

Shaoan Wang

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Education

Peking University

Ph.D. in Advanced Manufacturing and Robotics

- Supervisor: Junzhi Yu (IEEE Fellow)

Beijing, China

Sept. 2021 - Current

Beijing Institute of Technology

B.Eng. in Mechatronics Engineering

- GPA: 90/100
- Rank: 2/40

Beijing, China

Sept. 2017 - Jul. 2021

Research Interests

My current research interests primarily revolve around embodied visual navigation, with a specific focus on multimodal robot perception and navigation, including both event-based and image-based modalities.

In my previous work, I concentrated on achieving high-precision pose estimation for curved surfaces by leveraging fiducial markers, as well as accomplishing 3D vision tasks by fusing frames with event streams.

Publications

JOURNALS

[1] Spatially Compact Visual Navigation System for Automated Suturing Robot Towards Oral and Maxillofacial Surgery

Shaoan Wang, Qiming Zhao, Dongyue Li, Yaoqing Hu, Mingzhu Zhu, Fusong Yuan, Jinyan Shao, Junzhi Yu

IEEE Transactions on Instrumentation and Measurement. 2024

[2] CylinderTag: An Accurate and Flexible Marker for Cylinder-Shape Objects Pose Estimation Based on Projective Invariants

Shaoan Wang, Mingzhu Zhu, Yaoqing Hu, Dongyue Li, Fusong Yuan, Junzhi Yu

IEEE Transactions on Visualization and Computer Graphics (CCF-A). 2024

[3] Accurate Detection and Localization of Curved Checkerboard-like Marker Based on Quadratic Form

Shaoan Wang, Mingzhu Zhu, Yaoqing Hu, Dongyue Li, Fusong Yuan, Junzhi Yu

IEEE Transactions on Instrumentation and Measurement. 2022

PREPRINTS

[4] EF-Calib: Spatiotemporal Calibration of Event-and Frame-Based Cameras Using Continuous-Time Trajectories

Shaoan Wang, Zhanhua Xin, Yaoqing Hu, Dongyue Li, Mingzhu Zhu, Junzhi Yu

arXiv preprint arXiv:2405.17278. 2024

CO-AUTHORS

[5] O²Exp: A Framework of Online Object Exploration in Underwater Environment

Xingyu Chen, Yue Lu, Shaoan Wang, Zhengxing Wu, Junzhi Yu

Under review. 2024

[6] Robust Oral Localization Based on Multicamera Tracking of Self-Identifying Markers

Yaoqing Hu, Mingzhu Zhu, Shaoan Wang, Dongyue Li, Yan Meng, Fusong Yuan, Jinyan Shao, Junzhi Yu

IEEE Transactions on Instrumentation and Measurement. 2024

[7] Accurate and Automatic Dental Crown Components Segmentation With Multi-Scale Attention Based U-Net and Hybrid Level Set Models

Dongyue Li, Mingzhu Zhu, Shaoan Wang, Yaoqing Hu, Fusong Yuan, Junzhi Yu

IEEE Transactions on Automation Science and Engineering. 2024

[8] A Novel Lightweight Navigation System for Oral and Maxillofacial Surgery Using an External Curved Self-identifying Checkerboard

Yaoqing Hu, Mingzhu Zhu, Shaoan Wang, Dongyue Li, Fusong Yuan, Junzhi Yu

IEEE Transactions on Automation Science and Engineering. 2023

[9] A Vision-based Navigation System with Markerless Image Registration and Position-sensing Localization for Oral and Maxillofacial Surgery

Dongyue Li, Mingzhu Zhu, Shaoan Wang, Yaoqing Hu, Fusong Yuan, Junzhi Yu

IEEE Transactions on Instrumentation and Measurement. 2023

Projects

Binary similarity few-shot underwater object detection

Beijing, China

JKW-JCJQ Project

Mar. 2024 - Current

- Aiming at the differences in the distribution of base class and novel class objects in few-shot object detection, the traditional multi-class classification paradigm is replaced by a multiple-binary classification paradigm. A novel binary similarity detector (BSDet) is presented;
- We analyze the characteristics of similarity-based classification head and devise a novel similarity-based head called BSH;
- The FEM is proposed which can effectively increase the feature margin between positive and negative;
- We deployed BSDet on the NVIDIA Jetson NX platform, enabling real-time edge computing on an underwater robot.

Self-identifying visual marker-based navigation system for oral surgery robots

Beijing, China

National Key Research and Development Program of China

Sep. 2021 - Aug. 2023

- Aiming at the limitation of confined space in oral surgery, a flexible visual marker called HydraMarker (TPAMI 2022), which can be directly attached to the robot shell, is designed to possess self-identifying property, and the complete marker can be recovered only by the recognition of partial marker;
- A quadratic-based marker localization algorithm is developed for the curved nature of the robot shell, and the localization accuracy exceeds that of OpenCV in curved environments;
- For the widely existing developable surfaces represented by cylindrical surfaces, a visual marker based on projective invariance called CylinderTag is developed, which provides a new solution for high-precision position estimation of curved objects.

Professional Services

Reviewer IEEE Robotics & Automation Letters, IEEE Transactions on Instrumentation & Measurement, Scientific Reports

Skills

Programming C/C++, Python, MATLAB, 四X

Frameworks OpenCV, PyTorch, Ceres-solver, ROS, Habitat-sim

Miscellaneous Linux, Shell (Bash/Zsh), Git

Honors and Awards (Selected)

2023 **President Scholarship**, Peking University

China

2022 **Merit Student Award**, Peking University

China

2022 **Schneider Electric Scholarship**, Peking University

China

2021 **Weichai Power Scholarship**, Beijing Institute of Technology

China

Languages

Mandarin Native proficiency

English Professional proficiency