

Research Interests

My research interests lie in 3D vision and multimodal AI, particularly 3D reconstruction, registration, and vision-language models. I am interested in developing methods that enable machines to perceive and understand complex real-world environments.

Long-term Research Goal: I hope to apply these capabilities to image-guided surgical navigation and semi-autonomous endoscope assistance, with the aim of supporting surgeons and reducing their workload. I also remain open to exploring other applications of spatial intelligence.

Education

University College London, London, UK Sep 2024 – Sep 2025
MSc in Medical Robotics and Artificial Intelligence — Distinction (71.86/100)

Southwest Jiaotong University, Chengdu, China Sep 2019 – Jul 2023
BEng in Mechanical Design, Manufacturing and Automation — 82.87/100

University of Leeds, Leeds, UK Sep 2019 – Jul 2023
BEng in Mechanical Engineering — Upper Second-Class Honours (62.25/100)

Publications

Workshop Papers

- [1] **Jiang, L.,** Huang, J., Zhang, C., Jiang, C., Mao, Z., & Hoque, M. I. (2026). **RefineRank: Joint box refinement and ranking for surgical spatio-temporal grounding.** Accepted at the MedVidU Workshop, ECCV 2026. **Ranked 1st by STG score** on the MedVidBench leaderboard. [arXiv]

Peer-Reviewed Publications

- [2] Huang, J., He, R., Khan, D. Z., Mazomenos, E. B., Stoyanov, D., Marcus, H., **Jiang, L.,** Clarkson, M. J., & Hoque, M. I. (2026). **Surgical AI Copilot: Energy-based Fourier gradient low-rank adaptation for surgical LLM agent reasoning and planning.** *Proceedings of the AAAI Conference on Artificial Intelligence*, 40(3), 1846–1854. [DOI]
- [3] Wang, F., Liao, W., Su, H., Xu, L., Xue, H., **Jiang, L.,** Yang, Y., Piao, M., Sun, J., & Li, T. (2026). **A histopathologically verified dataset of magnifying narrow-band imaging endoscopy for classifying the gastric precancerous cascade.** *Scientific Data*, 13, Article 1307. [DOI]
- [4] Li, T., Liu, P., **Jiang, L.,** Gao, Y., & Wu, R. (2024). **Four hours duration acts as the safety threshold for driving fatigue management.** In *2024 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA)* (pp. 1–6). [DOI]
- [5] Liu, X., **Jiang, L.,** Wang, H., & Jiang, C. (2020). **Importance of effective regulation for the Chinese genetic testing industry.** *Trends in Biotechnology*, 38(6), 577–579. [DOI]

Preprints

- [6] **Jiang, L.,** Huang, J., Bano, S., Clarkson, M. J., Mao, Z., & Hoque, M. I. (2026). **C3VDReg: A benchmark for local-to-local colonoscopic registration toward anatomical localization.** *arXiv preprint*. [arXiv]

Honors & Awards

- Silver Award, China International College Students' Innovation Competition (**CICSIC**), 2024 (Top ~0.03% overall). The award recognised a team project on noninvasive blood circulation monitoring for older adults. I helped assemble the detector prototype and studied optical parameters using Monte Carlo simulations.

Patents

- [T1] Support Fixation Bracket for Endoscopic Surgery. CN Patent No. ZL 2022 2 2217588.9
- [T2] Percutaneous Pulmonary Puncture Angle Assist Device. CN Patent No. ZL 2023 2 2773803.8

Research Experience

Tianjin Union Medical Center, The First Affiliated Hospital of Nankai University

Visiting Student Researcher, Department of Thoracic Surgery

Oct 2025 – Present

Supervisor: [Chunyang Jiang, M.D.](#), Chief Physician

- **Clinical 3D planning:** Built a chest CT segmentation pipeline for the airway tree, pulmonary arteries and veins, and lung nodules, with an agent that checks connectivity and flags broken branches for interactive repair. Printed color-coded models for two pilot cases, which surgeon review found consistent with intraoperative anatomy.
- **RefineRank [1] [GitHub]:** Built RefineNet (1.25M parameters) to refine boxes and score their quality from frozen MedVLM and GroundingDINO features. Improved spatio-temporal grounding mIoU from 0.2719 to 0.4534 (+66.8%) in a controlled evaluation and ranked 1st by STG score on the MedVidBench leaderboard.
- **Clinical observation [Blog]:** Observed 10 thoracoscopic wedge resections at Tianjin Union Medical Center and 3 hybrid navigation procedures at Tianjin Medical University Cancer Institute and Hospital, discussed lung deformation and registration with clinicians, and documented the observations and lessons on my blog.

The University of Manchester

Research Assistant, School of Health Sciences

Aug 2025 – Present

Supervisor: [Mobarak I. Hoque](#), Associate Professor

- **C3VDReg [6] [GitHub]:** Extended the MSc research at UCL into a public benchmark of 10,015 viewpoint-matched C3VD point cloud pairs with a fixed protocol. Benchmarked GeoTransformer, REGTR and PointNetLK variants. The main failure mode of the current SOTA models was axial translation ambiguity in repetitive tubular anatomy.
- **MRI and video registration:** Paired preoperative MRI with surgical video for 50 pituitary cases (from 200+ records) to test MRI-to-video alignment. Segmented the sphenoid sinus in ITK-SNAP, reconstructed the videos into point clouds with VGGT Omega, set the scale from anatomical landmarks, and aligned the clouds manually. Surgeons accepted only 3/50 alignments, which led to a single-case simulator prototype that renders virtual endoscopic views and shows the endoscope pose in MRI.

University College London

MSc Dissertation Research — Colonoscopic Point Cloud Registration

2025

Supervisor: [Mobarak I. Hoque](#), Associate Professor

- **MambaNetLK:** Replaced PointNetLK's PointNet encoder with a Mamba state space model. A single encoder embeds both clouds, and inverse compositional Lucas–Kanade updates optimize their relative pose to align their features without point correspondences, outperforming the PointNetLK variants tested on C3VDReg.

Peking Union Medical College

Research Assistant, Institute of Biomedical Engineering

Sep 2023 – Jul 2024

Supervisor: [Ting Li](#), Professor

- **fNIRS optical simulation:** Used Monte Carlo modeling of photon migration in voxelized media (MCVM) on lower limb models, including absorption, scattering and anisotropy, with simulated penetration beyond 4.2 cm.
- **Detector prototype:** Soldered the circuit boards and assembled flexible probes for an fNIRS clot detector. Tests showed negligible channel interference and expected hemoglobin changes when a cuff briefly stopped blood flow.
- **Driver fatigue [4]:** Recorded fNIRS signals and ran hourly attention tests with eight volunteers during seven hours of simulated driving.

Southwest Jiaotong University

Undergraduate Thesis — Six-Axis Manipulator Path Planning

2023

Supervisor: [Fang Liu](#), Associate Professor

- **Motion planning:** Modified the artificial potential field method to escape local minima and not fall back into them, producing the shortest paths when tested against four variants in three 3D MATLAB scenes.
- **UR5 kinematics:** Derived the inverse kinematics in closed form to convert planned paths into joint configurations. Corrected a derivation error in a reference thesis and confirmed the formulas match the eight published solutions.

Technical Skills

Programming: Python, C/C++, C#, MATLAB **ML Frameworks:** PyTorch, Hugging Face, vLLM

Architectures: CNN, U-Net, Transformer, Mamba **Models:** Qwen/Qwen-VL, DINO, VGGT

Vision & 3D: COLMAP, SLAM, 3DGS **Robotics & Engineering:** ROS/ROS 2, SolidWorks, Blender