Dingbang Huang

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Research Interest

My research interests focus on the intersection of **3D Computer Vision**, **Computer Graphics** and **Robotics**. including human-object/scene interaction (HOI/HSI), 3D reconstruction, physics-based character animation, humanoid whole-body control, and visual generative modeling. I am specifically interested in **3D & Physics-Based Human-Object Interactions** (HOI) and its potential application in humanoid whole-body loco-manipulation. My goal is to develop a data flywheel for human-object interactions that facilitates large-scale learning from internet visual data and enables embodied agents like digital humans and humanoid robots to autonomously interact with their surroundings as humans do.

Education

Shanghai Jiao Tong University Shanghai, China

Major in **Physics**, Minor in **Computer Science and Technology** Sept. 2022 - Present

Overall GPA: 3.99, Average score: 91.66, **Rank: 2/30** (Major), 4/116 (Department)

Selected Courses

Data Structure (97), Design and Analysis of Algorithm (97), Computer System Architecture (97), Numeric Analysis and Scientific Computing (97), Discrete Mathematics (96), Computational Physics (95), Equations of Mathematical Physics (95)

Publications

Recovering Physically Plausible Human-Object Interactions from Monocular Videos

Dingbang Huang, Etienne Vouga, Qixing Huang, Georgios Pavlakos.

Submitted to *IEEE/CVF Conference on Computer Vision and Pattern Recognition 2026* ***(CVPR 2026)***

PSDiffusion: Harmonized Multi-Layer Image Generation with Layout and Appearance Alignment

Dingbang Huang, Wenbo Li, Yifei Zhao, Xinyu Pan, Chun Wang, Yanhong Zeng, Bo Dai.

IEEE/CVF Winter Conference on Applications of Computer Vision 2026 ***(WACV 2026)****. Round 1 Accept (****top 6.5%****)*

Reconstructing In-the-Wild Open-Vocabulary Human-Object Interactions

Boran Wen, Dingbang Huang, Zichen Zhang, Jiahong Zhou,Jianbin Deng,Jingyu Gong,Yulong Chen,Lizhuang Ma,Yong-Lu Li.

IEEE/CVF Conference on Computer Vision and Pattern Recognition 2025 ***(CVPR 2025)****.*

Memorize My Movement: Efficient Sensorimotor Navigation with Self-motion-based Spatial Cognition

Qiming Liu, Dingbang Huang, Zhe Liu, Hesheng Wang.

IEEE Transactions on Automation Science and Engineering ***(T-ASE)****.*

Research Experience

UT Austin - Department of Computer Science Austin, TX, US

Research Intern – Supervisor: Prof. Georgios Pavlakos and Prof. Qixing Huang June. 2025 - Present

- **Research topic: 3D & physics-based human-object interaction.**
- We propose a simulation-based framework for recovering physically plausible human-object interactions directly from RGB videos, without the need of motion capture, calibrated objects or detailed contact annotations. This framework begins with a kinematic estimation from monocular videos and then refines it through a reinforcement-learning-based (RL) tracking policy trained to reproduce the interaction in a physics simulator.
- To handle the severe noise of kinematic estimates, we introduce a novel adaptive sampling strategy and a dual self-improving mechanism that captures informative motion cues from the noisy kinematic reconstruction and iteratively refines both kinematic and physical states for improved consistency.
- Our method significantly improves physics-aware performances across two standard HOI benchmarks compared to state-of-the-art kinematics-based approaches, and achieves a substantial improvement on the success rate of physical grounding compared to previous physcis-based HOI tracking algorithm.

Shanghai AI Laboratory - Intelligent Digital Creation Group & Embodied AI Center Shanghai, China

Research Intern – Supervisor: Prof. Bo Dai & Dr. Yanhong Zeng Aug. 2024 - Apr. 2025

- **Research topic: Image generation and editing.**
- Proposed a unified diffusion framework for simultaneous multi-layer text-to-image generation.
- Proposed Inter-Layer, a high quality multi-layer RGBA image dataset, with artist-grade alpha mattes and rich, harmonious layer interactions.
- Designed a global-layer interactive mechanism which is composed of a layer cross-attention reweighting module and a partial joint self-attention module. This facilitates layer interactions like spatial layout and visual effects to achieve composite harmony.

Shanghai Jiao Tong University - Machine Vision and Intelligence Group Shanghai, China

Undergraduate Research Intern – Supervisor: Prof. Yong-Lu Li & Prof. Cewu Lu May. 2024 - Feb. 2025

- **Research topic: 3D human-object-interaction reconstruction**
- Designed a novel 3D HOI optimizer based on 3D Gaussian Splatting and contact optimization to reconstruct the spatial interactions between humans and objects from single images.
- Developed a 3DGS-based policy to obtain the contact region between humans and objects.
- Utilized SOTA 3D reconstruction tools to develop a 3D HOI annotation and reconstruction pipeline.
- Built a new and scalable in-the-wild 3D HOI dataset Open3DHOI consisting of 2.5k+ images with rich 2D and 3D annotations.

Shanghai Jiao Tong University - Intelligent Robotics and Machine Vision Laboratory Shanghai, China

Undergraduate Research Intern – Supervisor: Prof. Hesheng Wang Sept. 2023 - May. 2024

- **Research topic: Robotic navigation**
- Developed an efficient memory-enhanced navigation framework called MENEO, which builds spatial cognition of historically explored areas by memorizing the self-movements of mobile robots, thereby eliminating the need to store and process redundant raw scene features as previous methods did.
- Utilize normalized egocentric trajectory map to explicitly model global memory, enhancing both efficiency and interpretability for spatial cognition and develop an adaptive fusion mechanism for different decision-making sources to generate a cognitive policy output for various task and environment settings.

Selected Awards

BOLE Program, SJTU (**TOP 1** undergraduate researcher in every department) 2025
First Prize of Wangban Scholarship, SJTU 2024
Foresight&Sequoia Scholarship for Talent Development, SJTU (**TOP 2** in every department) 2023
Silver Medal Winner in International University Physics Competition 2023
Third Class Scholarship, SJTU 2023
Second Prize in National College Student Mathematics Competition 2023

Skills

Skills Python(Numpy, Pytorch, Diffusers...), Linux, LaTex, Git&Github, C++, Matlab, RISC-V, SQL, IsaacGym, Habitat

Languages English(TOEFL:103 speaking:25), Mandarin(native), Cantonese(native)