

# Hyeon Woo Lee

hyeonwoo610@gmail.com

Website: hyeonwoolee.net

Cell: 607-379-5619

## TECHNICAL SKILLS

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- Deep Learning: PyTorch, TensorFlow, Keras, CNN, Transformers, LSTM, Computer Vision
- Cloud Development Toolkits: Docker, AWS, HSDP, CUDA
- Programming Language: Python(Scikit-learn, Numpy, Pandas), C/C++, MATLAB, R, HTML, CSS, SQL

## PROFESSIONAL EXPERIENCE

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**Research Data Scientist**, *Ultrasound AI group, Philips*

July 2020 ~ Present

- Leading deep learning algorithm development for FAST ultrasound exam on mobile ultrasound system: [Lumify](#)
  - Successfully passed internal concept selection & validation process for AI solution deployment to Philips ultrasound system (preparing validations study for FDA 510(k) clearance)
  - Developed key organ detection and intra-abdominal free fluid segmentation model
- Leading development of middle cerebral arteries (MCA) detection model for Transcranial Doppler ultrasound
  - Collaborated with MIT and BIDMC for volunteer & patient study and data annotation
  - Developed MCA detection model for intracranial pressure estimation in 3D ultrasound images
- Developed and implemented state-of-the-art models including variants of YOLO, U-Net, DETR, and GAN
- Developed internal ML model development workflow that is now used by multiple project teams
  - Data extraction, statistical analysis, transformation & load, and model performance evaluation toolbox
  - Active learning to select unlabeled data with high uncertainty for annotation
- Authored 10+ invention disclosures (6 provisional patent filings) on AI for healthcare
- Collaborated with UI/UX designer to develop point-of-care-ultrasound workflow and showcased to key customers
- Promoted to higher grade of research scientist on May 2022

**Scientific Data Engineer**, *Allen Institute for Cell Science, Allen Institute*

July 2019 ~ July 2020

- Developed computer vision open source toolkit for microscopic cell images, [Allen Cell Structural Segmenter](#).
- Worked on classical segmentation methods to generate pseudo-label for the iterative learning.
- Developed a cell pair (mitotic cell) detector by implementing Faster-RCNN with Pytorch.
- Using spatial data augmentation and DeeplabV3+, I developed a 2D segmentation model for cardiomyocyte cell analysis in published paper at Cell Systems
- Worked on a conditional GAN that transfers 3D microscopic images between different magnification, different microscopic objects, different resolution, and different light microscope modalities.

## EDUCATION

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**Cornell University**, College of Engineering, Ithaca, NY

May 2019

Master of Engineering in Biomedical Engineering (Machine Learning Research Track. Advised by Dr. Sabuncu)

**University of Rochester**, College of Engineering, Rochester, NY

December 2017

Bachelor of Science in Biomedical Engineering (Electrical Engineering Concentration)

## ACADEMIC RESEARCH EXPERIENCE

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**Graduate Research Assistant**, *Sabuncu Lab, Cornell University*

August 2018 – June 2019

- Biomedical image segmentation in the scenario of only a few labeled brain MR images.
- Developed a multi-atlas segmentation (MAS) model for 3D Brain MRI segmentation.
- Proposed a novel method, MAS with semi-supervised learning-based registration.
- MAS with semi-supervised based registration in a low supervised setting was presented at Neurips ML4H 2019.

## CONFERENCE & JOURNAL PUBLICATIONS

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**H. Lee**, M. Zahiri, G. Goutam, et al

“Automated Anatomical Feature Detection for Completeness of Abdominal Fast Exam”

*IEEE International Ultrasonics Symposium (IUS)*, 2023, Accepted

K.A. Gerbin, T. Grancharova, R. M. Donovan-Maiye, M.C. Hendershott, ... , **H. Lee**, et al

“Cell states beyond transcriptomics: integrating structural organization and gene expression in hiPSC-derived cardiomyocytes”

*Cell Systems*, Volume 12. Issue 6. pp 680-687. 2021

J. Chen, L. Ding, M. P. Viana, **H. Lee**, et al

“The Allen Cell and Structure Segmenter: a new open source toolkit for segmenting 3D intracellular structures in fluorescence microscopy images”

*bioRxiv*, 2020

**H.W. Lee**, M. R. Sabuncu, and A. V. Dalca.

“Few Labeled Atlases are Necessary for Deep-Learning-Based Segmentation”

*NeurIPS ML4H: Machine Learning for Health*, 2019 [Acc. rate: 26.1%]

## CONFERENCE ABSTRACTS

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“Development of a real time organ feature detection to enhance learning and completeness of abdominal FAST exam”

N.Schnittke, **H. Lee**, C. Gregory, B. Hicks, et al

*Society of Academic Emergency Medicine (SAEM)*, Oral Presentation, May 2023

“Automated ultrasound methods for cerebral blood flow velocity measurement in point-of-care settings”

J. Fincke, J. Sutton, S. Kyne, R. S. Naidu, **H. Lee**, T. Heldt, B. I. Raju,

*International Symposium on Intracranial pressure and Brain Monitoring, Cape Town, South Africa, 2022*

“Artificial Intelligence model to identify organ features for guiding FAST ultrasound exam”

**H. Lee**, N. Schnittke, J. Fincke, et al

*American College of Emergency Physicians (ACEP), Annals of Emergency Medicine* 80.4 (2022): S19.

“AI Assistance to Acquire High-Quality FAST Exams”

M. U. Ghani, **H. Lee**, J. Fincke, G. Ghoshal, M. Zahiri, et al

*Military Health System Research Symposium (MHSRS)*. Poster Presentation. September 2022

## ACADEMIC SERVICE

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IEEE Engineering in Medicine and Biology Society (EMBC) Reviewer

2023

## HONORS & AWARDS

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NeurIPS ML4H Travel Grant Award

December 2019

Dean’s List, *University of Rochester*

Spring 2017