

Xinshuo Weng

[Personal Website](#) / [Google Scholar](#) / [DBLP](#) / [Semantic Scholar](#) / [GitHub](#) / [Linkedin](#) / [Twitter](#)

Email: xinshuow@cs.cmu.edu

RESEARCH INTERESTS

Fields: Computer Vision, Machine Learning, Robotics, Multimedia

Topics: 3D Computer Vision, Autonomous Driving, Graph Neural Networks, Generative Modeling, Point Cloud Processing, Video Analysis

EDUCATION

Carnegie Mellon University , Ph.D. in Robotics	2018 - Present
Carnegie Mellon University , M.S. in Computer Vision	2016 - 2018
Wuhan University , B.S. in Electrical Engineering	2012 - 2016

INDUSTRY EXPERIENCE

Oculus Research Pittsburgh (now Facebook Reality Lab), Research Engineer	2018
Facebook , Research Intern	2017

AWARDS

FELLOWSHIP AND SCHOLARSHIP AWARDS

Qualcomm Innovation Fellowship , \$100k award, 13 in North America	2020
Google Conference Scholarship	2020
IBM PhD Fellowship nomination, the only nominee at CMU Robotics Institute	2020
Microsoft Research PhD Fellowship nomination, 1 out of 3 at CMU Robotics Institute	2020
Microsoft Research Ada Lovelace PhD Fellowship nomination, 1 out of 3 at CMU Robotics Institute	2019
Google PhD Fellowship nomination, 1 out of 3 at CMU Robotics Institute	2019
University Scholarship, RMB 3k award per year	2013, 2015, 2016
Yang Gui Scholarship, Wuhan University, RMB 3k award	2015
Undergraduate Innovation and Entrepreneurship Fellowship, RMB 8k award	2014, 2015
National Scholarship, RMB 10k award	2014

CONTRIBUTED FUNDING AWARDS

Toyota Research Institute Research Grant, \$1.13 million award	2021 - 2024
NSF, National Robotics Initiative Research Grant, \$860k award	2020 - 2023

ACADEMIC AWARDS

Outstanding Reviewer Award , ACCV 2020	2020
Outstanding Graduate Award, Wuhan University	2016

Updated on January 4, 2021

PUBLICATIONS

JOURNAL PUBLICATIONS

1. Supervision by Registration and Triangulation for Landmark Detection
Xuanyi Dong, Yi Yang, Shi-En Wei, **Xinshuo Weng**, Yaser Sheikh, Shoou-I Yu
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [BibTex](#)

CONFERENCE PUBLICATIONS

2. Learning Shape Representations for Person Re-Identification under Clothing Change
Yu-Jhe Li, **Xinshuo Weng**, Kris Kitani
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2021
[PDF](#) | [BibTex](#)
3. Inverting the Forecasting Pipeline with SPF2: Sequential Pointcloud Forecasting for Sequential Pose Forecasting
Xinshuo Weng, Jianren Wang, Sergey Levine, Kris Kitani, Nick Rhinehart
Conference on Robot Learning (CoRL), 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#) | [Supp](#)
4. 3D Multi-Object Tracking: A Baseline and New Evaluation Metrics
Xinshuo Weng, Jianren Wang, David Held, Kris Kitani
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
5. When We First Met: Visual-Inertial Source Localization for Co-Robot Rendezvous
Xi Sun, **Xinshuo Weng**, Kris Kitani
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020
[PDF](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
6. Single Camera Worker Detection, Tracking and Action Recognition in Construction Site
Hiroaki Ishioka, **Xinshuo Weng**, Yunze Man, Kris Kitani
International Symposium on Automation and Robotics in Construction (ISARC), 2020
[PDF](#) | [BibTex](#)
7. GNN3DMOT: Graph Neural Network for 3D Multi-Object Tracking with 2D-3D Multi-Feature Learning
Xinshuo Weng, Yongxin Wang, Yunze Man, Kris Kitani
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
8. Forecasting Time-to-Collision from Monocular Video: Feasibility, Dataset, and Challenges
Aashi Manglik, **Xinshuo Weng**, Eshed Ohn-Bar, Kris Kitani
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [BibTex](#)
9. Monocular 3D Object Detection with Pseudo-LiDAR Point Cloud
Xinshuo Weng, Kris Kitani
IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, 2019
[PDF](#) | [Code](#) | [Poster](#) | [BibTex](#) | [Supp](#)

10. Learning Spatio-Temporal Features with Two-Stream Deep 3D CNNs for Lipreading
Xinshuo Weng, Kris Kitani
British Machine Vision Conference (BMVC), 2019
[PDF](#) | [Code](#) | [Poster](#) | [BibTex](#)
11. GroundNet: Monocular Ground Plane Normal Estimation with Geometric Consistency
Yunze Man, **Xinshuo Weng**, Xi Li, Kris Kitani
ACM International Conference on Multimedia (ACMMM), 2019
[PDF](#) | [Poster](#) | [BibTex](#)
12. Supervision-by-Registration: An Unsupervised Approach to Improve the Precision of Facial Landmark Detectors
Xuanyi Dong, Shou-I Yu, **Xinshuo Weng**, Shi-En Wei, Yi Yang, Yaser Sheikh
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2018
[PDF](#) | [Code](#) | [Demo](#) | [Slides](#) | [BibTex](#)
13. Rotational Rectification Network: Enabling Pedestrian Detection for Mobile Vision
Xinshuo Weng, Shangxuan Wu, Fares Beainy, Kris Kitani
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2018
[PDF](#) | [Code](#) | [Poster](#) | [Slides](#) | [BibTex](#)

NON-ARCHIVAL PUBLICATIONS

14. AB3DMOT: A Baseline for 3D Multi-Object Tracking and New Evaluation Metrics
Xinshuo Weng, Jianren Wang, David Held, Kris Kitani
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
15. End-to-End 3D Multi-Object Tracking and Trajectory Forecasting
Xinshuo Weng^{*}, Ye Yuan^{*}, Kris Kitani
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
16. Graph Neural Network for 3D Multi-Object Tracking
Xinshuo Weng, Yongxin Wang, Yunze Man, Kris Kitani
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
17. 4D Forecasting: Sequential Forecasting of 100,000 Points
Xinshuo Weng, Jianren Wang, Sergey Levine, Kris Kitani, Nick Rhinehart
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)

MANUSCRIPTS AND PRE-PRINTS

18. Representation Learning for Multi-Target Multi-Camera Tracking via Multi-Head Attention
Yu-Jhe Li, **Xinshuo Weng**, Yan Xu, Kris Kitani
In Submission, 2020
19. Leveraging the Multi-Modality of LiDAR Sensing for 3D Object Detection
Yunze Man, **Xinshuo Weng**, Matthew O'Toole, Kris Kitani
In Submission, 2020

20. Wide-Baseline Multi-Camera Calibration using Person Re-Identification
Yan Xu, Yu-Jhe Li, Xinshuo Weng, Kris Kitani
In Submission, 2020
21. All-In-One Drive: A Large-Scale Comprehensive Perception Dataset with High-Density Long-Range Point Clouds
Xinshuo Weng, Yunze Man, Dazhi Cheng, Jinhyung Park, Matthew O'Toole, Kris Kitani
In Submission, 2020
[PDF](#) | [Code](#) | [BibTex](#)
22. Joint Object Detection and Multi-Object Tracking with Graph Neural Networks
Yongxin Wang, Kris Kitani, Xinshuo Weng
arXiv:2006.13164, 2020
[PDF](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
23. Parallelized 3D Tracking and Forecasting with Graph Neural Networks and Diversity Sampling
Xinshuo Weng*, Ye Yuan*, Kris Kitani
arXiv:2003.07847, 2020
[PDF](#) | [Code](#) | [Website](#) | [BibTex](#)
24. AutoSelect: Automatic and Dynamic Detection Selection for 3D Multi-Object Tracking
Xinshuo Weng, Kris Kitani
arXiv:2012.05894, 2020
[PDF](#) | [Website](#) | [BibTex](#)
25. Deep Reinforcement Learning for Autonomous Driving
Sen Wang, Daoyuan Jia, Xinshuo Weng
arXiv:1811.11329, 2018
[PDF](#) | [BibTex](#)
26. CyLKs: Unsupervised Cycle Lucas-Kanade Network for Landmark Tracking
Xinshuo Weng, Wentao Han
arXiv:1811.11325, 2018
[PDF](#) | [Code](#) | [BibTex](#)
27. Image Labeling with Markov Random Fields and Conditional Random Fields
Shangxuan Wu, Xinshuo Weng
arXiv:1811.11323, 2018
[PDF](#) | [BibTex](#)
28. Visual Compiler: Synthesizing a Pedestrian Pose Estimator from a Single Image
Namhoon Lee, Xinshuo Weng, Vishnu Naresh Boddeti, Yu Zhang, Fares Beainy, Kris Kitani, Takeo Kanade
arXiv:1612.05234, 2016
[PDF](#) | [BibTex](#)

TALKS

INVITED TALKS

CVPR 2021, Keynote Speaker at Workshop on Autonomous Navigation in Unconstrained Environments 2021

CVPR 2021, Keynote Speaker at Workshop on Robust Video Scene Understanding	2021
Computer Vision Talks , Invited Speaker [Slides] [Video]	2020
Wayve, Invited Speaker [Slides]	2020
ECCV 2020, Keynote Speaker at Workshop on Benchmarking Trajectory Forecasting Models [Slides]	2020
CVPR 2020, Keynote Speaker at Scalability in Autonomous Driving Workshop [Slides] [Video]	2020
CMU, Robots Perceiving and Doing Lab [Slides1] [Slides2]	2018

CONTRIBUTED TALKS

ICPR 2020, International Workshop on Pattern Forecasting [Slides] [Video]	2021
CoRL 2020 [Slides] [Video]	2020
CMU, Multidrone Symposium 2020 [Slides]	2020
ECCV 2020, Woman in Computer Vision Workshop [Slides] [Video]	2020
ECCV 2020, Workshop on Benchmarking Trajectory Forecasting Models [Slides] [Video]	2020
ECCV 2020, 4D Vision Workshop [Slides1] [Video1] [Slides2] [Video2]	2020
IROS 2020 [Slides] [Video]	2020
CVPR 2020 [Slides] [Video]	2020
WACV 2018 [Slides]	2018

INTERNAL TALKS

CMU, PhD Speaking Qualifier: 3D Multi-Object Tracking for Autonomous Driving [Slides] [Video]	2020
CMU, Seminar at Klab : Games with Sequential Actions – Extensive Games [Slides]	2019
CMU, Seminar at Klab : Object Detection and Tracking in the 3D World [Slides]	2019
CMU, Seminar at Klab : Interpretability of Machine Learning for Computer Vision [Slides]	2018

SERVICES

ORGANIZING COMMITTEE

Organizer, Workshop on Machine Learning for Autonomous Driving at NeurIPS 2020	2020
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JOURNAL REVIEW

T-PAMI (Transactions on Pattern Analysis and Machine Intelligence)	2020, 2021
Pattern Recognition Letters	2021
T-ITS (Transactions on Intelligent Transportation Systems)	2020
MTA (Multimedia Tools and Applications)	2019
T-CSVT (Transactions on Circuits and Systems for Video Technology)	2018

CONFERENCE REVIEW

CVPR (Conference on Computer Vision and Pattern Recognition)	2018, 2020, 2021
ECCV (European Conference on Computer Vision)	2020
ICCV (International Conference on Computer Vision)	2019
ICLR (International Conference on Learning Representations)	2021
NeurIPS (Conference on Neural Information Processing Systems)	2020
ICML (International Conference on Machine Learning)	2021
AAAI (Association for the Advancement of Artificial Intelligence)	2020, 2021
ICRA (International Conference on Robotics and Automation)	2020, 2021

IROS (International Conference on Intelligent Robots and Systems)	2020
BMVC (British Machine Vision Conference)	2020
WACV (Winter Conference on Applications of Computer Vision)	2020, 2021
ACCV (Asian Conference on Computer Vision)	2018, 2020
IV (Intelligent Vehicles Symposium)	2020

CONFERENCE WORKSHOP REVIEW

CVPR, AI City Challenge	2020
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UNIVERSITY ACTIVITY

Thesis Committee, M.S. in Robotics, Sourish Ghosh	2021
Thesis Committee, M.S. in Robotics, Yunze Man	2021
Research Qualifier Committee, Ph.D. in Robotics, Rawal Khirodkar	2021
Admission Committee, M.S. in Computer Vision, CMU	2019, 2020, 2021

MENTORSHIP

PHD STUDENTS

Rawal Khirodkar (CMU RI PhD)	2020 - Present
Yan Xu (CMU ECE PhD)	2020 - Present
Yu-Jhe Li (CMU ECE PhD)	2020 - Present

MASTER STUDENTS

Yongxin Wang (CMU MSCV, now at Amazon)	2019 - Present
Yunze Man (CMU MSR)	2019 - Present
Jingjing Pan (CMU MSCV, now at Apple)	2020
Dazhi Cheng (CMU MSCS, now at Pony AI)	2020
Xi Sun (CMU MSR, now at Amazon)	2019 - 2020
Aashi Manglik (CMU MSR, now at Apple)	2019
Chunhui Liu (CMU MSCV, now at Amazon)	2019
Kai Yu (CMU MSCV, now at Pony AI)	2018
Zhongxu Wang (CMU MSCV, now at WeRide)	2018

UNDERGRADUATE STUDENTS

Jinhyung (David) Park (CMU Undergraduate)	2020 - Present
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INTERNS / VISITING STUDENTS

Yu-Jhe Li (CMU Intern, now ECE PhD at CMU)	2019 - 2020
Jianren Wang (CMU Intern, now RI Master at CMU)	2019 - 2020
Yunze Man (CMU Intern, now RI MSR at CMU)	2018 - 2019

TEACHING

Guest Lecturer, Computer Vision (16-720), CMU [Slides]	Fall 2020
Teaching assistant, Computer Vision (16-385), CMU	Fall 2019
Teaching assistant, Geometry-Based Methods in Computer Vision (16-822), CMU	Fall 2018