Minhyeok Bae



Machine vision software engineer · Semiconductor inspection

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I develop wafer alignment and defect detection algorithms. I reproduce false passes on low-contrast images and verify C++ ports against Python on the same inputs.

Experience

Software engineer, associate grade · Semiconductor inspection R&D Jan 2022 – present

Work-study hire. Supported production lines at two Korean memory manufacturers. By H1 2026, I had worked on **7+ tool types**, completed **80 tasks** and written **8 customer documents**.

2022–2024 · Inspection displays, defect statistics, coordinate matching and 2D/3D inspection tool setup.

Selected projects

Shot Key alignment mark detection 2026

Field alignment fell from **140 to 23 s**, with marks detected in **12/12** slots. CNN false detections fell from **280 to 114** on 6,150 in-house images including augmented examples.

Replaced templates with rules and cut the scan from 7 lines to about 3. Rules passed field tests. The CNN runs in shadow alongside the existing decision.

Wafer alignment without registered features 2026

False passes fell from **134 to 0** in 191 synthetic cases and from **31 to 0** in 48 in-house decisions. In-tolerance results withheld rose from **0 to 10** in the latter test.

Estimated rotation from die-grid spacing and agreement across regions, withholding low-confidence angles. Verified the C++ port in-house. Production qualification is in progress.

Die-edge crack detection 2026

Of **1,883** detections on the customer sample, **524** were classified as die-edge cracks.

Built an adaptive edge band, a mask and a tiled viewer for large images. Verified crack and chipping detection on customer material.

Skills

C++ (MFC), C#, C++/CLI, Python, OpenCV, IPP, PyTorch and ONNX. TDI line-scan and area cameras, 3D confocal sensors and frame grabbers.

Education and research

Inha University, Graduate School of Manufacturing Innovation · M.S. in Semiconductor Process Intelligence Convergence, part-time. Mar 2026 – Feb 2028 (expected).

Research on inspection zones and settings from layout data. On public SKY130 layouts and synthetic images, critical-defect detection rose from **81.3% to 95.3%** at ≤1 false call per image.

Tech University of Korea · B.S. in Computer and Electronic Engineering, work-study, Mar 2022 – Feb 2026. GPA 3.9/4.5, merit scholarship.

Seoul Robotics High School · Meister high school, Mar 2019 – Feb 2022.

Certifications and training

Work-Study Qualification in SW Development L5 (Dec 2025), ADsP data analytics (Sep 2025), national certifications in electronics, electricity and programming.

Eight major semiconductor fabrication processes (2022) and applied LLM training (2025).