Zecheng He

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Research Interest

My research focuses on **generative models for image and video**, including diffusion-based and native architectures, with a focus on controllable generation, personalization, and editing.

Education

Princeton University Princeton, NJ
Ph.D. in Electrical and Computer Engineering *Sep. 2015 – Aug. 2021*

Experience

Staff Research Scientist
Meta GenAI *Feb 2023 - Present*

- Personalized image and video generation
  - Tech lead for personalized media generation, including personalized image (*Imagine Yourself*) and video generation (*MovieGen*).
  - Developed Meta's first personalized image generation model. Deployed across multiple Meta products, e.g., MetaAI, Facebook, Instagram, and WhatsApp. First author to the corresponding paper "Imagine Yourself: Tuning-Free Personalized Image Generation".
  - Developed and deployed MovieGen personalized video generation, the first personalized video generation model with reference-image guidance.
- LLama4 native image generation
  - Co-led Llama4 native image generation, with focus on joint pre-training text, vision understanding, and image generation using discrete token.
  - Researched and developed the next generation of the native generation model combining MLLM and diffusion.
- Controllable image generation
  - Model owner of background outpainting diffusion model (*backdrop*). Launched in Instagram and Facebook.
  - Image-to-image pre-train of conditioned diffusion models. Powered various Meta AI's media generation products, e.g. editing, uncropping, and backdrop.

Meta Reality Labs *Sep. 2021 - Jan. 2023*

- Efficient vision models for AR/VR.
  - Developed MetaNet-Det, the family of SoTA efficient single-stage detection models. Launched in Real-time Arvata, AR face-tracking, Instagram Cutout, and LogoDNA detection.
  - Developed efficient VR face-tracking model. Launched to Meta Quest 2.
  - Developed efficient multi-task person understanding model. Launched to Instagram.

Research Intern Mountain View, CA (Remote in Princeton NJ due to COVID-19)
Google Research *May. 2020 – Aug. 2020*

- Multi-modal embedding with user action traces for UI screen understanding and navigation.
- Paper entitled "ActionBert: Leveraging User Actions for Semantic Understanding of User Interfaces" published in AAAI'21.

Machine Learning Engineer Intern Menlo Park, CA
Facebook *May 2019 – Aug. 2019*

- Improved policy-violating ads detection with weighted model training.
- Model deployed across multiple teams.

Research Intern Princeton, NJ
SRI International *Jun. 2017 – Sep. 2017*

- Researched and developed a new learning-based, statistical-test enhanced approach to detect industrial controller abnormal.

Selected Publications

- Feng Liang, Haoyu Ma, **Zecheng He**, Tingbo Hou, Ji Hou, Kunpeng Li, Xiaoliang Dai, Felix Juefei-Xu, Samaneh Azadi, Animesh Sinha, Peizhao Zhang, Peter Vajda, Diana Marculescu, "Movie Weaver: Tuning-Free Multi-Concept Video Personalization with Anchored Prompts", *CVPR*, 2025
- **Zecheng He** as core contributor, "Movie Gen: A Cast of Media Foundation Models", Meta Technical Report, 2024.
- **Zecheng He**, Bo Sun, Felix Juefei-Xu, Haoyu Ma, Ankit Ramchandani, Vincent Cheung, Siddharth Shah, Anmol Kalia, Harihar Subramanyam, Alireza Zareian, Li Chen, Ankit Jain, Ning Zhang, Peizhao Zhang, Roshan Sumbaly, Peter Vajda, Animesh Sinha, "Imagine yourself: Tuning-Free Personalized Image Generation", *arXiv Preprint*, 2024.
- Haochen Zhang, Animesh Sinha, Felix Xu, Haoyu Ma, Kunpeng Li, Zhipeng Fan, Xiaoliang Dai, Tingbo Hou, Peizhao Zhang, Peter Vajda, **Zecheng He**, "Conversational Image Generation: Towards Multi-Round Personalized Generation with Multi-Modal Language Models", *in submission*, 2024
- Mengyi Shan, **Zecheng He**, Haoyu Ma, Felix Xu, Peizhao Zhang, Tingbo Hou, Peter Vjada, Ching-Yao Chuang, "Populate a Scene: Affordance-Aware Human Video Generation", *in submission*, 2024
- Xu Ma, Peize Sun, Haoyu Ma, Hao Tang, Chih-Yao Ma, Jialiang Wang, Kunpeng Li, Xiaoliang Dai, Yujun Shi, Xuan Ju, Yushi Hu, Artsiom Sanakoyeu, Felix Juefei-Xu, Ji Hou, Junjiao Tian, Tao Xu, Tingbo Hou, Yen-Cheng Liu, **Zecheng He**, Zijian He, Matt Feiszli, Peizhao Zhang, Peter Vajda, Sam Tsai, Yun Fu, "Token-Shuffle: Towards High-Resolution Image Generation with Autoregressive Models", *arXiv Preprint*, 2024.
- Cong Wei, Bo Sun, Haoyu Ma, Ji Hou, Felix Juefei-Xu, **Zecheng He**, Xiaoliang Dai, Luxin Zhang, Kunpeng Li, Tingbo Hou, Animesh Sinha, Peter Vajda, Wenhu Chen, "MoCha: Towards Movie-Grade Talking Character Synthesis", *arXiv Preprint*, 2024.
- Kunpeng Song, Tingbo Hou, **Zecheng He**, Haoyu Ma, Jialiang Wang, Animesh Sinha, Sam Tsai, Yaqiao Luo, Xiaoliang Dai, Li Chen, Xide Xia, Peizhao Zhang, Peter Vajda, Ahmed Elgammal, Felix Juefei-Xu, "DirectorLLM for Human-Centric Video Generation", *arXiv Preprint*, 2024.
- Junjiao Tian, **Zecheng He**, Xiaoliang Dai, Chih-Yao Ma, Yen-Cheng Liu, Zsolt Kira, "Trainable Projected Gradient Method for Robust Fine-tuning", *CVPR*, 2023
- **Zecheng He**, Srinivas Sunkara, Xiaoxue Zang, Ying Xu, Lijuan Liu, Nevan Wichers, Gabriel Schubiner, Ruby Lee, Jindong Chen, "ActionBert: Leveraging User Actions for Semantic Understanding of User Interfaces", *AAAI*, 2021
- **Zecheng He**, Guangyuan He, Ruby Lee, "New Models for Understanding and Reasoning about Speculative Execution Attacks", *HPCA*, 2021
- **Zecheng He**, Tianwei Zhang, Ruby Lee, "Sensitive-sample fingerprinting of deep neural networks", *CVPR*, 2019
- **Zecheng He**, Tianwei Zhang, Ruby Lee, "Model Inversion Attacks Against Collaborative Inference", *ACSAC*, 2019
- **Zecheng He**, Ruby Lee "How secure is your cache against side-channel attacks?", IEEE/ACM International Symposium on Microarchitecture (MICRO), 2017

Selected Awards

Gordon Y.S. Wu Fellowship in Engineering, Princeton University
FutureMakers Challenge 1^{st} place, Siemens
National Scholarship, China
Guo Moruo Scholarship (top 1%), USTC

Professional Service

CVPR, ICCV, ECCV, NeurIPS, ICLR, ICML, AAAI, BMVC

Patents

- Srinivas Kumar Sunkara, Xiaoxue Zang, Ying Xu, Lijuan Liu, Nevan Holt Wichers, Gabriel Overholt Schubiner, Jindong Chen, Abhinav Kumar Rastogi, Blaise Aguera-arcas, **Zecheng He**, "Machine-Learned Models for User Interface Prediction, Generation, and Interaction Understanding", *US Patent 11,789,753*, 2023
- Sek Chai, **Zecheng He**, Aswin Raghavan, Ruby Lee, "Anomalous Behavior Detection in Processor Based Systems", *U.S. Patent 11,481,495*, 2022

Technical Skills

Languages: Python, C, Lua, Java, SQL
Frameworks: Pytorch, Tensorflow