Yuliang Xiao

Third-Year Ph.D. Student in Department of Medical Biophysics
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Education

University of Toronto / Sunnybrook Research Institute — *Toronto, Canada*
Ph.D. Candidate in Medical Biophysics — *Sep. 2023 - Now*
- Thesis topic: 3D Selective Excitation of Arbitrary Reduced FOV for High Resolution and Fast Reconstruction
- Supervisors: **Prof. Mark Chiew** and **Prof. Simon J. Graham**
- CGPA: 3.74/4.00

Johns Hopkins University / Laboratory for Computational Sensing and Robotics — *Baltimore, U.S.A*
M.Sc. in Robotics — *Sep. 2021 - May. 2023*
- Thesis topic: Automatic Segmentation and Registration for Image-guided Surgery
- Supervisors: **Prof. Manish Sahu** and **Prof. Russell H. Taylor**
- CGPA: 3.97/4.00

University of Pittsburgh — *Pittsburgh, U.S.A*
B.Sc. in Computer Science / B.S.E. in Mechanical Engineering — *Sep. 2018 - Aug. 2021*
- Thesis topic: Neural Network-based Approximation of Model Predictive Control Applied to a Flexible Shaft Servomechanism
- Supervisors: **Prof. Nikhil Bajaj**
- CGPA: 3.92/4.00

Sichuan University — *Chengdu, China*
B.E. in Mechanical Engineering — *Sep. 2016 - Aug. 2021*
- CGPA: 3.61/4.00

Conferences (* means equal contribution)

Stage-Aligned Knowledge Distillation for Fast and Memory-Efficient 4D Flow MRI Reconstruction — *MICCAI CMRx4DFlow Workshop 2026*
Yuliang Xiao, Kian Anvari Hamedani, Zach Vavasour, Simon J. Graham, Mark Chiew — *Paper*

Phase-Coupled State-Space Reconstruction for Ultra-Accelerated 4D Flow MRI — *MICCAI CMRx4DFlow Workshop 2026*
Kian Anvari Hamedani, Fatemeh Ebrahiminia, **Yuliang Xiao**, Zach Vavasour, Mark Chiew — *Paper*

Joint Optimization of Parallel Transmit RF Pulses and Gradient Waveforms for 2D Spatially Selective Excitation (PowerPitch Oral) — *ISMRM 2026*
Yuliang Xiao, Jason Rock, Tim Zhe Wu, Jamie Near, Mark Chiew, Simon J. Graham — *Paper*

Multi-shot 2D Selective Excitation for Extracranial Lipid Suppression in MR Spectroscopic Imaging of the Brain — *ISMRM 2026*
Jason Rock, **Yuliang Xiao**, Emile Kadalie, Christabel Faylinn, Tim Zhe Wu, Mark Chiew, Simon J. Graham, Jamie Near — *Paper*

Self-Supervised Parallel Transmit RF Pulse Design for 2D Spatially Selective Excitation (Pitch-and-Poster Presentation) — *IGTxImNO 2025*
Yuliang Xiao, Jason Rock, Jamie Near, Mark Chiew, Simon J. Graham — *Paper*

Statistical Shape Model of the Eustachian Tube for Understanding and Managing Eustachian Tube Dysfunction — *COSM 2023*
Ameen Amanian*, **Yuliang Xiao***, Zhiwei Gong, Manish Sahu, Brain Westerberg, Francis Creighton — *Paper*

Automated Sinonasal Computed Tomography Segmentation for Application in Rhinology: A Deep Learning Framework (Oral) — *COSM 2023*

Yuliang Xiao*, Ameen Amanian*, Aseem Jain, Manish Sahu, Francis Creighton, Andrew Thamboo, Masaru Ishii

Automated Segmentation of the Eustachian Tube for Applications in the Management of Eustachian Tube Dysfunction - A Deep Learning Framework (Oral) — *CMIMI 2022*

Ameen Amanian*, Yuliang Xiao*, Zhiwei Gong, Deepa Galaiya, Russell Taylor, Mathias Unberath, Manish Sahu, Francis Creighton

Paper

Journals (* means equal contribution)

A Vision-Based Cross-Platform Framework for Force Estimation in Robot-Assisted Minimally Invasive Surgery with Instrument Constraints — *IEEE TIM 2026*

Xinan Sun, Yuliang Xiao, Guowei Wang, Tao Liang, Shuxin Wang, Yuan Xing — *Under Review*

***Semi-HeRe*: Semi-Supervised Learning for Whole Heart Mesh Reconstruction** — *MIA 2026*

Yuliang Xiao*, Xinan Sun*, Jialun Pei, Shi Qiu, Shuxin Wang, Pheng-Ann Heng — *Under Review*

Simulations Supporting a Deep Neural Network for Markerless, Sub-millimeter Head Pose Estimation for Motion Correction in Brain MRI — *Medical Physics 2026*

Marina Silic, Yuliang Xiao, Simon J. Graham — *Revised and Submitted*

***SelExNet*: A Self-Supervised Physics-Informed Framework for Multi-Channel Joint RF and Gradient Waveform Optimization in 2D Spatially Selective Excitation** — *MRM 2026*

Yuliang Xiao, Jason Rock, Zhe Wu, Jamie Near, Mark Chiew, Simon J. Graham — *Project*

Self-Supervised Cyclic Diffeomorphic Mapping for Soft Tissue Deformation Recovery in Robotic Surgery Scenes — *IEEE TMI 2024*

Shizhan Gong, Yonghao Long, Kai Chen, Jiaqi Liu, Yuliang Xiao, Alexis Cheng, Zerui Wang, Qi Dou — *Project*

A Label-Efficient Framework for Automated Sinonasal CT Segmentation in Image-Guided Surgery — *Otolaryngology-HNS 2024*

Manish Sahu*, Yuliang Xiao*, Jose L. Porras, Ameen Amanian, Aseem Jain, Andrew Thamboo, Russell H. Taylor, Francis X. Creighton, Masaru Ishii — *Project*

Deep Learning Framework for Analysis of the Eustachian Tube and the Internal Carotid Artery — *Otolaryngology-HNS 2024*

Ameen Amanian, Aseem Jain, Yuliang Xiao, Chanha Kim, Andy S. Ding, Manish Sahu, Russell Taylor, Mathias Unberath, Bryan K. Ward, Deepa Galaiya, Masaru Ishii, Francis X. Creighton — *Project*

Professional Experience

Contrastive Multimodal Learning for Robust Cardiac MRI Reconstruction — *Toronto, Canada*

University of Toronto / Sunnybrook Research Institute — *Apr. 2026 - Aug. 2026*

- Designed a multimodal CMR reconstruction framework that integrates undersampled k-space, sampling masks, coil sensitivity maps, anatomical semantics, and acquisition-related information for joint reconstruction of magnitude images and velocity fields.
- Developed a shared-encoder, dual-branch architecture to disentangle anatomy-aware and acquisition-aware representations, enabling structured modeling of anatomical content and acquisition variability.
- Incorporated CLIP-style contrastive alignment between anatomical text labels and imaging embeddings, together with acquisition-pair supervision, to improve robustness and generalization across centers and organs.

Joint Optimization of pTx RF and Gradient Pulses for 2D Spatially Selective Excitation — *Toronto, Canada*

University of Toronto / Sunnybrook Research Institute — *Oct. 2024 - Dec. 2025*

- Design a **unified self-supervised framework** for 2D RF pulse optimization using physical information.
- Extend the framework for parallel transmit pulse design.
- Involve the improvement of the pulse design for B1 and B0 inhomogeneity.

Semi-Supervised 3D Cardiac Mesh Reconstruction

Hong Kong, China

University of Toronto / Tianjin University / The Chinese University of Hong Kong *Mar. 2023 - Now*

- Design semi-supervised U-Net backbone for feature extraction.
- Design the **GCN** to generate heart mesh.
- Combine the output mesh with surgical applications.

Vision-Based Force Estimation in Robot-Assisted Minimally Invasive Surgery

Toronto, Canada

University of Toronto / Tianjin University *Aug. 2024 - Apr. 2025*

- Design and finetune the **SAM** network to obtain the tool tip masks.
- Design the mapping of feature points to real-time 3D point cloud.
- Develop the collision detection algorithm based on the 3D point cloud.

Self-Supervised Cyclic Diffeomorphic Mapping for Soft Tissue Deformation Recovery

Hong Kong, China

Med-AIR Lab, The Chinese University of Hong Kong *Jan. 2023 - Apr. 2024*

- Implement the baseline experiments.
- Design the new traditional algorithms for 3D point cloud registration.

Automated Segmentation of Advanced Oropharyngeal Squamous Cell Carcinom

Baltimore, U.S.A

LCSR Lab, Johns Hopkins University *Oct. 2022 - Dec. 2022*

- Develop the supervised deep learning framework **(nnU-Net)** to make automated segmentation for oropharyngeal squamous cell carcinoma.
- Build a completed pipeline to evaluate the performance of model from the clinical views.

Video-based Assessment of Intra-operative Surgical Skills in Cataract Surgery

Baltimore, U.S.A

LCSR Lab, Johns Hopkins University *Sep. 2022 - Dec. 2022*

- Give segmentation on instruments in the video for **self-/semi-supervision** methods.
- Provide skill assessments based on surgical videos.
- Feedback catalog & Usability studies

Statistical Shape Modeling for Eustachian Tube Dysfunction Diagnosis

Baltimore, U.S.A

LCSR Lab, Johns Hopkins University *May. 2022 - Sep. 2022*

- Build a pipeline to make **PCA** on the Eustachian Tube.
- Generate mean shape and give a variation analysis among a large population based on principal components.

Automated Segmentation and Registration for the Eustachian Tube and Nasal Cavity

Baltimore, U.S.A

LCSR Lab, Johns Hopkins University *Jan. 2022 - Apr. 2024*

- Develop the **supervised**, **semi-** and **weakly-supervised** deep learning algorithms to make automated segmentation and registration on nasal cavity and eustachian tube.
- Build a completed pipeline to evaluate the performance of model from the clinical views.

2021-2022 AccelNet Surgical Robotics Challenge

Baltimore, U.S.A

ARCADE Lab, Johns Hopkins University *Oct. 2021 - Apr. 2022*

- Develop a deep learning algorithm to identify the pose (position and orientation) of the metallic suture needle with respect to the current endoscope pose.
- Move the large needle driver to grasp the needle and then move the needle tip to the target and drive the needle through the tissue until the tip exits.
- Drive the needle through the phantom from the first entry point to the corresponding exit point.

Honors & Awards

International

2023-Now	**PhD Fellowship**, Temerty Faculty of Medicine, University of Toronto	*Toronto, Canada*
2021	**Honor Student**, School of Information and Computing, University of Pittsburgh	*Pittsburgh, U.S.A*
2020	**Undergraduate Summer Research Scholarship**, Swanson School of Engineering, University of Pittsburgh	*Pittsburgh, U.S.A*
2019	**Honor Student**, Swanson School of Engineering, University of Pittsburgh	*Pittsburgh, U.S.A*
2018	**Dean's List**, Swanson School of Engineering, University of Pittsburgh	*Pittsburgh, U.S.A*

Domestic

2018	**Second Prize Scholarship**, Sichuan University	*Chengdu, China*
2017	**Third Prize Winner**, China Mathematic Competition for College Student	*Chengdu, China*