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

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

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 needdle 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.

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 competition of AR project in AR-assisted surgery.

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

- President's Academic Excellence Initiative PhD Award, University of British Columbia, Sep 2021.
- 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.