Hanchen David Wang

PhD Student in Computer Science

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Professional Experience

2025–Present **PhD Software Engineering Intern**, Google, Mountain View, CA

- Architected an end-to-end autonomous agent to accelerate debugging by automating the root cause analysis of internal server failures. The agent intelligently triages issues by processing complex performance and reliability logs from large-scale benchmarking systems, significantly reducing manual effort for engineering teams.
- Engineered a novel LLM-driven engine that transforms unstructured log text into structured, analyzable data. This core component interprets natural language descriptions from engineers to generate regex-based rules on the fly, enabling the agent to precisely detect known failure signatures and identify previously unseen performance bottlenecks.
- Designed and implemented a scalable Human-in-the-Loop (HITL) feedback system to ensure the agent's continuous evolution. This workflow allows domain experts to validate, refine, and approve the agent's findings on new failures, automatically incorporating them as few-shot learning examples to progressively enhance the model's diagnostic accuracy over time.

2022–Present **Research Assistant**, Vanderbilt University, Nashville, TN

- Researched activity recognition using deep learning methodologies, focusing on enhancing the quality assessment of exercises through Explainable Artificial Intelligence (XAI) techniques.
- Supervised and collaborated with a team of 4-5 undergraduate students on the development of a mobile application, primarily focusing on the application's data visualization and segmentation features, and research on human activity recognition (HAR) techniques.
- Worked closely with the team to promote an effective learning environment, fostering innovation and encouraging the application of theoretical concepts in a practical setting.

2023–Present **Teaching Assistant - AI Courses**, Vanderbilt University, Nashville, TN

- Assisted in teaching an intro to AI course and an AI in Cyber Physical System (CPS) course in the fall and spring semesters.
- Presented works in human activity recognition (HAR) and SOTA methods, and works that are being utilized.
- Graded homework and assignments such as a summary of papers and projects of AI in episodic or sequential environments with fully observable environments.
- Hosted at least 2 hours of office hours weekly to offer support to students with homework and understanding of the coursework.

2021–2022 **Teaching Assistant - Operating Systems**, Vanderbilt University, Nashville, TN

- Assisted in teaching an operating system course, which had approximately 100 students per semester, using the C programming language.
- Graded around 11 homework assignments each semester, ensuring a thorough understanding of each student's abilities and offering personalized feedback to enhance their learning experience.
- Hosted at least three hours of office hours per week to offer academic support to students, help with homework, and provide clarification on course content.
- Refined course slides and materials to better aid students' understanding of operating system concepts and practices.
- Conducted surveys and interviews to better understand how to improve course materials and facilitate students' learning experiences.

2019–2020 **Undergraduate Grader**, University of California, Irvine, Irvine, CA

- Designed and developed extensive test cases for command-line programs, Bash-like shell, and dynamic memory allocator, and client/server network programming in C.
- Collaborated with the professor and a team of 2 graders to design C programming assignments that could be programmatically tested with the auto-grader.
- Assisted students 1-on-1 with debugging programs and understanding test case failures.

2019–2019 **Information Services Intern**, St. Jude Children Research Hospital, Memphis, TN

- Developed Single Sign-On project using Agile & Waterfall development cycles and researched Active Directory Federation Service applications for authentication.
- Implemented idP-initiated SSO with Angular framework as frontend and Node.js as backend server to process SAML assertion from ADFS. Deployed the application on Tomcat to test the Active Directory by using SecureAuth.
- Optimized the application with MIT-Licensed NPM plugin for SAML 2.0, samlify, to establish connectivity with Active Directory over Node.js.

Education

2021–2026 **Dual Program of Master's and Ph.D. in Computer Science (Ongoing)**, Vanderbilt University, Nashville, TN

Advisor: Meiyi Ma. Representation Learning in DL, Open Source Imaging, HCI, Internet of Medical Things

2017–2021 **Bachelor of Science in Computer Science, Magna cum Laude (top 6%) GPA: 3.89**, University of California, Irvine, Irvine, CA

Research Experience

2024–Present **Explainable AI for First-Person Video Segmentation in Nursing Simulations**, Collaborators: Daniel Levin, Gautam Biswas, Alyssa White

- Developing explainable AI methods to analyze video segments from Tobii Glasses' first-person perspective during nursing simulation training sessions
- Designed an unsupervised segmentation method optimized for processing long videos efficiently
- Focused on interpretable models to link gaze dynamics with task performance and learning outcomes

2024–Present **IMU-Guided Segmentation and Sampling for Video Classification**, Collaborators: Meiyi Ma

- Creating an IMU-guided method to enhance classification accuracy and efficiency in multimodal data
- Improved Temporal Segment Networks by incorporating motion-based insights for better frame selection

2024–2024 **Continual Multitask Learning**, Collaborators: Meiyi Ma

- Developed a Continual Multitask Learning framework, addressing challenges in continual multitask learning without requiring replay buffers

2023–2024 **Star-based Reachability Verification for Targeted and Robust XAI**, Collaborators: Meiyi Ma, Taylor Johnson, Diego Manzanas Lopez

- Led development of framework to evaluate comprehensiveness of attribution methods
- Utilized Neural Network Verification (NNV) to analyze boundaries of sampling-based attribution methods
- Designed experiments showcasing method's robustness in providing deterministic explainability

2023–2024 **EXACT: A Meta-Learning Framework for Precise Exercise Segmentation in Physical Therapy**, Collaborators: Meiyi Ma

- Led development of EXACT, a novel method for segmenting exercises within multivariate time series data using PyTorch
- Designed U-Net architecture with temporal positional encoding for exercise phase identification
- Conducted extensive experiments demonstrating superiority over traditional segmentation techniques
- Developed modular Python framework for easy replication and experimentation

2022–2023 **MicroXercise: A Micro-Level Comparative and Explainable System for Remote Physical Therapy**, Collaborators: Meiyi Ma, Pamela Wisniewski

- Led development of MicroXercise integrating Siamese Neural Networks with saliency maps
- Designed Siamese Neural Network for similarity determination and attribution scoring
- Incorporated saliency map techniques for explainability across modalities
- Conducted mixed-methods study with interviews, surveys, and quantitative analysis

2021–2022 **PhysiQ: Off-Site Quality Assessment of Exercises in Physical Therapy**, Collaborators: Meiyi Ma

- Led development of PhysiQ framework for continuous tracking of off-site exercise activity
- Designed multi-task spatiotemporal Siamese Neural Network for quality assessment
- Collected and annotated data for 31 participants with varying exercise quality levels
- Achieved 89.67% detection accuracy and 0.949 R-squared correlation in similarity comparison

Publications

2025 **Wang, Hanchen David**, Liu, Yilin, Fu, Haowei, Mason, Madison Lee, Li, Fanjie, Wise, Alyssa, Levin, Daniel T, Biswas, Gautam, Ma, Meiyi. *SmartSeg: A Non-Parametric Approach for Smart Glass Video Segmentation.* MobiSys, March 2025, Prepare for Submission.

2025 **Wang, Hanchen David**, Khan, Nibraas, Ghosh, Ritam, Tauseef, Mahrukh, Mion, Lorraine, Ma, Meiyi, Sarkar, Nilanjan. *Decoding Human Motion: A Scoping Review of Explainable AI Methods in Movement Analysis.* IMWUT, May 2025, Under Review.

2025 **Wang, Hanchen David**, Robinette, Preston K., Lopez, Diego Manzanas, Oguz, Ipek, Johnson, Taylor T., Ma, Meiyi. *ReachX: Abstraction-based Reachability Verification for Targeted and Robust eXplainable AI.* JAIR, May 2025, Under Review.

2025 **Wang, Hanchen David**, Bae, Siwoo, Chen, Zirong, Ma, Meiyi. *Learning with Preserving for Continual Multitask Learning.* AAAI, July 2025, Prepared for Submission.

2024 Cohn, Clayton, Davalos, Eduardo, Vatral, Caleb, Fonteles, Joyce, **Wang, Hanchen David**, Ma, Meiyi, Biswas, Gautam. *Multimodal Methods for Analyzing Learning and Training Environments: A Systematic Literature Review*. ACM Computing Surveys, August 2024, Under Review.

2024 **Wang, Hanchen David**, Bae, Siwoo, Sun, Xutong, Thatigotla, Yashvitha, Ma, Meiyi. *EXACT: A Meta-Learning Framework for Precise Exercise Segmentation in Physical Therapy*. International Conference on Cyber-Physical Systems (ICCPS), November 2024, Accepted.

2024 Lopez, Diego Manzanas, Liu, Han, **Wang, Hanchen David**, Moyer, Daniel, Ma, Meiyi, Johnson, Taylor T., Oguz, Ipek. *Robustness Certification of Semantic Segmentation of Multiple Sclerosis Lesions*. Medical Imaging, August 2024, Under Revision.

2024 **Wang, Hanchen David**, Khan, Nibraas, Chen, Anna, Sarkar, Nilanjan, Wisniewski, Pamela, Ma, Meiyi. *MicroXercise: A Micro-Level Comparative and Explainable System for Remote Physical Therapy*. Connected Health: Applications, Systems and Engineering Technologies (CHASE), March 2024, Published.

2023 Robinette, Preston K., **Wang, Hanchen David**, Shehadeh, Nishan, Moyer, Daniel, Johnson, Taylor T.. *SUDS: Sanitizing Universal and Dependent Steganography*. Proceedings of the 26th European Conference on Artificial Intelligence (ECAI), September 2023, Published.

2022 **Wang, Hanchen David**, Ma, Meiyi. *PhysiQ: Off-Site Quality Assessment of Exercise in Physical Therapy*. Proc. ACM Interact. Mob. Wearable Ubiquitous Technol., December 2022, Published.

Skills

Programming	Python, Java, C/C++, JavaScript, TypeScript, Swift
Frameworks	PyTorch, TensorFlow, Angular, Node.js, React
Tools	Git, Docker, LaTeX, Unity
Domains	Machine Learning, Deep Learning, Computer Vision, Healthcare AI, Explainable AI