WANWEN CHEN

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EDUCATION

The University of British Columbia (UBC) **Vancouver, BC**
Ph.D. candidate in Electrical and Computer Engineering (GPA: 94%) *Sep 2021 - present*
Advisor: Dr. Tim Salcudean
Proposed Thesis: Transcervical Ultrasound Guided Transoral Robotic Surgery

Carnegie Mellon University (CMU) **Pittsburgh, PA**
M.S. in Robotics (GPA: 4.12/4.33) *Aug 2019 - Aug 2021*
Advisor: Dr. John Galeotti
Thesis: Ultrasound-based Needle Tracking and Lateral Manipulation Planning for Common Needle Steering

Peking University (PKU) **Beijing, China**
B.S. in Theoretical and Applied Mechanics (GPA: 3.78/4.0) *Sep 2015 - Jul 2019*
Thesis: Sensor Fusion for Attitude Measurement Based on Quaternions and Kalman Filter

University of California, Los Angeles (UCLA) **Los Angeles, CA**
Cross-disciplinary Scholars (CSST) Summer Program (GPA:4.0/4.0) *Jul 2018 - Sep 2018*

RESEARCH EXPERIENCE

Robotics and Control Lab, The University of British Columbia **Vancouver, BC**
Graduate Research Assistant, Advisor: Dr. Tim Salcudean *Sep 2021 - present*

- Prototyping a novel ultrasound (US)-guided augmented reality systems for transoral robotic surgery.
- Researching self-supervised learning for US tissue tracking and landmark retrieval.
- Developing new machine learning methods for MRI-US registration in the neck region.
- Coordinating with clinicians for data collection and system evaluation at Vancouver General Hospital.

Biomedical Image Guidance Lab, Carnegie Mellon University **Pittsburgh, PA**
Graduate Research Assistant, Advisor: Dr. John Galeotti *Oct 2019 - Aug 2021*

- Researched ultrasound-based needle tracking for autonomous robotic needle insertion.
- Developed an US optical flow-based tissue motion detection algorithm, an on-line needle tracking algorithm fusing US-based needle detection and robot kinematics to detect the needle under various visibility.
- Built a novel weighted-RANSAC real-time bent needle tracking algorithm.
- Studied integrating optical flow to improve deep learning-based lung US diagnosis and segmentation.

The Robotics Research Group, Peking University **Beijing, China**
Advisor: Dr. Qining Wang *Sep 2017 - May 2019*

- Designed a joint angle measurement algorithm using inertial sensors, and analyzed the movement of the knee joint in four swimming strokes, and built machine learning models to classify swimming strokes using inertial sensor signals.
- Developed deep learning models to classify locomotion mode using signals from a strain gauge in a prosthesis and wrote on-board neural network training and classification algorithms in C/C++ for real-time locomotion mode recognition in robotic transtibial prostheses.

Biomechatronics Lab, University of California, Los Angeles **Los Angeles, CA**
Advisor: Dr. Veronica J. Santos *Jul 2018 - Sep 2018*

- Researched human hand motion primitives during search and retrieval of a buried object in the sand and used machine learning models to discover human hand motion patterns and to classify motion intentions.
- Calibrated an inertial measurement units network with 18 sensors and created an animation framework for displaying hand movement in Python.

WORK EXPERIENCE

Intuitive Surgical Inc. **Sunnyvale, CA**
Algorithms Engineering Intern *May 2023 - Aug 2023*

- Developed the workflow of new robotic tools and imaging techniques for lung biopsy and other procedures.
- Implemented C++ and Python software for sensor calibration and sensor fusion and performed system integration for proof-of-concept demonstration and error analysis.
- Supported labs in robotic tool testing.

PEER-REVIEWED PUBLICATIONS

"" represents that the authors contributed to the manuscript equally.*

W3 **Chen W**, Schmidt A, Prisman E, and Salcudean SE. PIPsUS: Self-Supervised Dense Point Tracking in Ultrasound. In *5th International Workshop of Advances in Simplifying Medical UltraSound (ASMUS)*. 2024.

J4 Moore R, Yeung R, **Chen W**, Zeng Q, Prisman E, and Salcudean SE. Enabling Extracorporeal Ultrasound Imaging with the da Vinci Robot for Transoral Robotic Surgery - A Feasibility Study. *International Journal of Computer Assisted Radiology and Surgery*. 2024 May 24:1-8.

J3 **Chen W**, Kalia M, Zeng Q, Pang EHT, Bagherinasab R, Milner TD, Sabiq F, Prisman E, and Salcudean SE. Towrads Transcervical Ultrasound Image Guidance for Transoral Robotic Surgery. *International Journal of Computer Assisted Radiology and Surgery*. 2023 Apr 27:1-8.

C5 **Chen W**, Zeng Q, Milner TD, Bagherinasab R, Sabiq F, Prisman E, Pang EHT, and Salcudean SE. Feasibility of MRI-US Registration in Oropharynx for Transoral Robotic Surgery. In *Medical Imaging 2023: Image-Guided Procedures, Robotic Interventions, and Modeling* 2023 Apr 3 (pp. 516-522). SPIE.

C4 Bazargani R, **Chen W**, Sadeghian S, Asadi M, Boscheman J, Darbandsari A, Bashashati A, and Saulcudean SE. A novel H&E Color Augmentation for Unsupervised Domain Invariance Histopathology Prostate Cancer Classification. In *Medical Imaging 2023: Digital and Computational Pathology* 2023 Apr 6 (pp. 224-229). SPIE.

W2 Gare GR*, **Chen W***, Hung AL, Chen E, Tran HV, Fox T, Lowery P, Zamora K, DeBoisblanc BP, Rodriguez RL, Galeotti JM. The Role of Pleura and Adipose in Lung Ultrasound AI. In *MICCAI Workshop on Lessons Learned from the Development and Application of Medical-Imaging-Based AI Technologies for Combatting COVID-19 (LL-COVID19 2021)* 2021 Oct 1 (pp. 141-149). Springer, Cham.

W1 Hung AL, Sun Z, **Chen W**, Galeotti J. Hierarchical Probabilistic Ultrasound Image Inpainting via Variational Inference. In *MICCAI Workshop on Deep Generative Models (DGM4MICCAI 2021)* 2021 Oct 1 (pp. 83-92). Springer, Cham.

C3 **Chen W**, Mehta KN, Bhanushali BD, Galeotti J. Ultrasound-based tracking of partially in-plane, curved needles. In *2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)* 2021 Apr 13 (pp. 939-943). IEEE.

C2 Hung AL, **Chen W**, Galeotti J. Ultrasound confidence maps of intensity and structure based on directed acyclic graphs and artifact models. In *2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)* 2021 Apr 13 (pp. 697-701). IEEE.

J2 Wang Q, Zhou Z, Zhang Z, Lou Y, Zhou Y, Zhang S, **Chen W**, Mao C, Wang Z, Lou W, Mai J. An underwater lower-extremity soft exoskeleton for breaststroke assistance. *IEEE Transactions on Medical Robotics and Bionics*. 2020 May 8;2(3):447-62.

J1 Feng Y*, **Chen W***, Wang Q. A strain gauge based locomotion mode recognition method using convolutional neural network. *Advanced Robotics*. 2019 Mar 4;33(5):254-63.

C1 Mai J, **Chen W**, Zhang S, Xu D, Wang Q. Performance analysis of hardware acceleration for locomotion mode recognition in robotic prosthetic control. In *2018 IEEE International Conference on Cyborg and Bionic Systems (CBS)* 2018 Oct 25 (pp. 607-611). IEEE.

PRESENTATIONS

Towards Transcervical Ultrasound Image Guidance for Transoral Robotic Surgery
The 14th International Conference on Information Processing in Computer-Assisted Interventions (IPCAI), Munich, Germany *Jun 2023*

Ultrasound-based Needle Tracking and Lateral Manipulation Planning for Needle Steering
Master of Robotics Thesis Talk, Carnegie Mellon University, Pittsburgh, PA (Virtual) *Aug 2021*

Human Hand Motion Primitives in Haptic Search and Retrieval of Buried Objects in Sandbox
UCLA CSST Research Program, Los Angeles, CA *Sep 2018*
Presented in Mechanical and Aerospace Engineering Peer Seminar (awarded for Outstanding Research and Presentation) and a poster presentation.

ADDITIONAL TRAINING

Hamlyn Winter School on Surgical Imaging and Vision (Scholarship Recipient) **London, UK**
Imperial College London *Dec 2022*
One week of lectures on surgical imaging and a competition of project.

Medical Augmented Reality Summer School **Zürich, Switzerland (Virtual)**
University of Balgrist *Aug 2021*
Two weeks of lectures on medical AR/VR with a competition of projects in AR-assisted surgery.

TEACHING EXPERIENCE

- Teaching Assistant for undergraduate capstone — UBC, 2023W, 2024W
- Teaching Assistant for CPEN 441: Human Computer Interfaces in Engineering Design — UBC, 2022W1
- Tutor for Mathematics in Engineering (College of Engineering) — PKU, Spring 2019
- Tutor for Introduction to Computation (College of Engineering) — PKU, Fall 2018

AWARDS

- Chakrabarti Family Memorial Scholarship in Electrical Engineering — UBC, 2024
- Scholarship for Hamlyn Winter School on Surgical Imaging and Vision — The Hamlyn Centre, 2022
- Faculty of Applied Science Graduate Award — UBC, 2022
- President's Academic Excellence Initiative PhD Award — UBC, 2021-2025
- International Tuition Award — UBC, 2021-2025
- **2021 Four Year Doctoral Fellowship** — UBC, 2021-2025
- **Excellent Graduate (top 17%)** — PKU, 2019
- Outstanding Project in Undergraduate Student Research in College of Engineering — PKU, 2019
- Outstanding Research and Presentation at the Mechanical and Aerospace Engineering Peer Seminar — CSST, UCLA, 2018
- Meritorious Winner in Interdisciplinary Contest In Modeling — COMAP, 2018
- Gong Qiaoyu Scholarship — PKU, 2017, 2018
- Yang Fuqing and Wang Yangyuan Academician Scholarship — PKU, 2016

SKILLS

Programming	Python, Matlab, C++, C, OpenCV, PyTorch, ROS, dVRK, VTK
Systems	Windows, Linux
Tools	Git, LaTeX, Docker, 3D Slicer, ITK-SNAP, Autodesk Fusion 360, SolidWorks
Languages	Mandarin, English, Cantonese
Certifications	Standard First Aid, CPR C and AED (Canadian Red Cross); TCPS 2: CORE

ACADEMIC SERVICES

- Conference reviewer: ISMR 2023, AE-CAI 2023 & 2024, MICCAI 2024, DEMI 2024
- Journal reviewer: Physics in Medicine and Biology, IEEE Journal of Biomedical and Health Informatics
- Organization committee: DCA in MI workshop at CVPR 2024
- Conference volunteer: MICCAI 2023

LEADERSHIP AND OUTREACH

ECE Graduate Student Association, The University of British Columbia
VP Academic *May 2023 - Apr 2024*

- Proposed and executed events targeted toward the professional growth of ECE graduate students. Organized one field trip, one alumni networking event, three research and career skill development workshops, and co-organized the first UBC ECE research day.

Multidisciplinary Research Program in Medicine, The University of British Columbia
Undergraduate Mentorship *May 2022 - Aug 2022*

- Advised two undergraduate students on a summer project supervised by a cross-faculty pair of researchers. Mentored and supported students in fulfilling their proposed research project.

Women in Engineering, The University of British Columbia
High School Mentorship *Sep 2021 - Mar 2022*

- Provided inclusive and equitable access to information about engineering and supported a high school student as they navigate the university application process, and offered professional, academic, and interpersonal guidance for post-secondary transition.

The Robotics Institute, Carnegie Mellon University
Master Students Mentor *Sep 2020 - Dec 2020*

- Provided advice on academic development for three first-year master students.

Cantonese Development Society, Peking University
Vice President & Publicity Department *Sep 2017- May 2018*

- Managed the finance of the association.
- Organized Cantonese learning courses including student management and courses materials distribution.
- Designed publicity materials such as posters, tickets and souvenirs for multiple events.