Linghao Chen

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Education

2015–2019 **Bachelor in Computer Science and English (dual-degree)**, *Zhejiang University*.
GPA: 89.0/100

2019–Now **Ph.D. in Computer Science**, *Zhejiang University*, Advised by Prof. Xiaowei Zhou.
GPA: 89.9/100

2022–Now **Visiting Ph.D. in Computer Science and Engineering**, *UC San Diego*, Advised by Prof. Hao Su.

Award Experiences

2017 First-class Scholarship of ZJU

2019 Postgraduate Scholarship of ZJU

2021 The Most Academic Value Award of Zhejiang University Doctoral Conference Forum

2021 Second Prize of Artificial Intelligence Innovation Competition

2020 Excellent and Miyoshi Postgraduate

2019 Excellent graduation thesis

2018 Full marks in PAT Level-A

2016,2018 Second-class Scholarship of Zhejiang University

2016 The Third Prize of the National College Student Mathematics Competition

2016 Mathematics Modeling S Prize

Selected Publications

CVPR 2020, TPAMI 2021 **Disp R-CNN: Stereo 3D Object Detection via Shape Prior Guided Instance Disparity Estimation**.

Proposed a 3D object detection pipeline that estimates instance-level disparity maps on individual objects. This design guides the network to learn the category-level object shape prior for better disparity estimation and 3D object detection. Even when LiDAR ground truth is not available at training time, Disp R-CNN outperforms previous state-of-the-art methods by 20% in terms of average precision.

CVPR 2021 (Oral) **NeuralRecon: Real-time Coherent 3D Reconstruction with Monocular Video**.
Proposed the first learning-based pipeline that reconstructs 3D scene geometry from a monocular video in real-time. Unlike previous methods that estimate single-view depth maps and perform TSDF fusion later, NeuralRecon jointly reconstructs and fuses local surfaces directly in the sparse volumetric TSDF representation. This design allows the network to capture local smoothness prior and global shape prior of 3D surfaces, resulting in accurate and coherent surface reconstruction. NeuralRecon generalizes well to new data domains and is able to reconstruct large-scale 3D scenes on a laptop GPU in 33 keyframes per second.

RA-L 2023 **EasyHeC: Accurate and Automatic Hand-eye Calibration via Differentiable Rendering and Space Exploration**.
Introduced a new approach to hand-eye calibration called EasyHeC, which is markerless, white-box, and offers comprehensive coverage of positioning accuracy across the entire robot configuration space. We introduce two key technologies: differentiable rendering-based camera pose optimization and consistency-based joint space exploration, which enables accurate end-to-end optimization of the calibration process and eliminates the need for the laborious manual design of robot joint poses. EasyHeC enhances downstream manipulation tasks by providing precise camera poses for locating and interacting with objects.

NeuRIPS 2023 **One-2-3-45: Any Single Image to 3D Mesh in 45 Seconds without Per-Shape Optimization**.
Proposes a novel method that takes a single image of any object as input and generates a full 360-degree 3D textured mesh in a single feed-forward pass. We first use a view-conditioned 2D diffusion model to generate multi-view images for the input view and then aim to lift them up to 3D space. Our method reconstructs 3D shapes in significantly less time than existing methods. Moreover, our method favors better geometry, generates more 3D consistent results, and adheres more closely to the input image. In addition, our approach can seamlessly support the text-to-3D task by integrating with off-the-shelf text-to-image diffusion models.

NeuRIPS 2023 **OpenIllumination: A Multi-Illumination Dataset for Inverse Rendering Evaluation on Real Objects**.
Introduced OpenIllumination, a real-world dataset containing over 108K images of 64 objects with diverse materials, captured under 72 camera views and a large number of different illuminations. For each image in the dataset, we provide accurate camera parameters, illumination ground truth, and foreground segmentation masks. Our dataset enables the quantitative evaluation of most inverse rendering and material decomposition methods for real objects. We examine several state-of-the-art inverse rendering methods on our dataset and compare their performances.

ICRA 2023 **Perceiving Unseen 3D Objects by Poking the Objects**.
Proposed a novel approach to interactive 3D object perception for robots. Unlike previous perception algorithms that rely on known object models or a large amount of annotated training data, we propose a poking-based approach that automatically discovers and reconstructs 3D objects. The reconstructed objects are then memorized by neural networks with regular supervised learning and can be recognized in new test images. The experiments on real-world data show that our approach could unsupervisedly discover and reconstruct unseen 3D objects with high quality, and facilitate real-world applications such as robotic grasping.

Work Experiences

2018.9–2019.6 **Monitor of Class 1507**, *ZJU*.

2018.12–Now **Technical Secretary**, *GAMES (Graphics And Mixed Environment Seminar)*.
Managing live-streaming of GAMES Webinar and GAMES Courses. Maintainer of the official website and Bilibili account of GAMES.

Skills

Programming	Python, C/C++, JavaScript/HTML/CSS, LaTeX
Library	PyTorch, TensorFlow
English	TEM-4 (Good), TOFEL (103), CET-6 (606)
Designing	Blender, Unity

Service

- Conference reviewer: ICCV, AAAI, SIGGRAPH, IJCAI, IEEE RA-L, ICRA, PRCV, CVM

Publication List

* denotes equal contribution.

Joural Papers

[1] **Linghao Chen***, Jiaming Sun*, Yiming Xie, Siyu Zhang, Qing Shuai, Qinhong Jiang, Guofeng Zhang, Hujun Bao, and Xiaowei Zhou. Shape Prior Guided Instance Disparity Estimation for 3D Object Detection. ***TPAMI***, 2021.

[2] **Linghao Chen**, Yuzhe Qin, Xiaowei Zhou, and Hao Su. Easyhec: Accurate and automatic hand-eye calibration via differentiable rendering and space exploration. ***RA-L***, 2023.

Conference Papers (Peer-reviewed)

[3] Jiaming Sun*, **Linghao Chen***, Yiming Xie, Siyu Zhang, Qinhong Jiang, Xiaowei Zhou, and Hujun Bao. Disp R-CNN: Stereo 3D Object Detection via Shape Prior Guided Instance Disparity Estimation. ***CVPR***, 2020.

[4] **Linghao Chen**, Yunzhou Song, Hujun Bao, and Xiaowei Zhou. Perceiving Unseen 3D Objects by Poking. ***ICRA***, 2023.

[5] Jiaming Sun*, Yiming Xie*, **Linghao Chen**, Xiaowei Zhou, and Hujun Bao. NeuralRecon: Real-Time Coherent 3D Reconstruction from Monocular Video. ***CVPR***, 2021. **Oral presentation** and **Best paper candidate**.

[6] Isabella Liu*, **Linghao Chen***, Ziyang Fu, Liwen Wu, Haian Jin, Zhong Li, Chin Ming Ryan Wong, Yi Xu, Ravi Ramamoorthi, Zexiang Xu, and Hao Su. Openillumination: A multi-illumination dateset for inverse rendering evaluation on real objects. ***NeurIPS***, 2023.

[7] Minghua Liu*, Chao Xu*, Haian Jin*, **Linghao Chen***, Mukund Varma T, Xu Zexiang, and Hao Su. One-2-3-45: Generalizable single image to 3d mesh in 45 seconds. ***NeurIPS***, 2023.

[8] Jiaming Sun*, Yiming Xie*, Siyu Zhang, **Linghao Chen**, Guofeng Zhang, Hujun Bao, and Xiaowei Zhou. You Don't Only Look Once: Constructing-Spatial-Temporal-Memory-for Integrated 3D Object Detection. ***ICCV***, 2021.

[9] Zhiwei Jia, Fangchen Liu, Vineet Thumuluri, **Linghao Chen**, Zhiao Huang, and Hao Su. Chain-of-thought predictive control. *To* ***ICLR***, 2023.