

# Chenrui Ma

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Irvine, California - 92612, USA

## OBJECTIVE

Seeking a PhD position focused on generative and understanding models for real-world data (images, videos, 3D, and multi-modality). Motivated to address challenges in generation, understanding, reasoning, efficiency, and fairness. Aiming to contribute to innovative projects at the intersection of generative algorithms/models and practical problem-solving in domains such as scientific research and industrial applications.

## EDUCATION

- **University of California, Irvine** September 2025 – June 2026  
Irvine, California, USA  
*Master of Science in Computer Science (Networked Systems)*
  - GPA: 4.00 / 4.00
- **University of California, Irvine** September 2024 – June 2025  
Irvine, California, USA  
*Joint Education Student (UCI 3+2 Engineering program) in Computer Science*
  - GPA: 3.92 / 4.00
- **Central South University** September 2021 – June 2024  
Changsha, Hunan, China  
*Bachelor of Science in Computer Science*
  - Grade: 86.8%, Rank: Top 35%

## EXPERIENCE

- **Trustworthy ML/AI Group @ UCI [🌐]** September 2024 – Present  
Irvine, California, USA  
*Research Assistant*
  - Developed advanced algorithms and models for generative modeling, understanding, and reasoning, with applications in computer vision and vision-language models.
  - Proposed novel generative theory/algorithms for efficiency (one-step generation, multi-stage generation).
  - Designed methods to address challenges of fairness in generative models and representation learning.
- **Teaching Assistant @ UCI** January 2026 – March 2026  
Irvine, California, USA  
*Paid*
  - Assist the professor with teaching and grading, and organize course discussions.
- **Oak Ridge National Laboratory [🌐]** May 2025 – Present  
Oak Ridge, Tennessee, USA  
*Student Collaborator (remote)*
  - Engineered generative and understanding models with a focus on improving efficiency and performance.

## PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION

- [C.1] Chenrui Ma, et al. (2025). **CAD-VAE: Leveraging Correlation-Aware Latents for Comprehensive Fair Disentanglement**. Accepted by AAAI 2026 main track.
- [C.2] Xi Xiao, Chenrui Ma, et al. (2025). **PROBE: Self-Supervised Visual Prompting for Cross-Domain Road Damage Detection**. Accepted by WACV 2026.
- [C.3] Yingrui Ji, Chenrui Ma, et al. (2025). **CIBR: Cross-modal information bottleneck regularization for robust clip generalization**. In ICANN 2026, pp. 247–259. Springer. 2025.
- [S.1] Chenrui Ma, et al. (2025). **Learning Straight Flows: Variational Flow Matching for Efficient Generation**. Submitted to CVPR 2026.
- [S.2] Chenrui Ma, et al. (2025). **Stochastic Interpolants via Conditional Dependent Coupling**. Submitted to ICLR 2026.
- [S.3] Chenrui Ma, et al. (2025). **Beyond Editing Pairs: Fine-Grained Instructional Image Editing via Multi-Scale Learnable Regions**.
- [S.4] Xi Xiao, Chenrui Ma, et al. (2025). **Prompting Vision Foundation Models with Cascaded Semantics**. Submitted to CVPR 2026.
- [S.5] Xi Xiao, Chenrui Ma, et al. (2025). **Not All Directions Matter: Toward Structured and Task-aware Low-Rank Adaptation for Large-scale Model**. Submitted to ACL 2026.
- [S.6] Zhuxuanzi Wang, Chenrui Ma, et al. (2025). **CTR-LoRA: Curvature-Aware and Trust-Region Guided Low-Rank Adaptation for Large Language Models**. Submitted to ICASSP 2026.
- [J.1] Ding, Yingchao, Chenrui Ma, et al. (2024). **SCS-YOLO: a defect detection model for cigarette appearance**. *Electronics*, 13(18): 3761.
- [J.2] Huang, Yueming, Chenrui Ma, et al. (2024). **Dense Object Detection Based on De-Homogenized Queries**. *Electronics*, 13(12): 2312.

## PROJECTS

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- **One-Step Generation Modeling (Flow/Diffusion)** August 2025 – present (on-going)  
*Tools: Flow/Diffusion theory, Consistency Models, Mathematics*
  - Developed advanced one-step generation theory with proofs and analyses, together with corresponding algorithms and model parameterizations, enabling fast, stable, controllable, and robust one-step generation.
- **Enhance Efficiency and Performance for Generative Modeling (Flow/Diffusion)** June 2025 – September 2025  
*Tools: Flow/Diffusion theory, Autoregressive Models, Mathematics*
  - Proposed multi-stage generation framework with conditional dependent coupling with theoretical proofs and analyses, demonstrating consistency between theoretical predictions and experimental results.
  - Developed novel methods grounded in flow/diffusion theory to enhance efficiency and performance; achieved leading generation results on benchmark tasks, while maintaining scalability in efficient inference.
- **Instruction-driven Image Editing without Editing Pairs** April 2025 – June 2025  
*Tools: Flow/Diffusion theory, Autoregressive Models, Multi-modality Models(CLIP)*
  - Leveraging supervision from VLMs that align textual and visual features, we train a flexible learnable region to localize the editing area and guide the editing process, achieving instruction-consistent image editing.
- **Enhance Fairness in Generative Modeling and Representation Learning** September 2024 – March 2025  
*Tools: VAEs, Representation Learning, Information Theory, Mathematics*
  - Developed a conditional mutual information framework for representation learning, enabling robust and fairness-aware learning, and achieving both fairness and high performance in generative and downstream tasks.

## SKILLS

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- **Programming:** Python (PyTorch), JAX, Java, Matlab, C/C++, Web (HTML, CSS, JavaScript)
- **Mathematical & Statistical Tools:** Generative Methods (Flow/Diffusion, Autoregressive, VAEs, GANs), Algorithms (graduate-level), Information Theory, Linear Algebra
- **DevTool:** Git (version control system), Linux (operating system), Docker (containerization tool), Slurm (cluster management and job scheduling system)

## HONORS AND AWARDS

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- **AAAI-2026 Scholarship** November 2025  
*Singapore*
  - Awarded to students with outstanding academic performance for the year.
- **University-level Second Prize Scholarship (Top 20%)** September 2024  
*Central South University*
- **University-level Third Prize Scholarship (Top 30%)** September 2023  
*Central South University*
- **21st China Undergraduate Mathematical Competition in Modeling** September 2023  
*Changsha, Hunan, China*
  - National Second Prize, Top 15% nationwide.
- **4th National College Student Mathematical Modeling Competition** July 2023  
*Changsha, Hunan, China*
  - National First Prize, Top 5% nationwide.

## ACADEMIC SERVICES

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- **Conference Reviewer:**  
*CVPR 2026, AAAI 2026*
- **Journal Reviewer:**  
*npj Digital Medicine*

## REFERENCES

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1. **Dr. Yanning Shen**  
Associate Professor, Department of EECS  
University of California, Irvine  
Email: yannings@uci.edu  
*Relationship: Advisor, Thesis Supervisor, and Course Instructor*
2. **Dr. Tianyang Wang**  
Assistant Professor, Department of Computer Science  
University of Alabama at Birmingham  
Email: tw2@uab.edu  
*Relationship: Advisor*
3. **Dr. Xiao Wang**  
research staff scientist, the Computational Science and Engineering Division  
Oak Ridge National Laboratory  
Email: wangx2@ornl.gov  
*Relationship: Collaborator*