# Education

#### The Ohio State University

Ph.D. IN GEODETIC ENGINEERING

Thesis, "Collaborative simultaneous localization and mapping (SLAM) with crowdsourced data".

#### **Beihang University**

M.S. IN ROAD AND RAILWAY ENGINEERING

• Thesis, "An object-based change detection approach for remotely sensed imagery".

### **Beihang University**

**B.S. IN CIVIL ENGINEERING** 

• Capstone project, "An object-oriented multi-scale image segmentation approach".

## Summary\_

• 7+ years experience in sensor fusion, mapping and localization, and calibration, with sensors such as cameras, inertial measurement units(IMUs), depth cameras, LIDARs, and GPS receivers.

Jianzhu Hual

🛿 (+86) 136-7126-0930 📔 🔽 huai.3@osu.edu

• 3+ years experience in static/dynamic code analysis and test-driven development.

## Skills

**DevOps** Docker. Jenkins

**Programming** Proficient: C++, Python, Matlab; Intermediate: Java, Objective C, C#, MTFX

# Experience \_

## Spatial Sensing and Artificial Intelligence Lab of Prof. Yuan Zhuang

**DEPUTY DIRECTOR** 

- Research: Automated symbolic observability analysis of a visual inertial system; Rolling shutter camera-IMU system identification; Global bundle adjustment to fuse multisensor data.
- Project: Write scores of grant proposals at funding rate 10%; Principal investigator of a China national science foundation project for young scholars.
- Mentoring: Counsel and collaborate with 8 senior and grad students on autonomous ground robots.

## **Segway Robotics**

Algorithm Engineer

- Mapping: Devised and tested algorithms for mapping indoor areas by selectively fusing camera, IMU, wheel, depth and 2D LIDAR data, algorithms for growing and sparsifying point-based visual inertial maps.
- Odometry: Devised and tested place recognition algorithms relative to point-based maps or occupancy grid maps, odometry algorithms for indoor robots with localization against maps.
- Testing: Set up continuous integration tasks with Jenkins for testing mapping and odometry algorithms on thousands of data sessions.
- **Calibration**: Calibrated cameras and IMUs individually, and spatiotemporally calibrated a camera, an IMU and a 2D LIDAR.

## Grad Research, CEGE Dept., OSU(Prof. Dorota Grejner-Brzezinska)

#### RESEARCHER

- Developed collaborative localization and mapping algorithm using data collected by cameras and IMUs on smartphones.
- Developed stereo visual inertial localization and mapping algorithm with loop closure by using keyframe-based optimization.
- Developed an indoor reconstruction method by fusing data collected by a Kinect and an IMU.
- Developed an monocular visual inertial odometry method based on an extended Kalman filter(EKF) in Matlab.
- Developed GPS and IMU loose integration for odometry based on an EKF and a unscented Kalman filter(UKF). Beijing, China

## Samsung Telecom Research Institute

## INTERN RESEARCHER

- Adapted and tested face detection methods including the cascaded Viola-Jones classifier, discriminatively trained deformable part model (DPM).
- Created training data for classifiers in face detection.



Sep 2005 - Jun 2009

Wuhan, Hubei, China

Mar 2020 - Present

Columbus. OH

Beijing, China

Beijing, China

Jan 2013 - Dec 2016

Sep 2009 - Mar 2012

1/3

Columbus, OH

Jan 2013 - Jan 2017

Aug 2012 - Nov 2012

Beijing, China

Feb 2017 - Jun 2019

#### Shuzhiyuan Info Tech Inc.

INTERN PROGRAMMER

• Adapted a blob tracking algorithm to track moving objects in videos captured by stationary cameras.

## Grad research, Beihang University(Assoc. Prof. Yumin Tan)

• Designed heuristics to recognize movement patterns of these objects.

Researcher

- Developed a hierarchical two-phase region growing technique constrainted by edge cues for segementing remotely sensed images.
- Developed a image segment classification approach based on fuzzy logic that considered textural and geometric information of segments.

## Honors & Awards

Nov 2016Graduate Student Award, Institute of Navigation (ION)Sep 2009 - Mar 2012First Class Fellowship, Beihang University, 3 out of 13 studentsSep 2009Excellent Graduate Honor, China Civil Engineering Society, 31 out of 31 universities2008Honorable Mention Team, Mathematical Contest in Modeling, COMAP

# Publication List\_

## Journal Articles

- [1] D. Chen, Y. Zhuang, J. Huai, X. Sun, X. Yang, M. A. Javed, J. Brown, Z. Sheng, J. Thompson, "Coexistence and interference mitigation for wpans and wlans from traditional approaches to deep learning: a review", IEEE Sensors Journal (2021).
- [2] J. Huai, G. Jóźków, C. Toth, D. A. Grejner-Brzezinska, "Collaborative Monocular SLAM with Crowdsourced Data", Navigation 65, 501–515 (2018).
- [3] Y. Tan, J. Huai, Z. Tang, "Edge-Guided Segmentation Method for Multiscale and High Resolution Remote Sensing Images", Journal of Infrared and Millimeter Waves **29**, 312–315 (2010).
- [4] Y. Tan, J. Huai, Z. Tang, W. Xi, "An Improved Hierarchical Segmentation Method for Remote Sensing Images", Journal of the Indian Society of Remote Sensing **38**, 686–695 (2010).

## **Conference Proceedings**

- [5] J. Huai, Y. Lin, Y. Zhuang, M. Shi, "Consistent right-invariant fixed-lag smoother with application to visual inertial SLAM", 35th AAAI Conference on Artificial Intelligence (Feb. 2021).
- [6] J. Huai, Y. Zhang, A. Yilmaz, "The Mobile AR Sensor Logger for Android and iOS Devices", 2019 IEEE SENSORS (Oct. 2019).
- [7] J. Huai, G. Józków, C. Toth, D. Grejner-Brzezinska, "Collaborative Monocular SLAM with Crowd-Sourced Data", Proceedings of the 29th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS+ 2016), event-place: Portland, Oregon (Sept. 2016), pp. 1064–1079.
- [8] J. Huai, C. K. Toth, D. A. Grejner-Brzezinska, "Stereo-Inertial Odometry Using Nonlinear Optimization", Proceedings of the 28th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2015) (Sept. 2015), pp. 2087–2097.
- [9] J. Huai, Y. Zhang, A. Yilmaz, "Real-Time Large Scale 3d Reconstruction by Fusing Kinect and IMU Data", ISPRS Annals of Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. II-3/W5 (2015), pp. 491–496.

## Reports

[10] J. Huai, Y. Lin, Y. Zhuang, C. Toth, D. Chen, *Observability analysis and keyframe-based filtering for visual inertial odometry with full self-calibration*, tech. rep. (Wuhan University, Hubei, China, 2022).

Sep 2008 - Jun 2011

- [11] **J. Huai**, Y. Zhuang, Q. Yuan, Y. Lin, *Continuous-time spatiotemporal calibration of a rolling shutter camera-IMU system*, tech. rep. (Wuhan University, Wuhan, Hubei, China, Aug. 2021).
- [12] J. Huai, Y. Lin, C. Toth, Y. Zhuang, D. Chen, *A versatile keyframe-based structureless filter for visual inertial odometry*, tech. rep. (Wuhan University, Hubei, China, Dec. 2020).
- [13] J. Huai, Y. Qin, F. Pang, Z. Chen, *Segway DRIVE Benchmark: Place Recognition and SLAM Data Collected by a Fleet of Delivery Robots*, tech. rep., arXiv: 1907.03424 (Segway Robotics, Beijing China, July 2019).