

Stanford



Dongwoon Hyun

Research Engineer, Rad/Pediatric Radiology

Bio

BIO

My research interests are focused on the development and clinical translation of new ultrasound imaging techniques to improve the quality and diagnostic value of ultrasound imaging. My interests are in clinical translation of ultrasound molecular imaging for early cancer detection, improving image quality in difficult-to-image patients, and to reduce noise artifacts in ultrasound images. In my research, I have refined adaptive beamforming methods such as coherence-based imaging, helped to pioneer the use of deep learning tools on raw ultrasound data to produce more accurate B-mode images and more sensitive ultrasound molecular images, and developed GPU-based software beamforming tools to deploy these methods in real-time on experimental and clinical imaging systems.

LINKS

- Open-source GPU-based real-time software beamformer: <https://gitlab.com/dongwoon.hyun/rtbf>
- B-mode imaging with a neural-network beamformer: https://gitlab.com/dongwoon.hyun/nn_bmode

Publications

PUBLICATIONS

- **Short-Lag Spatial Coherence Imaging in 1.5-D and 1.75-D Arrays: Elevation Performance and Array Design Considerations** *IEEE TRANSACTIONS ON ULTRASONICS FERROELECTRICS AND FREQUENCY CONTROL*
Morgan, M. R., Hyun, D., Trahey, G. E.
2019; 66 (6): 1047–56
- **Beamforming and Speckle Reduction Using Neural Networks.** *IEEE transactions on ultrasonics, ferroelectrics, and frequency control*
Hyun, D., Brickson, L. L., Looby, K. T., Dahl, J. J.
2019; 66 (5): 898–910
- **Improved Visualization in Difficult-to-Image Stress Echocardiography Patients Using Real-Time Harmonic Spatial Coherence Imaging** *IEEE TRANSACTIONS ON ULTRASONICS FERROELECTRICS AND FREQUENCY CONTROL*
Hyun, D., Crowley, A. C., LeFevre, M., Cleve, J., Rosenberg, J., Dahl, J. J.
2019; 66 (3): 433–41
- **Local speed of sound estimation in tissue using pulse-echo ultrasound: Model-based approach.** *The Journal of the Acoustical Society of America*
Jakovljevic, M., Hsieh, S., Ali, R., Chau Loo Kung, G., Hyun, D., Dahl, J. J.
2018; 144 (1): 254
- **CLINICAL UTILITY OF FETAL SHORT-LAG SPATIAL COHERENCE IMAGING** *ULTRASOUND IN MEDICINE AND BIOLOGY*
Long, W., Hyun, D., Choudhury, K., Bradway, D., McNally, P., Boyd, B., Ellestad, S., Trahey, G. E.
2018; 44 (4): 794–806
- **Improved Sensitivity in Ultrasound Molecular Imaging With Coherence-Based Beamforming.** *IEEE transactions on medical imaging*
Hyun, D., Abou-Elkacem, L., Perez, V. A., Chowdhury, S. M., Willmann, J. K., Dahl, J. J.

2018; 37 (1): 241–50

- **Reverberation Noise Suppression in the Aperture Domain Using 3D Fully Convolutional Neural Networks**
Brickson, L. L., Hyun, D., Dahl, J. J., IEEE
IEEE.2018
- **High Sensitivity Liver Vasculature Visualization Using a Real-time Coherent Flow Power Doppler (CFPD) Imaging System: A Pilot Clinical Study**
Li, Y., Hyun, D., Durot, I., Willmann, J. K., Dahl, J. J., IEEE
IEEE.2018
- **Adaptive Grayscale Mapping to Improve Molecular Ultrasound Difference Images**
Shu, J., Hyun, D., Abou-Elkacem, L., Willmann, J., Dahl, J., IEEE
IEEE.2018
- **Efficient Strategies for Estimating the Spatial Coherence of Backscatter** *IEEE TRANSACTIONS ON ULTRASONICS FERROELECTRICS AND FREQUENCY CONTROL*
Hyun, D., Crowley, A. L., Dahl, J. J.
2017; 64 (3): 500-513
- **Coherence Beamforming and its Applications to the Difficult-to-Image Patient**
Dahl, J. J., Hyun, D., Li, Y., Jakovljevic, M., Bell, M. L., Long, W. J., Bottenus, N., Kakkad, V., Trahey, G. E., IEEE
IEEE.2017
- **Visualization of Small-Diameter Vessels by Reduction of Incoherent Reverberation With Coherent Flow Power Doppler.** *IEEE transactions on ultrasonics, ferroelectrics, and frequency control*
Li, Y. L., Hyun, D., Abou-Elkacem, L., Willmann, J. K., Dahl, J. J.
2016; 63 (11): 1878-1889
- **Short-Lag Spatial Coherence Imaging on Matrix Arrays, Part II: Phantom and In Vivo Experiments** *IEEE TRANSACTIONS ON ULTRASONICS FERROELECTRICS AND FREQUENCY CONTROL*
Jakovljevic, M., Byram, B. C., Hyun, D., Dahl, J. J., Trahey, G. E.
2014; 61 (7): 1113-1122
- **Short-Lag Spatial Coherence Imaging on Matrix Arrays, Part I: Beamforming Methods and Simulation Studies** *IEEE TRANSACTIONS ON ULTRASONICS FERROELECTRICS AND FREQUENCY CONTROL*
Hyun, D., Trahey, G. E., Jakovljevic, M., Dahl, J. J.
2014; 61 (7): 1101-1112
- **A GPU-based real-time spatial coherence imaging system**
Hyun, D., Trahey, G. E., Dahl, J., Bosch, J. G., Doyley, M. M.
SPIE-INT SOC OPTICAL ENGINEERING.2013
- **Lesion Detectability in Diagnostic Ultrasound with Short-Lag Spatial Coherence Imaging** *ULTRASONIC IMAGING*
Dahl, J. J., Hyun, D., Lediju, M., Trahey, G. E.
2011; 33 (2): 119-133
- **Development and Evaluation of Pulse Sequences for Freehand ARFI Imaging**
Doherty, J. R., Dumont, D. M., Hyun, D., Dahl, J. J., Trahey, G. E., IEEE
IEEE.2011: 1281–84