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.
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.
ICCV 2021	**You Don't Only Look Once: Constructing Spatial-Temporal Memory for Integrated 3D Object Detection and Tracking**. Proposed a novel system named UDOLO that simultaneously detects and tracks 3D objects, which uses a dynamic object occupancy map and previous object states as spatial-temporal memory to assist object detection in future frames. This memory, together with the ego-motion from back-end odometry, guides the detector to achieve more efficient object proposal generation and more accurate object state estimation.

Engineering Projects

2018.12	**Real-time 3D object pose estimation for 3D-printed objects**, *SenseTime*. Designed a training pipeline for real-time 3D object pose estimation for 3D-printed objects based on PVNet. Proposed to first perform object detection before applying PVNet, which reached real-time running speed using a GTX 1060 GPU.
2019.2 – 2019.8	**Monocular vehicle orientation estimation and key-point detection**, *SenseTime*. Working on improving the accuracy of vehicle orientation estimation. Implementing MultiBin algorithm which improved the accuracy to 95.81%. Designed a cross-training scheme for training a unified model for orientation estimation and key-point detection using different training sets.

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, IJCAI, SIGGRAPH, PRCV, CVM, IEEE RA-L

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.

Conference Papers (Peer-reviewed)

[2] 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.

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

[4] 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**.

[5] 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.