Runsheng Xu

Computer Vision| Deep Learning | Autonomous Driving

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- 3 years of industrial experience and 6 years of research experience in computer vision/autonomous driving
- Publications in **ECCV/ICRA/CoRL/IROS/WACV/ITSC** as the first author
- Participated in several impactful commercialized projects as a core member with 6 US patents
- Developed the most popular frameworks in connected autonomous driving and earned ☆ **1,300 stars** on Github

Skills

Programming	**Python**, **C++**, JAVA
Frameworks	**PyTorch**, **Tensorflow**, TensorRT, SNPE, Andriod NDK
Operation Systems	ROS, Linux, Windows

Education

University of California, Los Angeles Jan. 2021-Sep. 2023 (expected)
Ph.D., Research Field : Autonomous Driving, Transportation Engineering GPA : 4.0
Co-advised by Dr. Jiaqi Ma and Dr. Bolei Zhou

Northwestern University Sep. 2016-Dec.2017
Master of Science, Electrical and Electronics Engineering GPA : 3.81

Illinois Institute of Technology Aug. 2014-May 2016
Bachelor of Science, Electrical Engineering GPA : 3.84

North China Electric Power University Sep. 2012-May 2014
Bachelor of Science, Electrical Engineering GPA:82.19

Work Experience

UCLA Mobility Lab, University of California, Los Angeles — Jan. 2021-Present
Research Assistant

- Developed the first co-simulation (CARLA-SUMO) platform that supports both cooperative driving automation and regular autonomous driving components (e.g., perception, localization, and planning) named OpenCDA→☆ **700 stars**
- Worked on 3D LiDAR Detection, BEV Perception, Vision Transformer and Cooperative Perception for autonomous driving.
  - **Cooperative 3D LiDAR Detection [ICRA2022] :**Created the first large-scale cooperative 3D LiDAR dataset OPV2V and coding framework OpenCOOD, which supports SOTA LiDAR detection backbones and multi-agent visual fusion algorithms.→☆ **300 stars**
  - **Vision Transformer [ECCV2022] :** Proposed a novel Vision Transformer V2X-ViT to efficiently fuse the multi-agent neural features meanwhile handle the most common challenges in V2X communication.→☆ **110 stars**
  - **BEV Perception [CoRL2022] :** Proposed the first the first generic real-time multi-agent multi-camera BEV semantic segmentation framework CoBEVT. It achieves SOTA performance both on nuScenes and OPV2V dataset.

Mercedes-Benz R&D North America, Sunnyvale — Sep. 2019-Dec. 2020
Senior Sensor Fusion/Deep Learning Engineer

- Designed a multi-stage end-to-end convolutional neural network for urban map-less autonomous driving, which takes BEV images as input and outputs road topology directly. It achieved a real-time performance and 2.6 cm accuracy. [Paper Link]
- Proposed a novel occlusion-independent convolutional neural network that utilizes the multi-sensors fused data to predict stop lines reliably. Utilized TensorRT framework in C++ to implement the model on vehicles with a real-time latency AND 26 cm accuracy. [**Commercialized**, Paper Link]

OPPO US R&D, Palo Alto — June 2018-Aug 2019
Computer Vision Engineer

- Developed and embedded an important commercialized feature in OPPO phones that utilized deep learning methods to help users take high perceptual quality photos under extreme low-light conditions.[Product Link, Paper Link]
- Worked on model pruning, quantization and knowledge distillation techniques to improve models' efficiency. Applied Qualcomm Snapdragon Neural Processing Engine framework to migrate models to Android platforms.
- Built a robust 68 face landmarks detection system based on modified Global Supervised Descent Method and created an Android application for demos using Android NDK with 50 fps inference speed on Qualcomm Snapdragon 670 platform. [Patent Link]

Peer-reviewed Publication

[1] **R. Xu**, H. Xiang, Z. Tu, X. Xia, M. Yang J. Ma. "V2X-ViT : Vehicle-to-Everything Cooperative Perception with Vision Transformer."*European Conference on Computer Vision* (**ECCV**), 2022

[2] **R. Xu**, Z. Tu, H. Xiang, J. Ma, B. Zhou "CoBEVT : Cooperative Bird's Eye View Semantic Segmentation with Sparse Transformers" *Conference on Robot Learning* (**CoRL**), 2022

[3] **R. Xu**, H. Xiang, X. Xia, X. Han, J. Li, J. Ma. "OPV2V : An Open Benchmark Dataset and Fusion Pipeline for Perception with Vehicle-to-Vehicle Communication." *IEEE International Conference on Robotics and Automation* (**ICRA**), 2022

[4] **R. Xu**, Z. Tu, Y. Du, X. Dong, J. Li, Z. Meng, J. Ma, A. Bovik, H. Yu. "Pik-Fix : Restoring and Colorizing Old Photo." *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision* (**WACV**), 2023

[5] L. Zhang, F. Tafazzoli, G. Krehl, **R. Xu**, T. Rehfeld, M. Schier, A. Seal. "Hierarchical Road Topology Learning for Urban Mapless Driving." *IEEE/RSJ International Conference on Intelligent Robots and Systems* (**IROS**), 2022

[6] **R. Xu**, S. Zhang, A. Lin, P. Xiong, J. Ma, "Towards Better Driver Safety : Empowering Personal Navigation Technologies with Road Safety Awareness," *IEEE Intelligent Transportation Systems Conference* (**ITSC**), 2022

[7] X. Xia, **R. Xu**, J. Ma, Y. Li. "Secure cooperative localization for connected automated vehicles based on consensus estimation." . *IEEE Internet of Things Journal* (**IOTJ**), 2022

[8] **R. Xu**, Y. Guo, X. Han, X. Xia, H. Xiang, J. Ma. "OpenCDA:An Open Cooperative Driving Automation Framework Integrated with Co-Simulation." *IEEE Intelligent Transportation Systems Conference* (**ITSC**), 2021, **Nearly 1K stars earned on github**

[9] **R. Xu**, F. Tafazzoli, L Zhang, T. Rehfeld, G. Krehl, A. Seal, Holistic Grid Fusion Based Stop line Estimation, International Conference on Pattern Recognition (**ICPR**), 2020

[10] S. Zhang, Y. Zhao, D. Nguyen, **R. Xu**, S. Sen, J. Hester, and N. Alshurafa."NeckSense : A Multi-Sensor Necklace for Detecting Eating Activities in Free-Living Conditions," *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* (**Ubicomp**), 2020, **Best Paper Award**

[11] A. Zang, **R. Xu**, Z. Li, D. "Lane Boundary Extraction from Satellite Imagery," *ACM SIGSPATIAL Workshop on HighPrecision Maps and Intelligent Applications for Autonomous Vehicles* (**AutonomousGIS**), 2017, **Best Paper Award**

Preprints

[1] **R. Xu**, W. Chen, , H. Xiang, X. Xia, L. Liu, J. Ma. "Model-Agnostic Multi-Agent Perception Framework." *arXiv:2203.13168* , 2022

[2] B. Cui, L. Yang, Z. Zhang, S. Hong, **R. Xu**, Y. Zhao, Y. Shao, W. Zhang, Ming-Hsuan Yang. "Diffusion Models : A Comprehensive Survey of Methods and Applications." *arXiv:2209.00796*, 2022

Patent

[1] **Runsheng Xu**, Zibo Meng and Chiu Man Ho. Method and system for facial landmark detection using facial component-specific local refinement

[2] Zibo Meng, **Runsheng Xu**, Jin Pi and Chiu Man Ho. Method and apparatus for image processing, terminal

[3] Zibo Meng, **Runsheng Xu**, and Chiu Man Ho. Method and apparatus for image processing

[4] **Runsheng Xu**, Li Zhang and Timo Rehfeld. Stop-line prediction utilizing fusion map