# Bo Guo

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## Education

**Beihang University**, Beijing, China 2023 – Present

*M.Eng.* in Computer Technology Supervisors: Sijia Wen, Academician Zhiming Zheng

**Beihang University & BUCEA**, Beijing, China 2019 – 2023

*B.Eng.* in Computer Science and Technology

## Research Experience

My research interests focus on *neural rendering*, *virtual avatars*, and *dynamic 3D reconstruction*.

### Dynamic Digital Human Reconstruction with Accurate Geometry Extraction 2024 – 2025

*Leader, key contributor* https://superkeaibb.github.io/TGA/

- Led the research on dynamic Gaussian avatars, analyzing the limitations of vanilla 3DGS's projection model and capturing accurate geometric changes under subtle skin tone variations;
- Designed and implemented a novel perspective-aware projection method based on homogeneous representation, along with an incremental mesh extraction and update method based on Gaussian-BVH tree.

### High-Fidelity Dynamic Avatar Reconstruction from Casual Monocular Videos 2025 – Present

*Leader, key contributor,* ***Ongoing***

- Led the research on monocular avatar reconstruction, analyzing the inaccuracy challenges of applying FLAME-guided Gaussians deformation (widely used in multi-view scenarios) to sparse-view settings;
- Designed a novel dynamic Gaussian representation based on spatio-temporal anchors and trajectory segment modeling. Trying to leverage hypergraph data-structure to organize similar motion primitives.

### MetaVerse: Design and Implementation of a Decentralized Metaverse System 2024 – 2025

*Key Contributor* https://deepbpa.readthedocs.io/en/latest/doc/metaverse.html

- Responsible for fine-grained 3D model construction and metaverse scene design;
- Implemented blockchain deployment and on-chain verification using the Chang'an Chain;
- Conducted system integration and testing the metaverse environments across VR devices.

### Polarized Gaussian Splatting for Accurate Geometry in Challenging Regions 2023 – 2024

*Leader, key Contributor* https://superkeaibb.github.io/PolarGS/

- Investigate the limitations of 3DGS in reconstructing areas with unreliable photometric information;
- Designed and utilized the supplementary optical information from polarization to resolve geometric ambiguities of vanilla 3DGS in highly reflective and textureless regions for accurate surface extraction.

### Polarization-Guided Image Enhancement and 3D Extraction in Adverse Weathers 2023 – 2024

*Contributor, National Natural Science Foundation Project*

- Built a fusion device combining depth and polarization cameras, and performed camera alignment;
- Integrated multi-modal cues to recover absolute depth and fine-grained scene geometry via 3DGS;
- Researched and applied surface extraction algorithms suitable for adverse weather conditions.

## Papers

First author of 1 paper at top-tier conference (spotlight), and 1 journal paper currently under review.

- TGA: True-to-Geometry Avatar Dynamic Reconstruction
  **Bo Guo**, Sijia Wen, Ziwei Wang, Yifan Zhao
  *Advances in Neural Information Processing Systems (NeurIPS) 2025,* ***Spotlight***
- PolarGS: Polarimetric Cues for Ambiguity-Free Gaussian Splatting with Accurate Geometry Recovery
  **Bo Guo**, Sijia Wen, Yifan Zhao, Jia Li, Zhiming Zheng
  *IEEE Transactions on Image Processing (TIP) (Under Review)*
- Polarimetric Monocular Gaussian Splatting SLAM for Dense Surface Reconstruction
  Haitao Wang, Sijia Wen, **Bo Guo**
  *ACM International Conference on Multimedia (MM) 2025,* ***Oral***

## Patents

- *High-Precision 3D Surface Reconstruction Method and Device Enhanced by Polarization Information.*
  Sijia Wen, **Bo Guo**, Zhiming Zheng. *(CN119515945A)*
- *Dynamic Gaussian Reconstruction Method and System for Geometrically Realistic Avatars.*
  Sijia Wen, **Bo Guo**, Yifan Zhao, Jia Li. *(Pending)*
- *Polarization-Enhanced 3D Mapping Method, Device, Apparatus, and Medium*
  Sijia Wen, Haitao Wang, **Bo Guo**, Hainan Zhang, Ziwei Wang, Zhiming Zheng. *(CN120823321A)*
- *Digital Identity Authentication Method and Device for Metaverse Information Systems.*
  Sijia Wen, Yicong Zhu, **Bo Guo**, Qianyu Zhang, Hainan Zhang, Zhiming Zheng. *(CN120546923A)*

## Work Experience

**Beihang University**, Teaching Assistant for *Mixed Reality* Sept 2024 – Jan 2025

- Assisted the professor with course design and preparation of teaching materials, including designing and refining lecture slides and project assignments; guided students during lab sessions with engineering debugging; and supported the deployment and verification of VR/AR devices.

**Beijing Sport University**, Intern of 3D Computer Vision May 2024 – Sept 2024

- Participated in the custom reconstruction of the volleyball court; performed 3D registration and skeleton-based motion reconstruction of volleyball players using sparse-view videos; and used skeleton information to guide 4DGS rendering optimization to improve novel view synthesis.

## Scientific Research Honors

*First Prize*, Postgraduate Academic Scholarship, Beihang University (**Top 5%**) Oct 2025
*National Second Prize*, 3rd Goertek Cup National VR/AR Challenge Finals (**Top 10%**) Jul 2025
*University Third Prize*, 35th Fengru Cup Innovation Competition Main Track (**Top 20%**) Jun 2025

## Skills

- Coding: Proficient in C/C++, Python, Java, with extensive experience in C programming
- 3D vision: Unity, Blender, Pytorch, Pytorch3D, Open3D, CGAL
- Maths: Good mathematical background through multiple math courses (Mathematical analysis, advanced algebra, matrix theory, probability theory etc.)
- Lauguages: Mandarin Chinese (native), English (CET6:500)