JIAQI YE, PhD

✉ jxy404@outlook.com ☏ +44(0)7935431909

School of Engineering, University of Birmingham, Birmingham, B15 2TT, UK

RESEARCH PROFILE

Postdoctoral researcher, problem solver, and good communicator (in both English and Mandarin), can be judged by my seven years of experience in designing, testing, and commissioning laser and vision sensing systems, strong publication records, and several innovative projects that I successfully delivered. Specialize in the design of AI-powered sensing systems, multi-sensor fusion, image processing techniques, 2D/3D measurement and reconstruction, and deep learning algorithms.

AREAS OF EXPERTISE

- Laser and Camera Systems
- Sensor Fusion and Automation
- 2D/3D Sensing System Design
- Machine Learning/Deep Learning (ML/DL)
- Image and Point Cloud Processing
- Object Classification, Detection, and Segmentation
- Measurement and Inspection
- Embedded Systems
- Modern Robotics

TECHNICAL PROFICIENCIES

Programming Language: Python; MATLAB; C/C++

ML and CV Packages: Tensorflow, PyTorch, tkinter, OpenCV, PCL, etc.

Software: 3D modelling (Solidworks), Electronic circuit design (Altium, Fritzing), Code management (VS Code, Git), etc.

EXPERIENCE HIGHLIGHTS

University of Birmingham, Birmingham, UK **02/2018 – Present**

Research Fellow, Birmingham Centre for Railway Research and Education (04/2022 - present)

Supervised PhD students to carry out applied research, accessed the latest research findings, and formulated solutions for ongoing projects. Demonstrated responsibility, as a technical leader, by conceiving detailed R&D routes, partnering with cross-functional personnel, and successfully reaching milestones on schedule.

- **Industry 4.0 Automation** (04/2022 - present) Introduced an AI-driven robotic platform into a production line of complex machinery components to improve productivity and reduces operational costs.
  - Used project coordination, and research skills to aid in the successful project win of the grant, valued at £288,000.
  - Responsible for devising, implementing, and testing vision and AI algorithms integrated into UR robotic platforms.

PhD Candidate (02/2018 – 04/2022)

Independently planned and managed a research project on the development of laser- and vision-based high-precision inspection approaches applied to safety-critical infrastructures and facilities in the railway. Worked as a core member in multi-disciplinary teams for two industrial projects and one research project and successfully made the deliveries. Present and publish research outcomes, outlined in more than ten papers published in various IEEE, IET, and IMechE journals.

- Proficiency with sensing and sensor fusion techniques, and firstly proposed a portable multi-sensor prototype integrating a laser, a camera, and an IMU for high-precision 2D/3D object measurement.
- Research on 2D/3D point cloud registration and localization methods (e.g., ICP), developed dedicated graphical user interface (GUI) software for high-precision 2D/3D reconstruction and wear assessment of large infrastructures such as the railway track.
- Experience with ML/DL architectures (e.g., CNNs and FCNs) and frameworks (e.g., TensorFlow, Keras, and PyTorch); developed several dedicated DL models applied to real-world rail inspection to support efficient track component management and remedial works.

- **The Royal Society of the UK and the National Natural Science Foundation of China** (03/2019 – 03/2021) Organised the international exchange scheme between the UoB and the Xi'an Jiaotong University (XJTU).
  - Planned and organized the project application and was successfully awarded the grant of £70,000 in total.
  - Collaborated with researchers from the XJTU and explored the feasibility of using 3D class segmentation deep learning methods to assist the health monitoring and fault diagnosis of complex machinery components.

- **European Union's Horizon 2020** (02/2018 – 06/2020) Participated in the Shift2Rail research and innovation project (with a total budget of € 5 million) aiming to deliver a semi-autonomous optical inspection system that contributes to the establishment of cost-efficient and reliable underlying infrastructures in the railway.
  - Worked in a multidisciplinary team of 5 and focused on redesigning the firmware (based on a ChipKIT uC32 board) and the software (involving SDK and API techniques) for a portable laser scanner (Micro-Epsilon 2D), to allow for its interaction with mobile actuators such as drones and robots.
  - Proposed an IMU and vision-based 6DoF motion detection and tracking algorithm for the scanner, and achieved semi-autonomous profile measurement and wear assessment for fatigue components in the railway.
  - Responsible for authoring related reports to the project sponsors, system tests, and the final demonstrator as the main deliverable of the project.
- **China High-speed Rail** (05/2019 – 05/2020) Worked as an R&D team lead and proposed a vision-based 24hr remote condition monitoring strategy for a reciprocating device in the railway.
  - Designed the prototype involving an embedded vision system, dedicated algorithms, and cloud computing. The system has been deployed and proven to save up to 50% cost of unnecessary visual inspections.
  - In charge of the client relationship and managing the project timeline, remote code version control through Github, and on-site system testing and optimization.

National Laboratory for Optoelectronics, China **02/2014 – 08/2014**
Research Assistant

- Worked as a research assistant and learned 3D imaging techniques involving the use of lasers, depth cameras, and lidars.
- Assisted with the development and test of a laboratory prototype for a Kinect-based depth sensing system.

EDUCATION

University of Birmingham, UK **02/2018 – 04/2022**
PhD, Electronic, Electrical and Systems Engineering
Thesis: Next-Generation Railway Inspection Approaches Based on a Combination of Multiple Sensing Technologies

MRes, Electronic, Electrical and Systems Engineering **09/2015 - 09/2017**
Thesis: 3D Perceptual System for the Detection and Characterisation of Surface Defects in Rail

BEng, Electronic & Electrical Engineering, 1st class honours **09/2014 - 07/2015**
Dissertation: Vision-based Non-invasive Switch Inspection System

Huazhong University of Science and Technology, top 10 universities in China **09/2011 - 09/2014**
BEng, Electronics and Information Engineering, Grade average: 82.0/100

HONORS & AWARDS

No Corrections Passing PhD Viva, University of Birmingham (04/2022)

Full PhD Scholarship, Birmingham Centre for Railway Research and Education (BCRRE) (02/2018)

SAGE Best Journal Paper Award, Proceedings of the Institution of Mechanical Engineers (IMechE) (03/2019)

Best Master Research Thesis, BCRRE (09/2017)

PROFESSIONAL AFFILIATIONS & PUBLICATIONS

Reviewer of Journals: 《IEEE Transactions on Industrial Electronics》· 《IEEE Transactions on Instrumentation and Measurement》· 《IET Image Processing》· 《Sensors》

STEM Ambassador: STEM Learning UK

12 journal papers (5 first-authored plus 7 co-authored) in the fields of sensing, measurement, and computer vision. Total list of publications is attached and also available at: researchgate.net/profile/Jiaqi-Ye-6

RIGHT TO WORK

Graduate Visa – *unrestricted right to work for 3 years plus an applicable indefinite leave to remain in between.*

List of publications:

1. **J. Ye**, E. Stewart, Y. Lei, et al, " Deep Learning and Laser-Based 3-D Pixel-Level Rail Surface Defect Detection Method ," in *IEEE Transactions on Instrumentation and Measurement,* vol. 72, pp. 1-12, 2023.
2. **J. Ye**, E. Stewart, Q. Chen, et al, "A vision-based method for line-side switch rail condition monitoring and inspection," in *Part F: Journal of Rail and Rapid Transit,* 236(8):986-996, 2022.
3. **J. Ye**, E. Stewart, D. Zhang, et al, "Integration of Multiple Sensors for Noncontact Rail Profile Measurement and Inspection," in *IEEE Transactions on Instrumentation and Measurement,* vol. 70, pp. 1-12, 2021.
4. **J. Ye**, E. Stewart, D. Zhang, et al, "Method for automatic railway track surface defect classification and evaluation using a laser-based 3D model," in *IET Image Processing,* 14: 2701-2710, 2020.
5. **J. Ye**, E. Stewart, C. Roberts, et al, "Use of a 3D model to improve the performance of laser-based railway track inspection," in *Part F: Journal of Rail and Rapid Transit,* 233: 337-355, 2019. **("Editor's Choice" awarded)**
6. J Yang, E. Stewart, **J. Ye**, et al, "An Improved VMD Method for Use with Acoustic Impact Response Signals to Detect Corrosion at the Underside of Railway Tracks," in *Applied Sciences,* 13(2):942, 2023. (Corresponding author)
7. D. Zhang, **J. Ye**, M, Xie, et al, "Ensemble Graph Wavelet Neural Network for Intelligent Fault Diagnosis of Gearbox," in *IEEE Transactions on Industrial Informatics,* 2022. (Under review)
8. D. Zhang, E. Stewart, **J. Ye**, et al, "Roller Bearing Degradation Assessment Based on a Deep MLP Convolution Neural Network Considering Outlier Regions," in *IEEE Transactions on Instrumentation and Measurement*; vol. 69, no. 6, pp. 2996-3004, 2020. (Corresponding author)
9. Q. Chen, G. Nicholson, **J. Ye**, et al, "Fault Prognosis of In-service Railway Switch Systems Using Deep Neural Network," in *Engineering Applications of Artificial Intelligence*, 2022. (Under review)
10. Q. Chen, G. Nicholson, C. Roberts, **J. Ye**, et al, "Improved Fault Diagnosis of Railway Switch System Using Energy-Based Thresholding Wavelets (EBTW) and Neural Networks," in *IEEE Transactions on Instrumentation and Measurement,* vol. 70, pp. 1-12, 2021.
11. Q. Chen, G. Nicholson, **J. Ye**, et al, "Estimating Residual Life Distributions of Complex Operational Systems Using a Remaining Maintenance Free Operating Period (RMFOP)-Based Methodology," in *Sensors,* 20(19): 5504, 2020.
12. Q. Chen, G. Nicholson, **J. Ye**, et al, "Fault Diagnosis Using Discrete Wavelet Transform (DWT) and Artificial Neural Network (ANN) for A Railway Switch," in *2020 Prognostics and Health Management Conference (PHM-Besançon)*, pp. 67-71, 2020.