

Zeng Tianle

Tel.: +86-19927538993 | Email: [louiszeng16@163.com](mailto:louiszeng16@163.com)

Homepage: <https://louiszengcn.github.io/>

## RESEARCH INTERESTS

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Robotics, AI, Computer Vision, Medical Imaging

## EDUCATION

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**China University of Mining and Technology-Beijing (CUMT-Beijing)** 09/2022-06/2025

**Dual Master's Degree with the University of Leeds (funded by China Scholarship Council (CSC))**

- Master of Engineering in Geoscience and Surveying Engineering (CUMTB); GPA: 89/100, Ranking: 4/170
- Master of Engineering in Mechatronics and Robotics (University of Leeds)
- First-class CSC Scholarship (2023), First-class CUMTB Scholarship (2023)

**South China Agricultural University** 09/2018-06/2022

- Bachelor of Engineering in Electronic Information Science and Technology; GPA: 87/100

## PUBLICATIONS AS FIRST AUTHOR

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Realistic Surgical Images Dataset Generation Based on 3D Gaussian Splatting, International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI). 2024

Laser SLAM Method Based on Spatial Geometric Features in Degraded Environment, Journal of Chinese Inertial Technology. 2023

## ACADEMIC RESEARCH

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**Dynamic 3D Reconstruction of Medical Scenes Based on 3D Gaussian Splatting** 12/2023-present

*STORM Lab UK, da Vinci Surgical Robot Team, Supervisor: IEEE Fellow Professor Pietro Valdastri*

*First Author, **NeeCo: Novel Instrument Deformation Synthesis Based on Dynamic 3D Gaussian Reconstruction**, under review by IEEE Transactions on Medical Imaging*

*Key words: computer vision, 3D reconstruction, 3D Gaussian splatting, medical image processing, surgical robotics*

- Consulted top conference papers on computer vision and studied the application of 3D Gaussian splatting in medical image processing and environmental perception of surgical robots
- Mastered cutting-edge computer vision technology and 3D Gaussian and proposed a solution based on the dynamic 3D Gaussian model and MLP-based deformation fields to achieve accurate reconstruction of deformed instruments in dynamic surgical scenes
- Built a data acquisition experimental platform using the da Vinci surgical robot and an electromagnetic sensor, developed motion control system, and created a public dataset from 200GB of collected and processed images of surgical scenes

**Research on Multi-sensor Fusion of Power Grid Inspection Drones** 06/2023-12/2023

*First Author, **A Novel Automatic Extrinsic Calibration Method for LiDAR-Camera System**, major revision completed for IEEE Transactions on Instrumentation and Measurement*

*Key words: multi-sensor fusion, SLAM, multi-sensor joint calibration, drones*

- Delved into the multi-sensor fusion system of industry-level drones for power grid inspection, integrated LiDAR and camera data for higher accuracy of flight environment perception, and optimized visual SLAM through depth compensation to realize a multi-sensor fusion SLAM algorithm and precise self-localization
- Study the camera-LiDAR automatic joint calibration technology, streamlined the sensor calibration process before takeoff, and enhanced the accuracy of the extrinsic parameters of the LiDAR and the camera, as well as the precision of environmental perception of the multi-sensor fusion system in operation

**Intelligent Wearable Walking Aid Robot for the Visually Impaired** 09/2022-08/2023

*State Key Laboratory for Fine Exploration and Intelligent Development of Coal Resources of CUMTB*

*First Author, Gait-based Guiding System: A New Approach for Blind Guidance, under review by Science China-Information Sciences*

*First Prize in North China & National Second Prize(<3%) in the 2023 China Graduate Electric Design Contest*

*Key words: smart wearable devices, multi-sensor fusion, AI, SLAM, rehabilitation robots*

- Realized real-time fusion of LiDAR, IMU, and depth camera data by building a mathematical model of the sensor and applying spatial geometric constraints, and enhanced the precision of the device's environment perception
- Incorporated a laser SLAM method based on spatial geometric features into the device to improve its self-positioning accuracy and real-time operation in degraded environments
- Applied large language models to environment perception, image information conversion, and user speech interaction, designed the entire electronic system, deployed hardware, software, and sensors, and made the wearable device

## **ALGORITHM APPLICATIONS**

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### **DJI, SLAM Algorithm Engineer**

**07/2023-09/2023**

- Built a multi-sensor fusion SLAM algorithm for the drone platform and deployed it on the latest drone product after practical tests, analysis of algorithmic operation effects, and improvement of adaptability, enabling the drone to provide precise real-time operation and localization information

### **Autel Robotics, AI Application Researcher**

**05/2023-07/2023**

- Deployed cutting-edge multi-sensor fusion technologies of industry-level drones on the drone platform, acquired, tested, and evaluated real flight data, solved problems, and built a multi-sensor fusion SLAM algorithm to adapt different sensors of drones
- Developed a depth sensor and a parameter calibration toolchain based on the multi-sensor joint calibration algorithm to achieve rapid multi-sensor self-calibration of drones before takeoff

### **China State Shipbuilding Corporation Limited, Computer Vision Engineer**

**06/2022-09/2022**

- Developed real-time automatic reading algorithms based on YOLOv5 for the accurate recognition and reading of multiple digital instruments in industrial environments such as shipping warehouses, engine rooms of ships, and port pipelines, and optimized the decimal point recognition algorithm for highly accurate readings of single-frame images and real-time video stream inputs, achieving an accuracy rate of 95% and a recall rate of nearly 100% in industrial sites

## **PROFESSIONAL SKILLS**

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- English Proficiency: IELTS 7.0 (R8/L8/W6/S6)
- Software: C++, Python, OpenCV, Open3D, PCL, ROS, COLMAP, NeRF, 3D Gaussian Splatting, Hector, LIO-SAM, ORB-SLAM, YOLO, U-Net, LaTeX, MATLAB, Origin
- Experience in Hardware Platform Construction: da Vinci surgical robot, sensors (LiDAR, IMU, cameras), STM32 circuit design, Raspberry Pi, drones, smart wearable devices
- Awards in Competitions: Silver Prize in the Beijing University Student Entrepreneurship Competitio (2024), National Third Prize in the National Post-Graduate Mathematical Contest in Modeling (2022), "Innovation Pioneer Award" in the Huawei Mine AI Competition (2022)