

Jinglun Feng
Ph.D. Candidate of
CCNY Robotics Lab, New York, NY 10031
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Research Qualification

Robotics, Object Pose Estimation, 3D Vision/Reconstruction, GPR-based Intelligent Inspection, Synthetic Data Generation, Computer Vision, Sensor Fusion, Motion Control

Education

Ph.D. Candidate, Electrical Engineering, Robotics Lab, The City College (CCNY), City University of New York (CUNY), New York, U.S. (2018.09 - present)

Research Area: Intelligent Robotic Inspection, Object Pose Estimation, 3D Object Reconstruction

Advisor: Prof. Jizhong Xiao, Director of CCNY Robotics Lab

GPA: 3.7/4.0

Master's degree, Control Engineering, Robotics and Intelligent Systems Lab, Shandong University, China (2015 - 2018)

Thesis topic: Study on Indoor Robot Navigation and Obstacle Avoidance Algorithm

Advisor: Prof. Chengjin Zhang

GPA: 3.6/4.0

Bachelor's degree, Electrical Engineering & English, Shandong Jianzhu University, China (2011-2015)

Major GPA: 3.36/4.0

Minor GPA: 3.16/4.0

Technical Skills

- Languages: C/C++, Matlab, Python.
- Platforms: Linux (Ubuntu), Robotic Operating System (ROS),
- Tools: OpenCV, Open3D, G2O, Pytorch, TensorFlow, BlenderProc.

Research Experience

ABB, Raleigh, NC, USA (2021.06 ~ present)

- **Ph.D. Research Intern**

- Generate synthetic physically based renderer images for HOPE dataset. (Partial dataset that I created has been credited by the Nvidia Learning and Perception team).
- Build up a deep network, using synthetic data to train object detector, object pose estimation.
- Experimental testing and evaluation of object pose estimation, and benchmarking with the state-of-the-art works.

Robotics Lab, Dept. Electrical Engineering, CUNY-CCNY, New York, U.S. (2018.09 - present)

- **Research Assistant**

- **Deep Dense Subsurface Object Reconstruction via GPR data (2021.01-present)**

- Generate synthetic GPR dataset that covers most of the subsurface infrastructure scenarios. The synthetic objects have different sizes, being inserted in different depth, and has multiple shapes such as cylindrical, spherical, and cubic shape.
- Propose a novel learning-based subsurface 3D reconstruction method, that emulates the GPR-based 3D reconstruction from the back-projection (BP) perspective and outputs a dense volumetric map of subsurface objects.

- **DNN based 3D Underground Utilities Reconstruction with GPR Sensor (2020.02-2020.12)**

- Focusing on deep learning for subsurface object detection and reconstruction, the project's purpose is to generate underground object detection results with 3D reconstruction using MigrationNet and GPRNet. The detection and reconstruction approaches are a fully convolutional neural network with SLAM based 3D positioning information registered. [Project Video](#).
 - Develop a new GPR dataset for research purpose, which includes both synthetic and on-site GPR B-scan data and images, as well as GPR 3D models for reconstruction purpose.
 - Develop a mathematical based 3D migration software, which use conventional back-projection method to recover the underground targets. The software is developed on Visual Studio and patented protect.
- **Robotic-based GPR Inspection system with high positioning accuracy for Infrastructure Inspection. SBIR Phase-I, USA. (2019 – 2020)**
 - Design an omnidirectional robotic GPR inspection system, this system could hold a GPR antenna to move forward, backward, sideways without any rotations, to detect the underground objects, and reconstruct the subsurface 3D objects map using GPR data. The positioning accuracy of our robotic system could reach 1 cm using Visual-Inertial Odometry and AprilTag markers.
 - Develop an automated GPR data collection solution by using an omnidirectional robot, which holds the GPR antenna on the bottom and move forward, backward and sideways without any rotations to collect GPR data.
 - **Smart and Intelligent Climbing Robot for Wind Turbine Inspection, National Nature Science Foundation, USA. (2018 – 2019)**
 - The goal of the project is to develop a robotic inspection system using wall-climbing robots and an impact sounding system to detect the defects and delamination of the wind turbines.
 - Develop a tracking system for positioning and reconstruction, then navigate the robot using the map information with obstacle avoidance mission.
 - Develop an impact sounding system to collect acoustic measurement data to reveal subsurface flaws. This system includes a sliding track, solenoid, and a microphone. The solenoid is moving along the sliding tracking while providing impacting action, and the microphone record the echo sound. [Demo Video](#).
 - Focusing on processing the sounding data with Frequency Density (FD) to describe the energy of the acoustic measurement. Furthermore, we register this FD data as well as the trajectory data on the map built from the tracking system.

Geophysical Survey System Inc., Nashua, NH, USA

(2019.05 ~ 08)

- **Ph.D. Research Intern**
- **Project: Robotic based 3D Migration algorithm with arbitrary motion.**
- This project aims to develop a 3D migration algorithm to interpret GPR data as well as design a robotic GPR data collection method. [Project Video](#).
- Develop a 3D migration method that gets rid of the limitations of conventional GPR migration methods, that is, takes both position and orientation of GPR into consideration.
- Develop the robotic GPR data collection method instead of manually pushing the GPR cart. The GPR data is tagged with positioning information provided by the RGB-D camera, which is mounted on the robot.

Suzhou Sino-Germany Robooster Intelligent Technology Co.Ltd., China

(2017 – 2018)

- **Research Intern**
- **Project: Indoor mobile robot for mapping and navigation.**

- Lead the research team to develop the indoor mobile robot for mapping, navigation, and obstacle avoidance tasks. [Demo Video](#).
- Develop an RGB-D SLAM system that could reconstruct point cloud map, saving the current map and loading next time.
- Design the navigation and obstacle avoidance system based on the artificial potential field method.
- Develop a QT-based GUI for a customer using, the function of the GUI includes target position setup, map saving, map loading, and relocalization..

Robotics and Intelligent Systems Lab, Dept. of Control Engineering, Shandong University (2015-2017)

- **Research Assistant**
- **Project: Study on the Self-Organizing Behavior of Group Robots, National Nature Science Foundation of China**
- The goal of this project is to develop a formation control algorithm for multi-robot, and we also develop a simulation environment to verify the multi-robot formation system. [Demo Video](#).
- Develop the obstacle avoidance strategy of a multi-robot system, which is designed base on an artificial potential function method. It enables multi-robot to avoid obstacles while keeping a specific formation.

Selected Publications (Patents / Papers)

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- U.S. Copyright Case #: 1-9890704641, The title of the software is “*GPR Migration C++*” for ground penetrating radar (GPR) migration and subsurface object detection and mapping, Inventors: **Jinglun Feng**, Jizhong Xiao, filing date: 11/18/2020, owned by InnovBot (100%).
 - CUNY Docket Number #: 20A0037. (GPR-imaging, Omni-GPR-Cart) “*Method and Apparatus for Automatic GPR Data Collection and GPR Imaging*”, Inventors: Jizhong Xiao, **Jinglun Feng** and Liang Yang, Provisional patent application #63031977, filing date: May 29, 2020, ownership: InnovBot (50%) and CUNY (50%).
 - CUNY Docket Number TCO #21A0001 (GPR migration, NN-based) “*Subsurface Map Reconstruction Using GPR data and Neural Networks*”, inventors: Jizhong Xiao, **Jinglun Feng** and Liang Yang, Provisional paten application # 63064661, filing date: Aug. 12, 2020, ownership: InnovBot (50%) and CUNY (50%).
 - **Jinglun Feng**, L. Yang, Ejup Hoxha, Diar Sanakov, Stanislav Sotnikov and Jizhong Xiao. "GPR-based Model Reconstruction System for Underground Utilities Using GPRNet." In 2021 IEEE International Conference on Robotics and Automation (ICRA).
 - **Jinglun Feng**, L. Yang, Haiyan Wang, Yingli Tian, Jizhong Xiao. “*Subsurface Pipes Detection Using DNN-based Back Projection on GPR Data*”, Winter Conference on Applications of Computer Vision (WACV), 2021.
 - **Jinglun Feng**, Hua X, Hoxha E, et al. “*Automatic Impact-sounding Acoustic Inspection of Concrete Structure*”. 10th international conference on structural health monitoring of intelligent infrastructures (SHMII-10), 2021.
 - Haiyan Wang, L. Yang, Xuejian Rong, **Jinglun Feng**, Jizhong Xiao, Yingli Tian. “*Self-supervised 4D Spatio-temporal Feature Learning via Order Prediction of Sequential Point Cloud Clips*”. Winter Conference on Applications of Computer Vision (WACV), 2021.
 - **Jinglun Feng***, L. Yang*, Haiyan Wang, Yifeng Song, and Jizhong Xiao. "GPR-based Subsurface Object Detection and Reconstruction Using Random Motion and DepthNet." In 2020 IEEE International Conference on Robotics and Automation (ICRA), pp. 7035-7041. IEEE, 2020.
 - Yang Liang, Chang Yong, Sotnikov Stanislav, **Jinglun Feng**, Li Bingbing, Xiao Jizhong. “*Wind-turbine Blade Inspection Using Impact-Sounding Module and Acoustic Analysis*”, 9th IEEE International Conference on CYBER Technology in Automation, Control, and Intelligent Systems. (CYBER 2019), China.

- **Jinglun Feng**, Chengjin Zhang, Yong Song and Ting Chi. “*A Multi-Robot Dynamic Formation Scheme Based on Rigid Formation*”, 2016 IEEE International Conference on Information and Automation (ICIA2016), Ningbo China, 1-3 August 2016.

Service and Awards

- "SBIR-Phase II" the Small Business Innovation Research (SBIR), (**Technical Leader**), \$1,000,000.00, 2021-2023.
- "I-Corps: Non-Destructive Evaluation of Infrastructure," the National Science Foundation - Division of Industrial Innovation & Partnerships (NSF IIP), (**Collaborative Technical Leader**), \$50,000.00, 2019-2020.
- The FIRST Outreach and Scholarship Program of City College of New York, 2019.
- Ph.D. research fellowship in City College, The City University of New York from 2018.
- Outstanding Graduates Awards, 2018
- Outstanding Individual of Community Activity, 2016

Teaching Experience

- Adjunct Lecturer for course “EE425: Computer Engineering Lab” at Dept. of Electrical Engineering, City College, The City University of New York (Fall 2019 - Present)
- Teaching Assistant for course “G5501: Introduction to Robotics” at Dept. of Electrical Engineering, City College, The City University of New York (Fall 2020)
- Teaching Assistant for course “G3300: Advanced Mobile Robotics” at Dept. of Electrical Engineering, City College, The City University of New York (Spring 2021)

Paper Review

- IEEE Robotics and Automation Letter (RA-L21’)
- Journal of Visual Communication and Image Representation (J-VCIP21’)
- Journal of Imaging (J-Imaging21’)
- IEEE Conference on Winter Applications of Computer Vision (WACV21’, 22’)
- IEEE International Conference on Robotics and Automation (ICRA20’, 21’, 22’)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS20’, 21’)