

Changjiang Cai Ph.D.

Research Scientist in CV/ML – Meta, Reality Lab

+1 (201) 912-1947 • changjiangcai2020@gmail.com
www.changjiangcai.com • [in changjiang-cai](https://www.linkedin.com/in/changjiang-cai) • [ccj5351](https://github.com/ccj5351)
[Google Scholar](#) [Research Gate](#) [Stackoverflow](#)

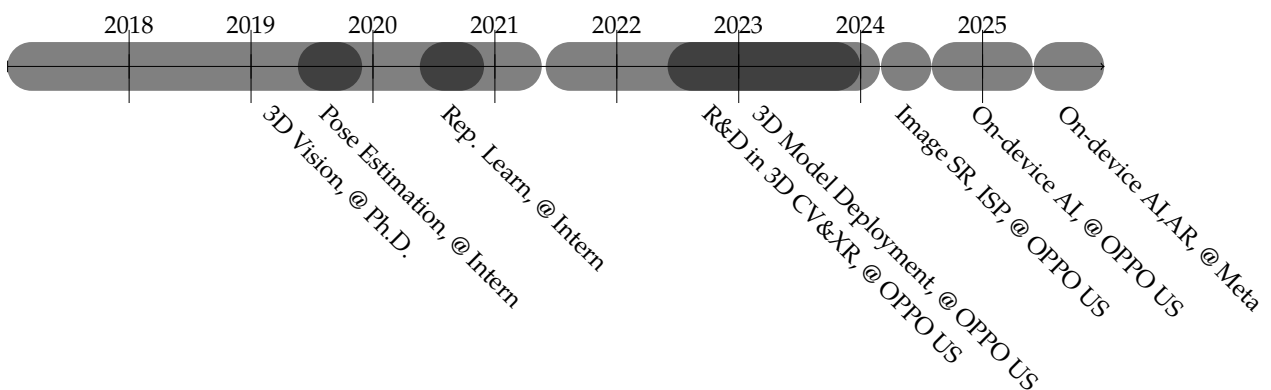
About

I am an Applied Research Scientist at Meta, on the ML Modeling and Optimization team within AR Input & Interaction of Reality Labs, where I focus on R&D in Augmented Reality (AR) for novel human-computer interaction (HCI) and Machine Learning (ML) modeling, optimization, and deployment on wearable devices (Smart Glasses/Watch/Wristband/Phone). Before that, I was a Research Engineer at OPPO US Research, Palo Alto, CA. My work at OPPO spanned from learnable ISP (RAW-to-sRGB) and image/video super-resolution and enhancement for mobile devices, to 3D reconstruction for AR headsets. I earned my Ph.D. in Computer Science from Stevens Institute of Technology, concentrating on depth estimation and 3D reconstruction. My ongoing and future research interests lie at the intersection of 2D/3D vision, on-device AI, and generative AI. My endeavors aim to continually advance the capabilities and applications of computer vision and machine perception technologies, contributing to innovative solutions in AR and HCI.

R&D Keywords.....

- 3D Computer Vision: depth estimation, multi-view stereo, 3D reconstruction, novel view synthesis, spatial intelligence, optical flow, human pose estimation
- 2D Computer Vision: learnable ISP (RAW-to-sRGB), image/video super-resolution and generation (diffusion model)
- On-device AI: ML modeling (CNNs, ViTs, DiTs, etc.), optimization, and on-device deployment (quantization and compression), human-computer interaction (HCI), vision-language models (VLMs) for wearable devices

R&D Timeline.....



Work Experience

- **Full-time** **Meta, New York, NY**
Applied Research Scientist Jun 2025 – Present
- **Full-time** **OPPO US Research, Palo Alto, CA**
Research Engineer Jun 2021 – May 2025
- **Summer intern** **Futurewei Technologies, Inc. Seattle, WA**
Research Intern May 2020 – Aug 2020
- **Summer intern** **UII America, Cambridge, MA**
Research Intern May 2019 – Aug 2019

Education

- **Stevens Institute of Technology** **Hoboken, New Jersey, USA**
Doctor of Philosophy in Computer Science, on May 26, 2021
Thesis: Domain Generalization, Adaptive Filtering and Multi-View Consistency in End-to-End Stereo Matching *Advisor: Philippos Mordohai*
- **Stevens Institute of Technology** **Hoboken, New Jersey, USA**
Master of Engineering in Electrical Engineering, on February 3, 2016
Thesis: Epitome Transform Coding: Towards Joint Compression of a Set of Images *Advisor: Gang Hua*
- **Xi'an Jiaotong University** **Xi'an, Shaanxi, China**
Mechanical Engineering
Research Area: Digital Image Processing. *Advisor: Dehong Yu*
- **Northwestern Polytechnical University** **Xi'an, Shaanxi, China**
B.E. in Automobile Engineering, on July 1, 2009
Thesis: Structural Design and 3D Modeling of an Assistive Robot. *Advisor: Renping Shao*

Project Experience

- 2025.06 - Present **Applied Research Scientist** *Meta*
Projects: **ML modeling and optimization for Wearable Devices**
 - lead the design, development, and optimization of AI models for hand gesture recognition to control Smart Glasses/Watch/Wristband/Phone.
 - conduct research and experiments to improve model accuracy and efficiency
 - deliver optimized language models or other deep learning models to meet device-specific requirements (tradeoff between latency/memory/power and accuracy).
- 2024.04 - 2025.05 **Staff Research Engineer** *OPPO US Research (InnoPeak Tech.)*

Projects: **R&D for Wearable AI Devices**

- develop learnable ISP for RAW to sRGB processing (computational photography).
- develop generative models for image/video generation and super-resolution (via *ViT*, *DiT*).
- drive research and product prototypes for key applications of wearable devices.

○ 2022.11 - 2024.03 **Staff Research Engineer** *OPPO US Research (InnoPeak Tech.)*

Projects: **R&D for XR (VR/AR/MR) applications**

- Developed and deployed deep learning-based depth estimation algorithms on headset devices.
- Optimized models using quantization and pruning techniques, such as Quantization Aware Training (QAT).
- Conducted model conversions for on-device deployment, transitioning algorithms from PyTorch to ONNX to SNPE, optimized for Qualcomm Snapdragon chipsets.

○ 2021.06 - 2022.10 **Senior Research Engineer** *OPPO US Research (InnoPeak Tech.)*
Projects: **cutting-edge research for XR (VR/AR/MR) technologies**

- Conducted a *transformer*-based architecture for Multi-View Stereo (MVS) depth estimation and 3D reconstruction, as detailed in our CVPR'23 paper [RIAV-MVS](#) (See GitHub [Code](#)).
- Developed 3D plane reconstruction techniques via MVS with slanted plane hypotheses, presented in our CVPR'22 paper [PlaneMVS](#) (See GitHub [Code](#)).

○ 2017.01 - 2021.05 **Ph.D. Student Researcher** Stevens Institute of Technology, NJ

Projects: depth estimation and 3D reconstruction via stereo matching

- [DAF-StereoNets](#): Do End-to-end Stereo Algorithms Under-utilize Information? 3DV'20
 - Implemented a pipeline to leverage segmentation cues by mapping image intensities into embeddings, which then generate local attention masks for accurate disparity estimation.
 - Enhanced state-of-the-art stereo matching networks, including DispNetC, GCNet, PSMNet, and GANet, with content-adaptive deep filtering techniques.
 - Implemented the algorithms in PyTorch (See GitHub [Code](#)).
- [MSNets](#): Matching-space Stereo Networks for Cross-domain Generalization 3DV'20
 - Proposed a novel family of end-to-end stereo matching architectures with domain-invariant generalization.
 - Implemented the algorithms in C++/PyThon (See GitHub [Code](#)).
- [CBMV](#): A Coalesced Bidirectional Matching Volume for Disparity Estimation CVPR'18
 - Generated a matching volume by coalescing diverse evidence from a bidirectional matching process via random forest classifiers.
 - Implemented the algorithms in C++/CUDA/PyThon (See GitHub [Code](#)).

○ 2020.05 - 2020.08 **Summer Research Intern** Futurewei Technologies, Inc. Seattle, WA

Project: Self-/Un-supervised Robust Presentation Learning

- Developed methods for self- or unsupervised learning to enhance robust representation, aiming to improve dense predictions across various tasks including semantic segmentation, optical flow estimation, and depth estimation.
- 2019.05 - 2019.08 **Summer Research Intern** UII America, Cambridge, MA
Project: Depth-Aware Human Mesh Recovery
 - Developed a method utilizing RGB-D images to estimate parametric human mesh models.
 - Introduced a dynamic data fusion module to enhance learning by integrating RGB-only and RGB-D datasets effectively.
 - Implemented the algorithm in PyTorch; details of the proposed approach are available in the [ArXiv technical report](#).
- 2015.09 - 2016.10 **Master Student Researcher** Stevens Institute of Technology, NJ
Project: Crowdsourcing: Budget-conscious Ranking by Non-interactive Crowdsourcing
 - Designed a crowdsourced ranking algorithm to generate optimal full rankings from pairwise comparisons within a limited budget.
 - Developed exact and heuristic algorithms to derive the most accurate full ranking based on transitive closure of pairwise preferences.
 - Implemented the algorithms in C++ (See [GitHub Code](#)). Discussed in detail in [ICDCS'17 paper](#).
- 2015.01 - 2015.08 **Master Student Researcher** Stevens Institute of Technology, NJ
Project: Epitome Transform Coding: Towards Joint Compression of a Set of Images
 - Developed epitome transform coding for joint compression of image sets.
 - Proposed a compact yet comprehensive epitome image representation, ensuring each block from the image collection matched a prototype block in the epitome.
 - Implemented the solution in C++ using the FFTW library for optimized convolution (See [GitHub Code](#)).

Academic Services

- **Reviewer for the following conferences:**
 - European Conference on Computer Vision (ECCV, 2024)
 - IEEE/CVF Conf. on Computer Vision and Pattern Recognition (CVPR, 2023,2024,2025)
 - Conference on Neural Information Processing Systems (NeurIPS, 2023,2025)
 - International Conference on Computer Vision (ICCV, 2023,2025)
 - AAAI Conference on Artificial Intelligence (AAAI, 2022,2023,2025,2026)
 - ACM Multimedia Conference (ACMMM, 2020,2021,2022)
 - International Conference on Pattern Recognition (ICPR, 2022)

- International Conference on Multimedia Information Processing and Retrieval (MIPR, 2022)
- **Reviewer for the following journals:**
 - IEEE Transactions on Image Processing (TIP)
 - IEEE Transactions on Multimedia (TMM)
 - International Journal of Computer Vision (IJCV)
 - Springer Multimedia Systems
 - Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- **Teaching Assistant:**
 - CS442 - Database Management Systems, Stevens Institute of Technology, Aug - Dec 2016

Skills

- **Programming Languages:** Python, C/C++, CUDA, Python& C++ Hybrid, MATLAB
- **Deep Learning:** PyTorch, TensorFlow, Keras, Caffe
- **Machine Learning:** OpenCV, Numpy, Scikit-learn, Scipy, Pandas
- **Other Library & APIs:** Cython, Boost C++, Matplotlib
- **Database:** MySQL, PostgreSQL
- **Tools:** Vim, Git, Docker, CMake, Bash, Tmux, MeshLab, Latex
- **OS Platforms:** Linux, macOS, Windows
- **Languages:** English (proficient), Chinese (native)
- **Hobbies:** Basketball, Running, Bicycling, Guitar, Driving for road trip

Publications

Please visit my **Google Scholar** page for additional details.

Published.....

- Xiangyu Xu, Lichang Chen, **Changjiang Cai**, Huangying Zhan, Qingan Yan, Pan Ji, Jun-song Yuan, Heng Huang, Yi Xu. *Dynamic voxel grid optimization for high-fidelity rgb-d supervised surface reconstruction*. In LNCS 2025
- Liyan Chen, Huangying Zhan, Kevin Chen, Xiangyu Xu, Qingan Yan, **Changjiang Cai**, Yi Xu. *ActiveGAMER: Active GAussian Mapping through Efficient Rendering*. In CVPR 2025, Nashville, US, June 2025

- Zheng Chen, Qingan Yan, Huangying Zhan, **Changjiang Cai**, Xiangyu Xu, Yuzhong Huang, Weihang Wang, Ziyue Feng, Yi Xu, Lantao Liu. *PlanarNeRF: Online Learning of Planar Primitives with Neural Radiance Fields*. In ICRA 2025, Atlant, US, May 2025
- Ziyue Feng, Huangying Zhan, Zheng Chen, Qingan Yan, Xiangyu Xu, **Changjiang Cai**, Bing Li, Qilun Zhu, Yi Xu. *NARUTO: Neural Active Reconstruction from Uncertain Target Observations*. In CVPR 2024, Seattle, US, June 2024
- **Changjiang Cai**, Pan Ji, Qingan Yan, Yi Xu. *RIAV-MVS: Recurrent-Indexing an Asymmetric Volume for Multi-View Stereo*. In CVPR 2023, Vancouver, Canada, June 2023
- Mohammed Kutbi, Haoxiang Li, Yizhe Chang, Bo Sun, Xin Li, **Changjiang Cai**, Nikolaos Agadakis, Gang Hua, Philippos Mordohai. *Egocentric Computer Vision for Hands-Free Robotic Wheelchair Navigation*. In Journal of Intelligent & Robotic Systems, 2023
- Jiachen Liu, Pan Ji, Nitin Bansal, **Changjiang Cai**, Qingan Yan, Xiaolei Huang, Yi Xu. *PlaneMVS: 3D Plane Reconstruction from Multi-View Stereo*. In CVPR 2022, New Orleans, LA, June 2022.
- **Changjiang Cai**, Philippos Mordohai. *Do End-to-end Stereo Algorithms Under-utilize Information?* In International Conference on 3D Vision (3DV), 2020.
- **Changjiang Cai**, Matteo Poggi, Stefano Mattoccia, and Philippos Mordohai, *Matching-space Stereo Networks for Cross-domain Generalization*. In International Conference on 3D Vision (3DV), 2020.
- Konstantinos Batsos, **Changjiang Cai**, Philippos Mordohai. *CBMV: A coalesced bidirectional matching volume for disparity estimation*. In CVPR 2018, Salt Lake City, Utah, June 2018.
- **Changjiang Cai**, Haipei Sun, Boxiang Dong, Bo Zhang, Ting Wang, Hui Wang. *Pairwise Ranking Aggregation by Non-interactive Crowdsourcing with Budget Constraints*. The 37th IEEE International Conference on Distributed Computing (ICDCS), June, 2017, Atlanta, GA.
- Haoxiang Li, Mohammed Kutbi, Xin Li, **Changjiang Cai**, Philippos Mordohai, Gang Hua, *An Egocentric Computer Vision based Co-Robot Wheelchair*. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2016.

Patents.....

- Ziyang Wu, Srikrishna Karanam, **Changjiang Cai**, Georgios Georgakis. *Systems and methods for human pose and shape recovery*, US Patent App. 18095857, 2023.

Preprints.....

- Xiangyu Xu, Lichang Chen, **Changjiang Cai**, Huangying Zhan, Qingan Yan, Pan Ji, Jun-song Yuan, Heng Huang, Yi Xu. *Dynamic Voxel Grid Optimization for High-Fidelity RGB-D Supervised Surface Reconstruction*. arXiv:2304.06178, 2023.

- Zhiqi Zhang, Pan Ji, Nitin Bansal, **Changjiang Cai**, Qingan Yan, Xiangyu Xu, Yi Xu. *CLIP-Flow: Contrastive Learning by semi-supervised Iterative Pseudo labeling for Optical Flow Estimation*. arXiv:2210.14383, 2022.
- Ren Li, **Changjiang Cai**, Georgios Georgakis, Srikrishna Karanam, Terrence Chen, Ziyang Wu. *Towards Robust RGB-D Human Mesh Recovery*. arXiv:1911.07383, 2019.