

Shuwei Xing

Header

Laboratory for Virtual Augmentation and Simulation for Surgery and Therapy (VASST), and
Translational Ultrasound Technologies (TRUST) Laboratory,
Robarts Research Institute, Western University, ON, Canada
Email: xshuwei@uwo.ca
Website: <https://xingorno.netlify.app/>

Education

Ph.D. Robarts Research Institute, Western University

London, ON, Canada

Program: Biomedical Engineering

Jan. 2020 - Mar. 2025

- Joint-supervisors: Prof. Terry M. Peters, Prof. Aaron Fenster
- Research: Image-guided interventions, 3D US, Deep Learning, Image registration
- Thesis: “Development, Validation, and Integration of a US-guided Interventional System for Liver Cancer” [\[link\]](#)

M.Sc. Tsinghua University

Beijing, China

Program: Biomedical Engineering

Sept. 2016 - Jul. 2019

- Supervisor: Prof. Guangzhi Wang
- Research: Augmented Reality (AR), Robot Teleoperation
- Thesis: “System Development of Augmented Reality for Mobile C-arms”

B.Eng. Northeast Electric Power University

Jilin, China

Program: Electrical Engineering and Automation

Sept. 2012 - Jul. 2016

- Thesis: “Software Design of Three-phase Energy Meter”
- GPA: 91.6/100

Research Experience

Graduate Researcher, Robarts Research Institute

London, ON, Canada

VASST Lab and TRUST Lab

Jan. 2020 - present

- Development of a 3D ultrasound guidance system for liver tumour ablation
- AI algorithm development on multimodal image registration, image segmentation, and procedural evaluation

Internship, HISKY Medical Technologies

Beijing, China

Research & Development

Aug. 2019 - Dec. 2019

- Ultrasound image denoising
- Integration of algorithms into commercial US products

Graduate Researcher, Tsinghua University

Beijing, China

Image Processing and Computer Assisted Interventions Lab

Sept. 2016 - Jul. 2019

- AR system for orthopedic guidance
- Robotic spine system (collaboration with Sinovation Inc., Beijing, China)
- Development of a telerobotic system with haptic feedback

- Software design for measuring three-phase energy
- Multi-objective optimization for designing a creative foldable table

Journals

In total: 13 (7 first author)

Under Review

“Sensorless 3D Ultrasound Reconstruction via Embedded Patterns: A Low-Cost Framework”

Libin Liang, Ling Dai, **Shuwei Xing**, Jihua Zhu, Aaron Fenster

IEEE Transactions on Medical Imaging (In submission)

“Towards Seamless Integration of Magnetic Tracking into Fluoroscopy-guided Interventions”

Shuwei Xing, Mateen Mirzaei, et al., Aaron Fenster, Terry M Peters, Elvis Chen

IEEE Transactions on Biomedical Engineering. (Under minor revision) [preprint]

“Needle Tracking for Free-hand Ultrasound-guided Percutaneous Liver Tumor Ablations”

Ningtao Liu, **Shuwei Xing**, Derek W. Cool, Jing Yuan, Shuiping Gou, Aaron Fenster

Medical Image Analysis. (Under review) [preprint]

Publications

“A Novel Framework for Integrating 3D Ultrasound into Percutaneous Liver Tumour Ablation.”

Shuwei Xing, Derek W. Cool, David Tessier, Elvis C.S. Chen, Terry M. Peters, Aaron Fenster

MICCAI Conference (accepted)

[\[paper, code\]](#)

“GRU-TV: Time- and Velocity-aware Gated Recurrent Unit for Patient Representation”

Ningtao Liu, et al., Claire K.S. Park, **Shuwei Xing**, Jing Yuan, Aaron Fenster, Shuiping Gou

Journal of Biomedical Informatics, 104855, (2025)

(IF: 4.0, JCR-Q1) [\[paper, code\]](#)

“Virtual Fluoroscopy for Interventional Guidance using Magnetic Tracking”

Shuwei Xing, Inaara Ahmed-Fazal, et al., Aaron Fenster, Terry M Peters, Elvis C.S. Chen

International Journal of Computer Assisted Radiology and Surgery, pp.1-9. (2025) + IPCAI

(IF: 2.3, JCR-Q2) [\[paper\]](#)

“Deep Regression 2D-3D Ultrasound Registration for Liver Motion Correction for Focal Tumor Thermal Ablation”

Shuwei Xing, Derek W. Cool, Elvis C.S. Chen, Terry M. Peters, Aaron Fenster

Healthcare Technology Letters, 12(1), p.e12117 + MICCAI-AECAI workshop. (2024)

(IF: 2.8, JCR-Q3) [\[paper, code\]](#)

“Deep Learning-based Ultrasound Auto-segmentation of The Prostate with Brachytherapy Implanted Needles”

Prakash Hampole, et al., **Shuwei Xing**, Aaron Fenster, Douglas A. Hoover

Medical Physics, 51(4), pp.2665-2677. (2023)

(IF: 3.2, JCR-Q1) [\[paper\]](#)

“3D US-CT/MRI Registration for Percutaneous Focal Liver Tumor Ablations”

Shuwei Xing, Joeana Cambranis Romero, et al., Elvis C.S. Chen, Terry M. Peters, Aaron Fenster

International Journal of Computer Assisted Radiology and Surgery, 18(7), pp.1159-1166. (2023) + IPCAI

(IF:2.3, JCR-Q2) [\[paper, code\]](#)

“X-ray Image Decomposition for Improved Magnetic Navigation”

Wenyao Xia, **Shuwei Xing**, Uditha Jarayathne, Utsav Pardasani, Terry Peters, Elvis Chen

International Journal of Computer Assisted Radiology and Surgery, 18(7), pp.1225-1233. (2023) + IPCAI

(IF: 2.3, JCR-Q2) [paper]

“3D US-based Evaluation and Optimization of Tumor Coverage for US-guided Percutaneous Liver Thermal Ablation”

Shuwei Xing, Joeana Cambranis Romero, Derek W. Cool, et al., Terry M. Peters, Aaron Fenster

IEEE Transactions on Medical Imaging, 41(11), pp.3344-3356. (2022)

(IF: 10.6, JCR-Q1) [paper, code, CTV media]

“Spatially Tracked Whole-breast Three-dimensional Ultrasound System Toward Point-of-care Breast Cancer Screening in High-risk Women with Dense Breasts”

Claire Keun Sun Park, **Shuwei Xing**, Samuel Papernick, et al., Aaron Fenster

Medical Physics, 49(6), pp.3944-3962. (2022)

(IF: 3.8, JCR-Q1) [paper]

“A Projection-augmented System for In Situ Projection for Mobile C-arms”

Shuwei Xing, Hui Ding, Guangzhi Wang

Beijing Biomedical Engineering, 38(6):551-559. (2019) [paper]

Conference Proceedings

In total: 5

“3D U-Net with Region of Interest Segmentation of Kidneys and Masses in Computed Tomography Scans”

Connor Mitchell, **Shuwei Xing**, Derek W. Cool, David Tessier, and Aaron Fenster

In Medical Imaging 2024: Image-Guided Procedures, Robotic Interventions, and Modeling (Vol. 12928, p. 129282E). (2024) [paper]

“3d U-Net with ROI Segmentation of Kidneys and Masses in CT Scans”

Connor Mitchell, **Shuwei Xing**, and Aaron Fenster

MICCAI Challenge: In International Challenge on Kidney and Kidney Tumor Segmentation (pp. 93-96). Cham: Springer Nature Switzerland. (2023) [paper]

“Introducing a Robotic 3D Ultrasound System for Improved Seroma Visualization and Implant Guidance in Partial Breast Brachytherapy”

Claire Zhang, **Shuwei Xing**, Lori Gardi, Aaron Fenster, Juanita Crook, Deidre Batchelar, Michelle Hilts

Brachytherapy, 22(5), p.S22. (2023) [paper]

“Intra-procedural Evaluation of Tumor Coverage using 3D US Images for Percutaneous Focal Liver Thermal Ablation”

Shuwei Xing, Joeana Cambranis Romero, et al., Elvis CS Chen, Terry M Peters, Aaron Fenster

In Medical Imaging 2022: Image-Guided Procedures, Robotic Interventions, and Modeling (Vol. 12034, pp. 144-151). (2022) [paper]

“A 2D/3D US/CT-guided System for Percutaneous Focal Liver Thermal Ablation”

Shuwei Xing, Derek W Cool, et al., Elvis CS Chen, Terry M Peters, Aaron Fenster

In Medical Imaging 2022: Image-Guided Procedures, Robotic Interventions, and Modeling (Vol. 12034, pp. 237-245). (2022) [paper, code]

Patents

“Methods to Enable 3D Surgical Navigation for Fluoroscopy-Guided Surgical Interventions”

Elvis Chen, **Shuwei Xing**, Wenyao Xia, Terry M. Peters

Protected by WORLDDiscoveries (Western University), (2024)

Book chapters

“3D Ultrasound Algorithms and Applications for Liver Tumor Ablation”

Derek Gillies and **Shuwei Xing**

In 3D Ultrasound (pp. 51-74). CRC Press. (Book chapter)(2023) [chapter]

“Intelligent Human-Machine Interface in Orthopedic Navigation”

Guangzhi Wang, Liang Li, **Shuwei Xing**, Hui Ding

Intelligent Orthopaedics: Artificial Intelligence and Smart Image-guided Technology for Orthopaedics, pp.207-224. (2018) [chapter]

Talks

In total: 17

“Virtual Fluoroscopy for Interventional Guidance using Magnetic Tracking”

International Conference on Information Processing in Computer-Assisted Interventions (IPCAI) (Platform)

Berlin, Germany

Jun. 17, 2025

“Development of a US-guided Interventional System for Liver Cancer ”

Invited by Prof. Yiming Xiao, Concordia University

Montreal, Canada

Feb. 10, 2025

“Deep Regression 2D-3D US Registration for Liver Motion Correction for Local Tumor Ablations”

MICCAI-AECAI workshop (Platform)

Marrakesh, Morocco

Oct. 6, 2024

“Ultrasound-CT/MRI Registration for Ultrasound-guided Focal Liver Tumor Thermal Ablations”

Image-Guided Therapeutics Symposium (Best poster award)

Montreal, Canada

Jun. 3, 2024

“Towards Seamless Integration of Magnetic Tracking into Fluoroscopy-Guided Interventions”

Image-Guided Therapeutics Symposium (Poster)

Montreal, Canada

Jun. 3, 2024

“Real-time Ultrasound-CT/MRI Registration for Ultrasound-guided Focal Liver Tumor Ablations”

Ontario Institute for Cancer Research: Translational Research Conference (Poster)

Toronto, Canada

Mar. 26, 2024

“Learning-empowered Real-time Needle Identification for Ultrasound-guided Percutaneous Liver Tumour Ablations”

Canadian Organization of Medical Physicists (Poster)

Quebec, Canada

Sept. 21, 2023

“An Electromagnetic Tracking-based Procedural Workflow for Fluoroscopy-guided Interventions”

Image-Guided Therapeutics Symposium (Poster)

Toronto, Canada

Jun. 12, 2023

“3D US-CT/MRI Registration for Percutaneous Focal Liver Tumor Ablations”

International Conference on Information Processing in Computer-Assisted Interventions (IPCAI) (Platform)

Munich, Germany

Jun. 20, 2023

“Learning-assisted 3D US-CT/MRI Registration for Liver Tumour Ablation”

Imaging Network Ontario (Platform)

London, Canada

Mar. 23, 2023

“Tumour Coverage Evaluation for Percutaneous Liver Tumour Ablations: 2D US vs 3D US”

Canadian Organization of Medical Physicists (Platform)

Quebec, Canada

Jun. 22, 2022

“A 3D US liver ablation system for ultrasonically invisible tumors: a proof of concept study”

London Imaging Discovery Day (Platform)

London, Canada

Jun. 9, 2022

“A 2D/3D US/CT-guided percutaneous liver ablation system for ultrasonically invisible tumors”

Robarts Research Retreat (Poster)

London, Canada

Jun. 16, 2022

“Intra-procedural Evaluation of Tumor Coverage Using 3D US Images for Percutaneous Focal Liver Thermal Ablation” <i>SPIE Medical Imaging (Platform)</i>	<i>San Diego, United States</i> <i>Feb. 22, 2022</i>
“A 2D/3D CT/US-guided System for Percutaneous Focal Liver Thermal Ablation” <i>SPIE Medical Imaging (Platform)</i>	<i>San Diego, United States</i> <i>Feb. 23, 2022</i>
“A 2D/3D US/CT-guided Liver System for Percutaneous Thermal Ablations: A Proof of Concept Study” <i>Image-Guided Therapeutics & Diagnostics Symposium (Virtual platform)</i>	<i>Vancouver, Canada</i> <i>Nov. 1, 2021</i>
“In Situ Overlay of X-ray Images for Mobile C-arms” <i>Asian Conference on Computer Aided Surgery (Platform)</i>	<i>Shanghai, China</i> <i>Nov. 2018</i>

Honors & Awards

Overall estimation: \$53, 400

invention to Innovation Skills Training Program (supported by NSERC) (CAD: \$3,000)	2025-2026
NSERC MediCREATE Training Award (CAD: \$11,500)	2023-2024
Best Poster Award: Image-guided Therapeutics Symposium (CAD: \$300)	2024
PhD grant: NSERC CREATE Training Program in Medical Informatics (CAD: \$5,000)	2023
NSERC MediCREATE Training Award (CAD: \$11,500)	2022-2023
National Award for Outstanding International Students (USD: \$6,000)	2022
NSERC MediCREATE Training Award (CAD: \$11,500)	2021-2022
National Endeavor Scholarship (RMB: ¥4000)	2015
University Students Mathematical Modelling Competition (1st place)	2015
Outstanding Student First-class Scholarship (Top 8%)	2015
National Endeavor Scholarship (RMB: ¥4000)	2014
Outstanding Student First-class Scholarship (Top 8%)	2014
ZhongDian Electric Scholarship (RMB: ¥2000)	2014
The Excellent Student (Top 8%)	2013
The Excellent Student Pacesetter (Top 2%)	2013
Outstanding Student First-class Scholarship (Top 8%)	2013
National University Students Electrical Engineering Mathematical Modelling Competition (3rd place)	2013

Teaching Experience

Teaching Assistant, ECE4438B Advanced Image Processing and Analysis, Western University Course Coordinator: Yimin Yang, PhD	<i>London, ON, Canada</i> <i>2023</i>
Teaching Assistant, ECE4445A Introduction of Digital Image Processing, Western University Course Coordinator: Hanif Ladak, PhD	<i>London, ON, Canada</i> <i>2022, 2023</i>
Teaching Assistant, ES1050 Foundations of Engineering Practice, Western University Course Coordinator: John Dickinson, PhD	<i>London, ON, Canada</i> <i>2021, 2022, 2023</i>
Mentorship, Beijing High School Students' Innovative Projects Tsinghua University	<i>Beijing, China</i> <i>2017, 2018, 2019</i>
Teaching Assistant, Medical Image Processing, Tsinghua University Course Coordinator: Guangzhi Wang, PhD	<i>Beijing, China</i> <i>2017, 2018</i>

Mentorship experience

In total: 2 Master Students, 8 Undergraduate Students

Master Students

- I. Ahmed-Fazal, Electrical and Computer Engineering, Western University 2024
Project: Robotic 3D Ultrasound Guidance System for Kidney Ablation
- M. Mirzaei, Department of Medical Biophysics, Western University 2024
Project: Assessment of Magnetic Tracking: Tracking Accuracy and Image Quality
Achievement: Incoming MD Student at University of Toronto; 1 SPIE proceeding

Undergraduate Students

- R. Driediger, Applied Science, University of Waterloo 2024
Project: Segmentation of Kidney and Kidney Ablation in CT
- N. Yu, Biomedical Engineering, University of Waterloo 2024
Project: Calibration of Robotic Arm
- L. Singer, Biomedical Engineering, University of Waterloo 2024
Project: Calibration of Robotic Arm
- H. Zhou, Medical Science, Western University 2024
Project: Annotation of Kidney and Kidney Ablation Zone in CT images
- C. Mitchell, Mathematics and Statistics, University of Toronto 2023
Project: 3d U-Net with ROI Segmentation of Kidneys and Masses in CT Scans
Publications (first author): 1 SPIE proceeding, 1 MICCAI KiTS Challenge paper
- I. Ahmed-Fazal, Biomedical Engineering, University of Waterloo 2023
Project: Yolo-based Landmark Tracking and Matching in Fluoroscopic Images
Publication: 1 IJCARS; 1 IPCAI conference paper
- O. Qi, Medical Science, Western University 2023, 2024
Project: Dataset Annotation for 2D-to-3D Ultrasound Registration
- M. Choi, Medical Science, Western University 2022
Project: nnUNet-based Carotid Segmentation in 3D Ultrasound
Publication: 1 SPIE proceeding (withdrawn)

Academic service

Reviewer Service

- IEEE TMI: IEEE Transactions on Medical Imaging
- MICCAI: International Conference on Medical Image Computing and Computer Assisted Interventions
- AIIM: Artificial Intelligence in Medicine
- IPCAI: International Conference on Information Processing in Computer-Assisted Interventions
- PMB: Physics in Medicine and Biology
- Medical Physics
- IJCARS: International Journal of Computer Assisted Radiology and Surgery
- IEEE ISBI: IEEE International Symposium on Biomedical Imaging
- CVPR workshop: Conference on Computer Vision and Pattern Recognition

JMI: Journal of Medical Imaging

The Photogrammetric Record

Academic Outreach

MICCAI Social Media Organizer

2022

Canadian Medical Hall of Fame, London

2020-present

Student Membership

IEEE student member

2020-present

MICCAI student member

2020-present

COMP student member

2020-present

SPIE student member

2020-present

IET student member

2024-present

Skills

Development 3D Slicer, VTK, ITK, QT and OpenCV

Modelling Solidworks, Adobe Suites (PhotoShop, Premiere, Illustrator)

Programming C/C++, Python (Pytorch and Tensorflow), Matlab

Languages Mandarin, English

References

Professor Terry M. Peters, PhD, FCCPM, FAAPM, FCOMP, FMICCAI, FIEEE, FCAHS, FRSC

Robarts Research Institute, Western University

Email: tpeters2@uwo.ca

Professor Aaron Fenster, PhD, FIEEE, FRSC, O.ONT, FIOP, FCAHS, FCCPM, FCOMP, FSPIE, FAAPM, FIOMP, FAIUM

Robarts Research Institute, Western University

Email: afenster@robarts.ca

Professor Guangzhi Wang, PhD

School of Biomedical Engineering, Tsinghua University

Email: wgz-dea@tsinghua.edu.cn

Professor Elvis C.S. Chen, PhD

Electrical and Computer Engineering, Western University

Email: chene@robarts.ca

Professor Derek W. Cool, MD, PhD, FRCPC

Department of Medical Imaging, Schulich School of Medicine and Dentistry, Western University

Email: derek.cool@lhsc.on.ca