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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

**Selected Awards**

9. **Finalist, Best Paper Award**      2026  
    For paper [J-5] at IPCAI 2026.
8. **Finalist, Best Paper Award**      2026  
    For paper [J-4] at IPCAI 2026.
7. **Bench-to-Bedside Award**      2024  
    For paper [J-1] at IPCAI 2024.
6. **Finalist, Best Paper Award**      2024  
    For paper [J-2] at IPCAI 2024.
5. LCSR Fellowship for Outstanding Incoming Ph.D. Students      2024  
    Johns Hopkins University
4. Best Project Award, [Computer Integrated Surgery II](#)      2023  
    Johns Hopkins University
3. Best Project Award, [Haptic Interface Design](#)      2023  
    Johns Hopkins University
2. Excellence in Manufacturing Award      2022  
    University of California, Davis
1. Dean's Honor List, University of California, Davis      2022  
    *Top 16% GPA in College of Engineering*

PUBLICATIONS      I have (first/co)-authored 3/2 journal articles, 0/5 conference papers, and 3/1 preprints, and I am an inventor on 2 patents or patent applications in process. A detailed list is available below and on [Google Scholar](#).

**Peer-reviewed Journal Articles**

- [J-5]. **H. Zhang**, Y. Shen, R. D. Soberanis-Mukul, A. Ghosh, H. Ding, L. Seenivasan, J. L. Porras, Z. Mao, C. Li, W. Xiao, L. Yarmus, A. C. Argento, M. Ishii, M. Unberath. “TwinOR: Photorealistic Digital Twins of Dynamic Operating Rooms for Embodied AI Research” Accepted at *International Journal of Computer Assisted Radiology and Surgery*, 2026.  
 Special Issue: *Information Processing in Computer-Assisted Interventions (IPCAI) 2026*  
 Audience vote for **long oral** presentation at IPCAI’26.  
 Finalist for **Best Paper Award** at IPCAI’26.
- [J-4]. B Inigo, S Kim, S.M. Cho, M. Song, **H. Zhang**, A. Uneri, C. Bailey, A. Krieger, M. Ishii, M. Unberath. “Vision-based Augmented Reality Guidance for Setting Up Robot-Assisted Spine Surgery” Accepted at *International Journal of Computer Assisted Radiology and Surgery*, 2026.  
 Special Issue: *Information Processing in Computer-Assisted Interventions (IPCAI) 2026*  
 Finalist for **Best Paper Award** at IPCAI’26.
- [J-3]. **H. Zhang\***, B.D. Killeen\*, Y. C. Ku, L. Seenivasan, Y. Zhao, M. Liu, Y. Yang, S. Gu, A. Martin Gomez, R.H. Taylor, G. Osgood, M. Unberath. “StraightTrack: 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. (\*Joint first authors)  
 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-5]. Y. Shen, **H. Zhang**, M. Unberath. “Training LLMs with Reinforcement Learning over Digital Twin Representations for Reasoning-Intensive Surgical VideoQA”. *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2026.

- [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 (MIDL)*, 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-4]. **H. Zhang**\*, B. Yang\*, M. Unberath. “Patient-Specific Articulated Digital Twins from a Single Full-Body CT Scan.” *arXiv*, 2026, arXiv:2607.02156.
- [M-3]. Nelson, N., Chen, J. T., Haworth, J., Chen, X., Zbinden, L., Huang, D., ..., Speidel, S.. “Open-H-Embodiment: A Large-Scale Dataset for Enabling Foundation Models in Medical Robotics.” *arXiv*, 2026, 2607.02156.
- [M-2]. **H. Zhang**\*, S. M. Cho\*, J. E. Mangulabnan\*, Z. Mao, Y. He, P. Guo, D. Xu, G. Hager, M. Ishii, M. Unberath. “Humanoid Robots as First Assistants in Endoscopic Surgery.” *arXiv*, 2026, arXiv:2602.24156. (\*Joint first authors)
- [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*, 2025, arXiv:2510.04802.

### 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

TALKS AND  
PRESS

**Invited Talks and Posters**

- [P-5]. Physics and AI-Driven Digital Twins, **Selected Poster** 06/2026  
Hamlyn Symposium on Medical Robotics, UK  
*“Digital Twin Virtual Reality Training for Central Line Dressing Change”*
- [P-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”*
- [P-3]. IEEE World Haptics Conference 07/2023  
Delft, Netherlands  
*“3D Hapkit: 3-degree-of-freedom (DOF) Haptic Device using a Delta Parallel Mechanism”*
- [P-2]. LCSR Industry Day 04/2023  
Johns Hopkins University, USA  
*“PelvisVR: Recreating Pelvic Trauma Surgery in Virtual Reality”*
- [P-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**

- [P-3]. Our humanoid surgical-assistant robot work [M-2] was featured in *The Baltimore Banner*.
- [P-2]. Our work [J-2] and [J-1] were featured in a [JHU Computer Science News](#) article on the IPCAI 2024 conference.
- [P-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](#).

SERVICE

**Conference Reviewer**

- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

- International Conference on Information Processing in Computer-Assisted Interventions (IPCAI)
- International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)