

YIFU WANG

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Working Experience

ShanghaiTech University & SIMIT

Postdoctoral Researcher

China

Apr. 2021 – Now

Education

Australian National University

Doctor of Philosophy, Engineering and Computer Science

Australia

Mar. 2016 – Nov. 2020

- Advisor: Associate Prof Laurent Kneip and Prof Hongdong Li

Australian National University

B. Eng. Hons Electronics and Communications

Australia

Feb. 2014 – Dec. 2015

Beijing Institute of Technology

B. Eng. Hons Automation

China

Sep. 2011 – Jul. 2015

Research Experience

Extrinsic calibration for multi-perspective cameras

Aug 2021 – Sep 2021

Submitted to ICRA2022

- present a novel closed-form solution for multi-handeye calibration problem
- introduce a practical, simple and accurate extrinsic calibration procedure
- validated on non-overlapping multi-camera systems and outperforms existing solutions

Visual odometry with a Stereo Event-Depth Camera

Aug 2021 – Sep 2021

Submitted to ICRA2022

- generate semi-dense 3d map by using modified time-surface map and depth info
- tracking with 2d-3d alignment strategy
- validated on 6-dof motion estimation case and outperforms regular RGB-D based solutions

Volumetric contrast maximization for event camera

Jan 2020 – Oct 2020

In Submission

- contrast maximization is restricted to a image-to-image warping function
- maximizes the contrast via smooth motion parameters in a volumetric ray density field
- validated on AGV motion estimation case and outperforms regular camera solution

Dynamic event camera calibration

Aug 2020 – Nov 2020

Published paper in IROS 2021

- event camera calibration methods require flashing patterns but difficult to construct or use
- a novel pattern extraction methods and b-spline based multi-segment optimization
- presents a fast and accurate event-based calibration method on regular calibration board

Bundle adjustment for AGV by using b-splines

Jan 2019 – Jun 2020

Published paper in ICRA 2021

- conventional bundle adjustment does not use the kinematic motion constraints of AGV
- uses b-spline parametrization and non-holonomic kinematic constraints in bundle adjustment
- strongly improves accuracy and robustness of monocular visual odometry for AGV

Globally-optimal event camera motion estimation

Jul. 2019 – Apr. 2020

Published paper in ECCV 2020 and T-PAMI 2021

- contrast maximisation framework is non-convex, which is sensitive to the initial guess
- uses Branch and Bound method to solve the global maximisation of contrast functions

- applies to different scenario, and significantly outperforms incremental local refinement

Motion estimation for surround-view camera systems

Dec. 2018 – Jun. 2019

Published paper in ICRA 2020

- a generalized planar motion solver for multiple cameras appears as a gap in the literature
- formulates epipolar geometry as an uni-variate, multi-eigenvalue minimization problem
- presents a highly accurate and reliable motion estimation for surround-view camera systems

Motion estimation for AGV over multiple views

Jul. 2018 – Dec. 2018

Published paper in CVPR 2019

- 1-point Ransac method is restricted to two views and unable to handle line correspondences
- extends the planar tri-focal tensor to multiple views and uses the Ackermann motion model
- outperforms 1-point Ransac when the Ackermann constraint is well fulfilled

Visual odometry for non-overlapping multi-camera systems

Apr. 2016 – Mar. 2017

Published paper in ICVS 2017

- non-overlapping multi-camera systems are easily affected by motion degeneracies that cause scale unobservabilities
- solves scaled translations and point depths through a closed-form, linear initialization approach
- presents a novel initialization method and a complete pipeline for non-overlapping MPC systems

Publications

Y Wang*, W. Jiang*, K. Huang, S. Schwertfeger, L. Kneip, Accurate calibration of multi-perspective cameras from a generalization of the hand-eye constraint, *submit to the 2022 IEEE International conference on robotics and automation (ICRA)* (**co-first author**)

Y. Zuo, J. Yang, J. Chen, X. Wang, **Y Wang**[#] and L. Kneip[#], EDVO: Visual Odometry in Challenging Conditions using a Stereo Event Depth Camera, *submit to the 2022 IEEE International conference on robotics and automation (ICRA)* (**corresponding author**)

Y Wang, J. Yang, X. Peng, P. Wu, L. Gao, K. Huang, J. Chen, and L. Kneip, Visual odometry with an event camera using continuous ray warping and volumetric contrast maximization. *arXiv preprint arXiv:2107.03011*, 2021.

K Huang, **Y Wang** and L Kneip. Dynamic Event Camera Calibration, *In Proceedings of the 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021)*, Sep. 2021.

K Huang, **Y Wang** and L Kneip. B-splines for Purely Vision-based Localization and Mapping on Non-holonomic Ground Vehicles, *In Proceedings of the 2021 IEEE International conference on robotics and automation (ICRA)*, Jun. 2021.

X. Peng, L. Gao, **Y Wang** and L. Kneip. Globally-Optimal Contrast Maximisation for Event Cameras, *In IEEE Transactions on Pattern Analysis and Machine Intelligence*, Jan. 2021.

X Peng*, **Y Wang***, L Gao* and L Kneip. Globally-Optimal Event Camera Motion Estimation. *In Proceedings of the European Conference on Computer Vision (ECCV)*, Aug. 2020. (**co-first author**)

Y Wang, K Huang, X Peng, H Li and L Kneip. Reliable frame-to-frame motion estimation for vehicle-mounted surround-view camera systems. *In Proceedings of the 2020 IEEE International conference on robotics and automation (ICRA)*, Jun. 2020.

K Huang, **Y Wang** and L Kneip. Motion estimation of non-holonomic ground vehicles from a single feature correspondence measured over n views. *In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition(CVPR)*, Jun. 2019.

Y Wang and L Kneip. On scale initialization in non-overlapping multi-perspective visual odometry. *In Proceedings of the International Conference on Computer Vision Systems*, Shenzhen, Jul 2017. **Best Student Paper Award**

Internship and Visiting history

Consultant <i>Stereye Intelligent Technologies</i> <ul style="list-style-type: none">Part-time technical consultant at SLAM Group of Stereye Intelligent Technologies.	Oct. 2020 – Present <i>Shanghai, China</i>
Visiting Researcher <i>ShanghaiTech University</i>	Jul. 2018 – Present <i>Shanghai, China</i>
Intern <i>Motovis Intelligent Technologies</i> <ul style="list-style-type: none">Internship at v-SLAM Group of Motovis Intelligent Technologies.	Jul 2019 –Aug 2019 <i>Shanghai, China</i>

Honors and Awards

Third Prize Winner <i>3rd Innovation and Entrepreneurship Summit of ShhanghaiTech University</i> <ul style="list-style-type: none">Our project “ARGUS.AI: Super vision for machines” won the third prize and 10,000 CNY in startup funds.	Dec 2020
Best Student Paper Award <i>International Conference on Computer Vision Systems 2017</i>	Jul 2017

Peer Reviews

International Conference on Robotics and Automation (**ICRA**) 2020, 2021
Conference on Computer Vision and Pattern Recognition (**CVPR**) 2021 2022
International Conference on Computer Vision (**ICCV**) 2021

Skills

Programming Languages: C/C++, Matlab, TeX
Human Languages: Mandarin, English
Developer Tools: Git, CLion, Matlab, OpenCV, Ceres, ROS, Most MS Office products.
Platforms Tools: Windows, Ubuntu, Mac OS.
General Business Skills: Strong sense of responsibility, good at communication and team work.