

Wei Pan Ph.D.

R&D Director · Industrial Machine Vision

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90+ Published patents

20+ Algorithm team

12 Top-tier papers

5 Industries in production

Summary

Eight years in industrial machine vision and 3D imaging; SUTD Ph.D. Currently R&D Director at OPT Tokyo, leading a 20+ algorithm team. Focused on high-precision 3D imaging (structured light, phase deflectometry, photometric stereo), point cloud / mesh processing, industrial defect inspection, and robotic vision — deployed in Li-battery, 3C, automotive, medical, and logistics production lines.

Experience

2013 – present · academia and industry, in parallel

2013 Committed to 3D geometry

Entered ultra-scale rapid prototyping and assembly planning at SUTD, locking "geometry + algorithm" as the long arc.

2019 From academia to industry

Joined OPT during postdoc — owned structured-light reconstruction and SciVision 3D SDK, turning algorithms into shipping code.

2021 IC to leadership

Became R&D Director at OPT Tokyo, shifting from individual contributor to team leader, driving funded national R&D programs and cross-industry production rollouts.

OPT Tokyo R&D Center · industrial vision algorithm stack

R&D DIRECTOR

- ROLE** Director at OPT Tokyo since 2021. Built a 20+ algorithm team from zero, owning the full industrial vision algorithm stack and coordinating between Japan field clients and the China HQ R&D org.
- ACTIONS** Designed three product lines (3D imaging / defect inspection / robotic guidance); shipped fused structured-light, phase-deflectometry and photometric-stereo pipelines; led joint research between Tokyo applied team and Dongguan HQ.
- IMPACT** Powers the full SciVision 3D camera algorithm stack; 90+ published patent applications, 30+ granted, 1 PCT WO; deployed across five industries: Li-battery, 3C, automotive, medical, logistics.

Dongguan Major Sci-Tech Program · high-end manufacturing inspection

PRINCIPAL INVESTIGATOR

- ROLE** PI of the 2023–2025 Dongguan Major Sci-Tech Program "Intelligent Inspection for High-end Manufacturing", a joint university-industry effort centered on structured-light and AI-based defect algorithms.
- ACTIONS** Coordinated algorithm / hardware / application teams; delivered fused phase-deflectometry plus photometric-stereo inspection, depth-map jitter correction, and semantic point-cloud registration.
- IMPACT** Within the cycle: 30+ patents filed, 1 PCT, and 4 SCI papers including EAAI 2026; algorithms in production for battery sealing-nail defect, glass coating evaluation, and automotive weld-quality inspection.

3D Imaging Products & SciVision 3D SDK · core company product line

MODULE OWNER

- ROLE** Owner of the company's 3D imaging products and the SciVision 3D SDK core modules since 2019 — multi-modal imaging, depth / point-cloud / mesh SDK, and real-time rendering, architecture through shipping.
- ACTIONS** Led high-precision reconstruction across structured light, line laser, and phase deflectometry; shipped depth / point-cloud / mesh filtering, CAD registration, and height/volume measurement SDK modules; authored original algorithms — HLO, Chebyshev flatness.
- IMPACT** Powers the company's full 3D camera line (structured light, line laser, etc.); HLO (half-kernel Laplacian) published in CAD; granted patents cover point-cloud normals (CN112802077B), progressive rendering (CN113269860B / WO2022257594), and mesh filtering (CN110120069B / CN113178013B).

Robotic 3D Vision Grasping · Dongguan Key R&D Project

KEY MEMBER

- ROLE** Key member of the 2020–2022 Dongguan Key R&D Project "Robotic 3D Vision Smart-Grasping System", responsible for hand-eye calibration and 3D object recognition algorithms.
- ACTIONS** Proposed a 3D-object-recognition-based hand-eye calibration method; built an automated 3D scanning rig for UR arms, closing the loop of "scan · recognize · grasp".
- IMPACT** Demonstrated in logistics sorting; granted patents CN109702738B (3D recognition-based hand-eye calibration) and CN109141281A (3D scanning device); folded into the company's robotic-guidance product line.

Education

SUTD, Singapore 2013–2018

Ph.D. in Engineering Product Development · advisor Prof. Lujie Chen · Presidential Graduate Fellowship

Zhejiang University 2009–2013

B.Eng. in Optical Engineering · Chu Kochen Honors College · GPA 3.60 / 4.0

Selected Publications

2020 - 2026 · ★ marks first / corresponding author · all SCI Q1 or top venues

EAAI	★ Improved graph attention network for industrial point clouds: battery sealing-nail defect segmentation.	2026	Patterns · Cell	★ Deep learning-enabled 3D multimodal fusion of CBCT and intraoral mesh scans.	2023
Adv. Photonics	Generative deep-learning-embedded asynchronous structured light for 3D imaging.	2024	Optics Express	Reconstruction of transparent objects using PSP based on diffusion models.	2024
CAD	★ HLO: Half-kernel Laplacian Operator for Surface Smoothing.	2020	Meas. Sci. Tech.	★ Gap measurement via projection lines and convex analysis of 3D point cloud.	2024
IEEE TVCG	DeSC: Learning Deep Semantic Descriptor for NeRF Registration (in press).	2025	ECCV	SemReg: Semantics-constrained point cloud registration.	2024

Selected Patents

granted / published · 90+ applications · 30+ granted · ★ marks first inventor

CN119006550B	★ Neural Radiance Field (NeRF) registration method & system	2025	CN120598883A	★ Fused phase-deflectometry + photometric-stereo defect inspection	2025
CN114324168B	Surface defect detection method & system	2024	CN120388003A	★ Multi-cost speckle structured-light stereo matching	2025
CN113269860B WO2022257594	★ High-precision real-time progressive 3D rendering · PCT	2021	CN120339358A	★ Fused phase-deflectometry + photometric-stereo surface reconstruction	2025
CN112802077B	★ High-precision point cloud normal estimation	2021	CN119919533B	★ Downsampled single-frequency phase unwrapping	2025
CN113178013B	★ Triangle mesh filtering method & device	2021	CN118397020A	★ Fast image region segmentation and contour extraction	2024
CN110120069B	★ Laplacian-based triangle mesh filtering	2019	CN109702738B	3D recognition-based robotic hand-eye calibration	2019

Service & Awards

Academic Service

JOURNAL REVIEWER	EAAI · ESWA · AUTCON · CVIU · KBS · TVCG · IJCV · CVMJ · Scientific Reports
CONFERENCE REVIEWER	NeurIPS 2026 · CVPR 2025/26 · ECCV 2025/26 · ACM MM 2024/25/26 · AAAI 2026
PROGRAM COMMITTEE	ICICV 2025 · ICIGP 2025 / 2026 · ACM MM 2024 · MCACCV 2022
EDITORIAL BOARD	The Computational Vision and Imaging

Selected Awards

1ST PRIZE	Guangdong Machinery Industry Sci-Tech Award	2023
1ST PRIZE	Guangdong Mech. Eng. Society Sci-Tech Award	2023
2ND PRIZE	Henan Province Sci-Tech Progress Award	2023
PHD FELLOWSHIP	SUTD Presidential Graduate Fellowship (5 yr)	2013-18

Core Skills

3D IMAGING	structured light · line laser · phase deflectometry · photometric stereo · speckle stereo; high-speed reconstruction and multi-modal fusion
POINT CLOUD & MESH	filtering, normals, registration, segmentation, CAD matching, feature extraction; original HLO · half-window Laplacian · Chebyshev flatness
DEFECT INSPECTION	deep learning + classical fusion; welding · sealing · surface · QR / DM code · contour; battery sealing-nail and automotive weld in production
ROBOTIC VISION	3D-guided grasping, hand-eye calibration, object recognition; UR arm productionization, end-to-end "scan · recognize · grasp"
ENGINEERING & LEADERSHIP	C++ / Python / MATLAB; leads 20+ team; PI on government-funded programs; cross-site coordination across Tokyo and Dongguan

"Less, but better." — Dieter Rams

"Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away." — Saint-Exupéry

"Constraints are catalysts."