WANWEN CHEN

aliciachenw.github.io wanwenc@student.ubc.ca aliciachenw

RESEARCH INTERESTS

Image Guidance for Robotic Surgery, Medical Imaging and Analysis

EDUCATION

The University of British Columbia (UBC) **Vancouver, BC**
Ph.D. student in Electrical and Computer Engineering (GPA: 94%) *Sep 2021 - present*
Advisor: Dr. Tim Salcudean

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*

- Researching image guidance for robotic transoral surgery using fused MRI with ultrasound. The research includes 3D ultrasound-MRI registration and augmented reality for the da Vinci surgical robot system.
- Coordinating with clinicans for data collection and intraoperative study 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. I developed an optical flow-based tissue motion segmentation algorithm to track hardly visible needles and an on-line needle tracking algorithm fusing ultrasound-based needle detection and robot kinematics to detect the needle under various visibility. I also built a novel weighted-RANSAC real-time bent needle tracking algorithm.
- Studied using optical flow to improve deep learning-based lung disease diagnosis and segmentation in lung ultrasound.

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 for swimming movement analysis. I 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. I also 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. I 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.

PUBLICATIONS

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

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. *Accepted by SPIE Medical Imaging 2023.*

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. *Accepted by SPIE Medical Imaging 2023.*

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

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

Human Hand Motion Primitives During 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

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

TEACHING EXPERIENCE

- 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 AND FUNDING

- President's Academic Excellence Initiative PhD Award UBC, 2021, 2022
- International Tuition Award UBC, 2021, 2022
- **2021 Four Year Doctoral Fellowship** UBC, 2021
- **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++
Packages	OpenCV, PyTorch, ROS, dVRK, SimpleITK
Tools	Git, LaTeX, Docker, 3D Slicer, ITK-SNAP, Autodesk Fusion 360
Languages	Mandarin, English, Cantonese

MENTORSHIP

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.

SERVICES

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.