WANWEN CHEN

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EDUCATION

University of British Columbia, Department of Electrical and Computer Engineering **Vancouver, BC**
Ph.D. student in Electrical and Computer Engineering *Start in Sep 2021*
- Advisor: Dr. Tim Salcudean

Carnegie Mellon University, The Robotics Institute **Pittsburgh, PA**
M.S. in Robotics *Aug 2021*
- GPA: 4.12/4.33
- Advisor: Dr. John Galeotti
- Thesis: Ultrasound-based Needle Tracking and Lateral Manipulation Planning for Common Needle Steering
- Relevant courses: Mechanics of Manipulation, Computer Vision, Medical Image Analysis, SLAM, Deep Learning

Peking University, College of Engineering **Beijing, China**
B.S. in Theoretical and Applied Mechanics *Jul 2019*
- GPA: 3.78/4.0 (Award for Excellent Graduate)
- Thesis: Sensor Fusion for Attitude Measurement Based on Quaternions and Kalman Filter (Advisor: Dr. Qining Wang)
- Cross-disciplinary Scholars in Science and Technology (CSST) Research Program, University of California, Los Angeles, Jul - Sep, 2018
- Relevant courses: Data Structure and Algorithm, Circuits and Electronics, Principles of Automatic Control, Medical Imaging, Machine Learning, Finite Element Method, Information Theory, Applied Stochastic Processes

RESEARCH EXPERIENCE

Biomedical Image Guidance Lab, Carnegie Mellon University **Pittsburgh, PA**
Research Assistant, Advisor: Dr. John Galeotti *Oct 2019 to Aug 2021*
- Researched ultrasound-based needddle tracking for autonomous robotic needle insertion.
- Developed a novel optical flow-based tissue motion segmentation algorithm for needle localization to track hardly visible needle.
- Designed an on-line needle tracking algorithm fusing ultrasound-based needle detection algorithms and robot kinematics to track the needle robustly under various visibility.
- Built a novel weighted-RANSAC real-time bent needle C++/Python binding tracking algorithm.
- Researched using classical image pre-processing to guide AI learning better in lung disease diagnosis using lung ultrasound.
- Researched using optical flow and the confidence of optical flow to improve deep learning-based lung ultrasound segmentation.

The Robotics Research Group, Peking University **Beijing, China**
Advisor: Dr. Qining Wang *Sep 2017 to May 2019*
- Researched inertial sensors-based human motion measurement and human locomotion recognition algorithms for prosthesis and wearable robots.
- Designed a joint angle measurement algorithm for swimming strokes measurement based on inertial sensors in Matlab and C which achieved a matched performance with an optical motion capture system.
- Analyzed the patterns of knee joint angle in four swimming strokes and built machine learning models to classify swimming strokes with inertial sensor signals.
- Designed a deep learning model to classify locomotion mode using signals from a strain gauge in prosthesis.
- Developed a C program for on-board neural network training and classification system 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 to Sep 2018*
- Researched discovering human hand motion primitives during search and retrieval of a buried object in sand.
- Calibrated an inertial measurement units network with 18 sensors and created an animation framework for displaying hand movement in Python.
- Used machine learning methods to discover motion primitive patterns and to classify motion intentions.

PUBLICATIONS

"*" means equal contribution.

Hung, A.L.Y., Sun, Z., **Chen, W.** and Galeotti, J. Hierarchical Probabilistic Ultrasound Image Inpainting via Variational Inference. (Accepted by *MICCAI 2021 workshop on Deep Generative Models for Medical Image Computing and Computer Assisted Intervention (DGM4MICCAI)*).

Gare, G.R.*, **Chen, W.***, Hung, A.L.Y., Chen, E., Tran, H.V., Fox, T., Lowery, P., Zamora, K., deBoisblanc, B.P., Rodriguez, R.L. and Galeotti, J. The Role of Pleura and Adipose in Lung Ultrasound AI. (Accepted by *MICCAI 2021 workshop on Lessons Learned from the development and application of medical imaging-based AI technologies for combating COVID-19*).

Chen, W., Mehta, K.N., Bhanushali, B.D. and Galeotti, J., 2021, April. Ultrasound-Based Tracking Of Partially In-Plane, Curved Needles. In *2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)* (pp. 939-943). IEEE.

Hung, A.L.Y., **Chen, W.** and Galeotti, J., 2021, April. 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)* (pp. 697-701). IEEE.

Wang, Q., Zhou, Z., Zhang, Z., Lou, Y., Zhou, Y., Zhang, S., **Chen, W.**, Mao, C., Wang, Z., Lou, W. and Mai, J., 2020. An Underwater Lower-Extremity Soft Exoskeleton for Breaststroke Assistance. *IEEE Transactions on Medical Robotics and Bionics*, 2(3), pp.447-462.

Feng, Y.*, **Chen, W.*** and Wang, Q., 2019. A strain gauge based locomotion mode recognition method using convolutional neural network. *Advanced Robotics*, 33(5), pp.254-263.

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

PRESENTATIONS

Ultrasound-based Tracking of Partially In-plane, Bending Needle **Nice, France (Virtual)**
International Symposium on Biomedical Imaging 2021 *April 2021*
- Presented in the poster session.

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

TEACHING EXPERIENCE

College of Engineering, Peking University **Beijing, China**
Tutor for Mathematics in Engineering *Feb 2019 to Jun 2019*
- Provided classes and support to sophomores for concepts clarification and exam reviews.

College of Engineering, Peking University **Beijing, China**
Tutor for Introduction to Computation *Sep 2018 to Jan 2019*
- Provided classes and supports to freshmen for concepts clarification, programming skills training and exam reviews.
- Advised freshmen on their academic development.

AWARDS

- International Tuition Award, University of British Columbia, Sep 2021.
- 2021 Four Year Doctoral Fellowship, University of British Columbia, Sep 2021.
- Excellent Graduate, Peking University, Jun 2019.
- Outstanding Project in Undergraduate Student Research, College of Engineering, Peking University, Jun 2019.
- Outstanding Research and Presentation at the Mechanical and Aerospace Engineering Peer Seminar, CSST Program, UCLA, Sep 2018.
- Meritorious Winner in Interdisciplinary Contest In Modeling, COMAP, Apr 2018.
- Gong Qiaoyu Scholarship, 2017, 2018.
- Yang Fuqing and Wang Yangyuan Academician Scholarship, 2016.

SKILLS

Programming and Tools: Python, Matlab, OpenCV, PyTorch, ROS, C, C++, Tensorflow
Languages: Mandarin, English, Cantonese

EXTRACURRICULAR ACTIVITIES

The Robotics Institute, Carnegie Mellon University **Pittsburgh, PA**
Master Students Mentor *Sep 2020 to Dec 2020*
- Provided advice on academic development for three first-year master students.

Cantonese Development Society, Peking University **Beijing, China**
Vice President & Publicity Department *Sep 2017 to 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.