

CURRICULUM VITA

CHAO LIU

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LIRMM, UMR 5506, CNRS
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EDUCATION

Ph.D. Electrical & Electronic Engineering, Nanyang Technological University Singapore Jun 2006

Dissertation: “Adaptive Control of Robot Manipulators with Uncertain Kinematics and Actuator Dynamics”

Advisor: Prof. *Chien Chern Cheah*

Thesis Reviewers: Prof. *Jean-Jacques E. Slotine* (MIT, U.S.A.), Prof. *Suguru Arimoto* (U. Ritsumeikan, Japan)

B.E. Control Science and Engineering, Shandong University, China Jul 2000
Overall Ranking: 1st/65 (GPA=3.8/4)

RESEARCH INTERESTS

- Medical/Surgical robotics
- Teleoperation & Haptics
- Human-robot interaction
- Nonlinear control systems

PROFESSIONAL EXPERIENCES

- *CRCN Research Scientist (2018-present)*

French National Center for Scientific Research (CNRS)

Department of Robotics, LIRMM (CNRS-UM2), Montpellier, France

- *CR1 Research Scientist (2012-2018)*

French National Center for Scientific Research (CNRS)

Department of Robotics, LIRMM (CNRS-UM2), Montpellier, France

- *CR2 Research Scientist (2008-2012)*

French National Center for Scientific Research (CNRS)

Department of Robotics, LIRMM (CNRS-UM2), Montpellier, France

- *Post-Doctoral Researcher (2007-2008)*

University of Montpellier 2, Montpellier, France

- *Research Fellow (2005-2006)*

Intelligent Systems Center, Nanyang Technological University, Singapore

- *Research Assistant (2001-2005)*

School of E.E.E., Nanyang Technological University, Singapore

- *System Engineer (2000-2001)*

Perspective Technology Development Ltd., China

HONORS & AWARDS

- “Outstanding Reviewer” for Automatica, 2017

PROFESSIONAL INVOLVEMENTS

- **Project Evaluation Committee Expert:**
French National Research Agency (ANR)
Swiss National Science Foundation (SNSF)
Dutch Research Council (NWO)
- **Research Community Service:**
IEEE Technical Committee on *Surgical Robotics* (2011 ~)
IEEE Technical Committee on *Telerobotics* (2011 ~)
IEEE Technical Committee on *Haptics* (2011 ~)
IFAC Technical Committee on “Biological and Medical systems” (2012 ~)
Technical Editor, IEEE/ASME Transactions on Mechatronics, 2020~
Guest Editor, SI on “Future AI and Robotics: Visual- and Spatial-Based Perception Enhancement and Reasoning”, Electronics (MDPI), 2023
Guest Editor, SI on “Artificial Intelligence at the Forefront of Machine Vision and Image Processing”, Journal of Imaging Science and Technology, 2022
Guest Editor, SI on “Recent Advancements in Sensor Technologies for Healthcare and Biomedical Applications”, Sensors, 2022
Guest Editor, SI on “Robotic dexterous manipulation: from tele-operation to autonomous learning and adaptive control”, Complex & Intelligent Systems, 2022
Guest Editor, SI on “Advances in Artificial Intelligence for Perception Augmentation and Reasoning”, Applied Sciences, 2022
Guest Editor, SI on “Recent Advancements in Sensor Technologies for Healthcare and Biomedical Applications”, Sensors, 2022
Guest Editor, SI on “Perception Recovery and Augmentation in Medical Robotics”, Frontiers in Neurorobotics, 2021
Guest Editor, SI on “Unmanned Autonomous Systems in Complex Environments”, Complexity, 2021
Guest Editor, SI on “Continuum, Compliant, Cognitive, and Collaborative Surgical Robots”, Journal of Medical Robotics Research, 2017
Associate Editor, IEEE International Conference on Advanced Robotics & Mechatronics, 2021
Associate Editor, IEEE International Conference on Robotics and Automation, ICRA 2014
Co-organizer, Workshop on “Dexterous manipulation in the real-contact context: new progress and challenges”, at IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2021, Prague, Czech
Co-organizer, Special Session on “Safe and Intelligent Robots Interaction”, at IEEE International Conference on Advanced Robotics and Mechatronics, ICARM 2022, Guilin, China
Co-organizer, Workshop on “C4 Surgical Robots: Compliant, Continuum, Cognitive, and Collaborative”, at IEEE International Conference on Robotics and Automation, ICRA 2017, Singapore
Organizing Committee, Joint Workshop on New Technologies for Computer/Robot Assisted Surgery, CRAS 2017, 2018, 2019, 2020, 2021, 2022, 2023

International Program Committee, the International Conference on Robotics, Computer Vision and Intelligent Systems, ROBOVIS 2020

International Program Committee, the International Program Committee of the Conference on Signal, Control and Communication, SCC 2019

International Program Committee, the World Congress on Intelligent Control and Automation, WCICA 2010, 2012, 2014, 2018

International Program Committee, International Conference on Intelligent Manufacturing and Internet of Things, IMIOT 2018

Program Committee, 5th International Conference on Cloud and Robotics, ICCR 2018

International Program Committee, the International Conference on Modelling, Identification and Control, ICMIC 2015, 2016, 2017

Program Committee, IEEE International Conference on Information and Automation, ICIA 2013, 2014, 2015, 2016

Program Committee, the Canadian Conference on Electrical and Computer Engineering (CCECE), 2015

International Program Committee, the International Conference on Control, Automation, Robotics & Vision, ICARCV 2006, 2008, 2010, 2012, 2014

Program Committee, IEEE International Conference on Robotics and Biomimetics, ROBIO 2013, 2014

International Program Committee, the International Conference on Intelligent Robotics and Applications, ICIRA 2010

International Program Committee, the IEEE Conference on Robotics, Automation and Mechatronics, RAM 2006, 2008, 2010

Program Committee, IEEE International Conference on Automation and Logistics, ICAL 2008, 2009

Session Chair, "Robot Manipulators and Control", the 9th International Conference on Control, Automation, Robotics & Vision, ICARCV 2006

- **Professional & Honorary Societies:**

Senior Member, **IEEE**

Member, **Sigma Xi**

RESEARCH PROJECTS

1. **Exploring muscle state information from surface EMG signals to improve surgical training and skill assessment**

PI, Jan. 2019 – Nov. 2020 (*10.5K Euros*, Funded by LabEx NUMEV, France)

2. **TS2RT (Towards Safer and Smarter Robotic-assisted Telesurgery)**

PI, Jan. 2018 – Dec. 2020 (*15K Euros*, Funded by CNRS, France)

3. **ROBACUS (ROBot léger pour l'insertion d'Aiguille téléopérée avec Compensation de moUvements physiologiqueS)**

Participant, Mar. 2012 – Feb. 2015 (*586.2K Euros*, Funded by ANR, France)

4. **HaTUMoCo (Haptic Teleoperation with Uncertainty and Motion Compensation)**

PI, Feb. 2010 - Feb. 2012 (*30K Euros*, Funded by CNRS, France)

5. **ARAKNES (Array of Robots Augmenting the KiNematics of Endoluminal Surgery)**

Participant, May 2008 - April 2012 (*11.1M Euros*, Funded by Europe Union)

6. **USComp (Compensation temps réel du mouvement physiologique sous imagerie ultrasonore)**

Participant, Dec. 2008 – May 2012 (*1.54M Euros*, Funded by ANR, France)

7. **AccuRobAs (Accurate Robot Assistant)**

Participant, Oct 2006 – Oct 2009 (3.79M Euros, Funded by Europe Union)

STUDENT SUPERVISION

Research Engineer:

Chenji LI

November 2021 ~ present

“Multimodal Sensor Based Surgical Skill Analysis”

PhD These:

Fadi ALMASALMAH ALYOUSEF (30%)

November 2021 ~ present

Thesis title: “Sécurité des Gestes Chirurgicaux Télé-opérés à Retour d'Effort”

Short summary: The goal of the thesis is to come up with new control schemes to guarantee the safety in the bilateral surgical teleoperation, and particularly, to keep the stability while optimizing for transparency. The main investigation tool used is the model predictive control (MPC) technique in order to optimize for transparency under stability constraints and with the presence of uncertainties on the master and/or slave side.

Mohamed Nassim BOUSHAKI (70%)

October 2012 ~ October 2016

Thesis title: “Design Optimization and Control for Concentric Tube Robot in Assisted Single-Access Laparoscopic Surgery”

Short summary: Concentric Tube Robots (CTR) are becoming more and more popular in medical robotics community. In this thesis, the first contribution is a concept study of using CTR for resection of deep brain tumors located at the frontal lobe. Grid searching has been used as a new optimization method for the CTR tubes design. This method allows to avoid the crucial problem of weights preselection which is required in all scalarization methods existing in literature. The elastic stability is considered and evaluated with a new approach. The second contribution of this thesis is to deal with the kinematic uncertainties in motion control of CTR. The proposed control method designed at the actuator level shows that the control design of actuator input with task-space feedback and approximate Jacobian matrix provides robustness in handling inaccuracy in kinematic model and maintains good control performance at the same time.

Jing GUO (70%)

November 2012 ~ March 2016

Thesis title: “Enhanced Wave Variable Based Haptic Teleoperation for Robotic-Assisted Surgery with Time Delay”

Short summary: In this thesis, two main contributions have been made to facilitate the applications of the wave-variable based bilateral teleoperation system for robotic-assisted surgery with time delay. A new wave variable compensation (WVC) teleoperation structure is proposed by introducing two wave variable compensation terms into the original wave variable transformation (WVT) structure, and two energy reservoir-based regulators have been used to guarantee system stability. Scaled wave variable compensation (SWVC) structure is proposed to benefit robotic-assisted microsurgery. The passivity and transparency conditions are derived to achieve stable and accurate scaled tracking performances which are highly important for robotic-assisted microsurgeries.

Abdulrahman ALBAKRI (70%)

October 2011 ~ December 2015

Thesis title: “Haptic Teleoperation for Robotic-Assisted Surgery”

Short summary: This thesis aims to improve telesurgical systems's transparency for challenging applications where number of uncertainties are present (such as physiological motion disturbances and tissue modelling uncertainties). A comparative analytical study on the performance of 3-Channel control architectures group is first provided. An illustrative case study is presented to clarify the usability of the proposed guideline to select a suitable control architecture (CA) that meets a set of requirements. The effect of physiological disturbance presented in the operated tissue on achieved transparency is studied. A new transparent teleoperation CA is proposed that involves interaction control of the surgical robot by integrating Hunt-Crossly model to represent the viscoelastic properties of the operated soft tissues.

Guochong QIU (30%, co-supervised with Dr. Long TENG, Prof. Suet To of ISE, the Hong Kong Polytechnic University, Hong Kong)

Thesis title: "Design, Development and Intelligent Control of a Novel Bio-Inspired Crawling-Flying Robot" (August 2022 - present)

Short summary: This thesis aims to develop a novel crawling-flying robot, which is able to perform bio-inspired multi-modal motions such as crawling, flying, and their transitions, as well as possess bio-inspired multi-modal grasping abilities. First, the flying and crawling mechanisms are dynamically coupled, allowing the robot to perform agile flying ability which is expected to be much closer to that of animals. Second, the robot adopts different grasping strategies: smaller objects is grasped using a single mechanical claw, while larger objects are grasped using two or more claws in combination. Third, the coupled mechanisms not only result in agile flying, but also pose great challenge for flight control. In order to solve the problem, a novel reinforcement learning control architecture will be studied in this research.

Master These/Projects:

Makinthan THANGARAJAH, February 2022

“Design and Control of a Haptic Teleoperation Device”

Tianming HU, August 2020

“Intelligent Transfer of Human Skill to Surgical Robot using EMG Signal”

Ege GURSOY, Esther GERUNA, February 2020

“Build, Program and Control Haptic Devices”

Walid REMMAS, Tsiory MAMONJY, February 2018

“Latest Developments in Haptic Teleoperation”

Auguste COURTIN, Sep. 2017

“Augmented Perception in Transoral Robotic Surgery for Tongue Base Cancer”

Oubad ANAS, Baha Eddine MEDMOUNE, July 2017

“Modélisation géométrique, cinématique et dynamique d'un mécanisme de tensesgrity sous V-REP”

Antonio PAPPALARDO (November 2013 ~ May 2015)

Exchanging Master Student - Politecnico Milano, Italy

"Force Control for Robot-Assisted Minimally Invasive Surgery"

Yacine MOKHTARI, July 2011

"Simulation and experimental study of force control on soft tissue"

Hayet SFIHI, July 2011

"Performance studies of task-space and joint-space position control methods for robot manipulator"

Visiting Students:

Yuhang YE, April ~ June 2019 (Master student)

“Surface EMG Signal Processing and Analysis for Robotic Surgical Training”

Jing LUO, November ~ December 2018 (Ph.D. student)

“Research on Human-Robot Interaction Strategies for Surgical Robotic Systems”

TEACHING COURSES

- Linear control systems (2018 ~ present)
- Nonlinear control systems (2020 ~ present)
- Teleoperation (2021 ~ present)
- Biomedical system modeling and control (2012~2014)

INVITED TALKS

1. "Haptic Teleoperation and Concentric Tube Robot for Robot-Assisted Surgery", Tutorial on Mechatronics for medical robotics – How to succeed in medical mechatronic development, IEEE/ASME Int. Conf. Advanced Intelligent Mechatronics (AIM) 2014, Besançon, France
2. “Haptic Teleoperation and Concentric Tube Robot - Some New Control Developments for New Surgical Robot Applications”, invited mini-symposium talk at the 36th International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'14), Chicago, USA, 2014
3. “Research Activities on Surgical Robotics in LIRMM”, Invited speech at the HCST Symposium on Medical Robotics, 23 March, 2015, Tel-Aviv, Israel
4. “A Concentric Tube Robot Platform for Surgical Application: Design, Control and Experiments”, Journée GT1 & GT6 -Conception mécatronique pour les interventions minimales invasives, 29 June 2017, ISIR, Paris

PUBLICATIONS

Book Chapters:

1. J. Guo, *C. Liu*, and P. Poignet, "Effect of Non-passive Operator on Enhanced Wave-Based Teleoperator for Robotic-Assisted Surgery: First Case Study", in *New Trends in Medical and Service Robots - Human Centered Analysis, Control and Design*, P. Wenger, C. Chevallereau, D. Pisla, H. Bleuler, A. Rodić (Eds.), Springer, ISBN 978-3-319-30674-2, 2016.
2. L. Alonso Sanchez, M.Q. Le, K. Rabenoroso, *C. Liu*, N. Zemiti, P. Poignet, E. Dombre, A. Menciassi, P. Dario, "A Case Study of Safety in the Design of Surgical Robots: The ARAKNES Platform", in *Frontiers of Intelligent Autonomous Systems*, Sukhan Lee, Kwang-Joon Yoon, Jangmyung Lee (Eds.), Springer, ISBN 978-3-642-35485-4, 2013.

Journal Articles:

1. *C. Liu*, C. C. Cheah, “Task-space Adaptive Setpoint Control for Robots with Uncertain Kinematics and Actuator Model”, *IEEE Transactions on Automatic Control*, pp.1854-1860, Vol.50. No. 11, Nov. 2005.
2. C. C. Cheah, *C. Liu* and J. J. E. Slotine, “Experiments on Adaptive Control of Robots with Uncertain Kinematics and Dynamics”, *Experimental Robotics IX*, pp. 57-67, 2006.
3. C. C. Cheah, *C. Liu* and J. J. E. Slotine, “Adaptive Tracking Control for Robots with Unknown Kinematic and Dynamic Properties”, *International Journal of Robotics Research*, pp. 283-296, Vol. 25, No. 3, Mar. 2006
4. *C. Liu*, C. C. Cheah and J. J. E. Slotine, “Adaptive Jacobian Tracking Control of Rigid-Link Electrically Driven Robots based on Visual Task-Space Information”, *Automatica*, pp. 1491-1501, Vol. 42, Iss. 9, Sep. 2006

5. C. C. Cheah, C. Liu and J. J. E. Slotine, "Adaptive Jacobian Tracking Control of Robots with Uncertainties in Kinematic, Dynamic and Actuator Models", *IEEE Transactions on Automatic Control*, pp. 1024-1029, Vol. 51, No. 6, Jun. 2006
6. C. Liu, C. C. Cheah and J. J. E. Slotine, "Adaptive Task-Space Regulation of Rigid-Link Flexible-Joint Robots with Uncertain Kinematics", *Automatica*, Issue 44:7, Jul. 2008.
7. R. Richa, P. Poignet, C. Liu, "Three-dimensional Motion Tracking for Beating Heart Surgery Using a Thin-Plate Spline Deformable Model", *International Journal of Robotics Research*, pp. 218-230, Vol. 29, Feb. 2010.
8. C. C. Cheah, C. Liu and J. J. E. Slotine, "Adaptive Jacobian vision based control for robots with uncertain depth information", *Automatica*, pp. 1228-1233, Vol. 46, Issue 7, July 2010
9. X. Xiang, C. Liu, B. Jouvencel and L. Lapiere, "Synchronized Path Following Control of Multiple Homogenous Underactuated AUVs", *Journal of Systems Science and Complexity*, pp. 71-89, Vol. 25, No. 1, Feb. 2012
10. W. K. Wong, B. Yang, C. Liu and P. Poignet, "A Quasi-Spherical Triangle Based Approach for Efficient 3-D Soft-Tissue Motion Tracking", in the *IEEE/ASME Transactions on Mechatronics*, Vol. 18, pp. 1472 - 1484, Oct. 2013
11. B. Yang and C. Liu, "Robust 3D Motion Tracking for Vision-Based Control in Robotic Heart Surgery", *Asian Journal of Control*, Vol. 16, Issue 3, pp. 632-645, May 2014
12. B. Yang, W. K. Wong, C. Liu and P. Poignet, "3D Soft-Tissue Tracking Using Spatial-Color Joint Probability Distribution and Thin-Plate Spline Model", *Pattern Recognition (IF=2.632)*, Vol. 47, Issue 9, pp. 2962-2973, September 2014
13. P. Moreira, N. Zemiti, C. Liu and P. Poignet, "Viscoelastic model based force control for soft tissue interaction and its application in physiological motion compensation", *Computer Methods and Programs in Biomedicine (IF=1.555)*, available online Feb. 2014
14. M. Boushaki, M. T. Chikhaoui, K. Rabenorosa, C. Liu, N. Andreff and P. Poignet, "Conception, modélisation et commande des robots à tubes concentriques : vers des applications médicales", *Techniques de l'Ingénieur: Conception, modélisation et commande en robotique (in French)*, Vol. TIB398DUO, pp. 1-29, May 2016.
15. A. Pappalardo, A. Albakri, C. Liu, L. Bascetta, E. De Momi and P. Poignet, "Hunt-Crossley Model Based Force Control for Minimally Invasive Robotic Surgery", *Biomedical Signal Processing and Control*, Vol. 29, pp. 31-43, August 2016.
16. B. Yang, C. Liu, W. Zheng and S. Liu, "Motion prediction via online instantaneous frequency estimation for vision-based beating heart tracking", *Information Fusion (IF=4.353)*, Vol. 35, pp. 58-67, May 2017
17. B. Yang, C. Liu, K. Huang and W. Zheng, "A triangular radial cubic spline deformation model for efficient 3D beating heart tracking", *Signal, Image and Video Processing*, Vol. 11, Issue 7, pp. 1329-1336, October 2017
18. X. Xiang, C. Liu, H. Su and Q. Zhang, "On decentralized adaptive full-order sliding mode control of multiple UAVs", *ISA Transactions (IF=3.394)*, Vol. 71, Part 2, pp. 196-205, Nov. 2017
19. C. Liu, J. Guo and P. Poignet, "Nonlinear Model-Mediated Teleoperation for Surgical Applications under Time Variant Communication Delay", *IFAC-PapersOnline*, Vol. 51, Iss. 22, pp. 493-499, 2018
20. B. Yang, C. Liu, W. Zheng, S. Liu and K. Huang, "Reconstructing a 3D heart surface with stereo-endoscope by learning eigen-shapes", *Biomedical optics express*, Vol. 9(12), pp. 6222-6236, 13 Nov. 2018
21. J. Guo, C. Liu, P. Poignet. "A Scaled Bilateral Teleoperation System for Robotic-Assisted Surgery with Time Delay", *Journal of Intelligent and Robotic Systems*, Springer Verlag, Issue 1, Vol. 95, pp. 165-192, July 2019
22. C. Yang, J. Luo, C. Liu, M. Li and S. L. Dai, "Haptics-Electromyography Perception and

Learning Enhanced Intelligence for Teleoperated Robot”, IEEE Transactions on Automation Science and Engineering, vol. 16, no. 4, pp. 1512-1521, Oct. 2019

23. J. Luo, C. Yang, H. Su and C. Liu, "A Robot Learning Method with Physiological Interface for Teleoperation Systems", Applied Science (MDPI), 9(10), 2019

24. J. Luo, C. Liu, C. Yang, "Estimation of EMG-Based Force Using a Neural-Network-Based Approach", IEEE Access, Vol. 7, Issue 1, pp. 64856-64865, December 2019

25. J. Luo, C. Liu, N. Wang and C. Yang, "A wave variable approach with multiple channel architecture for teleoperated system", IEEE Access, (early access), 04 October 2019

26. J. Luo, C. Liu, Y. Feng and C. Yang, "A method of motion recognition based on electromyographic signals", Advanced Robotics, Vol. 34, pp. 976-984, 07 Apr 2020

27. J. Guo, Y. Liu, J. Wang, C. Zeng, J. Huang and C. Liu, "The Design of Compact Robotic-Assisted Needle Position System with MPC-Based Remote Control", Complexity, Vol. 2020, 16 Sep. 2020

28. J. Guo, Y. Liu, Q. Qiu, J. Huang, C. Liu, Z. Cao and Y. Chen, "A Novel Robotic Guidance System with Eye Gaze Tracking Control for Needle based Interventions", IEEE Transactions on Cognitive and Developmental Systems, vol. 13, no. 1, pp. 179-188, March 2021

29. W. Zhang, G. Yao, B. Yang, W. Zheng and C. Liu, "Motion Prediction of Beating Heart Using Spatio-Temporal LSTM", IEEE Signal Processing Letters, vol. 29, pp. 787-791, 2022

30. S. Xu, B. Yang, C. Xu, J. Tian, Y. Liu, L. Yin, S. Liu, W. Zheng and C. Liu, "Sparse angle CBCT reconstruction based on guided image filtering", Frontiers in Oncology, 2022 Apr 27, 12:832037

31. B. Yang, Y. Li, W. Zheng, Z. Yin, M. Liu, L. Yin and C. Liu, "Motion prediction for beating heart surgery with GRU", Biomedical Signal Processing and Control, Volume 83, 2023

32. H. Feng, B. Yang, J. Wang, M. Liu, L. Yin, W. Zheng, Z. Yin and C. Liu, "Identifying Malignant Breast Ultrasound Images Using ViT-Patch", Applied Science, 13, 3489, 2023.

33. J. Guo, H. T. Nguyen, C. Liu and C. C. Cheah, "Convolutional Neural Network-Based Robot Control for an Eye-in-hand Camera", IEEE Transactions on Systems, Man and Cybernetics: Systems, to appear, 2023

Conference Papers:

1. C. C. Cheah, C. Liu and J. J. E. Slotine, "Approximate Jacobian Adaptive Control for Robot Manipulators", *Proceeding of the International Conference on Robotics & Automation (ICRA 04)*, New Orleans, LA, pp.3075-3080, April 2004.

2. C. Liu, C. C. Cheah, "Task-space Adaptive Setpoint Control for Robots with Uncertain Kinematics and Actuator Model", *Proceeding of the American Control Conference (ACC 04)*, Boston, Massachusetts, pp. 5268-5273, June 30 - July 2 2004.

3. C. Liu, C. C. Cheah and H. C. Liaw, "Adaptive Regulation of Robots using Approximate Models", *Proceedings of the IEEE International Symposium on Intelligent Control (ISIC 04)*, Taipei, Taiwan, pp. 180-185, September 2004.

4. C. C. Cheah, C. Liu and H. C. Liaw, "Stability of Inverse Jacobian Control for Robot Manipulator", *Proceedings of the IEEE International Conference on Control Applications (CCA 04)*, Taipei, Taiwan, pp. 321-326, September 2004.

5. C. Liu, C. C. Cheah, "Adaptive Regulation of Rigid-Link Electrically Driven Robots with Uncertain Kinematics", *Proceeding of the IEEE International Conference on Robotics & Automation (ICRA 05)*, Barcelona, Spain, pp. 3273-3278, April 2005.

6. C. C. Cheah, C. Liu and J. J. E. Slotine, "Adaptive Jacobian Tracking Control of Robots based on Visual Task-space Information", *Proceeding of the IEEE International Conference on Robotics & Automation (ICRA 05)*, Barcelona, Spain, pp. 3509-3514, April 2005.

7. C. Liu, C. C. Cheah and J. J. E. Slotine, "Adaptive Task-Space Regulation of Rigid-Link Flexible-Joint Robots with Uncertain Kinematics", *IEEE International Conference on Robotics & Automation (ICRA 06)*, Orlando, Florida, USA, pp. 2565-2570, May 2006.
8. C. Liu, C. C. Cheah and J. J. E. Slotine, "Adaptive Jacobian PID Regulation for Robots with Uncertain Kinematics and Actuator Model", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 06)*, Beijing, China, pp. 3044-3049, October 2006.
9. C. C. Cheah, C. Liu and J. J. E. Slotine, "Adaptive Vision Based Tracking Control of Robots with Uncertainty in Depth Information", *IEEE International Conference on Robotics & Automation (ICRA 07)*, Roma, Italy, pp. 2817-2822, April 2007.
10. R. Richa, P. Poignet, C. Liu, "Deformable Motion Tracking of the Heart Surface", In Proceedings of *IEEE Conference on Intelligent Robots and Systems (IROS '08)*, pp. 3997-4003, Nice, France, 2008
11. R. Richa, P. Poignet, C. Liu, "Efficient 3D Tracking for Motion Compensation in Beating Heart Surgery", In Proceedings of *Medical Image Computing and Computer-Assisted Intervention (MICCAI '08)*, volume 5242-II, pages 684-691, New York, USA, 2008
12. P. Poignet, A. Chemori, N. Zemiti, C. Liu, "Some Control-Related Issues in Mini-Robotics for Endoluminal Surgery", In Proceedings of *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 09)*, Minnesota, USA, 2009
13. C. Liu and P. Poignet "SP-ID Regulation of Rigid-Link Electrically-Driven Robots with Uncertain Kinematics", In Proceedings of *IEEE International Conference on Robotics & Automation (ICRA 10)*, Alaska, USA, 2010
14. C. Liu, X. Xiang and P. Poignet, "Adaptive Tracking Control of Rigid-Link Flexible-Joint Robot Manipulator with Uncertainties", in Proceedings of *IFAC 18th World Congress (IFAC2011)*, pp. 10300-10306, Milan, Italy, 2011
15. Y. Kobayashi, P. Moreira, C. Liu, P. Poignet, N. Zemiti, M. G. Fujie, "Haptic Feedback Control in Medical Robots through Fractional Viscoelastic Tissue Model", in Proceedings of the *33rd International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'11)*, pp. 6704-6708, Boston, USA, 2011
16. C. Liu, P. Moreira, N. Zemiti, P. Poignet, "3D Force Control for Robotic-Assisted Beating Heart Surgery Based on Viscoelastic Tissue Model", in Proceedings of the *33rd International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'11)*, pp. 7054-7058, Boston, USA, 2011
17. L. A. Sanchez Secades, C. Liu, C. Stefanini, N. Zemiti, A. Menciassi, P. Poignet, P. Dario, "Real-Time Control and Evaluation of a Teleoperated Miniature Arm for Single Port Laparoscopy", in Proceedings of the *33rd International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'11)*, pp. 7049-7053, Boston, USA, 2011
18. P. Poignet, R. Richa, A. Bo, C. Liu, "Robust 3D tracking for robotic-assisted beating heart surgery", the *33rd International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'11)*, invited session
19. P. Moreira, C. Liu, N. Zemiti and P. Poignet, "Force Control for Robotic-Assisted Surgery Based on Viscoelastic Tissue Model", In Proceedings of the International Conference SKILLS 2011, Montpellier, France, Dec. 2011
20. Xianbo Xiang, Lionel Lapierre, Chao Liu, Bruno Jouvencel, "Path tracking: combined path following and trajectory tracking for autonomous underwater vehicles", In Proceedings of *IEEE Conference on Intelligent Robots and Systems (IROS'11)*, pp. 3558-3563, San Francisco, USA, 2011
21. P. Moreira, C. Liu, N. Zemiti and P. Poignet, "Soft Tissue Force Control Using Active Observers and Viscoelastic Interaction Model", In Proceedings of *IEEE International Conference on Robotics & Automation (ICRA'12)*, Saint Paul, MN, USA, 2012

22. L. A. S. Secades, M. LE, C. Liu, N. Zemiti and P. Poignet, "The Impact of Interaction Model on Stability and Transparency in Bilateral Teleoperation for Medical Applications ", In Proceedings of *IEEE International Conference on Robotics & Automation (ICRA'12)*, Saint Paul, MN, USA, 2012
23. C. Liu, P. Moreira and P. Poignet, "Viscoelastic Model Based Force Tracking Control for Robotic-Assisted Surgery", in Proceedings of *IEEE International Conference on Biomedical Robotics and Biomechanics (BioRob'12)*, pp. 1199-1204, Roma, Italy, 2012
24. L.A. Sanchez, M.Q. Le, K. Rabenoroso, C. Liu, N. Zemiti, P. Poignet, E. Dombre, A. Menciassi and P. Dario, "A Case Study of Safety in the Design of Surgical Robots : The ARAKNES platform", in Proceeding of *12th International Conference on Intelligent Autonomous Systems (IAS'12)*, Jeju, Korea, 2012
25. P. Moreira, C. Liu, N. Zemiti and P. Poignet, "Beating Heart Motion Compensation Using Active Observers and Disturbance Estimation", in Proceedings of *10th IFAC Symposium on Robot Control (SYROCO'12)*, Dubrovnik, Croatia, September 2012
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