

Jingdao Chen

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Education

Georgia Institute of Technology

Ph. D. in Robotics (*Expected graduation: Summer 2020*)
Core Areas: Perception, Artificial Intelligence

Atlanta, GA
Jun 2015 - present

Georgia Institute of Technology

M.S. in Computer Science
Specialization in Machine Learning

Atlanta, GA
Dec 2019

Washington University in St Louis

B. S. in Electrical Engineering, Computer Science minor
Summa Cum Laude

St. Louis, MO
May 2015

Research Focus

My research is centered on creating rich, versatile, and informative 3D representations of the surrounding environment through point cloud data. Emerging technologies such as robotics and ubiquitous sensing allow spatial data to be collected on a large-scale basis, yet interpreting the raw data and rendering it into formats that are useful for end users remains a fundamental challenge. My research aims to leverage databases of known object models to infer structure and semantics from an unknown 3D scene. Machine learning and computational geometry techniques are used to process 3D point clouds and associate scanned objects with their corresponding design models[J2,C4-6]. Real-time algorithms have been developed that enable these data parsing solutions to be deployed on robotic platforms [J1,J3,C2-3,C7]. The algorithms are designed to deal with data imperfections such as occlusion and clutter in unstructured environments such as construction sites and disaster sites [J4-5,J8,C1]. The research has diverse potential applications including autonomous driving, search and rescue, remote surveillance, and infrastructure mapping.

Experience

Georgia Institute of Technology, RICAL Lab

Graduate Research Assistant

Atlanta, GA
Jun 2015 - present

- Studied the theory and application of intelligent robots for construction automation
- Investigated real-time 3D infrastructure mapping with Lidar-mounted mobile robots
- Explored deep learning methods for semantic understanding from point cloud scenes
- Developed cloud-based infrastructure and real-time visualization tools for smart equipment operation

Wheego Technologies, Inc.

Intern, Autonomous Vehicle Project

Atlanta, GA
May 2017 – Jul 2017

- Applied deep learning tools for the task of object detection from monocular camera
- Implemented computer vision algorithms for object tracking across video frames
- Performed large-scale object motion auto-annotation with Lidar data
- Designed an image-based distance estimation framework for longitudinal vehicle control

Hunter Engineering Company

Computer Science Co-op, Wheel Balancer Project

St. Louis, MO
Jan 2014 – Jul 2014

- Developed software for the Wheel Balancer using C++ on Linux platform
- Designed a data-driven approach to feature testing with SQL databases
- Performed 3D modelling of wheel surfaces with laser-guided computer vision

Washington University, Electrical and Systems Engineering

Undergraduate Research Assistant, Autonomous Quadcopter Project

St. Louis, MO
Sep 2013 – Dec 2013

- Developed computational tools for optimized control of an autonomous quadcopter
- Benchmarked numerical algorithm performance on embedded Linux
- Coded Python wrappers for numerical optimization libraries including SNOPT, NPSOL, NLOPT, and IPOPT

Journal Publications

- [J1] **Chen, J.**, Kira, Z. and Cho, Y. (2019). "Multi-view Incremental Segmentation of 3D Point Clouds for Mobile Robots." Robotics and Automation Letters. Accepted Jan 2019.
- [J2] **Chen, J.**, Kira, Z. and Cho, Y. (2019). "Deep Learning Approach to Point Cloud Scene Understanding for Automated Scan to 3D Reconstruction." ASCE Journal of Computing in Civil Engineering. Accepted Jan 2019.
- [J3] Kim, P., **Chen, J.**, and Cho, Y. (2018). "SLAM-driven robotic mapping and registration of 3D point clouds." Automation in Construction, Volume 89, Pages 38-48.
- [J4] Kim, P., **Chen, J.**, and Cho, Y. (2017). "Automated Point Clouds Registration using Visual and Planar Features for Construction Environments." ASCE Journal of Computing in Civil Engineering, Volume 32, March 2018
- [J5] **Chen, J.**, Fang, Y., and Cho, Y. (2017). "Performance Evaluation of 3D Descriptors for Object Recognition in Construction Applications." Automation in Construction, Volume 86, Pages 44-52, February 2018
- [J6] Kim, P., **Chen, J.**, and Cho, Y. (2017). "Robotic sensing and object recognition from thermal-mapped point clouds." International Journal of Intelligent Robotics and Applications. September 2017, Volume 1, Issue 3, Pages 243-254
- [J7] **Chen, J.**, Fang, Y., and Cho, Y. (2017). "Real-Time 3D Crane Workspace Update Using a Hybrid Visualization Approach." ASCE Journal of Computing in Civil Engineering, Vol. 31. Issue 5
- [J8] **Chen, J.**, Fang, Y., Cho, Y., Kim, C. (2016). "Principal Axes Descriptor (PAD) for Automated Construction Equipment Classification from Point Clouds." ASCE Journal of Computing in Civil Engineering, Volume 31, Issue 2

Conference Publications

- [C1] **Chen, J.**, Cho, Y., and Ueda, J. (2018). "Sampled-Point Network for Classification of Deformed Building Element Point Clouds". Proceedings of the 2018 IEEE Conference on Robotics and Automation (ICRA).
- [C2] **Chen, J.**, Kim, P., Cho, Y., and Ueda, J. (2018). "Object-sensitive potential fields for mobile robot navigation and mapping in indoor environments." Proceedings of the 2018 IEEE 15th International Conference on Ubiquitous Robots (UR), Honolulu, HI, USA, June 26-30.
- [C3] Kim, P., **Chen, J.**, Kim, J., and Cho, Y. (2018). "SLAM-Driven Intelligent Autonomous Mobile Robot Navigation for Construction Applications." Best Paper Award, Proceedings of Workshop of the European Group for Intelligent Computing in Engineering, EG-ICE. pp. 254-269, Lausanne, Switzerland,
- [C4] **Chen, J.** and Cho, Y. (2018). "Point-to-point Comparison Method for Automated Scan-vs-BIM Deviation Detection." Proceedings of 17th International Conference on Computing in Civil and Building Engineering, Tampere, Finland
- [C5] **Chen, J.**, Cho, Y., and Kim, K. (2018). "Region Proposal Mechanism for Building Element Recognition for Advanced Scan-to-BIM Process." ASCE Construction Research Congress 2018, April 2 - 4, New Orleans, LA,
- [C6] **Chen, J.**, Fang, Y., and Cho, Y. (2017). "Unsupervised Recognition of Volumetric Structural Components from Building Point Clouds." Proceedings of the 2017 International Workshop on Computing for Civil Engineering (IWCCE), Seattle, WA, USA, June 25-27,
- [C7] **Chen, J.**, Cho, Y. (2016). "Real-time 3D Mobile Mapping for the Built Environment". International Symposium on Automation and Robotics in Construction (ISARC), Auburn, AL, July 18-21, 2016

Skills

Languages:	English (Proficient), Mandarin Chinese (Proficient), Malay (Proficient)
Programming:	C, C++, Java, Python, MATLAB, Bash, SQL
Operating Systems:	Windows, Mac OS, Linux, iOS, Android
Software Frameworks:	Robot Operating System (ROS), Tensorflow, scikit-learn