

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

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## Education

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### 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 top academic distinction based on GPA.

## Experience

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### 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.
- Developed and optimized 3D inspection modules with laser profiling and confocal microscopy, including 3D UI displays and rigorous reliability testing.
- 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

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**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

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<b>Programming Languages:</b> C++, Python, MATLAB, CUDA, C#	<i>Proficient</i>
<b>Machine Learning:</b> TensorFlow, PyTorch, Cognex VisionPro, Halcon	<i>Experienced</i>
<b>Computer Vision:</b> OpenCV, Scikit-Image, Halcon, Cognex	<i>Experienced</i>
<b>Machine Vision:</b> Optics, Camera Calibration, Vision-Guided Robot Control	<i>Experienced</i>
<b>Software Development:</b> Agile Development, Git, CI/CD (GitHub Actions)	<i>Proficient</i>
<b>System Design:</b> Distributed Systems, Data-Intensive Applications	<i>Intermediate</i>

## Projects

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### 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

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**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

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### 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

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### 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

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**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.