Vision Guide Industry Robot for Random Bin Picking

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

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
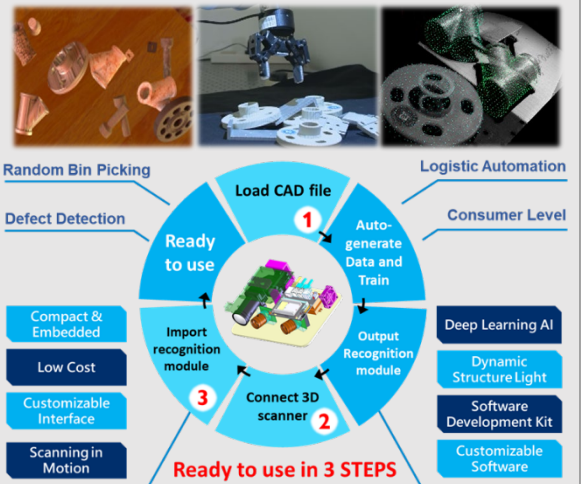
Project completed

- 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

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Project reference
Related innovation - Chatbot with sentiments