QINGWEN XU

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EDUCATION

University of Chinese Academy of Sciences Sep. 2015 - Jun. 2021
& ShanghaiTech University , Shanghai, China
PhD in Communication and Information System
Advisor: Prof. Sören Schwertfeger

Jacobs University, Bremen, Germany May. 2018 - Aug. 2018
Visiting Student
Advisor: Prof. Andreas Birk

Southeast University, Nanjing, China Aug. 2011 - Jun. 2015
B.E. in Communication Engineering, Chien-Shiung Wu College

RESEARCH EXPERIENCE

Rethinking Fourier-Mellin Transform (FMT) in Multi-depth Environment Jan. 2020 - Jan. 2021

· Extend the Fourier-Mellin Transform to work in Multi-depth Environment with respect to translation and scaling such that it can be used for more general robotic applications.

Optimal Experiment Design Based Sensors Calibration Mar. 2020 - Oct. 2020

· Use the optimal experiment design technology to implement self-reflective sensors calibration, which make the robot calibrate the sensors actively.

Improved Visual-Inertial Localization for Low-cost Rescue Robots Oct. 2019 - Dec. 2019

· Detect and isolate abnormal sensors' measurements to improve the localization accuracy.

Pose Estimation for Omni-directional Cameras using Sinusoid Fitting Jan. 2019 - Oct. 2019

· Use the FMT algorithm to find the motion of pixels and fit the motion to sinusoidal functions to calculate the relative pose.

Deep-Sea Localization in Structured Environments Oct. 2018 - Dec. 2018

· Estimate pose based on fast 3D plane registration in deep-sea environment, which can be an alternative and supplement to the marker-based localization.

Pose Estimation for Omnidirectional Images Based on FMT May. 2018 - Sep. 2018

· Use spectral method to find relative motion between each sub-frame cropped from omnidirectional images, then estimate relative poses between two omnidirectional images based on epipolar geometry.

Small-size Rescue Robot May. 2017 - Jul. 2019

· As the team leader, I am mainly responsible for the task allocation and coordination. I lead the team to participate in RoboCup China Open and World Cup for several times.

Multiple Laser Comparison Apr. 2016 - Jul. 2016

· Compare different laser scanners including Hokuyo, Velodyne, Kinect and Faro with respect to quality, size and price.

RESEARCH INTERESTS

- Mobile robots, especially rescue robots
- Visual odometry & visual SLAM with spectral methods
- Optimization based sensor fusion
- Model predictive control based path planning

PUBLICATIONS

[1] **Q. Xu**, H. Kuang, L. Kneip, and S. Schwertfeger. Rethinking the Fourier-Mellin Transform: Multiple Depths in the Cameras View. Remote Sensing 13, no. 5 (2021): 1000.

[2] **Q. Xu**, H. Bülow, A. Birk, and S.Schwertfeger, 3D Visual Odometry based on 2.5D Spectral Registration of Omnidirectional 2D Images. Robotics and Autonomous Systems. (Under Review)

[3] **Q. Xu**, X. Long, H. Kuang, and S. Schwertfeger, Rotation Estimation for Omni-directional Cameras using Sinusoid Fitting. accepted to Journal of Intelligent & Robotic Systems.

[4] Y.Yuan, **Q. Xu**, and S. Schwertfeger, "Configuration-Space Flipper Planning on 3D Terrain," 2020 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), 2020, pp. 318-325.

[5] **Q. Xu**†, Z. He†, Z. Chen, and Y. Jiang, "An Optical Flow Based Multi-Object Tracking Approach Using Sequential Convex Programming," 2020 16th International Conference on Control, Automation, Robotics and Vision (ICARCV), 2020, pp. 1216-1221. († Equal Contribution)

[6] X. Long†, **Q. Xu**†, Y. Yuan, Z. He, and S. Schwertfeger, Improved Visual-Inertial Localization for Low-cost Rescue Robots. 21st World Congress of the International Federation of Automatic Control (IFAC), 2020. († Equal Contribution)

[7] H. Kuang, **Q. Xu**, X. Long, and S. Schwertfeger, "Pose Estimation for Omni-directional Cameras using Sinusoid Fitting," 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019, pp. 900-906.

[8] A. G. Chavez, **Q. Xu**, C. A. Mueller, S. Schwertfeger, and A. Birk, "Adaptive Navigation Scheme for Optimal Deep-Sea Localization Using Multimodal Perception Cues," 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019, pp. 7211-7218.

[9] **Q. Xu**, A. G. Chavez, H. Bülow, A. Birk, and S.Schwertfeger, "Improved Fourier Mellin Invariant for Robust Rotation Estimation with Omni-Cameras," 2019 IEEE International Conference on Image Processing (ICIP), 2019, pp. 320-324.

[10] H. Kuang, **Q. Xu**, and S. Schwertfeger, "Depth Estimation on Underwater Omni-directional Images Using a Deep Neural Network", Workshop on Underwater Robotics Perception, 2019 IEEE International Conference on Robotics and Automation (ICRA) 2019. (Best Paper Award)

PATENTS

[1] S. Schwertfeger, **Q. Xu**, X. Long, and H. Kuang. Rotation Estimation for Omni-directional Cameras Using Sinusoid Fitting. (CN111354044A)

[2] **Q. Xu**, and S. Schwertfeger. An Extended Fourier-Mellin Transform Method for Multi-depth Scenarios. (CN111951318A)

WORK EXPERIENCE

DeepGlint Jul. 2017 - Aug. 2017
Robotics Intern

· Deploy the SLAM algorithm Cartographer on an embedded board
· Improve the space complexity of Cartographer

TE Connectivity Mar. 2017 - Jun. 2017
Automation Intern

· Develop a robot simulation system based on ROS and Gazebo for navigation algorithms
· Develop an app for material transportation project and support on the technology evaluation

TEACHING EXPERIENCE

Co-Teacher, Robotics. Sep. 2020 - Jan. 2021
Teaching Assistant, Introduction to Control. Sep. 2018 - Jan. 2019
Teaching Assistant, Computer Architecture. Sep. 2017 - Jan. 2017
Teaching Assistant, Computer Architecture. Sep. 2016 - Jan. 2016

AWARDS

2020 University of Chinese Academy of Sciences, Merit Student
2018 RoboCup China Open Rescue League, Third Prize
2017 DAAD Scholarship
2016 China Graduate Student Mathematical Contest in Modeling, Third Prize
2016 Best TA Award for Computer Architecture, ShanghaiTech University

TECHNICAL STRENGTHS

Programming Languages C++, MATLAB
Tool &Others ROS, Git, Linux