity of PI for HK Research Grants Council (RGC) Projects (Total: HK\$5,562,424≈US\$720k)

- | | |
|------------------------|--|
| Jan 2021 –
Dec 2023 | PI – <i>Intra-operative MRI-guided Robotic System for Ultrasound-driven Drug Delivery</i> , funded by Research Grants Council (RGC) of Hong Kong, via General Research Fund (GRF)
[Project no. 17207020], HK\$614,675 |
| Jan 2020 –
Dec 2022 | PI – <i>Robot-assisted Laser Treatment of Hepatocellular Carcinoma under Intra-operative Magnetic Resonance Imaging</i> , funded by Research Grants Council (RGC) of Hong Kong, via General Research Fund (GRF)
[Project no. 17205919], HK\$869,898 |
| Jan 2019 –
Dec 2021 | PI – <i>Intra-operative MRI-guided Robotic System for Photothermal Therapy of Bladder Cancer</i> , funded by Research Grants Council (RGC) of Hong Kong, via General Research Fund (GRF)
[Project no. 17206818], HK\$632,421 |
| Jan 2018 –
Dec 2020 | PI – <i>MRI-guided Soft Continuum Robotic System for Transoral Laser Microsurgery</i> , funded by Research Grants Council (RGC) of Hong Kong, via General Research Fund (GRF), [Project no. 17202317], HK\$443,950 |
| Jan 2017 –
Dec 2019 | PI – <i>High-performance MRI-guided Robotic System for Functional and Stereotactic Neurosurgery</i> , funded by Research Grants Council (RGC) of Hong Kong, via General Research Fund (GRF) |

[Project no. 17227616], **HK\$482,605**

Jan 2016 – Dec 2018 PI – *MRI-guided and Robot-assisted Catheterization for Cardiac Electrophysiological Intervention*, funded by **Research Grants Council** (RGC) of Hong Kong, via Early Career Scheme (ECS)

[Project no. 27209515], **HK\$1,008,875**

Dec 2018 – Nov 2023 Co-PI – Image-guided Automatic Robotic Surgery, funded by Research Grants Council (RGC) of Hong Kong, via Theme-based Research Scheme (TRS),

[Project no. T42-409/18-R], Total Project Cost: **HK\$ 47,341,000**, Project Cost obtained by Ka-Wai's HKU account: **HK\$1,510,000**

In the capacity of PI for Non-RGC Projects (Total: HK\$15,294,733≈US\$2M)

Feb 2019 – Jan 2021 PI – *Enhanced Magnetic Resonance Imaging Guidance for Robotic Transoral Surgery*, funded by **Innovation and Technology Commission** (ITC), via University Industry Collaboration Programme (UICP), Postdoctoral Hub (PH) + Researcher Programme (RP) of the Innovation and Technology Fund Projects (ITF),

[Project no. UIM/353, PiH/244/19, InP/200/19, InP/199/19, PiH/120/19], **HK\$6,787,365**

May 2016 – May 2017 PI – *Development of Soft Robotic Colonoscopy for Non-invasive Diagnostic and Therapeutic Colonoscopy*, funded by **Innovation and Technology Commission** (ITC), via Innovation and Technology Support Programme (ITSP)

[Project no. ITS/361/15FX, InP126/16, InP156/16] **HK\$8,007,368**

Aug 2014 – Jul 2019 PI – *Interventional Imaging and Robotic Systems*, funded by **Croucher Foundation**, via Start-up allowance for Croucher award recipients,

HK\$500,000

In the capacity of Co-I for RGC Projects

Apr 2018 – Dec 2021 Co-I – *Safe Robotic Organ Retraction System with Force Sensing and Semi-Automatic Retraction Capability*, funded by **Research Grants Council** (RGC) of Hong Kong, via General Research Fund (GRF),

[Project no. 14209118], **HK\$632,421**

In the capacity of Co-I for Non-RGC Projects

Jun 2019 – Nov 2020 Co-I - *Develop a Novel Self-Navigated 3D Diffusion-Weighted Magnetic Resonance Imaging Technology*, funded by **Innovation and Technology Commission** (ITC), via Innovation and Technology Support Programme (ITSP),

[Project no. ITS/403/18], **HK\$1,134,884**

Jun 2019 – May 2021 Team Member – *Development and Validation of An Image Guided Augmented Reality Surgical System for Skullbase, Head and Neck Surgery*, funded by **Innovation and Technology Commission** (ITC), via Innovation and Technology Support Programme (ITSP),

[Project no. ITS/435/18FX], **HK\$4,621,407.52**

May 2018 – Apr 2021 Co-I – *3D Printing Technology for Planning Left Atrial Appendage Occlusion: A Randomised Trial*, funded by **Food and Health Bureau**, via Health and Medical Research Fund (HMRF),

[Project no. 05160976], Total Project Cost: **HK\$1,191,977**

May 2017 – Nov 2018 Co-I – *Development of 3D-printed cardiovascular models for personalised structural intervention*, funded by **Innovation and Technology Commission** (ITC), via Innovation and Technology Support Programme (ITSP)

[Project no. ITS/025/16)], **HK\$1,399,000**

Other External Research Grants

(Total: HK\$5,308,281 ≈ US\$690k in the capacity of PI)

- Dec 2017 – PI – *Tele-operated Robotic System for Intra-operative MRI-guided Stereotactic Neurosurgery*, funded by **Signate Life Sciences Limited**, **HK\$2,526,588**
- Nov 2019
- Jul 2015 – PI – *Development of Magnetic Anchored Soft Robotic Capsule Colonoscope for Non-invasive Diagnostic and Therapeutic Colonoscopy*, funded by **Bio-Medical Engineering (HK) Ltd.**, via Contract Research at HKU, **HK\$2,781,693**
- Jun 2016

Internal Grants

(Total: HK\$1,669,680 ≈ US\$217k in the capacity of PI)

- Oct 2019 – PI – *Empowering Students via Experiential Learning in Robotics*, funded by **HKU**, via Knowledge Exchange (KE) Funding Exercise 2019/20: Impact Project Scheme, [Project no. KE-IP-2019/20-35], **HK\$100,000**
- Jun 2020
- Apr 2019 – PI – *High-performance Integrated Robotic Systems for Intra-operative MRI-guided Interventions*, funded by **University Research Committee (URC)** of HKU, via Platform Technology Funding (PTF) 2018/19, **HK\$999,680**
- Mar 2021
- Jan 2015 – PI – *Quantitative Assessment of Tongue and Pulse Diagnosis for Integrative Chinese and Western Medicine Practice*, funded by **HKU**, via Seed Funding Programme for Applied Research, **HK\$100,000**
- Dec 2015
- Jan 2015 – PI – *Advanced Human-Robot Cooperative Control Interfaces for Tele-operated Anthropomorphic Manipulation Systems*, funded by **HKU**, via Seed Funding Programme for Basic Research, **HK\$120,000**
- Mar 2017
- Oct 2014 – PI – *Design and Control of Flexible Continuum Robot for Minimally Invasive Surgery*, funded by **Faculty of Engineering, HKU**, **HK\$350,000**
- Sep 2017

Journal/Conference Editorial Board Service

Associate Editors

1. **Annals of Biomedical Engineering** [2018 – present], IF: 3.474, JCR Rank: Q1 in [Engineering, Biomedical]
2. **Frontiers in Robotics and AI** [2017 – present]
3. **IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS)**, [2017– present],
4. **The 15th International Conference on Ubiquitous Robots (UR)** [2018]
5. **IEEE International Conference on Robotics and Automation (ICRA)** [2019 – present]
6. **Proc. IMechE Part I: Journal of Systems & Control Engineering (JSCE)** [2020 – present], IF: 1.101
7. **Information Processing for Computer Assisted Interventions (IPCAI)** [2019 – present]

Guest Editors

1. “Surgical Robots and Intelligent Control” for **Actuators** [2020], IF: 1.957, JCR Rank: Q2 in [Instruments & Instrumentation]
2. “Focused Section on Surgical Robotics” for **International Journal of Intelligent Robotics and Applications** [2019]

Reviewers for Journal papers

1. **Science Robotics** [2018 - present]; IF: 19.400, JCR Rank: Q1 in [Robotics];
2. **Soft Robotics (SoRo)** [2016 - present]; IF: 6.403, JCR Rank: Q1 in [Robotics];
3. **IEEE Transaction on Robotics (TRO)** [2016 - present]; IF: 6.483, JCR Rank: Q1 in [Robotics];
4. **IEEE Robotics and Automation Letters (RAL)** [2017 - present]; IF: N/A, JCR Rank: N/A;

5. **IEEE Transaction on Biomedical Engineering (TBME)** [2012 - present]; IF: 2012 - present, JCR Rank: Q1 in [Engineering, Biomedical];
6. **International Journal of Computer Assisted Radiology and Surgery (IJCARS)** [2011]; IF: 2.155; JCR Rank: Nil;
7. **IEEE/ASME Transactions on Mechatronics (TMech)** [2017 - present]; IF: 4.943, JCR Rank: Q1 in [Automation & Control Systems], [Engineering, Manufacturing], [Engineering, Electrical & Electronic], [Engineering, Mechanical], [Robotics & Automatic Control];
8. **Mechatronics** [2012]; IF: 2.978, JCR Rank: Nil;
9. **IEEE Journal of Biomedical and Health Informatics (JBHI)** [2013 - 2014]; IF: 4.217, JCR Rank: Q1 in [Medical Informatics], [Computer Science, Information Systems], [Computer Science, Interdisciplinary Applications], [Mathematical & Computational Biology];
10. **Annals of Biomedical Engineering (ABME)** [2014 - present]; IF: 3.474, JCR Rank: Q1 in [1. Engineering, Biomedical];
11. **IEEE Transaction on Control Systems Technology (TCST)**; IF: 4.883, JCR Rank: Q1 in [Automation & Control Systems], [Engineering, Electrical & Electronic], [Robotics & Automatic Control];
12. **Advanced Intelligent Systems** [2019 - present] IF: N/A, JCR Rank: N/A;
13. **IEEE Transactions on Haptics** [2019] IF: 2.757, JCR Rank: Q2 in [Computer Science, Cybernetics];
14. **The International Journal of Medical Robotics and Computer Assisted Surgery** [2015] IF: 1.634, JCR Rank: Q3 in [Surgery];
15. **Advanced Intelligent Systems** [2020 - present]

Reviewers for full conference papers

16. Medical Image Computing and Computer-Assisted Intervention (MICCAI) [2011-2013];
17. IEEE International Conference on Robotics and Automation (ICRA) [2013 - 2019];
18. IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS) [2012 - 2017];
19. IEEE Engineering in Medicine and Biology Conference (EMBC) [2013];
20. IEEE Systems, Man, and Cybernetics (SMC) [2012];
21. Hamlyn Symposium for Medical Robotics (HSMR) [2012, 2013, 2016].

Press and Media Conferences

14 Mar 2019 **Press conference at HKU**

Title/URL: [HKU and Tohoku University sign Agreement on Collaborations in Transformative AI and Robotics Technologies](#)

The application of robots to our daily lives is becoming more extensive, such as in medical applications where they can be used for the development of sophisticated surgical instruments, or in-home applications such as taking care of elderly people or in rehabilitation equipment, as well as other social, industrial and commercial uses.

The University of Hong Kong (HKU) will sign an agreement with Tohoku University, Japan (Tohokudai) to collaborate on general academic exchange, as well as research of transformative artificial intelligence (AI) and robotics technologies. The partnership will transform and upgrade AI and robotics technology with the outstanding research and academic achievements of the two universities. This collaboration is aimed at opening up new technologies for the transformation of the manufacturing industry and of mega cities.

- 23 Dec 2018 **Press Release** by HKU
Title/URL: [Harvard Medical School and HKU win First Prize Paper Award in the IEEE Transactions on Power Electronics \(TPEL\)](#)
 In collaboration with the Harvard Medical School (HMS), an HKU engineering team led by Dr Kwok Ka-wai of Mechanical Engineering, the Faculty of Engineering, was conferred the First Prize Paper Award for 2017 in the IEEE Transactions on Power Electronics (TPEL).
 The paper was co-authored by Assistant Professor Dr Kwok Ka-Wai and two research postgraduate students Mr Lun Tianle and Ms Guo Ziyan of the Department of Mechanical Engineering and their collaborators Dr Tang Sai Chun (first author) and Dr Nathan J. McDannold from Brigham and Women's Hospital, Harvard Medical School (HMS).
- 13 Jun 2018 **Press conference** at HKU
Title/URL: [World's First Intra-operative MRI-guided Robot for Bilateral Stereotactic Neurosurgery](#)
 Stereotactic neurosurgery is one of the treatments to a variety of movement and neuropsychiatric disorders, such as Parkinson's disease (PD), essential tremor and major depression. It involves a technique that can locate targets of surgical interest using an external positioning system, which is widely applied in brain biopsy, tumor ablation, drug delivery, as well as deep brain stimulation ("DBS"). Parkinson's disease alone is the second most common disease of the nervous system after Alzheimer's disease, and is projected to affect over 8.7 million people worldwide by 2030. As such, any improvement to this surgery would benefit a large population.
 A HKU Mechanical Engineering team led by Dr. Ka-Wai Kwok recently designed the first neurosurgical robotic system capable of performing bilateral stereotactic neurosurgery inside a magnetic resonance imaging ("MRI") scanner. The team also conducted pre-clinical validation of the system with CUHK neurosurgeons, Dr. Danny Chan Tat-ming and Professor Poon Wai-sang. This innovative technological breakthrough can facilitate the treatment of Parkinson's disease and other neuropsychiatric disorders.
- 24 May 2016 **Press conference** at Prince Wales Hospital (PWH), HK
Title/URL: [CUHK and HKU Researchers Introduce 3D Printing Technology in Complex Cardiac Surgery Procedures](#)
 A joint research team from The Chinese University of Hong Kong (CUHK) and the University of Hong Kong (HKU) is the first in Hong Kong to introduce three-dimensional (3D) printing technology to complex cardiac procedures for enhancing procedural efficacy and safety. Researchers from the Division of Cardiology of the Department of Medicine and Therapeutics, Faculty of Medicine, CUHK, and the Department of Mechanical Engineering, Faculty of Engineering, HKU, collaborated to use echocardiographic data, to create soft silicone-based models of complex cardiac structures using 3D printing. The models allow cardiologists to personalise planning for cardiovascular intervention for each patient. The practice was applied to a complex case of Left Atrial Appendage (LAA) occlusion last year and the patient is now in good condition. This case has been reported in the medical journal Circulation: Cardiovascular Interventions.

Media Coverage

Research Output has aroused attention to general public by extensive media exposure. 59 exposure on television broadcasts, newspapers, online and social media were achieved in 5 years' time.

Summary of contents are listed as below:

<u>Date</u>	<u>Media</u>	<u>Title (URL)</u>
20-Apr-20	Seeker	This Doctor Asked His Patient To Play Her Violin Through Brain Surgery
20-Apr-20	Seeker Youtube	This Doctor Asked His Patient To Play Her Violin Through Brain Surgery

29-Jan-20	Hong Kong Economic Journal	鑽研醫療機械獲獎 工程博士郭子彥：覺得醫院很親切
29-Jan-20	Hong Kong Economic Journal	回應醫生需要
5-Dec-19	HKU	Three HKU researchers elected Innovators Under 35 for the Asia Pacific Region by MIT Technology Review
20-Jul-19	鳳凰衛視	廣納人才助研究發展 提升大學排名
24-May-19	HKU	The Best Paper Award (Second Place) in the 2019 IEEE International Conference on Robotics and Automation (ICRA'19) workshop on Surgical Robots
15-Mar-19	Ming Pao	伙日大學設 AI 平台 港大研救災機械人
15-Mar-19	Sing Tao Daily	港大日本東北大合研 AI 機械人
15-Mar-19	Wen Wei Po	港大夥日本東北大設中心研 AI 機械人
15-Mar-19	Headline Daily	港大夥日東北大學研搜救及滅火機械人 港日合作發展鏡變機械人中心
15-Mar-19	Lion Rock Daily	港大聯日本東北大設 AI 機械人研究室
23-Dec-18	HKU	Harvard Medical School and HKU win First Prize Paper Award in the IEEE Transactions on Power Electronics (TPEL)
6-Nov-18	Sing Tao Daily	港大首創手術 MRI 導管機器人 降低復發風險
1-Aug-18	柏友新知	深腦刺激新技術 — 機器人+MRI 實時導航
13-Jun-18	TVB	港大中大研發全球首個腦科手術機器人 手術可省時約一半
13-Jun-18	TVB	港大中大研發腦外科手術機械人 稍後作臨床試驗
13-Jun-18	Apple Daily	腦手術突破！機械人助減手術時間
13-Jun-18	Apple Daily HK Youtube	腦手術突破！機械人助減手術時間
14-Jun-18	Apple Daily	機械人 潛行深腦 港大研發 免病人清醒開顱
13-Jun-18	on.cc	港大中大共研腦手術機械人 治柏金遜快而準
13-Jun-18	CRHK	港大研發首個可配合磁力共振做腦手術機械人
13-Jun-18	RTHK	港大開發神經外科機器人系統 促進柏金遜症等治療
13-Jun-18	Ming Pao	兩大研發「腦手術 GPS」機械人 助紓柏金遜
14-Jun-18	Sing Tao Daily	港大研發手術機械人 助深腦外科實時導航
13-Jun-18	South China Morning Post	Hong Kong engineers develop world's first robotics system capable of performing brain surgery inside an MRI scanner
14-Jun-18	The Standard	HKU team invents brain-surgery robot
14-Jun-18	Oriental Daily	腦手術機械人治柏金遜快而準
14-Jun-18	Sky Post	腦手術機械人系統 增精準度
14-Jun-18	Headline Daily	港大手術機械人提升精準度
14-Jun-18	am730	機械 MRI 手術實時定位 提升治理柏金遜病
14-Jun-18	Metro Daily	港大研腦手術機器人 GPS 提升手術精準
14-Jun-18	Wen Wei Po	機器人瞄準細胞 「落刀」更準確
14-Jun-18	Hong Kong Commercial Daily	神經外科機械人料 2 年後臨床
14-Jun-18	Hong Kong Economic Times	港大中大研發 腦神經手術機器人
14-Jun-18	Sing Pao Daily	兩大研機器人治腦神經病 料縮減手術時間到 4 至 6 小時
14-Jun-18	Hong Kong Economic Journal	港大機械人可施深腦手術
14-Jun-18	Lion Rock Daily	GPS 導航機器人 精準做深腦手術
14-Jun-18	ejnsight on the pulse	HKU team designs neurosurgical robot for brain procedures
5-Jul-18	Asian Scientist	A Robotic Brain Surgeon That Works Inside An MRI Machine
20-Jun-18	Medical XPress	World's first intra-operative MRI-guided robot for bilateral stereotactic neurosurgery

19-Jun-18	Science Daily	World's first intra-operative MRI-guided robot for bilateral stereotactic neurosurgery
18-Jun-18	Radiology Business	Chinese team develops MRI-compatible robot to facilitate neurosurgery
13-Jun-18	TOPick	港大研發首個腦科手術機器人 實時導航提升手術精準度
13-Jun-18	Xinhuanet	香港大學研發機器人系統提高腦科手術準確度
13-Jun-18	sina	香港大學研發機器人系統提高腦科手術準確度
24-May-16	Ming Pao	中大 3D 打印病人手術部位模型 放置儀器更準確 已完成 4 心臟手術
25-May-16	HK01	3D 打印助模擬心臟手術 中大港大聯手降併發風險
25-May-16	Oriental Daily	3D 打印心臟供術前試位
25-May-16	Ming Pao	3D 打印模型助心臟手術 中大港大合研 醫生練習增準確度
25-May-16	Sky Post	3D 打印模型 心臟手術更精準
25-May-16	Hong Kong Economic Journal	3D 打印助心臟手術更精準
25-May-16	Hong Kong Commercial Daily	3D 打印助心臟手術效佳
25-May-16	Wen Wei Po	中大港大 3D 打印 製模型助心臟手術
25-May-16	Ta Kung Pao	中大港大聯手降併發風險 3D 打印心臟助規劃手術
25-May-16	Care For Your Heart	3D 打印模型 心臟手術更精準
24-May-16	3ders	CUHK and HKU researchers use 3D printing for safer and more precise cardiac surgeries
4-Jan-16	HKU	Dr. Ka-Wai Kwok won the Early Career Award 2015/16 by RGC
16-Oct-15	Sing Tao Daily	港大學者獲傑出獎 研微型手術器械

Talks and Presentations

Active engagement in disseminations on research outcomes with almost 60 invited lectures, talks and presentations with various parties.

14 July 2020	Invited talk in the title of <i>Challenges in Robotics for MRI-guided Interventions</i> , for Wellcome/EPSRC Centre for Interventional and Surgical Sciences (WEISS), Virtual Mini-Symposium, University College London
30 May 2020	Invited talk in the title of <i>Fluid-driven MR-safe motors for MRI-guided Robotic Interventions</i> , for Multiscale Medical Robotics Center: CUHK-JHU Kick Off Symposium
20 May 2020	Invited Lecture in the title of <i>Robot and Intelligent System for Intra-operative MRI-guided Interventions</i> , for The Chinese University of Hong Kong, Shenzhen (conducted via Zoom)
11 Dec 2019	Invited talk in the title of <i>Robot-assisted Interventions under Intra-operative MRI-based Guidance</i> , for Surgical Robotics Symposium at 17 th International Conference on Biomedical Engineering, National University of Singapore (NUS) Engineering, Singapore
9 Nov 2019	Invited talk in the title of <i>MRI-based guidance for Robot-assisted Interventions</i> , for TRS Symposium 2019 - Image-guided Automatic Robotic Surgery, CUHK, Hong Kong
27 Oct 2019	Invited talk in the title of <i>MRI-based Guidance for Robot-assisted Interventions</i> , for the 9th International Robotic Surgery Symposium, Severance Hospital, Korea
1 Aug 2019	Invited Lecture in the title of <i>Interventional and Surgical Robotics</i> , for School of Mechanical Engineering of Zhejiang University, China

- 24 May 2019 **Invited talk** in the title of *Computational Mechanics of Soft Robots – from Design, Control to Sensing*, for 2019 IEEE International Conference on Robotics and Automation (ICRA) workshop on Soft Haptic Interaction: Modeling, Design and Application
- 11 May, 2019 **Plenary Lecture** in the title of *Intraoperative MRI guided surgery*, for International Minimally Invasive Surgery Conference 2019, Old Wing, Hong Kong Convention and Exhibition Centre
- 10 Dec, 2018 **Invited talk** in the title of *From Machine to Artificial Intelligence: Why it Matters in Healthcare Applications*, for Signate Life Sciences: Smart Robotics and Artificial Intelligence Workshop, Intercontinental Hotel, Hong Kong
- 18 Aug 2018 **Invited talk** in the title of *Intra-Operative MRI-Guided Robotics Systems*, for Engineering Medical Innovation Summit: Medicine for the Future 2018, Charles K. Kao Auditorium, Hong Kong Science Park
- 9 Aug 2018 **Invited talk** in the title of *High-performance Robotic System for MRI-Guided Interventions*, for Alibaba Technology Association (ATA) Workshop, Hangzhou, China
- 28 Jul 2018 **Invited talk** in the title of *An Engineer's Perspective of 3D Printing for Medical Application*, for Hong Kong 3D Printing Association, First Hong Kong International Interdisciplinary Clinical 3D Printing Forum 2018, Charles K. Kao Auditorium, Hong Kong Science Park
- 24 Jun 2018 **Invited talk** in the title of *Computational Mechanics of Soft Robots – from Design, Control to Sensing*, for Hamlyn Symposium on Medical Robotics 2018, Workshop of Soft and Continuum Robots Across Scale, London, UK.
- 16 Apr 2018 **Invited lecture** in ENGG5402 Advanced Robotics by Department of Mechanical and Automation Engineering, CUHK
- 20 Jan 2018 **Invited talk** in the title of *Beyond Human Intelligence: Lesson Learned from Healthcare AI*, for Eagle Eye Quantitative Trading Workshop and Forum, Shenzhen, China
- 24 Sep 2017 **Invited talk** in the title of *Soft is Hard? Control of Soft Robots*, in IROS 2017 Workshop on Soft Morphological Design for Haptic Sensation, Interaction and Display, Vancouver, Canada
- 10 Sep 2017 **Invited talk** in the title of *A concise review of 3D printing for clinicians*, CUHK 3D Echo Course: An Interactive Hands-on Workshop, Prince of Wales Hospital, Hong Kong
- 19 Jul 2017 **Invited talk** in the title of *High-performance Robot-Assisted Systems for Image-guided Interventions* for Centre for Frontier Medical Engineering, Chiba University, Japan
- 18 Mar 2017 **Invited talk** in the title of *MRI-guided Robotic Stereotaxy: An engineer's perspective*, International Minimally Invasive Surgery Conference (i-MISC), Hong Kong
- 1 Feb 2017 **Invited talk** in the title of *MRI-guided Robotic Interventions: Towards Application of Stereotactic Neurosurgery*, Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital
- 7 Dec 2016 **Invited talk** in the title of *MR-compatible Robotic Systems: Towards the Intra-operative MRI-Guided Interventions*, The 16th International Conference on Biomedical Engineering (ICBME'16), Singapore
- Dec 2016 **Invited talk** in the title of *High-performance Robot-assisted Systems for MRI-guided Interventions*, by Prof. H. Bleuler, The Laboratoire de Systèmes Robotiques at École polytechnique fédérale de Lausanne (EPFL), Switzerland
- 25 Oct 2016 **Lecture** for HKU Mechanical Engineering Freshman
- Jul 2016 **Invited talk** in the title of *3D Printing in Cardiology: Seeing is believing but touching is the truth*, for Medical Grand Round - organised by Department of Medicine and Therapeutics, Prince of Wales Hospital, The Chinese University of Hong Kong
- Jun 2016 **Invited talk** in the title of *High-performance MR-conditional Robotic System for*

MRI-guided Interventions, for School of Engineering & Materials Science at Queen Mary University of London, UK

- Jun 2016 **Invited talk** in the title of *High-performance MR-conditional Robotic System for MRI-guided Interventions*, Centre for Medical Image Computing at University College London, UK
- 3 Jun 2016 **Invited talk** in the title of *Smarter, Smaller and Safer Robot-assisted Systems for MRI-guided Interventions*, APAC Innovation Summit 2016
- 22 Apr 2016 **Invited talk** in the title of *High-performance Robot-assisted Systems for MRI-guided Interventions*, T Stone Robotics Institute - Robotics Symposium cum Naming ceremony, The Chinese University of Hong Kong
- Mar 2016 **Invited talk** in the title of *MRI-guided Robotic Systems for Minimally Invasive Surgeries*, School of Science and Engineering at The Chinese University of Hong Kong, Shenzhen
- 26 Feb 2016 **Invited talk** in the title of *Smarter, Smaller and Safer Robot-assisted Systems for MRI-guided Interventions*, CityU Robotics Workshop, City University of Hong Kong
- 20 Aug 2015 **Invited talk** in the title of *Interventional Image-guided and Robot-assisted Systems*, Bioengineering Symposium in the 21st Century, Hong Kong
- 24 Jun 2015 **Invited talk** in the title of *High-performance Computing System for Image-guided Robotic Intervention*, IEEE International Conference on Real-time Computing and Robotics (RCAR'15), Changsha, China
- Apr 2015 **Invited talk** in the title of *High-performance MR-guided and Robot-assisted Interventional System*, for Department of Informatics, King's College London, UK
- Feb 2015 **Invited talk** in the title of *Design and Control of a Soft Robotic Capsule Colonoscope*, for Board Meeting held by Bio-medical Engineering (HK) Ltd., Hong Kong
- 18 Jun 2013 **Talk for seminar** in Dept. of Orthopaedics and Traumatology, HKU
- 16-11 May 2013 **Poster Presentation** in IEEE International Conference on Robotics and Automation 2013 (ICRA'13), Karlsruhe, Germany
- 15 Mar 2013 **Talk for seminar** in Dept. of Mechanical Engineering, HKU
- 5 Sep 2012 **Poster Presentation** invited by Medical Engineering Solutions in Osteoarthritis Centre of Excellence, University of Oxford
- 7 Jun 2012 **Talk for Seminar** in Dept. of Mechanical and Biomedical Engineering, City University of Hong Kong
- 20-24 Sep 2010 **Poster Presentation** in Medical Image Computing and Computer-Assisted Intervention 2010 (MICCAI'10), Beijing, China
- 14-16 Sep 2010 **Invited talk** in UK Focus for Biomedical Engineering – Medical Robotics: Robotic Surgery and Robotic Rehabilitation, organized by **Royal Academy of Engineering**
- 11-15 Oct 2009 **Oral Presentation** in IEEE/RSJ International Conference on Intelligent Robotics and Systems 2009 (IROS'09), St Louis, US
- 20-24 Sep 2009 **Poster Presentation** in Medical Image Computing and Computer-Assisted Intervention 2009 (MICCAI'09), London, UK
- 6-10 Sep 2008 **Poster Presentation** in Medical Image Computing and Computer-Assisted Intervention 2008 (MICCAI'08), New York, US
- 6 May 2008 **Poster Presentation** in Inaugural Workshop for The Hamlyn Centre for Robotic Surgery, Imperial College. **Best Poster Award (1st prize)**
- 1 Dec 2006 **Poster Presentation** at the First Microsoft Joint Laboratory Symposium co-organized by Microsoft Research Asia (MSRA) and CUHK
- 8-10 Oct 2006 **Oral Presentation** (session co-chair) in IEEE Conference on Automation Science and Engineering 2006 (CASE'06), Shanghai, China

- 3-6 Jul 2006 **Oral Presentation** in Beijing-Hong Kong Doctoral Forum 2006 ---TIFDC Sub Forum A: Network and Media Computing (NMC'06), Beijing, China
- 27-29 Jun 2005 **Oral Presentation** in the 2005 International Conference on Control and Automation (ICCA'05), Budapest, Hungary

Service/Administration

Service to both international and local organizations and as well as local communities with expertise in robotics and engineering

International professional organizations

- Jul 2019 **Workshop Organizer** for 2019 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) – *Towards Soft Robotics for Biomimetics and Applications: Emerging Sensors, Actuators, and Methods*
- 2019 **Area Chair** for 2019 Information Processing for Computer Assisted Interventions (IPCAI)
- Dec 2018 **Workshop Organizer** for Signate Life Sciences for *Smart Robotics and Artificial Intelligence Workshop*
- Sep 2017 **Program Committee** in 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop – *Soft Morphological Design for Haptic Sensation, Interaction and Display*
- 9-10 Sep 2017 **Panel Member** for CUHK 3D Echo Course: An Interactive Hands-On Workshop
- Apr 2017 **Organizer** for HKU MedE Symposium on Advances in Biomedical Engineering and Robotics
- Jun 2015 **Organized Sessions Chair** in 2015 International Conference on Real-time Computing and Robotics (RCAR)
- Dec 2011 – **Postdoctoral Research Associate** in Robotic Intervention for Osteoarthritis – funded by Wellcome Trust and EPSRC
- May 2013
- Jun 2013 **Local Organiser** of 2013 Hamlyn Symposium workshop– *Innovations in human-robot interaction for Surgical Robotics*
- Apr 2010 – Surgical porcine trial for usability testing of our newly developed surgical robotic devices at **Northwick Park Hospital**, London (regularly twice a year)
- May 2013
- Jul 2007 **Program committee** of The Second Beijing – Hong Kong International Doctoral Forum 2007

Local professional organizations

- Jul 2017 – **External Examiner** of an enrichment module – ENG3414 Robotics Control System, Jun 2019 Vocational Training Council (VTC)
- Oct 2016 – **Scientific Assessment Committee** for licensing and acquisition of early stage preclinical Present assets, Aptorum Therapeutics Limited, a member of Aptorum Group (Nasdaq: APM)
- Feb 2018 – **Scientific Advisory Committee** for R&D of products and drug candidates, Signate Life Present Sciences Limited, a member of Aptorum Group (Nasdaq: APM)
- Apr 2018 – **Consultant** for R&D of surgical instrumentation, Shenzhen ROBO Medical Technology Dec 2019 Co., Ltd
- Feb 2015 – **Consultant** of Non-Invasive Surgical Innovations (NISI), Bio-Medical Engineering (HK) Feb 2017 Limited

Community Engagement Activities

- 20-29 Aug 2019 Organizing the *Summer Robotics Workshop* for eight primary school students to gain hands-on experience of robotics at their early age. Topics include hydraulic actuation, solar-powered vehicles and 3D printing.
- 10 Jul – 22 Aug 2019 Offering summer internships for *three* secondary school students to gain hands on project experience in Ka-Wai Kwok's laboratory.
- 4 May 2019 Providing mechanical engineering supports in the area of drone photography to a charity event – *Braintrekking*, organized by Otto Wong Brain Tumour Centre, CUHK.
- 2 May 2019 Organizing the *Hydraulic Robotic Arm Workshop* for *twelve* primary school students at C.C.C. Kei Tsun Primary School for knowledge exchange of mechanical engineering knowledge to underprivileged students.
- 3-11 Nov 2018 Exhibiting in *InnoCarnival 2018* organized by the Innovation and Technology Commission (ITC) to introduce the team's research on surgical robotics to the public.

Teaching Experience

Advisor of current IRIS members: **3** postdoctoral fellows, **10** PhD and **2** MPhil students, **4** research assistants

Advisor of taught programme students: **3** MSc students, **20** undergraduate project students at HKU

3 PhD and **5** MPhil Graduates under Ka-Wai's primary supervision:

<u>Graduation Date</u>	<u>Student Name</u>	<u>Thesis Title</u>	<u>Degree</u>
Aug 2020	Ziyang Dong	<i>High-performance Tele-operated Robot Systems for Intra-operative MRI-guided Interventions</i>	PhD
Dec 2019	Justin Di-lang Ho	<i>Learning-based Control and Sensing for Soft Robotic Systems</i>	MPhil
Dec 2019	Hing-choi Fu	<i>Design and Optimization for High Performance Soft Robotic Manipulation</i>	MPhil
Apr 2019	Kit-hang Lee	<i>Continuum Robotic Systems for Intra-operative MRI-Guided Interventions</i>	PhD
Oct 2018	Ziyan Guo	<i>Fluid-Driven Robotic Systems for Intraoperative MRI-Guided Interventions</i>	PhD
Oct 2018	Chun-kit Chow	<i>Design and Control of a Soft Robotic Manipulation System for Transoral Laser Microsurgery under Magnetic Resonance Imaging</i>	MPhil
Oct 2018	Tian-le Lun	<i>Real-Time Surface Shape Sensing for Monitoring Flexible Structures Using Fiber Bragg Grating</i>	MPhil
Sep 2018	Chun-wing Leong	<i>Performance-Aware Programming for Intraoperative Intensity-Based Image Registration on Graphics Processing Units</i>	MPhil

Lecturer for courses at HKU:

- 1) **Jan 2020 – Present:** MECH3433, Robotics, drones and autonomous ground vehicles
- 2) **Sep 2019 – Present:** BMED2206, Engineering in Biology and Medicine
- 3) **Sep 2017 – 2018:** ENGG1206, Introduction to biomedical engineering
- 4) **Jan 2017 – Present:** MECH4404, Automatic control

- 5) *Jan 2015 – Present:* CCST9050, Robot: Flesh, Machines, Intelligence
- 6) *Jan 2015 – Present:* MECH3418, Dynamics and control
- 7) *Sep 2014 – Present:* MECH2407, Multivariable calculus and partial differential equations
- 8) *Sep 2015 – Dec 2015:* MECH2413, Engineering mechanics

Course developer and lecturer:

- 1) *Robot: Flesh, Machines, Intelligence* (CCST9050) general education at HKU
- 2) *Robotics, Drones and Autonomous Ground Vehicles* (MECH3433) Mechanical Engineering UG course at HKU

Teaching Assistant for Master of Research (MRes) postgraduate course: *Medical Robotics and Image Guided Intervention*, held by Dept. of Surgery and Cancer, Imperial College London. (2011-13)

The duties include:

- Individual supervision on MRes project:
 - Project Topic: *Implicit Active Constraints for Robot Assisted Arthroscopy*
 - MRes student: **Edoardo Lopez** (2011-12)
 - [who achieved **The Best Student Award 2011-12** in recognition of the project outcome]
 - Project Topic: *Dynamic Active Constraints for Knee Arthroscopy*
 - MRes students: **Konrad Leibbrandt, Mihaela Carjeu** (2012-present)

Tutorial Assistant for ACAE Masters of Science postgraduates, CUHK:

- 1) Systems & Optimization (Jan–May 2006)

Tutorial Assistant for ACAE undergraduates, CUHK:

- 2) Fundamentals of Machine Intelligence (Jan–May 2005)
- 3) Introduction to Control Systems (Sep–Dec 2003, 2004, 2005) [**Excellent Tutor Award 2003-04**]
- 4) Engineering Mechanics (Jan–May, 2004) [**Excellent Tutor Award 2004-05**]

Instructor for robot competitions:

- 1) Solar Rechargeable Robot Contest of the 2006 Hong Kong Youths Skills Competition (*Merit prize*)
- 2) Micro Robot Maze Contest of the 2004 Hong Kong Youths Skills Competition (*Champion*)
- 3) Robocon 2004 Hong Kong Contest “*Lovers’ Reunion*” (*Second Runner-up Award*)