QIJIA SHEN

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Education

University of Oxford — **Oxford, UK**
Ph.D. in Neurosciences — *Oct 2021 – Jul 2025*
Shanghai Jiao Tong University (SJTU) — **Shanghai, China**
B.E. in Biomedical Engineering — *Sep 2017 – Jun 2021*

Research Experience

• General Tool-Use Agent RL Training on Toolathlon-Gym — **Present**
Poolside (continued from Poolside Hackathon), based on Laguna XS.2
- Benchmarked general MCP tool usage capability of Laguna XS.2 model on Toolathlon.
- Converted Toolathlon-Gym to 539 independent environments for scaling sandboxes in RL training.
- Ongoing RL training with the long-horizon tool tasks and partial progress reward providing dense reward signal.

• Scalable RL Environments for Terminal Agents (SETA) — **Jul 2025 – Present**
CAMEL-AI, London
- Led the design and implementation of SETA, a scalable framework for synthesizing verifiable terminal environments for RL training of LLM-based agents; released SETA-Env, the largest open-source verifiable terminal RL dataset to date (4,567 environments, 14 categories; ~12K monthly downloads; https://huggingface.co/datasets/camel-ai/SETA-Env).
- Built source-adaptive synthesis (SETA-Synth) and difficulty-adaptive evolution (SETA-Evol) pipelines, with execution-based verification and adaptive task difficulty calibrated to the training model's capability frontier.
- Trained Qwen3-8B with GRPO on SETA-Env, achieving 12% pass@1 on Terminal-Bench 2.0 (3.3× over base) — the best reported result for an RL-trained model at 8B scale, with strong transfer to CompileBench (6.7% → 40%) and CRUST-Bench (15% → 24%).
- Trained DeepSeek V4 Flash on SETA-Env with 7% on Terminal-Bench, demonstrating that SETA-Env provides effective training signal across model scales.
- Publication: *Qijia Shen, et al. SETA: Scaling Environments for Terminal Agents. Submitted to NeurIPS 2026.*

• Generative AI & 3D Vision — **Oct 2022 – Jun 2023**
Advisor: Guangrun Wang, Department of Engineering Science, University of Oxford
- Pioneered research in geometry-aware 3D model generation from large-scale, unstructured 2D image datasets (ImageNet) using StyleGAN2-ADA.
- Developed novel view synthesis techniques, including a "min-view" strategy to mitigate overfitting and enhance generalization.
- Engineered an ensemble of pre-trained vision models as discriminators, significantly improving training stability and convergence speed for complex generative tasks.
- Publication: *Qijia Shen, Guangrun Wang. Geometry aware 3D generation from in-the-wild images in ImageNet. Arxiv 2024.*

• Connectomics & Image Segmentation — **Jul 2020 – Apr 2021**
Advisor: Hanspeter Pfister, School of Engineering and Applied Sciences, Harvard University (Visiting Researcher)
- Developed and fine-tuned a modified 3D-UNet architecture for instance segmentation on the large-scale MitoEM mitochondria dataset (4096×4096×1000).
- Investigated and implemented Flux and Distance Transform representations to improve robustness against false splits in segmentation.
- Applied semi-supervised learning and consistency regularization techniques at the pixel level to enhance segmentation accuracy with limited labeled data.
- Achieved a 10% improvement (AP-75) over the MitoEM benchmark in the MICCAI 2020 challenge.
- Related Publication: *Daniel Franco-Barranco, …, Qijia Shen, … Current Progress and Challenges in Large-scale 3D Mitochondria Instance Segmentation. IEEE TMI 2023.*

• Pathological Image Analysis & Classification — **Jan 2020 – Jul 2020**
Advisor: Qian Wang, School of Biomedical Engineering, SJTU
- Implemented and adapted the Hover-Net model for multi-organ nuclei segmentation and classification (MoNuSAC challenge).
- Designed targeted color augmentation strategies for pathological images, boosting neutrophil classification accuracy from 50% to 86%.
- Constructed a two-stage model achieving 3rd place on the MoNuSAC competition leaderboard.

• Real-time Medical Image Detection **Dec 2019 – Mar 2020**

Advisor: Dahong Qian, School of Biomedical Engineering, SJTU

- Developed a real-time system for carcinoma pharyngeal detection in endoscopy videos.
- Investigated the interplay of texture and geometric information for cancer diagnosis.
- Utilized Class Activation Maps (CAM) for model interpretability and localization of cancerous regions.
- Achieved an F1 Score of 0.82 and 61 fps in real-time prediction.
- Publication: *Ming Zhou, ..., Qijia Shen, ... Hierarchical and Robust Pathology Screening for Cervical Abnormality. CMIG 2021.*

• Data-Driven Multi-Modal Neuroimaging & Representation Learning (UK Biobank) **Oct 2024 – Jul 2025**

Advisor: Weikang Gong, Department of Clinical Neurosciences, University of Oxford

- Performed a data-driven analysis of the UK Biobank dataset, focusing on multi-modal MRI fusion to predict neurocognition and health features.
- Developed and applied advanced machine learning techniques, including dictionary learning and Independent Component Analysis (ICA), for robust feature vector extraction — a strong example of representation learning aimed at discovering highly informative, compact data representations from complex, multi-modal neuroimaging data.
- Demonstrated that the extracted data-driven imaging features significantly surpassed the predictive power of traditional expert-derived imaging phenotypes in forecasting key neurocognitive and health metrics.
- Demonstrated expertise in handling large-scale, multi-modal datasets and extracting meaningful, predictive insights through sophisticated machine learning pipelines.

• Advanced Medical Image Reconstruction & Optimization **Oct 2021 – Jul 2025**

Advisor: Thomas Okell, Department of Clinical Neurosciences, University of Oxford

- **Motion Correction with Subspace-Based Self-Navigation (Machine Learning Application):** developed a subspace-based method for motion navigator reconstruction from Arterial Spin Labelling (ASL) MRI data, significantly reducing artifacts caused by signal variation; designed a split-update iterative optimization algorithm incorporating regularization to simultaneously reconstruct label and control images.
- **Ultra-High Temporal Resolution Angiography with Subspace Reconstruction (Signal Modeling):** integrated physics models into subspace-based reconstruction frameworks for time-resolved angiography; achieved an unprecedented 14.7 ms temporal resolution in 4D dynamic angiography.
- **Efficient 3D Trajectory Design for Combined Imaging (Optimization):** engineered an optimized two-stage k-space sampling trajectory for both high spatial-temporal resolution angiography and perfusion imaging; applied locally low-rank constraints across frames for effective denoising in dynamic image series.

Selected Publications

- Shen, Q., et al. (2026). SETA: Scaling Environments for Terminal Agents. Submitted to NeurIPS 2026.
- Shen, Q., Wang, G. (2024). Geometry aware 3D generation from in-the-wild images in ImageNet. ArXiv, 2402.00225.
- Shen, Q., Wu, W., Chiew, M., Ji, Y., Woods, J., Okell, T. W. (2024). Ultra-high temporal resolution dynamic angiography using arterial spin labelling with a subspace reconstruction. Magnetic Resonance in Medicine, 1–18.
- Shen, Q., Wu, W., Chiew, M., Ji, Y., Woods, J., Okell, T. W. (2024). Efficient 3D cone trajectory design for improved combined angiographic and perfusion imaging using arterial spin labeling. Magnetic Resonance in Medicine, 92(4), 1568–1583.
- Shen, Q., Wu, W., Chiew, M., Ji, Y., Woods, J., Okell, T. W. Motion correction with subspace-based self-navigation for combined angiography, perfusion and structural imaging. bioRxiv. (minor revision from Imaging Neuroscience).
- Franco-Barranco, D., Lin, Z., Jang, W.D., Wang, X., Shen, Q., ..., Wei, D. (2023). Current Progress and Challenges in Large-scale 3D Mitochondria Instance Segmentation. IEEE Transactions on Medical Imaging, 42, 3956–3971.
- Zhou, M., Du, X., Ouyang, X., Zhang, X., Shen, Q., Fan, X., Wang, Q. (2021). Hierarchical and Robust Pathology Screening for Cervical Abnormality. Computerized Medical Imaging and Graphics, 89, 101892.

Skills

- **Programming Languages:** Python, MATLAB, C/C++
- **Frameworks:** PyTorch, Git, LaTeX

Awards & Prizes (Selected)

- Guarantors of Brain travel grant (£910) **2024**
- ISMRM student travel grant ($500, $300) **2023, 2024**
- Competitive conference and fieldwork funding (£1400) **2022, 2023, 2024**
- China Undergraduate Mathematical Contest in Modelling: First Prize (Top 0.7%, Nationwide) **2019**
- MicroPort Undergraduate Scholarship (top 3% in SJTU) **2018, 2019**