Han Zhang

CONTACT

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SUMMARY

My research focus on creating a digital twin environment for providing patient care, using methods in artificial intelligence, robotics, and mixed reality.

EDUCATION

Ph.D. in Computer Science 01/2024 – now
Johns Hopkins University
Affiliated with the Laboratory for Computational Sensing and Robotics.
Primary advisor: Mathias Unberath

M.S. Biomedical Engineering 08/2022 - 12/2023
Johns Hopkins University

B.S. Biomedical Engineering with Honors, 09/2018 – 06/2022
University of California, Davis

SELECTED AWARDS

Personal Awards

2. LCSR Fellowship for Outstanding Incoming Ph.D. Students 2024
   Johns Hopkins University

1. Dean's Honor List, University of California, Davis 2022
   Top 16% GPA in College of Engineering

Publication Awards

2. **Bench-to-Bedside Award** 2024
   For paper [J-1] at IPCAI 2024.

1. Finalist, **Best Paper Award** 2024
   For paper [J-2] at IPCAI 2024.

Project Awards

3. Best Project Award, Computer Integrated Surgery II 2023
   Johns Hopkins University

2. Best Project Award, Haptic Interface Design 2023
   Johns Hopkins University

1. Excellence in Manufacturing Award at Senior Design 2021
   University of California, Davis

Service and Leadership

Societies

– **Team Lead, Microfluidics** 09/2021 – 06/2022
BioInovation Group at University of California, Davis

Conference Reviewer

International Conference on Information Processing in Computer-Assisted Interventions (IPCAI)

Talks and Press

Invited Talks and Demos

4. End of Semester Social, **Selected Posters and Demos** 05/2024
Data Science and AI Institute, Johns Hopkins University, USA
"Interventional X-ray Imaging in Virtual Reality for Orthopedic Surgery"

3. IEEE World Haptics Conference 07/2023
Delft, Netherlands
"3D Hapkit: 3-degree-of-freedom (DOF) Haptic Device using a Delta Parallel Mechanism"

2. LCSR Industry Day 04/2023
Johns Hopkins University, USA
"PelvisVR: Recreating Pelvic Trauma Surgery in Virtual Reality"

1. College of Engineering Design Showcase 06/2022
University of California, Davis, USA
"THF:Radiolucent Hand and Wrist Fixation Device for Intraoperative Fluoroscopy"

Selected Press

2. Our work [J-2] and [J-1] were featured in a JHU Computer Science News article on the IPCAI 2024 conference.

1. Our work [C-1] presenting the first approach to surgical phase recognition in X-ray guided surgery with dynamic simulation was featured in the JHU Hub and Surgery International.

Teaching

Computer Integrated Surgery II EN.601.456/656, Project Mentor
Johns Hopkins University

– *Measuring Variability of Pelvic Standard Views in Virtual Reality* 2024
Voted runner-up, **Best Project Award**.
– *A Cannula Marker Body for Tracker-free Surgical Navigation during Kirschner Wire Placement* 2024

Computer Integrated Surgery I EN.601.455/655, Course Assistant
Department of Computer Science, Johns Hopkins University
Fall 2024

Haptic Interface Design EN 530.491/691, Teaching Assistant
Department of Mechanical Engineering, Johns Hopkins University

Fall 2023

Introduction to Augmented Reality EN 601.454/654, Course Assistant
Department of Computer Science, Johns Hopkins University

Fall 2023

Publications

I have (first/co)-authored 2/1 journal articles, 0/4 conference papers, and 1/0 preprints, and I am an inventor on 2 patents or patent applications in process. My publication list is also available on Google Scholar.

Peer-reviewed Journal Articles

[J-3]. **H. Zhang***, B. Killeen*, Y.-C. Ku, L. Seenivasan, Y. Zhao, M. Liu,Y. Yang, S. Gu, A. Martin Gomez, R.H. Taylor, G. Osgood, M. Unberath. "Straight-Track: Towards Mixed Reality Navigation System for Percutaneous K-wire Insertion," *Wiley Health Technology Letters*, 2024.
Special Issue: *Augmented Environments for Computer Assisted Interventions (AE-CAI) 2024*

[J-2]. B.D. Killeen*, **H. Zhang***, L. Wang, Z. Liu, C. Kleinbeck, M. Rosen, R.H. Taylor, M. Unberath. "Stand in Surgeon's Shoes: Virtual Reality Cross-training to Enhance Teamwork in Surgery," *International Journal of Computer Assisted Radiology and Surgery*, 2024.
Special Issue: *Information Processing in Computer-Assisted Interventions (IPCAI) 2024*
Audience vote for **long oral** presentation at IPCAI'24.
Finalist for **Best Paper Award** at IPCAI'24.

[J-1]. C. Kleinbeck, **H. Zhang**, B.D. Killeen, D. Roth, M. Unberath. "Neural Digital Twins: Reconstructing Complex Medical Environments for Spatial Planning in Virtual Reality," *International Journal of Computer Assisted Radiology and Surgery*, 2024.
Special Issue: *Information Processing in Computer-Assisted Interventions (IPCAI) 2024*
Audience vote for **long oral** presentation at IPCAI'24.
Honored with the **Bench-to-Bedside Award** at IPCAI'24.

Peer-reviewed Conference Papers

[C-4]. H. Ding, L. Seenivasan, H. Shu, G. Byrd, **H. Zhang**, P. Xiao, J. Barragan, R. H. Taylor, P. Kazanzides, M. Unberath. "Towards Robust Automation of Surgical Systems via Digital Twin-based Scene Representations from Foundation Models" .*COLlaborative Intelligence and Autonomy in Image-guided Surgery (COLAS) 2025*

[C-3]. B.D. Killeen, L.J. Wang, B. Inigo, **H. Zhang**, M. Armand, R.H. Taylor, G. Osgood, M. Unberath. "FluoroSAM: A Language-promptable Foundation

Model for Flexible X-ray Image Segmentation." *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2025.

[C-2]. A. Perez, **H. Zhang**, Y.C. Ku, L. Seenivasan, R. D. Soberanis-Mukul, J. L. Porras, R. Day, J. Jopling, P. Najjar, M. Unberath. "Privacy-Preserving Operating Room Workflow Analysis using Digital Twins," *Medical Imaging with Deep Learning 2025*.

[C-1]. B.D. Killeen, **H. Zhang**, J.E. Mangulabnan, M. Armand, R. Taylor, G. Osgood, M. Unberath. "Pelphix: Surgical Phase Recognition from X-ray Images in Percutaneous Pelvis Fixation," *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2023.
Featured in the **JHU Hub** and Surgery International.

Preprints

[M-1]. **H. Zhang**, L. Seenivasan, J. L. Porras, R. D. Soberanis-Mukul, H. Ding, H. Shu, B.D. Killeen, A. Ghosh, L. Yarmus, M. Ishii, A. C. Argento, M. Unberath. "Did You Just See That? Arbitrary View Synthesis for Egocentric Replay of Operating Room Workflows from Ambient Sensors." *arXiv preprint*, 2025, arXiv:2510.04802.