Hyeon Woo Lee

Research and Engineering in Deep Learning
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PROFESSIONAL EXPERIENCE

AI Scientist, *Philips, Ultrasound AI group* July 2020 ~ Present

- AI product development for Philips Ultrasound systems: *Lumify* and *Compact 5000 series*
  - Developed real-time ultrasound detection + segmentation model for the FAST trauma exam guidance.
  - Optimized on-device AI pipelines for 20 ms inference on handheld and cart-based ultrasound systems.
  - Designed an automated FAST exam reporting workflow to streamline clinician quality assessment.
  - Applied multi-task, weakly supervised, domain adaptation, and knowledge distillation to tackle limited/noisy data.
- Deep learning research and pipeline development
  - Lead data-engineering & model-validation pipeline for data integrity and reliable performance.
  - Developed vessels detection & optimal frame selection for 3D transcranial Doppler ultrasound sweeps
  - Standardized unstructured ECG reports using LLM + RAG, enabling consistent downstream analysis.
  - Developed a representation-learning framework: masked-token denoising pretraining & fine tuning for ECG signal pathology classification.
- Contributed to FDA 510(k) and De Novo regulatory affairs and intellectual property (IP) development.
  - Collaborated on clinical validation study design, attended FDA Q-Sub meetings.
  - Authored 20+ invention disclosures and 9+ provisional patents.

Scientific Data Engineer, *Allen Institute, Cell Science group* July 2019 ~ July 2020

- Computer vision open-source toolkit for microscopic cell images, *Allen Cell & Structure Segmenter*
  - Worked on classic image segmentation and iterative learning workflow.
  - Developed a deep learning-based mitotic cell pair detection and cardiomyocyte segmentation models.
- Worked on a generative model for 3D image transfer between different magnifications and resolutions.

TECHNICAL SKILLS

- **Core Expertise**: Computer Vision, Large Language Models, Multi-Modality Models, Data Engineering.
- **Programming Languages**: Python, C/C++, R, SQL, HTML, CSS.
- **Frameworks & Libraries**: PyTorch, TensorFlow, Keras, Hugging Face Transformers, OpenCV, ITK.
- **Tools & Platforms**: Docker, AWS, CUDA, MATLAB, Git, Linux.

EDUCATION

Cornell University, Ithaca, NY May 2019
Master of Engineering in Biomedical Engineering (Machine Learning Research Track. Advised by Dr.Mert Sabuncu.)

University of Rochester, Rochester, NY December 2017
Bachelor of Science in Biomedical Engineering (Electrical Engineering Concentration.)

ACADEMIC RESEARCH

Graduate Research Assistant, *Cornell University, Sabuncu Lab* August 2018 ~ July 2019

- 3D brain MR image segmentation with semi-supervised registration – presented at *NeurIPS ML4H.*

PUBLICATIONS

H. Lee, M. Zahiri, G. Goutam, et al
"Automated Anatomical Feature Detection for Completeness of Abdominal FAST Exam"
IEEE International Ultrasonics Symposium (IUS), 2023, pp. 1-4.

K.A. Gerbin, T. Grancharova, R. M. Donovan-Maiye, … , **H. Lee**, et al
"Cell states beyond transcriptomics: integrating structural organization and gene expression in hiPSC-derived cardiomyocytes"
Cell Systems, 2021, Volume 12. Issue 6. pp 680-687.

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%].

PATENTS

C. Christopher, M. Xun, J. Fincke, P. Patel, … , **H. Lee**
"Graphical User Interface for Providing Ultrasound Imaging Guidance"
US published patent: US-20230320694-A1. Oct 2023.

M.H. Ghani, **H. Lee**, J. Fincke, B.I Raju
"Ultrasound Imaging"
US published patent: US-20230329674-A1. Oct 2023.

H. Lee, M.H. Ghani, J. Fincke, B.I Raju
"Supplemented Ultrasound"
Worldwide published patent: WO-2023242072-A1. Dec 2023.

M.H. Ghani, **H. Lee**, J. Fincke, B.I Raju
"Systems and Methods for Imaging Screening"
Worldwide published patent: WO-2024013114-A1. Jan 2024.

P.K. Patel, C.E. Haverstock, **H. Lee**, et al
"Dynamic Determination of Imaging Sequence Completeness"
Worldwide published patent: WO-2024235772-A1. Nov 2024.

J. Fincke, **H. Lee**, M.H. Ghani, B.I Raju
"Dynamic medical imaging duration warning"
Worldwide published patent: EP-4494568-A1. Jan 2025.

CONFERENCE ABSTRACTS

N.Schnittke, **H. Lee**, C. Gregory, B. Hicks, et all
"Development of a real time organ feature detection to enhance learning and completeness of abdominal FAST exam"
Society of Academic Emergency Medicine (SAEM), Oral Presentation, May 2023.

H. Lee, N. Schnittke, J. Fincke, et all
"Artificial Intelligence model to identify organ features for guiding FAST ultrasound exam"
American College of Emergency Physicians (ACEP), Annals of Emergency Medicine 80.4 (2022): S19.

M. U. Ghani, **H. Lee**, J. Fincke, G. Ghoshal, M. Zahiri, et all
"AI Assistance to Acquire High-Quality FAST Exams"
Health System Research Symposium (MHSRS). Poster Presentation. September 2022.