Aohan He | Senior Software Engineer | Machine Learning and Vision Specialist

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Education

National University of Singapore
PhD in Mechanical Engineering *2016–2020*
- Focused on phase retrieval techniques for optical applications, including surface, displacement, and strain measurement.
- Developed CUDA-based GPU acceleration for optical coherent methods.
- Gained expertise in image processing, optics, and programming (C++, MATLAB, CUDA).

Beihang University
Bachelor in Measurement Control and Information Technology *2011–2015*
- Specialized in optics, computer science, control systems, and signal processing.
- Conducted research on rail wheel diameter measurement and laser structure light.
- Graduated with First-Class Honors.

Experience

Seagate Singapore International Headquarters Pte. Ltd.
Senior Engineer *2022–Present*
- Designed and implemented machine vision algorithms for high-precision assembly equipment, including pick-and-place tasks and defect detection.
- Developed a hybrid rule-based and machine learning vision system for transferring slider bars.
- Integrated CI/CD pipelines using GitHub Actions for automated software development.
- Collaborated with cross-functional teams to design scalable software architectures for automated inspection systems.

Semiconductor Technologies & Instruments Pte Ltd
Software Engineer *2020–2022*
- Designed advanced image processing algorithms for wafer inspection, including edge defect detection and bump height measurement.
- Spearheaded the development of deep learning-based segmentation models.
- Implemented real-time 3D laser profiling systems, achieving sub-micron accuracy in defect detection.
- Optimized software pipelines for high-throughput inspection systems.

National University of Singapore
PhD Candidate *2016–2020*

- Conducted research on phase retrieval techniques for optical metrology, publishing three peer-reviewed papers.
- Developed GPU-accelerated algorithms for optical coherent methods, achieving significant computational efficiency.
- Designed and implemented experimental setups for surface and strain measurement using advanced imaging techniques.

National University of Singapore
Teaching Assistant *2016–2019*

- Assisted in teaching modules such as Mechanics of Machines, Engineering Principles and Practice, and Mechanics of Materials.
- Mentored undergraduate students in research projects involving image processing and system design.

Honors and Awards

2016–2020: **Research Scholarship**, National University of Singapore

2013: **National Scholarship of China** (Top 0.2% of students nationwide)

2012–2014: **First-Prize Scholarship**, Beihang University

2013: **Honorable Mention**, Mathematical Contest in Modeling

Technical Skills

Programming Languages: C++, Python, MATLAB, CUDA, C#	*Proficient*
Machine Learning: TensorFlow, PyTorch, Cognex VisionPro, Halcon	*Experienced*
Computer Vision: OpenCV, Scikit-Image, Halcon, Cognex	*Experienced*
Software Development: Agile Development, Git, CI/CD (GitHub Actions)	*Proficient*
System Design: Distributed Systems, Data-Intensive Applications	*Intermediate*
Documentation: LaTeX, MS Office	*Proficient*

Projects

2025: **Vision System for Slider Bar Transfer Equipment**

- Designed a machine vision system for real-time measurement and guidance for Slider Bar Transfer Equipment.
- Implemented an algorithm to locate the slider bars that are not covered by any other bar.
- Implemented measurement and guidance vision function using rule-based method.
- Implemented DL classification model for tray type classification.
- Implemented vision sequence for hardware triggered camera.
- Designed auto teach and calibration sequence.

2025: **Vision System for Hard Drive Assembly Equipment**

- Designed a machine vision system for real-time measurement and guidance for Hard Drive Assembly Equipment.
- Implemented a capture and processing sequence for a high-speed camera by closely cooperating with the robot control system.
- Designed auto teach and calibration sequence.
- Implemented measurement and guidance vision function using rule-based method.
- Implemented CI/CD pipelines for seamless deployment of station software.

2025: **CI/CD for Department Software Repositories**

- Implemented CI/CD pipelines for seamless deployment of station software.
- Added features and fix bugs for common libraries Repositories.
- Implemented CI/CD pipelines for common libraries Repositories.
- Persuaded the team to adopt CI/CD practices, resulting in improved software quality and faster deployment cycles.

2024: **Disk and Spacer Assembly Simulation**

- Simulated assembly process with disks and spacers from different vendors to estimate the assembly quality with different parts control strategies.
- Implemented the simulation using Python and wrote the unit test using PyTest.

2023: **Vision System for Auto Screw Install Station**

- Designed a machine vision system for real-time measurement and guidance for Auto Screw Install Station.
- Located a slowdown issue caused by the control software vendor by carefully designing a test sequence and using Git.
- Designed auto teach and calibration sequence.
- Implemented measurement and guidance vision function using rule-based method.
- Implemented CI/CD pipelines for seamless deployment of station software.

2023: **Vision System for Auto Glue Dispenser Station**

- Conducted a proof-of-concept study for the machine vision system using Halcon for the Auto Glue Dispenser Station.
- Integrated rule-based method for localization and ML method for anomaly detection.
- Use rule-based method to measure glue droplet to trigger the robot axis movement.

2022: **Deep Learning Inspection Module for Wafer Inspection Vision System**

- Developed software part for Deep Learning Module.
- Integrated Cognex Vidi to the module.
- Conducted extensive testing and deployment support to ensure robustness and reliability in production environments.

2022: **Wafer Edge Inspection Module for Wafer Inspection Vision System**

- Developed software part for Wafer Edge Inspection Module.
- Cooperated with Control Software Engineer to define the inspection and calibration sequence.
- Conducted extensive testing and deployment support to ensure robustness and reliability in production environments.

2021: **3D Inspection Module for Wafer Inspection Vision System**

- Developed software part for 3D Inspection Module.
- Optimized existing laser profiling system for 3D Inspection Module.
- Integrated Confocal Microscopy System for 3D Inspection Module.
- Developed 3D UI Display for 3D Inspection Module.
- Conducted extensive testing to ensure robustness and reliability in production environments.

2020: **Recipe Load Optimization for Wafer Inspection Vision Software**

- Optimized recipe load process: located the bottleneck, i.e., FOV and Dice map generation, and optimized it.

Certifications

2023: **MVTEC Halcon Certification**, Advanced Machine Vision Development

2022: **LinkedIn Learning**, Advance Your Skills in AI and Machine Learning

2022: **PMI-ACP Certification Preparation**, Agile Methodologies

Continuous Learning

Machine Learning:

- Completed courses on advanced NLP, GANs, and deep learning optimization.
- Certifications in AI and machine learning from platforms like TensorFlow and PyTorch.

Software Engineering:

- Read books like *Head First Design Patterns*, *The Pragmatic Programmer*, and *Head First Software Development*.
- Completed courses on object-oriented design, software architecture, and design patterns.
- Gained expertise in SOLID principles, refactoring, and clean code practices.

System Design:

- Studied books like *Designing Data-Intensive Applications* and *System Design Interview*.

Research Expertise

Phase Retrieval Techniques:

- Developed swarm intelligence algorithms (APSO, DE) for phase retrieval in optical metrology.
- Implemented CUDA acceleration for two-shot techniques, achieving better computational efficiency.
- Designed simplified paraboloid phase models and Hilbert spiral transforms for fringe direction estimation.

Publications: Published journal articles on optical cryptosystems, phase tracking, and fringe pattern analysis, contributing to both theoretical advancements and practical validations.

Publications

2019: **A. He** and C. Quan, "Wavefront correction for spatial nonuniformity of the liquid crystal on silicon based spatial light modulator," *Optics and Lasers in Engineering*, vol. 121, pp. 377–388.

2018: **A. He** and C. Quan, "An improved principal component analysis based region matching method for fringe direction estimation," *Optics Communications*, vol. 413, pp. 87–102.

2017: **A. He**, B. Deepan, and C. Quan, "Simplified paraboloid phase model-based phase tracker for demodulation of a single complex fringe," *Applied Optics*, vol. 56, pp. 7217–7224.