MINGXU LI

Assistant Researcher | Railway Inspection and Computer Vision

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PROFILE

Assistant Researcher at the China Academy of Railway Sciences with a Ph.D. in Computer Science and research experience in railway defect detection, fine segmentation and efficient visual inference. Focuses on catenary and rail-surface inspection, small defects in complex backgrounds, and fast screening followed by detailed recognition. First-author research includes S2R and RBNet, with related defect segmentation achieving 71 FPS on Jetson Nano.

PROFESSIONAL EXPERIENCE

China Academy of Railway Sciences | Sep 2026 - Present

Assistant Researcher, Infrastructure Inspection Research Institute

- Conduct visual inspection research for railway catenary systems and rail surfaces, focusing on rapid localization and fine recognition of small defects in complex backgrounds.
- Investigate fast screening, candidate-region analysis and lightweight inference to improve inspection-image throughput and latency, supporting defect extraction and assisted review.

The Alan Turing Institute, London | May 2024

- AI Research Intern: Participated in statistical analysis and visualization for a Mastercard transaction prediction project, identifying patterns and features to inform prediction models.

Tencent WeChat Group, Chengdu | Apr 2021 - Jul 2021

- Test Development Intern: Built automated test cases and execution workflows for cross-platform JSAPI interfaces in WeChat Work; improved testing efficiency by over 50%.

SELECTED RESEARCH AND PUBLICATIONS

S2R: From Screening to Recognition, Event-Driven Perception of Railway Defects in Low-Power Systems

First author | IEEE Transactions on Intelligent Transportation Systems, 2026 | DOI

- Developed an event-driven SNN-CNN framework coupling low-power defect screening with fine segmentation; used contrastive learning and hard-sample mining to distinguish defects from interference.

RBNet: An Ultra-Fast Rendering-based Architecture for Railway Defects Segmentation

First author | IEEE Transactions on Instrumentation and Measurement, 2023 | DOI

- Designed a rendering-inspired coarse-to-fine segmentation architecture with 2.36M parameters for efficient railway defect inspection.

Latent Space Segmentation Model for Visual Surface Defect Inspection

First author | IEEE Transactions on Instrumentation and Measurement, 2024 | DOI

- Performed segmentation in the decoder latent space to reduce computation; achieved 71 FPS on Jetson Nano and improved few-shot segmentation accuracy over evaluated baselines.

EDUCATION

Southwest Jiaotong University | Ph.D., Computer Science | Sep 2022 - Jun 2026

Joint Ph.D. study: Nanyang Technological University, Aug 2024 - Dec 2025;
University of Birmingham, Jan 2024 - Aug 2024

Southwest Jiaotong University | M.Eng., Software Engineering | Sep 2019 - Jun 2022

Jiangsu University of Science and Technology | B.Eng., IoT Engineering | Sep 2015 - Jun 2019

TECHNICAL EXPERTISE

Railway visual inspection; catenary and rail-surface defect detection; semantic segmentation; small-defect recognition; coarse-to-fine analysis; spiking neural networks; contrastive learning; few-shot learning; lightweight models; edge inference; automated testing.