He Zhang

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"$1.01^{365} = 37.8$"

Education

UALR (University of Arkansas at Little Rock) — *Little Rock, AR, U.S.A.*

PH.D. IN ENGINEERING SCIENCE AND SYSTEMS, ELECTRICAL AND COMPUTER ENGINEERING — *Aug. 2014 - May 2018*

UCAS (University of Chinese Academy of Sciences) — *Beijing, China*

STUDY CERTIFICATE OF COMPUTER ARCHITECTURE AT INSTITUTION OF COMPUTING TECHNOLOGY — *Sep. 2009 - May 2010*

CUMTB (Chinese University of Mining and Technology at Beijing) — *Beijing, China*

B.E. IN COMPUTER SCIENCE AND TECHNOLOGY — *Sep. 2005 - Jul. 2009*

Experience

Virginia Commonwealth University — *Richmond, VA, U.S.A.*

POSTDOCTORAL ASSOCIATE — *Jun. 2018 - Present*

- NRI: A Wearable Robotic Object Manipulation Aid (W-ROMA) for the Visually Impaired (Publications: C1-3, C7)
  - Worked on visual-inertial odometry (VIO) to estimate the device pose for object manipulation
  - Developed W-ROMA's software system, including object detection, 3D mapping, etc.
- NRI: A Co-Robotic Navigation Aid for the Visually Impaired (Publications: J1-2, C4-6, W1)
  - Developed VIO algorithm using RealSense D435/Structure Core with VN100 for real-time navigation
  - Developed modules for Co-Robotic Cane system: localization, path planning, obstacle avoidance, motor controller etc.

University of Arkansas at Little Rock — *Little Rock, AR, U.S.A.*

RESEARCH ASSISTANT — *Aug. 2014 - May 2018*

- NRI: A Co-Robotic Navigation Aid for the Visually Impaired (Publications: J3, C10-11)
  - Developed software system: visual odometry (SwissRanger 4000), graph optimization, Client-Server framework, path planning, visual interface, etc.
  - Improved RGB-D SLAM by using geometric features: floor planes and wall lines
  - Tested indoor navigation performance of developed prototype by nine human subjects
- NRI: Collaborative Research: Quadrupedal Human-Assistive Robotic Platform (Q-HARP) (Publications: J4, C8-9, C12)
  - Implemented a machine learning algorithm to detect humans' lower limb using a 3D camera e.g. Kinect
  - Extracted skeletal points for feet and shank from detected lower-limb
  - Proposed a Markov-Chain based method to detect human's walking pattern using skeleton information

Lenovo (Beijing) R&D — *Beijing, China*

CORE MEMBER OF MIIM TEAM — *May 2010 - May 2014*

- Pegasus: IoT-Robot Project (Publications: C13-14, W2)
  - Improved sustainability of RGB-D SLAM by submapping strategy
  - Developed Client-Server framework to realize hierarchical SLAM
  - Developed laser-based localization method using particle filter and scan correlation
  - Surveyed literature for topics: 2D-3D SLAM, 3D HCI and Cloud-enhanced SLAM etc.

Publications

Journal

J1 **H. Zhang** and C. Ye, "Plane-Aided Visual-Inertial Odometry for 6-DOF Pose Estimation of a Robotic Navigation Aid," *IEEE Access*, 2020. DOI: 10.1109/ACCESS.2020.2994299.

J2 L. Jin, **H. Zhang**, and C. Ye, "Camera Intrinsic Parameters Estimation by Visual Inertial Odometry for a Mobile Phone with Application to Assisted Navigation," *IEEE/ASME Transactions on Mechatronics*, 2020. DOI: 10.1109/TMECH.2020.2997606.

J3 **H. Zhang** and C. Ye, "An Indoor Wayfinding System based on Geometric Features Aided Graph SLAM for the Visually Impaired," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 25, no. 9, pp. 1592-1604, 2017.

J4 **H. Zhang** and C. Ye, "RGB-D Camera Based Walking Pattern Recognition by Support Vector Machines for a Smart Rollator," *International Journal of Intelligent Robotics and Applications*, vol. 1, no. 1, pp. 32-42, 2017.

Conference

C1 **H. Zhang** and C. Ye, "DUI-VIO: Depth Uncertainty Incorporated Visual Inertial Odometry based on an RGB-D Camera," in *Proceedings of IEEE International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, Oct. 25-29, 2020. (accepted)

C2 **H. Zhang**, L. Jin, and C. Ye, "The VCU-RVI Benchmark: Evaluating Visual Inertial Odometry for Indoor Navigation Applications with an RGB-D Camera," in *Proceedings of IEEE International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, Oct. 25-29, 2020. (accepted)

C3 L. Jin, **H. Zhang**, and C. Ye, "Human-Robot Interaction for Assisted Object Grasping by a Wearable Robotic Object Manipulation Aid for the Blind," in *Proceedings of 1st IEEE International Conference on Human-Machine Systems (ICHMS)*, Rome (Virtual), Sep. 7-9, 2020. (accepted)

C4 **H. Zhang** and C. Ye, "A Visual Positioning System for Indoor Blind Navigation," in *Proceedings of IEEE International Conference on Robotics and Automation (ICRA)*, Paris (Virtual), May 31-June 4, 2020.

C5 **H. Zhang** and C. Ye, "Human-Robot Interaction for Assisted Wayfinding of a Robotic Navigation Aid for the Blind," in *12th IEEE Conference on Human System Interaction (HSI)*, Richmond, Virginia, June 25-27, 2019, pp. 137-142.(**Best Conference Paper Award**)

C6 **H. Zhang**, L. Jin, Hao Zhang, C. Ye, "A Comparative Analysis of Visual-Inertial SLAM for Assisted Wayfinding of the Visually Impaired," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, Hawaii, Jan. 7-11, 2019, pp. 210-217.

C7 X. Liu, **H. Zhang**, L. Jin, C. Ye, "A Wearable Robotic Object Manipulation Aid for the Visually Impaired," in *1st IEEE International Conference on Micro/Nano Sensors for AI, Healthcare, and Robotics (NSENS)*, Shenzhen, China, Dec. 5-7, 2018, pp. 5-9.

C8 T. Shen, M. R. Afsar, **H. Zhang**, C. Ye, X. Shen, "Development of a Motorized Robotic Walker Guided by an Image Processing System for Human Walking Assistance and Rehabilitation," in *Proceedings of the ASME Dynamic Systems and Control Conference (DSCC)*, Atlanta, Georgia, Sep. 30-Oct. 3, 2018, Vol. 51890, p. V001T07A009.

C9 M. R. Afsar1, M. Wadsworth, T. Shen, **H. Zhang**, C. Ye, X. Shen , "A Motorized Robotic Walker for Human Walking Assistance," in *ASME Dynamic Systems and Control Conference*, Minneapolis, Minnesota, April 10–13, 2017, Vol. 40672, p. V001T05A013.

C10 **H. Zhang** and C. Ye, "Plane-Aided Visual-Inertial Odometry for Pose Estimation of a 3D Camera based Indoor Blind Navigation," in *Proceedings of British Machine Vision Conference (BMVC)*, London, Sep. 4-7, 2017.

C11 **H. Zhang** and C. Ye, "An Indoor navigation aid for the visually impaired," in *IEEE International Conference on Robotics and Biomimetics (ROBIO)*, Qingdao, China, Dec. 3-7, 2016, pp. 467-472. (**Finalist of Best Conference Paper Award**)

C12 **H. Zhang** and C. Ye, "An RGB-D Camera based Walking Pattern Detection Method for Smart Rollators," in *Proceedings of the 11th International Symposium on Visual Computing (ISVC)*, Las Vegas, Dec. 14-16, 2015, pp. 624-633.

C13 **H. Zhang**, Z. Hou, N. Li, S, Song, P. Xu, "Duo-Graph: An Efficient and Robust Method for Large-scale Mapping for Visual-Guided Robots," in *12th International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Guangzhou, China, Dec. 5-7, 2012, pp. 323-328.

C14 **H. Zhang**, Z. Hou, N. Li, S. Song, "A Graph-based Hierarchical SLAM Framework for Large-scale Mapping," in *5th International Conference on Intelligent Robotics and Applications (ICIRA)*, Montreal, Quebec, Oct. 3-5, 2012, vol. 7507, pp 439-448.

Workshop

W1 **H. Zhang**, L. Jin, and C. Ye, "A depth-enhanced visual inertial odometry for a robotic navigation aid for blind people," in *Proceedings Visual-Inertial Navigation: Challenges and Applications Workshop at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, Nov. 4-8, 2019. (**LORD Best Paper Award**)

W2 **H. Zhang**, G. Liu and Z. Hou, "An Iterative Graph Optimization Approach for 2D SLAM," in *6th IROS Workshop on Planning, Perception and Navigation for Intelligent Vehicles (PPNIV)*, Chicago, Sep. 14-18, 2014.

Technical Reviews

IEEE/CAA Journal of Automatica Sinica (JAS 2019,2020), ACM Transactions on Accessible Computing (TACCESS 2020), IEEE Access (2020), IEEE Internet of Things Journal (IoT 2018,2019), IEEE Transactions on Systems, Man, and Cybernetics: Systems (TSMC 2018, 2019), Journal of Intelligent Service Robotics (JIST 2019), International Journal of Advancements in Computing Technology (IJACT 2011), IROS (2020), ICRA (2020), HSI (2019), CASE (2014), ICIRA (2012)

Teaching Experience

Instructor for CMSC 591 Robotic Vision, Virginia Commonwealth University, Spring, 2019 & 2020

Activities

2019	Participated How-to Talks series at Tompkins-McCaw Library	*VCU, Richmond*
2018	Completed Nanodegree Program for Self-Driving Car Engineer	*Udacity Online*
2017	Demonstrated CoRobotic Cane at AIMBE Congressional BioMedical Technology Exhibition	*Washington D.C.*
2017	Completed Nanodegree Foundations Program for Deep Learning	*Udacity Online*
2017	Participated NIH's Coulter College Commercializing Innovation Program	*Washington D.C.*
2016	Demonstrated Smart Cane at Congressional Robotics Caucus	*Washington D.C.*

Honors & Awards

2018	**Systems Engineering Award,** Excellent Ph.D. Student	*Little Rock, AR, U.S.A*
2017	**2nd Place Award,** 3MT Competition at UA Little Rock	*Little Rock, AR, U.S.A*