

# ZHIWEI GONG

+1 667-910-0274  $\diamond$  gongz3@upmc.edu  
1914 Murray Avenue, Pittsburgh, PA, US, 15217  
Github: <https://github.com/zhiweigong75>

## EDUCATION

<b>University of Pittsburgh</b> , Pittsburgh, PA <i>Ph.D.in Intelligent Systems; GPA: 4.00/4.00</i>	August 2024 - Present
<b>Johns Hopkins University</b> , Baltimore, MD <i>M.S.E.in Applied Mathematics and Statistics; GPA: 3.61/4.00</i>	August 2021 - May 2023
<b>University of Reading</b> , Reading, UK <i>B.S.in Mathematics and Applied Mathematics; GPA: 3.93/4.00</i>	September 2020 - July 2021
<b>Nanjing University of Information Science &amp; Technology</b> , Nanjing, China <i>B.S.in Mathematics and Applied Mathematics; GPA: 3.80/4.00</i>	September 2017 - July 2021

## CONFERENCES & ABSTRACTS

- [1] **Gong, Z.**, Liu, C., Berg, W.A., Arefan, D., Wu, S. (2025). Deep Learning Models on Contrast-Enhanced Mammography to Reduce False Recalls. *Radiological Society of North America Annual Meeting*. November 30-December 4. Oral Presentation. [Accepted]
- [2] **Gong, Z.**, Amanian, A., Xiao, Y., Jain, A., Sahu, M., Creighton, F. (2023). Statistical Shape Model of the Eustachian Tube for Understanding and Managing Eustachian Tube Dysfunction. *Combined Otolaryngology Spring Meetings*. May 3-7, 2023.
- [3] Amanian, A., Xiao, Y., **Gong, Z.**, Sahu, M., Ding, A., Taylor, R., Unberath, M., Galaiya, D., Ward, B.K., Creighton, F. (2022). Automated Segmentation of the Eustachian Tube for Applications in the Management of Eustachian Tube Dysfunction – A Deep Learning Framework. *Conference on Machine Intelligence in Medical Imaging*. October 2-3, 2022. Virtual Conference.

## PUBLICATIONS

- [1] **Gong, Z.**, Wan, B., Paranjape, J. N., Sikder, S., Patel, V. M., & Vedula, S. S. (2024). Evaluating the Generalizability of Video-Based Assessment of Intraoperative Surgical Skill. *International Journal of Computer Assisted Radiology and Surgery*.

## RESEARCH EXPERIENCE

<b>Video-Based Assessment Of Intraoperative Surgical Skill</b> <i>Research Assistant-supervised by Dr. Swaroop Vedula &amp; Dr. Shameema Sikder</i>	Oct 2022 - May 2024 <i>Johns Hopkins University</i>
<ul style="list-style-type: none"><li>Established the state-of-the-art performance of semi-supervised domain adaptation (SSDA) and unsupervised domain adaptation (UDA) methods for generalizability of algorithms for video-based assessment (VBA) of intra-operative skill in a critical step in cataract surgery.</li><li>Evaluated the utility of UDA with maximum mean discrepancy (MMD) for prediction tasks that use temporal models.</li><li>De-identified and processed cataract surgical videos.</li></ul>	
<b>Statistical Shape Modeling of the Eustachian Tube</b> <i>Research Assistant-supervised by Dr. Francis Creighton &amp; Dr. Manish Sahu</i>	Oct 2022 - Apr 2024 <i>Johns Hopkins University</i>
<ul style="list-style-type: none"><li>Developed an automated pipeline to build Statistical Shape Models (SSMs) from a pool of CT scans of patients to facilitate quantitative analysis and visual exploration of anatomical variations of eustachian tube (ET).</li><li>Constructed anatomical ET shapes using Point Distribution Model, and captured principal modes of shape variability by Principal Component Analysis (PCA).</li></ul>	
<b>Deep Learning Platform for Automated Segmentation of the Eustachian Tube</b> <i>Research Assistant-supervised by Dr. Russell Taylor &amp; Dr. Manish Sahu</i>	May 2022 - Oct 2022 <i>Johns Hopkins University</i>
<ul style="list-style-type: none"><li>Applied Semi-Supervised VoxelMorph framework on the CT scans of ET to do automated registration and segmentation.</li></ul>	

- Build a completed pipeline to evaluate the performance of deep learning models from the clinical views

## PRESENTATIONS & PROJECTS

### Cardiac Ultrasound Image Segmentation and Stroke Volume Estimation

Feb 2023 - May 2023

Medical Image Analysis course project-supervised by Dr. Jerry Prince

Johns Hopkins University

- Employed an UNet-based network to segment the left ventricle endocardium of the cardiac ultrasound sequence.
- Performed the cubic spline approach to reconstruct 3D shape of the left ventricle endocardium and estimate the stroke volume.
- Achieved 80.0657% accuracy for segmentation task, 0.74% and 2.3487% relative error for stroke volume and ejection fraction estimation task.
- Ranked 1st out of 8 teams and won the best presentation award.

### Neuroimage Registration and Synthesis

Feb 2023 - May 2023

Medical Image Analysis course project-supervised by Dr. Jerry Prince

Johns Hopkins University

- Performed Inter-modality registration to align T2w, fractional anisotropy (FA) and apparent diffusion coefficient (ADC) to T1w space using ANTs-SyN.
- Synthesized diffusion tensor imaging (DTI) related images, FA and ADC, utilizing the provided structural images (T1w and T2w).
- Achieved 0.0058, 0.0185, 0.0794 MAE values of T2w, FA, ADC for registration task, and 0.0293, 0.1804 MAE values of FA, ADC for synthesis task.
- Ranked 3rd out of 8 teams and won the best presentation award.

### dmMRI Distortion Correction: A Deep Learning-based Registration Approach

March 2022 - May 2022

Deep Learning course project-supervised by Dr. Vishal Patel

Johns Hopkins University

- Performed MRI image preprocessing such as affine spatial normalization and brain extraction using FreeSurfer to obtain the segmentation for various structure.
- Run traditional registration method, SyN as baseline for comparison with deep learning-based algorithm.
- Applied VoxelMorph on HCP and Buckner40 brain datasets to perform subject-to-atlas registration tasks.

## SKILLS

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| • <b>Programming Languages</b>               | Python, R, MATLAB  |
| • <b>Frameworks &amp; Tools</b>              | PyTorch, TensorFlow, Keras, Git, Linux, OpenCV, VoxelMorph, ANTsPy |
| • <b>Deep Learning Techniques</b>            | CNNs, GANs, RNNs, Transformers                                     |
| • <b>Statistical &amp; Database software</b> | SPSS, MySQL  |

## SELECTED COURSEWORK

Medical Image Analysis, Deep Learning; Introduction to Natural Language Processing; Machine Perception; Statistical Data Science and Machine Learning; Mathematical Image Analysis; Computational Molecular Medicine; Bayesian Statistics; Stochastic Processes; Differential Equations; Multivariate Data Analysis

## HONORS & AWARDS

- SCI Fellowship in University of Pittsburgh
- First-class Academic Scholarship, three times (Top 5%, one of the highest honors in our university)
- Merit Student, three times (Top 5%, one of the highest honors in our university)