

Xiwei Xuan

Assistant Professor, Department of Computer Science
Virginia Commonwealth University

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Academic Appointments and Education

Assistant Professor of Computer Science , Virginia Commonwealth University	Richmond, VA	Present
Ph.D. in Computer Science , University of California, Davis	Davis, CA	2026
M.S. in Electrical Engineering , Washington University in St. Louis	St. Louis, MO	2020
B.S. and M.S. in Electrical and Computer Engineering , Harbin Institute of Technology	Harbin, China	2018

Research Interests

My research lies at the intersection of **artificial intelligence**, **computer vision**, and **data analytics**, advancing **responsible and efficient AI scaling across heterogeneous modalities and diverse applications**. I design efficient learning algorithms, AI-aided data analytics, and collaborative multi-modal/multi-agent systems that improve **model trustworthiness**, **data quality**, and **AI adaptability**, fostering practical AI systems that can reason, interact, and generalize for real-world benefit.

Keywords: machine learning, computer vision, AI, data analytics, multi-modality, foundation model, data science

Selected Research Experience

Assistant Professor (tenure eligible) <i>Virginia Commonwealth University</i>	Aug 2026 - Present
Research Focus: Artificial intelligence, computer vision, multimodal learning, and reliable AI systems.	
Visiting Scholar <i>Johns Hopkins University</i>	June 2025 - September 2025
Research Focus: Visual geometry, model perception, 3D reconstruction, embodied AI.	
Research Intern <i>Bosch Center for Artificial Intelligence (BCAI), Robert Bosch LLC</i>	June 2022 - March 2024
Research Focus: Model and dataset validation for AI trustworthiness and multi-modal data quality.	
Graduate Student Researcher <i>University of California, Davis</i>	Sep 2020 - Jun 2026
Research Focus: Learning algorithms and data analytics for AI efficiency, reliability, and real-world applications.	

Awards

ICCV 2025 Highlight Paper , link	2025
Excellence in Graduate Student Research Award , UC Davis CoE News CS News	2025
Highly Helpful Reviewer , ACM UIST	2024
Outstanding Master's Thesis Award	2018
Outstanding Graduate Student Award	2018
First Prize Academic Scholarship (Awarded twice, top 1 among 111 students)	2017 & 2018
Outstanding Student Leader Award	2014

Contribution to Awarded Grants (Total \$13.49 million)

- [G1] *Tachyon: Intelligent Multi-Scale Modeling of Distributed Resilient Infrastructure and Workflows for Data Intensive HEP Analyses*. DOE (ASCR), DE-SC0024580. PI: Christopher D. Carothers; Lead Co-PI: Kwan-Liu Ma. (2023 – 2028). \$7,500,000.00.
- Contributed to one of four threads, proposing AI-driven research and methods for the diagnosis of hidden issues in large-scale data and machine learning models.
- [G2] *III: Small: Communicating and Resolving Ambiguity in Collaborative Visual Analytics*. NSF, 2427770. PI: Kwan-Liu Ma. (2024 – 2027). \$599,997.00.
- Contributed to two directions related to learning algorithms and data analytics for scientific research and public health, proposing techniques and plans for designing interactive and intelligent visualization.
- [G3] *The National Center for Interventional Biophotonic Technologies (NCIBT)*. NIH, P41-EB032840. PI: Laura Marcu; Co-PI: Kwan-Liu Ma. (2022 – 2027). \$5,213,247.00.
- Contributed to the computing thread, proposing research direction, techniques, and plans for supporting endoscopic surgery with computer vision, learning, and data analytical methods.

- [G4] *Structuring and Visualizing Semantic Information in Machine Maintenance Logs based on Domain Ontology*. NIST (National Institute of Standards and Technology), 2021-NIST-MSE-01. PI: Kwan-Liu Ma. (2021 – 2022). \$89,505.00.
- Contributed to one of two threads regarding the trustworthiness of AI systems, including the background and research plan on explainable AI, visualization, and data analytics techniques for technical language processing.
- [G5] *Technical Language Processing and Visualization for Machine Maintenance Logs*. NIST (National Institute of Standards and Technology), 2020-NIST-MSE-01. PI: Kwan-Liu Ma. (2020 – 2021). \$89,505.00.
- Contributed to the development and evaluation plan of data analytical and machine learning methods.

Peer-Reviewed Publications

- [J1] Jieneng Chen, Tiezheng Zhang, **Xiwei Xuan**, Ju He, Yifan Yin, Haujun Shi, Suyu Ye, Xinyi Li, Ruisheng Yuan, Tianming Shu, and Alan Yuille. “Fast Generative DeOcclusion for Visual Geometry and Robotics.” *Proc. of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Findings*, 2026.
- [J2] Kaiyuan Liao, **Xiwei Xuan**, Tanwi Mallick, Kevin Brown, Christopher D. Carothers, and Kwan-Liu Ma. “Evaluating Forecasting Techniques for Hardware Errors on a Large-scale HPC System.” *MODA Workshop at ISC 2026*.
- [J3] Zili Wang, **Xiwei Xuan**, and Kwan-Liu Ma. “Surgical Visualization with Real-Time Endoscopic Scene Reconstruction and Functional Imaging Overlay.” *Proc. of the IEEE International Symposium on Biomedical Imaging (ISBI)*, 2026.
- [J4] **Xiwei Xuan***, Ziquan Deng*, Kwan-Liu Ma, and Zhaodang Kong (**equally contributed*). “A Reliable Anomaly Detection Framework in Time Series with Human-in-the-Loop.” *ACM Transactions on Interactive Intelligent Systems (TiiS)*, 2026. [paper](#), [arXiv](#).
- [J5] **Xiwei Xuan**, Ziquan Deng, and Kwan-Liu Ma. “ReME: A Data-Centric Framework for Training-Free Open-Vocabulary Segmentation.” *Proc. of the IEEE/CVF International Conference on Computer Vision (ICCV)*, 2025. 🏆 **ICCV Highlight**. [paper](#), [video](#), [conf page](#).
- [J6] **Xiwei Xuan**, Xiaoqi Wang, Wenbin He, Jorge Piazentin Ono, Liang Gou, Kwan-Liu Ma, and Liu Ren. “VISTA: A Visual Analytics Framework to Enhance Foundation Model-Generated Data Labels.” *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, 2025. [paper](#), [video](#).
- [J7] **Xiwei Xuan**, Jorge Piazentin Ono, Liang Gou, Kwan-Liu Ma, and Liu Ren. “AttributionScanner: A Visual Analytics System for Metadata-Free Data-Slicing Based Model Validation.” *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, 2025. [paper](#), [video](#).
- [J8] Xinyuan Yan, **Xiwei Xuan**, Jorge Piazentin Ono, Jiajing Guo, Vikram Mohanty, Shekar Arvind Kumar, Liang Gou, Bei Wang, and Liu Ren. “VISLIX: An XAI Framework for Validating Vision Models with Slice Discovery and Analysis.” *Computer Graphics Forum (CGF) Journal (also EG/VGTC EuroVis)*, 2025. [paper](#), [arXiv](#).
- [J9] Divyanshu Malik, **Xiwei Xuan**, and Kwan-Liu Ma. “Interactive 3D Surgical Scene Reconstruction: An Incremental Training and Monitoring Framework.” *Proc. of the IEEE International Symposium on Biomedical Imaging (ISBI)*, 2025. [paper](#).
- [J10] Kaiyuan Liao, **Xiwei Xuan**, and Kwan-Liu Ma. “Deep Learning for Time Series Forecasting: A Survey of Recent Advances.” *Frontiers of Computer Science*, 2025. [paper](#).
- [J11] **Xiwei Xuan**, Ziquan Deng, Hsuan-Tien Lin, and Kwan-Liu Ma. “SLIM: Spuriousness Mitigation with Minimal Human Annotations.” *Proc. of the European Conference on Computer Vision (ECCV)*, 2024. [paper](#), [supp](#), [arXiv](#), [poster](#), [code](#), [video](#).
- [J12] Xiaoqi Wang, Wenbin He, **Xiwei Xuan**, Clint Sebastian, Jorge Piazentin Ono, Xin Li, Sima Behpour, Thang Doan, Liang Gou, Han-Wei Shen, and Liu Ren. “USE: Universal Segment Embeddings for Open-Vocabulary Image Segmentation.” *Proc. of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024. [paper](#), [supp](#), [video](#).
- [J13] **Xiwei Xuan**, Ziquan Deng, Hsuan-Tien Lin, and Kwan-Liu Ma. “SUNY: A Visual Interpretation Framework for Convolutional Neural Networks from a Necessary and Sufficient Perspective.” *Proc. of the XAI4CV Workshop at the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024. [paper](#), [supp](#), [video](#).
- [J14] **Xiwei Xuan***, Xiaoyu Zhang*, Alden Dima, Thurston Sexton, and Kwan-Liu Ma (**equally contributed*). “LabelVizier: Interactive Validation and Relabeling for Weakly-Supervised Technical Text Annotations.” *Proc. of the IEEE PacificVis*, 2023. [paper](#).

- [J15] **Xiwei Xuan**, Xiaoyu Zhang, Oh-Hyun Kwon, and Kwan-Liu Ma. “VAC-CNN: A Visual Analytics System for Comparative Studies of Deep Convolutional Neural Networks.” *IEEE Transactions on Visualization and Computer Graphics* (also *Proc. of the IEEE PacificVis*, 2022.) [paper](#), [code](#), [video](#).

Patents

- [P1] **Xiwei Xuan**, Jorge Piazzentin Ono, Liang Gou, and Liu Ren. “Visual Analytics Framework for Explainable Data Slicing-Based Model Validation.” US Patent App. [18/524,021](#).
- [P2] **Xiwei Xuan**, Xiaoqi Wang, Wenbin He, Jorge Piazzentin Ono, and Liu Ren. “Visual Analytics System for Enhancing Foundation Model-Generated Multi-modal Data Labels.” U.S. Patent Pending Approval.
- [P3] Xiaoqi Wang, Wenbin He, **Xiwei Xuan**, Clint Sebastian, Jorge Piazzentin Ono, Xin Li, Sima Behpour, Thang Doan, and Liu Ren. “Universal Segment Embeddings for Open-Vocabulary Image Segmentation.” U.S. Patent Pending Approval.
- [P4] **Xiwei Xuan**, Weizhe Xu, and Jinxiang Wang. “Adaptive Pixel Prediction Algorithm Using Bidirectional Analysis.” Patent No. ZL201710612069.X.
- [P5] Weizhe Xu, **Xiwei Xuan**, Fangfa Fu, and Jinxiang Wang. “Portable and Accurate Intra-Frame Image Prediction Algorithm.” Patent No. ZL2017106111614.7.

Teaching

Instructor: CMSC 697 Human-AI Interaction) syllabus	Fall 2026
Virginia Commonwealth University	Richmond, VA
Co-Instructor: ECS 289H Explainable and Responsible AI (Graduate-level) syllabus	Fall 2025
University of California, Davis	Davis, CA
Instructor: ECS 171 Machine Learning (Undergraduate-level) syllabus , eval Eval. Score: 9.6 / 10.0	Summer 2024
University of California, Davis	Davis, CA
Teaching Assistant: ECS 140A Programming Languages (Undergraduate-level) Eval. Score: 4.4 / 5.0	Spring 2022
University of California, Davis	Davis, CA
Teaching Assistant: ECS 32C Data Structure in C (Undergraduate-level) eval Eval. Score: 4.3 / 5.0	Winter 2021
University of California, Davis	Davis, CA
Guest Instructor: ECS 273 Visual Analytics (Graduate-level)	Winter 2023
University of California, Davis	Davis, CA
Guest Instructor: ECS 272 Information Visualization (Graduate-level)	Fall 2022
University of California, Davis	Davis, CA

Student Mentoring

Name	Degree	Student Inst. (Intern)	Outcome	Term
Ziquan Deng	Ph.D.	UC Davis	[J4], [J13]	2023 – 2026
Hsiao-Ying Lu	Ph.D.	UC Davis (Chase)	Paper under review	2025 – 2026
Yu-Chia Huang	Ph.D.	UC Davis (Argonne National Laboratory)	Paper under review	2024 – 2025
Zili Wang	Master	UC Davis (Microsoft)	Master thesis, [J3]	2025 – 2026
Kaiyuan Liao	Master	UC Davis (Argonne National Laboratory)	[J2], [J10]	2024 – Present
Divyanshu Malik	Master	UC Davis	[J9]	2023 – 2024
Matthew Ward	Undergraduate	UC Davis	Undergraduate project	2025 – 2026
Yuhua Huang	Undergraduate	UC Santa Cruz	Undergraduate project	2025 – 2025

Talks

“Advancing AI Scaling towards the Open World: Efficiency, Responsibility, and Adaptability.” <i>Computer Science Colloquium at the University of Arizona. Tucson, Arizona.</i>	Nov 2025
“VISTA: A Visual Analytics Framework to Enhance Foundation Model-Generated Data Labels.” <i>IEEE VIS 2025. Vienna, Austria.</i>	Nov 2025
“AttributionScanner: A Visual Analytics System for Metadata-Free Data-Slicing Based Model Validation.” <i>IEEE VIS 2025. Vienna, Austria.</i>	Nov 2025
“Empowering AI with Human Insight: Advancing Data-Centric and Responsible AI for Real-World Impact.” <i>Women in Tech Global Conference 2025. Virtual.</i>	May 2025
“Towards Interactive 3D Surgical Scene Reconstruction: an Incremental Training and Monitoring Framework.” <i>IEEE ISBI. Houston, Texas.</i>	Apr 2025
“LabelVizier: Interactive Validation and Relabeling for Weakly-Supervised Technical Text Annotations.” <i>IEEE PacificVis 2023. Seoul, South Korea.</i>	Apr 2023
“VAC-CNN: A Visual Analytics System for Comparative Studies of Deep Convolutional Neural Networks.” <i>IEEE PacificVis 2022. Virtual.</i>	Apr 2022

Selected Media Coverage

Women in Tech Global Conference 2025. link	May 2025
Matt Marcure and Jessica Heath, “Meet the Recipients of the 2025 Graduate Student Excellence Awards.” link	May 2025
Matt Marcure, “College Honors CS Graduate Student for Excellence in Research.” link	May 2025

Service

Co-chair

Agentic AI4SE Track at IEEE SANER 2027 [official listing](#), [homepage](#)

Co-organizer

1st Embodied Spatial Reasoning Workshop at ICCV 2025 [official listing](#), [homepage](#)

Reviewer

IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)

Neural Information Processing Systems (NeurIPS)

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)

IEEE/CVF International Conference on Computer Vision (ICCV)

European Conference on Computer Vision (ECCV)

Association for the Advancement of Artificial Intelligence (AAAI)

ACM Conference on Human Factors in Computing Systems (CHI)

IEEE VIS

ACM Symposium on User Interface Software and Technology (UIST) 🏆 **Highly Helpful Reviewer, 2024**

IEEE Transactions on Image Processing (TIP)

IEEE Transactions on Information Forensics & Security (T-IFS)

ACM Transactions on Knowledge Discovery from Data (TKDD)

British Machine Vision Conference (BMVC)

IEEE Pacific Visualization Symposium (PacificVis)

Scientific Reports

IEEE International Symposium on Biomedical Imaging (ISBI)

Visual Informatics

Computational Visual Media Journal (CVMJ)

ACM Conference on Designing Interactive Systems (DIS)

ACM Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutomotiveUI)

Extracurricular Activities & Leaderships

Volunteer , Animal Protective Association (APA), St. Louis	2020 - 2021
President of the University's Student Union	2013 - 2014
Volunteer , Children's Autism & Rehabilitation Center	2012 - 2014
Gold Medal , Youth Art Competition of Shaanxi Province	2007
Swimming Athlete , National Youth Games , ranked 6 th in breaststroke	2007