Gregory Holste

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RESEARCH INTERESTS

My research develops deep learning methods to interpret health data and support clinical decision-making with the goal of real-world translation. I work with clinicians to design, validate, and implement tools for automated disease assessment and clinical decision support. My work bridges method development in self-supervised and multimodal learning with clinical expertise to develop AI systems that improve patient care.

EDUCATION

The University of Texas at Austin, Austin, TX — Aug. 2021-Aug. 2026
Ph.D. Candidate in Electrical & Computer Engineering — Advisor: Atlas Wang

Kenyon College, Gambier, OH — Aug. 2016-May 2020
B.A. in Mathematics & Statistics, summa cum laude

EXPERIENCE

Weill Cornell Medicine, New York, NY — Sep. 2026-present
Assistant Professor, Population Health Sciences (Health Informatics & AI), Radiology, Cardiology

The University of Texas at Austin, Austin, TX — Aug. 2021-present
Graduate Research Assistant, Visual Informatics @ UT Austin — Advisor: Atlas Wang

Yale School of Medicine, New Haven, CT — Aug. 2021-present
Research Associate, Cardiovascular Data Science Lab — Advisor: Rohan Khera

Weill Cornell Medicine, New York City, NY — May-Oct. 2023
Visiting Research Intern, Population Health Sciences — Advisor: Yifan Peng

Artera Inc, Mountain View, CA — May-Oct. 2022
Machine Learning Scientist Intern — Advisors: Akinori Mitani, Andre Esteva

Michigan State University, East Lansing, MI — Aug. 2019-Jul. 2021
Research Assistant, Medical Imaging & Data Integration Lab — Advisor: Adam Alessio

PUBLICATIONS

Selected publications are highlighted in gray. * denotes co-first authorship — **h-index: 17**

[1] **Artificial intelligence-enabled echocardiography as a surrogate for multimodality aortic stenosis imaging: post hoc analysis of a clinical trial**
E.K. Oikonomou, N.J. Craig, **G. Holste**, S.V. Shankar, A. White, M. Mahendran, D.E. Newby, M.R. Dweck, R. Khera
Circulation: Cardiovascular Imaging — 31 Dec. 2025

[2] **CXR-LT 2024: A MICCAI challenge on long-tailed, multi-label, and zero-shot disease classification from chest X-ray**
M. Lin*, **G. Holste***, S. Wang, Y. Zhou, Y. Wei, I. Banerjee, P. Chen, T. Dai, Y. Du, N.C. Dvornek, Y. Ge, Z. Guo, S. Hanaoka, D. Kim, P. Messina, Y. Lu, D. Parra, D. Son, Á. Soto, A. Urooj, R. Vidal, Y. Yamagishi, Z. Yang, R. Zhang, Y. Zhou, L.A. Celi, R.M. Summers, Z. Lu, H. Chen, A. Flanders, G. Shih, Z. Wang, Y. Peng
Medical Image Analysis — 29 Jul. 2025

[3] **Complete AI-Enabled Echocardiography Interpretation with Multitask Deep Learning**
G. Holste*, E.K. Oikonomou*, M. Tokodi, A. Kovács, Z. Wang, R. Khera
JAMA [AHA 2024 Late-Breaking Science] [AIHC 2024 Oral Presentation] — 23 Jun. 2025

[4] **EchoNeRF: Generalizable Neural Radiance Fields for Novel Echocardiographic View Synthesis**
Y. Wang, E. Mei, Z. Wang, **G. Holste**
CVPR Workshop on Neural Fields Beyond Conventional Cameras 11 Jun. 2025

[5] **Deep Rib Fracture Instance Segmentation and Classification from CT on the RibFrac Challenge**
J. Yang, R. Shi, L. Jin, X. Huang, K. Kuang, D. Wei, S. Gu, J. Liu, P. Liu, Z. Chai, Y. Xiao, H. Chen, L. Xu, B. Du, X. Yan, H. Tang, A. Alessio, **G. Holste**, J. Zhang, X. Wang, J. He, L. Che, H. Pfister, M. Li, B. Ni
IEEE Transactions on Medical Imaging 30 Apr. 2025

[6] **Artificial intelligence-guided detection of under-recognised cardiomyopathies on point-of-care cardiac ultrasonography: a multicentre study**
E.K. Oikonomou, A. Vaid, **G. Holste**, A. Coppi, R.L. McNamara, G. Nadkarni, C. Baloescu, H. Krumholz, Z. Wang, R. Khera
The Lancet Digital Health 1 Feb. 2025

[7] **Improving Fairness of Automated Chest X-ray Diagnosis by Contrastive Learning**
M. Lin, T. Li, Z. Sun, **G. Holste**, Y. Ding, F. Wang, G. Shih, Y. Peng
Radiology: Artificial Intelligence 21 Aug. 2024

[8] **Harnessing the power of longitudinal medical imaging for eye disease prognosis using Transformer-based sequence modeling**
G. Holste, M. Lin, R. Zhou, F. Wang, L. Liu, Q. Yan, S.H. Van Tassel, K. Kovacs, E.Y. Chew, Z. Lu, Z. Wang, Y. Peng
npj Digital Medicine 16 Aug. 2024

[9] **Efficient deep learning-based automated diagnosis from echocardiography with contrastive self-supervised learning**
G. Holste, E.K. Oikonomou, B.J. Mortazavi, Z. Wang, R. Khera
Communications Medicine 6 Jul. 2024

[10] **Towards long-tailed, multi-label disease classification from chest X-ray: Overview of the CXR-LT challenge**
G. Holste, Y. Zhou, S. Wang, A. Jaiswal, M. Lin, S. Zhuge, Y. Yang, D. Kim, T. Nguyen-Mau, M. Tran, J. Jeong, W. Park, J. Ryu, F. Hong, A. Verma, Y. Yamagishi, C. Kim, H. Seo, M. Kang, L.A. Celi, Z. Lu, R.M. Summers, G. Shih, Z. Wang, Y. Peng
Medical Image Analysis 31 May 2024

[11] **High sensitivity methods for automated rib fracture detection in pediatric radiographs**
J. Burkow, **G. Holste**, J. Otjen, F. Perez, J. Junewick, A. Zbojniewicz, E. Romberg, S. Menashe, J. Frost, A. Alessio
Scientific Reports 10 Apr. 2024

[12] **A Multimodal Video-Based AI Biomarker for Aortic Stenosis Development and Progression**
E.K. Oikonomou, **G. Holste**, N. Yuan, A. Coppi, R.L. McNamara, N.A. Haynes, A.N. Vora, E.J. Velazquez, F. Li, V. Menon, S.R. Kapadia, T.M. Gill, G.N. Nadkarni, H.M. Krumholz, Z. Wang, D. Ouyang, R. Khera
JAMA Cardiology 6 Apr. 2024

[13] **Biometric contrastive learning for data-efficient deep learning from electrocardiographic images**
V. Sangha, A. Khunte, **G. Holste**, B.J. Mortazavi, Z. Wang, E.K. Oikonomou, R. Khera
Journal of the American Medical Informatics Association 24 Jan. 2024

[14] **Improving model fairness in image-based computer-aided diagnosis**
M. Lin, T. Li, Y. Yang, **G. Holste**, Y. Ding, S.H. Van Tassel, K. Kovacs, G. Shih, Z. Wang, Z. Lu, F. Wang, Y. Peng
Nature Communications 6 Oct. 2023

[15] **How Does Pruning Impact Long-Tailed Multi-Label Medical Image Classifiers?**
G. Holste, Z. Jiang, A. Jaiswal, M. Hanna, S. Minkowitz, A.C. Legasto, J.G. Escalon, S. Steinberger, M. Bittman, T.C. Shen, Y. Ding, R.M. Summers, G. Shih, Y. Peng, Z. Wang
Medical Image Computing & Computer-Assisted Intervention (MICCAI) 1 Oct. 2023
[Early Accept (Top 14%)]

[16] **Improved Multimodal Fusion for Small Datasets with Auxiliary Supervision**
G. Holste, D. van der Wal, H. Pinckaers, R. Yamashita, A. Mitani, A. Esteva
IEEE International Symposium on Biomedical Imaging (ISBI) [ISBI 2023 Best Papers] 1 Sep. 2023

[17] **Severe aortic stenosis detection by deep learning applied to echocardiography**
G. Holste, E.K. Oikonomou, B.J. Mortazavi, A. Coppi, K.F. Faridi, E.J. Miller, J.K. Forrest, R.L. McNamara, L. Ohno-Machado, N. Yuan, A. Gupta, D. Ouyang, H.M. Krumholz, Z. Wang, R. Khera
European Heart Journal [Editor's Choice] 23 Aug. 2023

[18] **Radiomics-Guided Global-Local Transformer for Weakly Supervised Pathology Localization in Chest X-Rays**
Y. Han, **G. Holste**, Y. Ding, A. Tewfik, Y. Peng, Z. Wang
IEEE Transactions on Medical Imaging 26 Oct. 2022

[19] **Long-Tailed Classification of Thorax Diseases on Chest X-Ray: A New Benchmark Study**
G. Holste, S. Wang, Z. Jiang, T.C. Shen, G. Shih, R.M. Summers, Y. Peng, Z. Wang
MICCAI Workshop on Data Augmentation, Labelling, & Imperfections [Oral Presentation] 16 Sep. 2022

[20] **Avalanche decision schemes to improve pediatric rib fracture detection**
J. Burkow, **G. Holste**, J. Otjen, F. Perez, J. Junewick, A. Alessio
SPIE Medical Imaging: Computer-Aided Diagnosis 4 Apr. 2022

[21] **End-to-End Learning of Fused Image and Non-Image Features for Improved Breast Cancer Classification from MRI**
G. Holste, S. Partridge, H. Rahbar, D. Biswas, C. Lee, A. Alessio
ICCV Workshop on Computer Vision for Automated Medical Diagnosis 31 Oct. 2021

[22] **Multi-class semantic segmentation of pediatric chest radiographs**
G. Holste, R. Sullivan, M. Bindschadler, N. Nagy, A. Alessio
SPIE Medical Imaging: Image Processing [Oral Presentation] 10 Mar. 2020

[23] **Deep learning methods for segmentation of lines in pediatric chest radiographs**
R. Sullivan, **G. Holste**, J. Burkow, A. Alessio
SPIE Medical Imaging: Computer-Aided Diagnosis 16 Mar. 2020

SELECTED PRESS

Complete AI-enabled echocardiography interpretation (*JAMA*)

- **Medscape**: *AI Makes Echocardiography Faster, More Accessible*, Nov. 2024
- **MedPage Today**: *AI Can Do Whole Echo Reports, Improve Efficiency*, Nov. 2024
- **TCTMD**: *AI-Informed Echo Can Aid Diagnosis, With High Accuracy*, Jun. 2025
- **Yale Medicine**: *AI Tool Interprets Echocardiograms in Minutes, New Yale Study Finds*, Jun. 2025
- **UT Austin School of Engineering**: *AI Can Diagnose Your Heart in Just a Few Minutes*, Jun. 2025
- **European Medical Journal**: *AI Achieves High Accuracy in Automated Echocardiogram Interpretation*, Jun. 2025
- **Becker's Hospital Review**: *AI model accurately interprets echocardiograms: 5 study notes*, Jun. 2025

Severe aortic stenosis detection from echocardiography (*European Heart Journal*)

- **Yale Medicine**: Artificial Intelligence Automates Diagnosis of Severe Heart Valve Disease, Aug. 2023
- **Yale Daily News**: *Yale researchers investigate the future of AI in healthcare* , Sep. 2023
- **Tech Explorist**: *AI streamlines severe heart valve disease diagnosis*, Aug. 2023

Broader research coverage

- **UT Austin**: *Four Texas ECE Students Win Prestigious NSF Graduate Research Fellowships*, Apr. 2023
- **Aunt Minnie**: *AI proposed to help radiologists detect child abuse injuries*, Apr. 2024
- **Yale Medicine**: *AI-Based Biomarker for Aortic Stenosis Found by Yale Researchers*, Apr. 2024

HONORS & AWARDS

Selected honors are highlighted in gray.

Innovators under 35 Semifinalist Feb. 2026
Semifinalist for MIT Technology Review's 35 Innovators under 35 for 2026

NSF Graduate Research Fellowship (GRFP) Mar. 2023–Aug. 2026
Three-year national fellowship for outstanding STEM graduate students

Dean's Prestigious Fellowship Supplement Sep. 2023–Aug. 2026
UT Austin award for graduate students receiving prestigious external scholarships

CVPR 2025 Outstanding Reviewer Jun. 2025
Awarded to top 5% of reviewers for exceptional contributions

MICCAI 2024 Outstanding Reviewer Honorable Mention Sep. 2024
One of 92 reviewers (top 5%) who consistently exceeded expectations

IEEE ISBI 2023 Best Papers Dec. 2023
Outstanding paper at ISBI 2023 invited to a special issue of IEEE Transactions on Medical Imaging

Ram's Horn Best Project Award Apr. 2023
Best student project in Prof. Alan Bovik's EE 381K: Digital Video

Charles W. & Margaret A. Tolbert Endowed Scholarship Aug. 2021
UT Austin Cockrell School of Engineering scholarship for top incoming students

Phi Beta Kappa May 2020
Elected to Kenyon College's chapter of the national honor society

Sigma Xi Feb. 2020
Inducted into the Kenyon-Denison chapter of the national science research honor society

Pi Mu Epsilon Apr. 2018
Elected to the Ohio Pi chapter of the national mathematics society

Wendell D. Lindstrom Memorial Prize Apr. 2018
One of 12 students given prize for outstanding mathematics students at Kenyon College

Kenyon College Merit List (8x) every semester

INVITED TALKS

AI-Enabled Echocardiography: From Valve to Whole Heart to Whole Patient
Greenberg Division of Cardiology, Weill Cornell Medicine Oct. 2026

Artificial Intelligence in Diagnosing Valvular Heart Disease–the Future is Now
American Heart Association (AHA) Scientific Sessions Nov. 2025

PanEcho: Toward Complete AI-Enabled Echocardiography Interpretation
Shen Lab, Perelman School of Medicine at the University of Pennsylvania Oct. 2025

PanEcho: Toward Complete AI-Enabled Echocardiography Interpretation
AI + Health Seminar Series, The University of Texas at Austin Sep. 2025

PanEcho: Toward Complete AI-Enabled Echocardiography Interpretation
Health Informatics & Artificial Intelligence Seminar Series, Weill Cornell Medicine Sep. 2025

Deep Learning for Automated Echocardiography Interpretation
Ken Kennedy Institute AI Seminar Series, Rice University Sep. 2025

PanEcho: Toward Complete AI-Enabled Echocardiography Interpretation
Stanford MedAI Group Exchange, Stanford University — Aug. 2025

Deep Learing for Automated Echocardiography Interpretation
Medical Imaging & Data Integration Lab, Michigan State University — Aug. 2025

PanEcho: Complete AI-enabled echocardiography interpretation with multi-task deep learning
Foundry Technologies AI for Science Symposium — May 2025

PanEcho: Complete AI-enabled echocardiography interpretation with multi-task deep learning
Laboratory for Computational Physiology, MIT — Feb. 2025

Self-supervised learning for echocardiography
Cardiovascular Data Science Lab, Yale University — Jul. 2023

Fusing imaging and clinical information for improved automatic breast cancer detection
Virtual Imaging Research Symposium, Michigan State University — Feb. 2021

Automatic segmentation of pediatric chest radiographs
Math Monday, Kenyon College — Nov. 2019

ORAL PRESENTATIONS

PanEcho: Complete echocardiography interpretation with multi-task deep learning
American Heart Association (AHA) Scientific Sessions [Late-Breaking Science] — Nov. 2024

Universal echocardiography interpretation with multi-task deep learning
AI in Health Conference (AIHC) — Sep. 2024

Long-Tailed Classification of Thorax Diseases on Chest X-Ray: A New Benchmark Study
MICCAI Workshop on Data Augmentation, Labelling, & Imperfections — Sep. 2022

Multi-class semantic segmentation of pediatric chest radiographs
SPIE Medical Imaging: Image Processing — Feb. 2020

SERVICE

WORKSHOP & CHALLENGE ORGANIZER

Workshop on GenAI for Health: Potential, Trust, and Policy Compliance
Student Organizer, NeurIPS 2025 — Dec. 2025

CXR-LT Challenge on Long-tailed, Multi-label, and Zero-shot Classification on Chest X-rays
Lead Organizer, MICCAI 2024 — 2024

Workshop on Computer Vision for Automated Medical Diagnosis
Co-lead Organizer, ICCV 2023 — Oct. 2023

CXR-LT Challenge on Multi-Label Long-Tailed Classification on Chest X-Rays
Lead Organizer, ICCV CVAMD 2023 — 2023

CONFERENCE REVIEWER

Computer Vision & Pattern Recognition (CVPR)	2024-2026
International Symposium on Biomedical Imaging (ISBI)	2024-2026
International Conference on Machine Learning (ICML)	2023-2025
Neural Information Processing Systems (NeurIPS)	2023-2025
Medical Image Computing & Computer-Assisted Intervention (MICCAI)	2024-2025
International Conference on Learning Representations (ICLR)	2025
Association of the Advancement of Artificial Intelligence (AAAI)	2025
European Conference on Computer Vision (ECCV)	2024

WORKSHOP REVIEWER

GenAI for Health Workshop, NeurIPS 2024-2025 2024-2025
Foundation Models for Science Workshop, NeurIPS 2024 2024
Computer Vision for Automated Medical Diagnosis Workshop, ICCV 2023 2023

JOURNAL REVIEWER

Clinical: JAMA, JAMA Cardiology, European Heart Journal, JACC, JAHA

Digital Health & Machine Learning: npj Digital Medicine, IEEE Transactions on Medical Imaging, Transactions on Machine Learning Research, Medical Physics, IEEE Journal of Biomedical and Health Informatics, Computer Methods and Programs in Biomedicine, Artificial Intelligence in Medicine, ACM Transactions on Computing for Healthcare

Multidisciplinary: Scientific Reports, PLoS One, iScience

TEACHING & MENTORSHIP

GUEST LECTURES

BINF G4099: Research Seminar, **Columbia University** Jan. 2026
Host: Columbia Department of Biomedical Informatics

BMI 7150: Research Seminar, **UTHealth Houston** Oct. 2025
Host: Elmer Bernstam, Jim Zheng

CPH 270: Computational Precision Health Seminar, **UC Berkeley** Oct. 2025
Host: Adam Yala

MENTORSHIP

Ziyi Yang, The University of Texas at Austin Oct. 2025-Aug. 2026
Topic: Novel view synthesis for echocardiography

Yuehao Wang, The University of Texas at Austin May 2024-Aug. 2026
Topic: Novel view synthesis for echocardiography

Anthony Wang, The University of Texas at Austin May-Dec. 2024
Topic: Self-supervised learning for echocardiography

EDUCATIONAL MATERIALS

Module 6: Deep Learning for Medical Image Segmentation Jan. 2021
Educational Modules: Artificial Intelligence in Diagnostic Medicine, Michigan State University

K-Means Clustering, Decision Trees, Neural Networks Dec. 2019
MATH 493: Topics in Machine Learning, Kenyon College

PEER-REVIEWED ABSTRACTS

[A1] **PanEcho: Complete AI-enabled echocardiography interpretation with multi-task deep learning**
G. Holste, E.K. Oikonomou, M. Tokodi, A. Kovács, Z. Wang, R. Khera
Carnegie Mellon Forum on Biomedical Engineering Sep. 2025

[A2] **An AI-Echo Strategy to Define a Personalized Aortic Stenosis Progression Profile and its Pathophysiological Correlates in the SALTIRE-2 Trial**
E.K. Oikonomou, N. Craig, **G. Holste**, S.V. Shankar, A. White, T. Pawade, D.E. Newby, M. Dweck, R. Khera
American College of Cardiology (ACC) Scientific Session Mar. 2025

[A3] **PanEcho: Complete echocardiography interpretration with multi-task deep learning**
G. Holste, E.K. Oikonomou, Z. Wang, R. Khera
American Heart Association (AHA) Scientific Sessions Nov. 2024

[A4] **Artificial intelligence-enabled detection and phenotyping of left ventricular hypertrophy on real-world point-of-care cardiac ultrasonography and its implications for patient outcomes**
E.K. Oikonomou, **G. Holste**, A. Coppi, C. Baloescu, R. McNamara, R. Khera
American Heart Association (AHA) Scientific Sessions Nov. 2024

[A5] **Universal echocardiography interpretation with multi-task deep learning**
G. Holste, E.K. Oikonomou, Z. Wang, R. Khera
AI in Health Conference (AIHC) Sep. 2024

[A6] **Artificial intelligence-guided screening of under-recognized cardiomyopathies adapted for point-of-care echocardiography**
E.K. Oikonomou, **G. Holste**, A. Coppi, R.L. Mcnamara, G.N. Nadkarni, H.M. Krumholz, Z. Wang, E.J. Miller, R. Khera
European Society of Cardiology (ESC) Congress Sep. 2024

[A7] **Cross-modal validation of an artificial intelligence video-based approach for the automated risk stratification of aortic stenosis**
E.K. Oikonomou, **G. Holste**, G. Nadkarni, Z. Wang, R. Khera
American College of Cardiology (ACC) Scientific Session Apr. 2024

[A8] **ECG-GPT: Automated Complete Diagnosis Generation From ECG Images Using Novel Vision-Text Transformer Model**
A. Khunte, V. Sangha, **G. Holste**, L.S. Dhingra, A. Aminorroaya, Z. Wang, R. Khera
American Heart Association (AHA) Scientific Sessions Nov. 2023

[A9] **Predicting aortic stenosis progression using a video-based deep learning model of aortic stenosis built for single-view two-dimensional echocardiography**
E.K. Oikonomou, **G. Holste**, R.L. Mcnamara, E.J. Velazquez, G.N. Nadkarni, D. Ouyang, H.M. Krumholz, Z. Wang, R. Khera
European Society of Cardiology (ESC) Congress Aug. 2023

[A10] **Biometric Contrastive Modeling for Data-Efficient Deep Learning from Electrocardiographic Images**
V. Sangha, A. Khunte, **G. Holste**, B. Mortazavi, Z. Wang, E.K. Oikonomou, R. Khera
American College of Cardiology (ACC) Scientific Session Mar. 2023

[A11] **Long-Tailed Classification of Thorax Diseases on Chest X-Ray**
G. Holste, S. Wang, Z. Jiang, T.C. Shen, G. Shih, R.M. Summers, Y. Peng, Z. Wang
Radiological Society of North America (RSNA) Annual Meeting Nov. 2022

[A12] **Automated Detection of Aortic Stenosis From Single-View 2-Dimensional Echocardiography Using a Semi-Supervised, Contrastive Learning Approach**
E.K. Oikonomou, **G. Holste**, B. Mortazavi, Z. Wang, R. Khera
American Heart Association (AHA) Scientific Sessions Nov. 2022

[A13] **Self-Supervised Learning of Echocardiogram Videos Enables Data-Efficient Clinical Diagnosis**
G. Holste, E.K. Oikonomou, B. Mortazavi, Z. Wang, R. Khera
ICML Workshop on Interpretable Machine Learning in Healthcare Jul. 2022

[A14] **Rib fracture detection in pediatric radiographs via deep convolutional neural networks**
J. Burkow, **G. Holste**, F. Perez, J. Junewick, A. Zbojniewicz, J. Frost, E. Romberg, S. Menashe, J. Otjen, A. Alessio
International Pediatric Radiology Congress Oct. 2021

[A15] **Automatic segmentation of chest radiographs with deep learning**
G. Holste, R. Sullivan, N. Nagy, M. Bindschadler, A. Alessio
Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE) Jul. 2019

[A16] **Deep learning methods for automatic evaluation of lines in chest radiographs**
R. Sullivan, **G. Holste**, A. Alessio
Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE) Jul. 2019