Chen Wang

Project Scientist at Carnegie Mellon University

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Experience

2021–Present **Project Scientist, Robotics Institute**, *Carnegie Mellon University*, Pittsburgh, USA

2019–2021 **Postdoctoral Fellow, Robotics Institute**, *Carnegie Mellon University*, Pittsburgh, USA

2014–2019 **Ph.D., Robotic Perception**, *Nanyang Technological University*, Singapore

2010–2014 **B.Eng., Electrical Engineering**, *Beijing Institute of Technology*, China

Awards

Jun. 2017 **Best Paper Award in robotic planning**, *Non-iterative SLAM*, 2017 18th International Conference on Advanced Robotics (ICAR), Hong Kong

Jun. 2014 **Best Top Ten Projects**, *Chinese Students Innovation Research Projects*, Beijing Institute of Technology, Top 1%

Patents

July. 2019 **Chen Wang***, *Lihua Xie*, *Junsong Yuan*, "Simultaneous Localization and Mapping Methods and Apparatus," July. 2019, US Patent App: 16/329,118

First Author Publications

T-RO **Chen Wang**, *Yuheng Qiu, Wenshan Wang, Yafei Hu, Seungchan Kim, Sebastian Scherer*, "Unsupervised Online Learning for Robotic Interestingness with Visual Memory," *The IEEE Transactions on Robotics (T-RO), 2021*, [PDF][Code]

CVPR 2022 Submitted **Chen Wang**, *Yuheng Qiu, Dasong Gao, Sebastian Scherer*, "Lifelong Graph Learning," Submitted to *Conference on Computer Vision and Pattern Recognition*, [PDF][Code]

- The first practical method for continuously learning graph-structured tasks.
- Convert the problem of node classification into graph classification.
- Construct new graph topology to learn feature interaction.

ECCV 2020 Oral (2%) **Chen Wang**, *Wenshan Wang, Yafei Hu, Yuheng Qiu, Sebastian Scherer*, "Visual Memorability for Interestingness Prediction via Unsupervised Online Learning," *European Conference on Computer Vision (ECCV), 2020*, [Video][PDF][Code]

- Propose long-term, short-term, and online learning architectures for interesting scene recognition.
- Introduce novel visual memory module with translation-invariant reading and sparse writing.

CVPR 2019 Oral (5.6%) **Chen Wang**, *Jianfei Yang, Lihua Xie, Junsong Yuan*, "Kervolutional Neural Networks," *Conference on Computer Vision and Pattern Recognition (CVPR), 2019*, [Codes][PDF]

- Biologically inspired, extend convolution to kernel space, while keep linear complexity.

AAAI 2018 **Chen Wang**, *Le Zhang, Lihua Xie, Junsong Yuan*, "Kernel Cross-Correlator," *AAAI Conference on Artificial Intelligence (AAAI-18)*, Feb. 2018. [Codes] [PDF]

- Break the theoretic limitations of KCF that is only able to predict translation.
- Predict affine transforms with complexity $\mathcal{O}(n \log n)$, e.g. translation, rotation, scale, etc.

ICRA 2018 **Chen Wang***, *Tete Ji*, Thien-Minh Nguyen, Lihua Xie*, "Correlation Flow: Robust Optical Flow Using Kernel Cross-Correlators," *International Conference on Robotics and Automation (ICRA), 2018*, [Video][PDF][Code]

- Reduce the complexity of joint rotation-scale prediction from $\mathcal{O}(n \log n + mn)$ to $\mathcal{O}(n \log n)$.
- Improve accuracy by 50% compared to the state-of-the-art PX4Flow.

IROS 2017 **Chen Wang**, *Handuo Zhang, Thien-Minh Nguyen, Lihua Xie*, "Ultra-Wideband Aided Fast Localization and Mapping System," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 1602-1609, Sep. 2017, [PDF][Code]

- Propose the first UWB-Aided Visual SLAM system, **commercialized** for aircraft inspection..
- Take advantage of local smoothness of visual odometry and global robustness of UWB.

ICAR 2017 Best Paper in Robotic Planning **Chen Wang**, *Junsong Yuan, Lihua Xie*, "Non-Iterative SLAM," *International Conference on Advanced Robotics (ICAR)*, pp. 83–90, July 2017, [Video] [PDF]

- Find the first close-form solution for RGB-D-inertial odometry.
- Achieve real-time performance even on an ultra-low power processor.

Publications as Mentor

RA-L 2021 ICRA Kuan Xu, ***Chen Wang***, *Chao Chen, Wei Wu, and Sebastian Scherer*, "AirCode: A Robust Object Encoding Method," *IEEE Robotics and Automation Letters (RA-L) with ICRA option*, [Code][PDF][Video]

ICRA 2021 Tete Ji, ***Chen Wang***, *Lihua Xie*, "Towards Real-time Semantic RGB-D SLAM in Dynamic Environments," *International Conference on Robotics and Automation (ICRA)*, [PDF]

SMCA 2020 Xu Fang, ***Chen Wang***, *Thien-Minh Nguyen, Lihua Xie*, "Graph Optimization Approach to Range-based Localization," *IEEE Transactions on Systems, Man and Cybernetics: Systems*, 2020, [PDF][Code]

T-CYB 2020 Xu Fang, ***Chen Wang***, *Lihua Xie, Jie Chen*, "Cooperative Pursuit with Multi-Pursuer and One Faster Free-moving Evader," *IEEE transactions on Cybernetics*, 2020, [PDF][Code]

IROS 2020 Han Wang, ***Chen Wang***, *Lihua Xie*, "Online Visual Place Recognition via Saliency Re-identification," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020)*, [PDF][Code][Video]

ICRA 2022 Submitted Yuheng Qiu, ***Chen Wang***, *Wenshan Wang, Mina Henein, and Sebastian Scherer*, "AirDOS: Visual SLAM Benefits from Dynamic Objects," Submitted to *International Conference on Robotics and Automation (ICRA)*, [PDF][Code]

ICRA 2022 Submitted Dasong Gao, ***Chen Wang***, *and Sebastian Scherer*, "AirLoop: Lifelong Loop Closure Detection," Submitted to *International Conference on Robotics and Automation (ICRA)*, [Code][PDF]

CVPR 2022 Submitted Bowen Li, ***Chen Wang***, *Pranay Reddy Anthireddy, Seungchan Kim, and Sebastian Scherer*, "AirDet: Few-Shot Detection without Fine-tuning for Autonomous Exploration," Submitted to *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, [PDF]

CVPR 2022 Submitted Nikhil Keetha, ***Chen Wang***, *Yuheng Qiu, Kuan Xu, Sebastian Scherer*, "AirObject: A Temporally Evolving Graph Embedding for Object Identification," Submitted to *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, [PDF]

Publications as Co-Author

IROS 2021 Han Wang, ***Chen Wang***, *Lihua Xie*, "F-LOAM: Fast LiDAR Odometry and Mapping," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021)*, [Code][PDF]

ICRA 2021 RA-L Han Wang, ***Chen Wang***, *Lihua Xie*, "Intensity-SLAM: Intensity Assisted Localization and Mapping for Large Scale Environment," *International Conference on Robotics and Automation (ICRA)*, [Code][PDF]

ICRA 2021 RA-L Han Wang, ***Chen Wang***, *Lihua Xie*, "Lightweight 3-D Localization and Mapping for Solid-State LiDAR," *International Conference on Robotics and Automation (ICRA)*, [Code][Video][PDF]

ICRA 2020 Han Wang, ***Chen Wang***, *Lihua Xie*, "Intensity Scan Context:Coding Intensity and Geometry Relations for Loop Closure Detection," *International Conference on Robotics and Automation (ICRA)*, [PDF][Code]

ICRA 2018 Thien-Minh Nguyen, *Abdul Hanif Zaini,* ***Chen Wang****, Kexin Guo, and Lihua Xie*, "Robust Target-relative Localization with Ultra-Wideband Ranging and Communication," *International Conference on Robotics and Automation (ICRA), 2018* [PDF]

Projects as Technical Leader

2019–Present **Stochastic Distributed Optimal Dual Control: A Unified Framework for Decentralized Multi-agent Perception and Planning (SDODC)**, *Office of Naval Research (ONR), Department of Defense*, United States, USD $1,855,876

2021–Present **Distributed Lifelong Learning and Inference**, *Army Research Lab (ARL), Department of Defense*, United States, USD $400,000, Prepared the Proposal

2021–Present **Rapid Scouting in Urban Outdoor and Indoor Applications with Multiple Autonomous Air Vehicles**, *Singapore Defense Science and Technology Agency (DSTA)*, USD $1,053,796

2020-2021 **Autonomous Search and Rescue with Multimodal Identification**, *The Air Force, Department of Defense with Perceptronics Solutions Inc.*, United States, USD $100,000

2019–2020 **Staying localized with a 1000 Moving Objects: SLAM in Dynamic Environments**, *Sony Research Award*, USD $100,000

Projects as Principal Investigator (PI)

PI **Lifelong Navigation and Scene Coding for Robots in the Wild**, *Neocortex Allocation under National Science Foundation (NSF) Grant Number 2005597*, United States, 2021

PI In review **Lifelong Navigation and Distributed Scene Coding for Robots in the Wild**, *Amazon Research Awards*, United States, 2021, In Review

Co-PI In review **Multi-Robot Navigation and Distributed Place Embedding**, *Sony Faculty Innovation Award*, United States, 2021, In Review

Students Working with Me

2019–Present **Yafei Hu**, *Third Year PhD Student*, Robotics Institute, CMU, [Page]

2020–Present **Seungchan Kim**, *Second Year PhD Student*, Robotics Institute, CMU, [Page]

2020–Present **Yuheng Qiu**, *First Year PhD Student*, Robotics Institute, CMU, [Page]

2020–Present **Shibo Zhao**, *First Year PhD Student*, Robotics Institute, CMU, [Page]

2021–Present **Siyu Chen**, *First Year PhD Student*, EE, Nanyang Technological University

2020–Present **Dasong Gao**, *Second Year Master Student*, Machine Learning Department, CMU, [Page]

2021–Present **Bowen Li**, *Junior Student*, Robotics Institute Summer Scholars (RISS) at CMU, Tongji University, [Page]

2021–Present **Nikhil Keetha**, *Junior Student*, Robotics Institute Summer Scholars (RISS) at CMU, Indian Institute of Technology, Dhanbad, [Page]

2021–Present **Rishabh Tiwari**, *Junior Student*, Intern at CMU, Indian Institute of Technology, Dhanbad, [Page]

2021–Present **Pranay Reddy**, *Junior Student*, Intern at CMU, Indian Institute of Information Technology, Design and Manufacturing, Jabalpur, [Page]

2021–Present **Jingwei Wang**, *Sophomore*, School of Computer Science (SCS), CMU, [Page]

2021–Present **Xiao Lin**, *Freshman*, Electrical and Computer Engineering, Georgia Institute of Technology

2019–2020 **Yaqian Chen**, *RISS at CMU*, CUHKSZ, Now: Master at Johns Hopkins University, [Page]

Academic Services

RA-L **Associate Editor**, *IEEE Robotics and Automation Letters (RA-L)*

Reviewers **ICRA, IROS, CVPR, ICCV, ICML, NeurIPS, AAAI, Nature Machine Intelligence**