Vanderbilt University
Nashville, TN, USA

Hanchen David Wang

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EDUCATION

Vanderbilt University **Nashville, TN** **Aug 2021 – May 2026 (Expected**

- Dual Program of Master's and Ph.D. in Computer Science (Ongoing), advised by Meiyi Ma
- **Highlighted Coursework:** Representation Learning in DL, Open Source Imaging, HCI, Internet of Medical Things

University of California, Irvine **Irvine, CA** **Aug 2017 – Jun 2021**

- Bachelor of Science in Computer Science, Magna cum Laude (top 6%) GPA: 3.89

Professional Experience

PhD Software Engineering Intern **Mountain View, CA** **May 2025 – Aug 2025**

Google

- 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.

Research Assistant **Nashville, TN** **May 2022 – Present**

Vanderbilt University

- 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.

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

Vanderbilt University

- 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.

Teaching Assistant - Operating Systems **Nashville, TN** **Aug 2021 – May 2022**

Vanderbilt University

- 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.

Undergraduate Grader **Irvine, CA** **Sep 2019 – Jun 2020**

University of California, Irvine

- 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.

Information Services Intern **Memphis, TN** **Jun 2019 – Aug 2019**

St. Jude Children Research Hospital

- 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.

Research Experience

BEAGLE: Behavioral Explanation via Agent Graph Learning Aug 2025 – Present

Collaborators: Meiyi Ma

- Developing a novel framework to make AI tutors both interpretable and verifiable through behavioral explanation
- Created a synthetic dataset with ground truth knowledge states and action labels for educational AI agent evaluation
- Implementing LTL-based Verification for formal checking of pedagogical properties using Linear Temporal Logic
- Constructing temporal graphs from educational dialogues and employing Graph Attention Networks to predict and explain tutor actions
- Verifying whether action sequences satisfy formal pedagogical specifications to ensure responsible deployment in learning environments

Explainable AI for First-Person Video Segmentation in Nursing Simulations Jul 2024 – Mar 2025

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

IMU-Guided Segmentation and Sampling for Video Classification Feb 2024 – Dec 2024

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

Learning with Preserving for Continual Multitask Learning Jan 2024 – Oct 2024

Collaborators: Meiyi Ma

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

Towards Verified and Targeted Explanations through Formal Methods Sep 2023 – May 2024

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

EXACT: A Meta-Learning Framework for Precise Exercise Segmentation in Physical Therapy May 2023 – Jun 2024

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

MicroXercise: A Micro-Level Comparative and Explainable System for Remote Physical Therapy Aug 2022 – May 2023

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

PhysiQ: Off-Site Quality Assessment of Exercises in Physical Therapy Aug 2021 – May 2022

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

[1] **Wang, Hanchen David**, Cohn, Clayton, Xu, Zifan, Guo, Siyuan, Biswas, Gautam, Ma, Meiyi. *BEAGLE: Behavioral Explanation via Agent Graph Learning*. TBD, 2025 (In Preparation).

[2] **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*. Pervasive and Mobile Computing, 2025 (Under Review).

[3] **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. Pervasive and Mobile Computing, 2025 (Under Review).

[4] **Wang, Hanchen David**, Robinette, Preston K., Lopez, Diego Manzanas, Oguz, Ipek, Johnson, Taylor T., Ma, Meiyi. *Towards Verified and Targeted Explanations through Formal Methods*. JAIR, 2024 (Major Revision).

[5] **Wang, Hanchen David**, Bae, Siwoo, Chen, Zirong, Ma, Meiyi. *Learning with Preserving for Continual Multitask Learning*. AAAI, 2025 (Accepted (Oral)).

[6] 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, 2024 (Under Review).

[7] **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), 2024 (Published).

[8] 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, 2024 (Under Revision).

[9] **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), 2024 (Published).

[10] 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), 2023 (Published).

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

Leadership and Service

Mentor, Students Projects **Nashville, TN** **Aug 2021 – Present**

Vanderbilt University

- 2025–Present: Mentoring undergraduate Daniel Park on extension work for ICCPS 2025.
- 2025–Present: Mentoring undergraduate Selena Xu on GENIUS project for explainable and responsible AI.
- 2024–2025: Mentored master's student Yiling Liu and undergraduates Haowei Fu and Christin Ann Sanchez on "SmartSeg: A Non-Parametric Approach for Smart Glass Video Segmentation," an event segmentation project for a nursing training simulation.
- 2024–2025: Mentored undergraduate Haoran (Max) Ma on an IMU-guided video classification project to improve model accuracy.
- 2024–2025: Mentored undergraduate Siwoo Bae on "Learning with Preserving for Continual Multitask Learning," focused on preserving representational space in continual learning. The work was presented at the Vanderbilt Undergraduate Research Fair, earning a poster award.
- 2022–2024: Mentored undergraduate Xutong (Helen) Sun and Yashvitha Thatigotla on "EXACT: A Meta-Learning Framework for Precise Exercise Segmentation in Physical Therapy."
- 2022–2023: Mentored undergraduates Anna Chen on projects in iOS app development, Unity visualization, and data analysis for micro-level exercise explainability, notably "MicroXercise: A Micro-Level Comparative and Explainable System for Remote Physical Therapy."
- 2021–2022: Mentored undergraduates David Atwood and Melissa Wang on "PhysiQ: Off-Site Quality Assessment of Exercise in Physical Therapy."

Volunteer, Mission Autonomy Hackathon **Nashville, TN** **Oct 2025 – Oct 2025**

Vanderbilt University & AWS

- Assisted with student organization and coordination for the Mission Autonomy Hackathon.
- Helped manage logistics and location setup for the hackathon event.
- Supported participants and organizers throughout the event.

Volunteer, PhD Orientation Talk **Nashville, TN** **Aug 2025 – Aug 2025**

Vanderbilt University

- Delivered a talk sharing personal PhD experience and insights with incoming graduate students.
- Provided guidance and advice to new students about navigating the PhD journey.
- Answered questions about research, coursework, and academic life at Vanderbilt.

Volunteer, NSF CPS PI Meeting **Nashville, TN** **Mar 2025 – Mar 2025**

Vanderbilt University

- Volunteered approximately 4-6 hours during the Principal Investigators meeting.
- Assisted with the setup for the poster and demonstration sessions.
- Provided guidance to presenters and attendees during these sessions.
- Helped with troubleshooting technical issues during the poster and demo sessions.

Graduate Honor Council Panelist **Nashville, TN** **Feb 2024 – Feb 2025**
Vanderbilt University
- Acted as a panelist to understand and justify the accused student and his/her innocence towards Vanderbilt School Honor Codes.
- Reviewed the materials of the accused, student and accusers, instructors to capture the full story of the situation and discussed the potential violation of the honor code at graduate school level.

Volunteer, IEEE/ACM CHASE **Wilmington, DE** **Jun 2024 – Jun 2024**
IEEE/ACM
- Worked around 10 hours in total for the period of 3 days at the conference; helped at the registration desk to guide conference participants and to distribute conference materials.
- Communicated and introduced the general guideline and schedules; organized the poster sessions for clarification of locations, materials gathering, and assistance of troubleshooting.

Volunteer, Graduate Student Recruitment Day **Nashville, TN** **Mar 2024 – Mar 2024**
Vanderbilt University
- Toured the new student body to different departments and building on campus at Vanderbilt University.
- Communicated and introduced the research works at Institute for Software Integrated Systems at Vanderbilt University.
- Discussed the experiences and future directions with faculties and new recruits.

Volunteer, SmartComp 2023 **Nashville, TN** **Jun 2023 – Jun 2023**
IEEE
- Provided volunteer support during the SmartComp 2023 conference for four days.
- Organized posters, provided guidance to presenters, and assisted with running errands.
- Assisted in organizing presentations and panels, ensuring smooth transitions and timely schedules.
- Collaborated with the conference team to create a positive and engaging environment for attendees.
- Contributed to the overall success of the conference by fulfilling various volunteer responsibilities.

Awards
- **2025 NSF CPS Rising Stars:** Selected to participate (17% acceptance rate) for the NSF Cyber-Physical Systems Rising Stars Workshop at Vanderbilt University, recognizing research excellence and academic leadership potential.
- **IEEE/ACM CHASE 2024 NSF Travel Award (Grant):** Honored for research excellence and presentation in Wilmington, Delaware. Received the NSF Travel Award, acknowledging the high esteem of the accepted paper.
- **Vanderbilt Awards for Doctoral Discovery (VADD):** Awarded for research excellence and presentation in Wilmington, Delaware, at Vanderbilt University.
- **ICCPS 2024 NSF Travel Grant:** Recognized for research excellence to travel to Hong Kong to further develop research skill in the domain of Cyber-Physical System.
- **UbiComp/ISWC 2023 Travel Grant:** Recognized for the research work and presented at Cancun, Mexico for accepted paper.
- **Vanderbilt University Travel Grant:** Recognized for the research work in the intersection of physical therapy and AI, traveling to present the work in 2023.
- **Magna Cum Laude:** Recognized for academic excellence by Donald Bren School of Information and Computer Science at UC Irvine.
- **Specialization in Intelligent Systems:** Achieved specialization through dedicated coursework and projects at UC Irvine.
- **Dean's Honor List:** Consistently maintained high GPA to be recognized on the Dean's List at UC Irvine.

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