

An embedded Intelligent 3D object recognition system for random bin picking.

Keywords:

- Stereo vision, Structure light phase shift, Polarized imaging system, Random bin picking, Object recognition, Object registration, 6D pose estimation, Machine learning, Backpropagation learning

Problems addressed

- Traditional automation involves robots that faithfully carry out specific actions repeatedly based on programs meticulously crafted by highly skilled engineers
- These robots are inflexible and ill-fitted for production of goods with short product lifecycle
- In high-productivity manufacturing line, parts detection and posture estimation must be performed in real-time

ASTRI's vision guided random bin picking system integrates AI based "eye" onto the robotic arm. Picking path is automatically calculated after object is located via Self-Learning 3D object recognition to reduce the engineering efforts.

Innovations

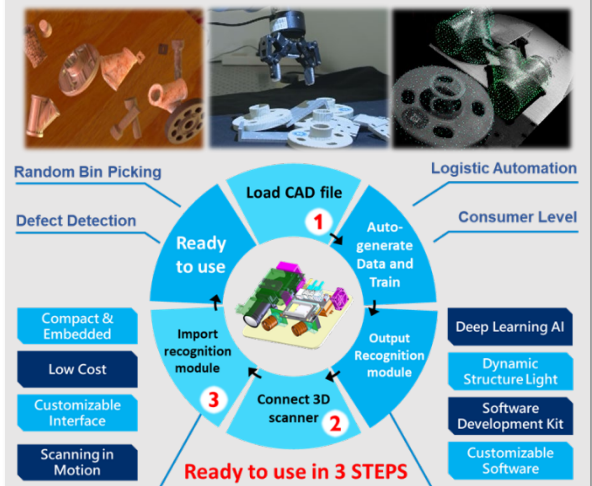
Eye (Adaptive Embedded 3D Vision System) + Brain (Self-Learning 3D Object Recognition):

- Data Generation Engine:** Generate artificial AI training data through 3D engine. No manual labelling is required
- Deep Learning:** Extract object features by AI to train an appropriate model without the need of manual parameter tuning for new object
- Adaptive Optical Design:** Adopts coded phase shift light pattern and dual-polarized optical design, the system is automatically adapted to different production line environment & multiple measured objects
- GPU Accelerated Point Cloud Processing:** Apply GPU accelerated algorithm on object recognition to ensure speed (< 0.5 s 3D recognition time) and accuracy (0.1 mm @ 0.5m)

Key impact

- Enhancement of the flexibility of manufacturing line by enabling efficient reconfiguration for multiple products
- Increasing the throughput of the manufacturing line in low-cost
- Expediting the upgrading of local industries with flexible cutting-edge 3D robot cognition to perform complex tasks in advanced manufacturing

Innovation snapshot



Project completed

- August 2020

Applications

- Random Bin Picking
- Defect Inspection
- Assembly
- Autonomous robot navigation

Patent(s)

- US Patent No. 11,287,626; CN App. No. 201980000804.2
- US Patent No. 11,023,770; CN App. No. 201980002023.7 and HK App. No. 62020022213.6

[ASTRI Patent Search](#)

Commercialisation opportunities

- IP licensing
- Technology co-development