# SOLOMON

Vision with Intelligence

SOLOMON

AI - 3D VISION

Smart Manufacturing • Smart Logistics

AccuPick 3D

A gold honoree of Vision Systems Design's Innovator Award, AccuPick 3D represents the state-of-the-art and comprehensive robotic picking solution for manufacturing and logistics industries. AccuPick 3D is comprised of three distinct but seamlessly integrated hardware and software modules:

AccuPick Application Process

- IPC
- PLC
- Robot Controller
- Server
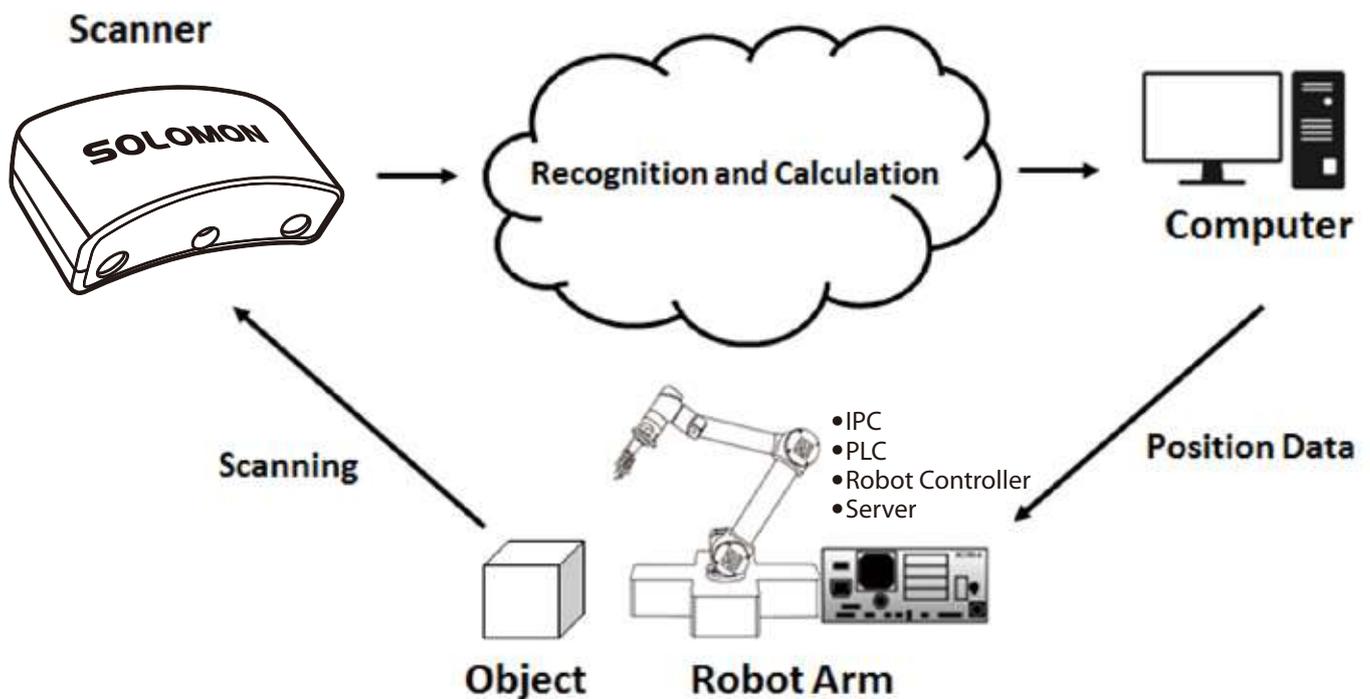
3D Scanner

AccuPick supports multiple 3D scanner technologies in obtaining 3D images of the work pieces, including structured light, Time-of-Flight (ToF), active stereo vision, laser.
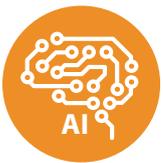
Image Analysis Software

3D point clouds generated are instantly analyzed by AccuPick's powerful deep learning software to recognize, segment, and locate work pieces.

Bin Collision Avoidance

In many applications robots with gripper need to reach deep inside of a bin to pick a work piece, AccuPick provides an optional module that optimizes robot path and prevents collision against bin.

Open AI-3D Platform

Robot · Cobot

UNIVERSAL ROBOTS   Kawasaki   STÄUBLI   YASKAWA

Mecademic   DENSO   ABB   KUKA   FANUC

MITSUBISHI   NACHi   DOOSAN   OMRON

TOSHIBA MACHINE   OTC   YAMAHA

AUBO   TM   EPSON   rethink rebotics

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AI 3D Vision

3D Camera Technologies

Structured Light   **Active Stereo Vision**

intel REALSENSE TECHNOLOGY
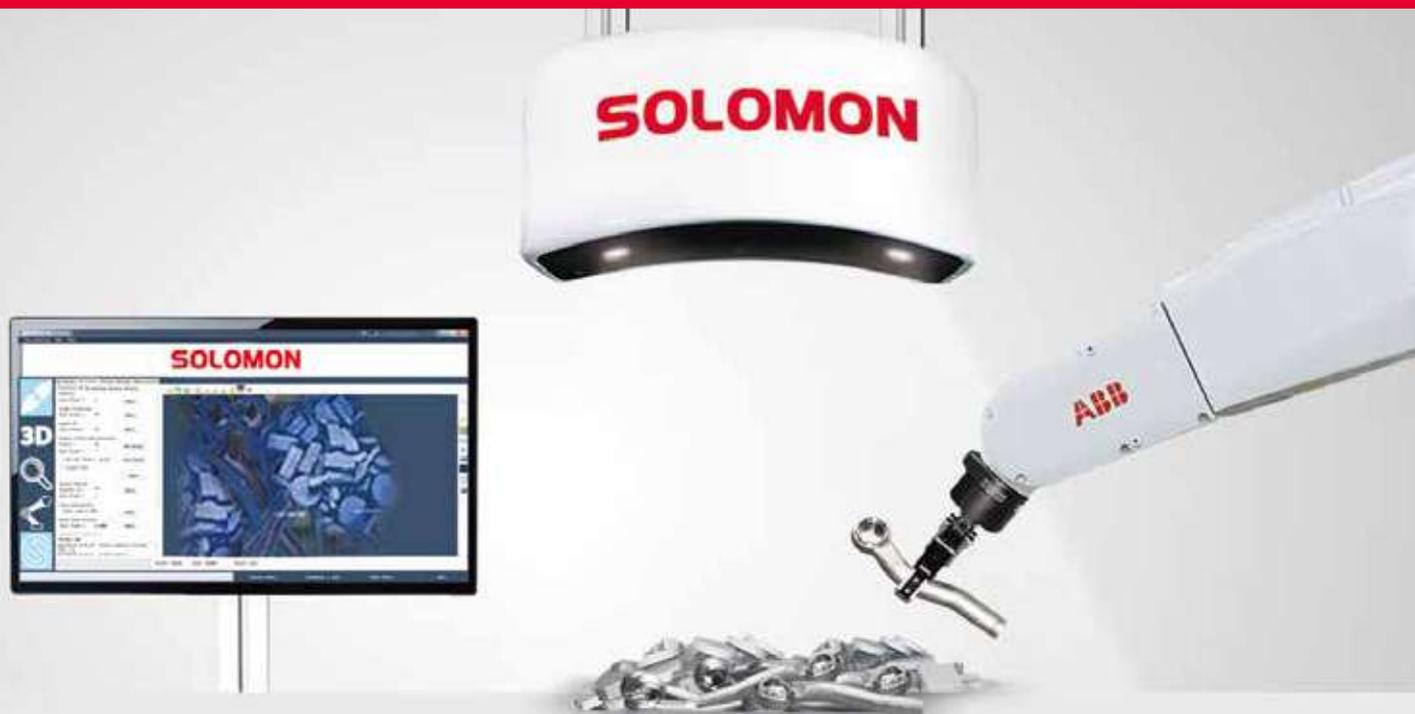
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Time-of-Flight (ToF)   **Laser**

PLC

Rockwell Automation

MITSUBISHI

SIEMENS

OMRON

AccuPick's key advantages

The unique way AccuPick 3D blends AI, 3D vision and robotics makes it an intelligent, fast, and intuitive solution. It offers superior return on investment with following advantages:

Recognition of widest range of objects and patterns

AccuPick 3D is able to recognize small, oddly shaped, uneven sized objects, or even transparent materials - all without needing an object's CAD file. System integrators and end users alike can deploy AccuPick 3D for wide array of applications.

Fast cycle time

Time is money for any factory with large volume production. Using advanced neural networks AccuPick is able to recognize objects two times faster than mainstream method that requires matching of 3D point cloud data against CAD file.

Optimized robot path to avoid collision

Recognizing an object alone is often not enough, robot has to reach and pick it without colliding into the bin. AccuPick's optional motion planning module quickly calculates optimal path to grab the identified object. Bin collision avoidance is necessary for applications with tall bin relatively to size of randomly placed objects.

Choice of 3D scanners

Different projects have different cycle time, accuracy, and budget requirements. AccuPick 3D software supports multiple 3D scanner technologies - structured lights, Time-of-Flight (ToF), active stereo vision, laser - providing system integrators and end users different choices to meet their application requirement.

Compatible with the most number of robot brands

AccuPick supports twenty robot, cobot, and SCARA brands. End users and SIs alike are able to choose the most suitable robot brands. AccuPick also provides connectivity to major PLC brands through common communication protocols.

User-friendly interface and simple set up

AccuPick's intuitive drag-and-drop graphic user interface and tutorial videos guide users through the steps required to complete picking task.

Applications of AccuPick

Factories worldwide are increasingly looking for flexible automation to enhance productivity. AccuPick harnesses advanced AI to intelligently recognize complex patterns and can be deployed to handle various tasks in factories across different industries.

Smart Manufacturing

Automotive

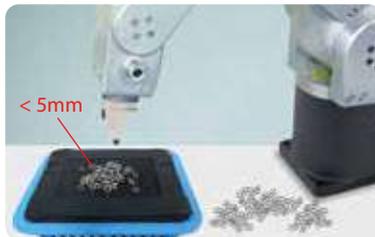Electronics

Rubber & Plastic

Food & Beverage

Pharmaceutical

Textile

Machinery

< 5mm

Metal

Consumer

Smart Logistics

AccuPick 3D is an equally powerful tool to automate material handlings in warehouses, e-commerce, distribution centers and logistics. Unlike factory applications, the number of SKUs to be identified and handled is not only far more but also constantly changing.

It is impractical in these environments to learn in advance individual SKUs one by one. AccuPick 3D is capable of locating and picking items fast and reliably without any prior knowledge of size, shape, and appearance of objects it picks. Common applications requiring robot to pick unknown objects include:

Retail Distribution Centers

Warehouses

Logistics

⚙️ Smart Manufacturing

Pick-and-Place

Items orderly placed in a bin or tote may still rely on 3D point cloud data to determine possible shift in individual item's position. Though not difficult from a technical point of view, this type of application is still common in factories.

⬚ Structured light, Active stereo vision

Machine Loading

Machine tending of metal and plastic parts is one of the most common applications in factories worldwide. Work pieces randomly positioned in a bin are identified and picked out of a bin and placed into a machine for processing. AccuPick 3D 'trains' the software to recognize objects in complex positions based on few sample images of the objects. For work pieces contained in large bin size, AccuPick provides an optional module that controls robot's motion to prevent collision against the bin.

⬚ Structured light

Pick-and-Drop

Picking randomly placed items from a bin and placing them individually on a conveyor or in a container is another application that is often done manually in factories. For any object which can be picked up using suction cups or foam grippers, AccuPick allows users to pick them without having any CAD file or objects' images; in other words, there is no 'learning' process required, the robot simply picks. This significantly simplifies the entire process and reduce set up time required to perform any picking task. Pick-and-Drop is suitable for wide ranging industries from automotive components, consumer items, medical supplies, etc.

⬚ Structured light, Active stereo vision

⚙️ Smart Manufacturing

Sorting

There are situations where sorting different objects without any specific pattern is required. AccuPick allows user to recognize the items, their orientations and 3D positions simply by labeling images and 'learn' through these sample images. While uncommon in manufacturing setting, automated sorting is a convenient tool in food & beverage, agricultural and service industries.

🔲 Structured light, ToF, Active stereo vision

Kitting

Kitting involves picking different items located in separate totes, placing and bundling them as a kit. AccuPick simplifies kitting because items' positions can be predefined or random. Kitting is common in industries such as automotive components, consumer electronics, pharmaceutical, cosmetics, retails, and food & beverage.

🔲 Structured light, Active stereo vision

Assembly

Assembly takes one step further than kitting; multiple parts need to be attached together, involving higher precision required to not only pick but also place the parts. With its intuitive user interface and support for various PLC brands, users can define the sequence required to complete the assembly process.

🔲 Structured light
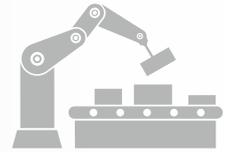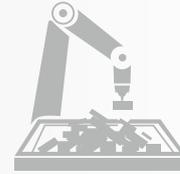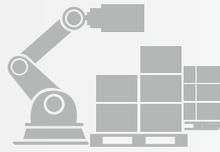
Packaging

Putting different items in the same package is another manual task that can be automated. By 'seeing' and 'learning' from operators how different items are placed in specific positions and orientations in a pack, AccuPick can help replicate and automate the packaging process with higher efficiency. Automated packaging can be useful for consumer products, pharmaceutical, food and beverage items.

Structured light, Active stereo vision

Complex Patterns

AccuPick offers unique capability to recognize highly complex patterns. For instance, it can identify and pick individual items from a pile of thin materials, such as metal, paper, rubber, or textile materials, even when the items are randomly stacked and overlapped. AccuPick can also identify transparent materials, which are notoriously difficult to 3D vision.

Structured light, Active stereo vision

Conveyor Picking

Picking items moving on conveyors is another common application. Whether it's picking when conveyor is stopped or in motion, AccuPick can pick wide range of objects in various poses, shapes, appearances. For picking items in motion, Time-of-Flight (ToF) and laser 3D scanners are most suitable choices.

Structured light, ToF, Active stereo vision, Laser

Smart Logistics

Order Picking   Structured light, Active stereo vision

In order picking, thousands of SKUs must be picked from their respective totes based on the orders received from customers. Though most popularly used in growing number of distribution centers for e-commerce, order picking is also prevalent in warehouses of corporate.

Order picking remains a highly manual task today. The high SKU count and constant introductions of new SKUs makes it impractical to label SKU's images one by one. AccuPick is able to identify 3D positions of individual items inside of a bin without any prior 'knowledge' of the item it's about to pick. For items placed in large sized bins, AccuPick's motion planning module prevents robot from colliding against the bin.

Parcel Picking   Structured light, Active stereo vision

For logistics companies, handling large number of parcels everyday is a highly labor intensive job. Regardless parcels' sizes and appearances, AccuPick is able to locate and pick individual parcels from random piles without the need to learn what each parcel looks like.

De-Palletization   Active stereo vision, ToF

Moving cartons and boxes from pallets is a common task in warehouses across different industries. Here again it is unnecessary to input images for AccuPick to 'learn' about individual boxes, regardless the sizes, shapes, appearances, and how they are positioned. With AccuPick picking unknown cartons is simple even if they are placed side by side without any obvious gaps between boxes.

3D Vision Software & Hardware Specifications

CERTIFIED BY UNIVERSAL ROBOTS · VCI · KC · CE · FC

Specifications			
Module Name	SLM 3DRBP-0231C	SLM 3DRBP-0501C	SLM SVRBP-0092C
3D Technology	Structured light		Active stereo vision
Pixels	2.3 M	5 M	0.92 M
Camera Resolution	1920 x 1200	2590 x 2048	1280 x 720
Field of View ★★	231 x 178 ~ 1033 x 778 mm (9.09 x 7.01 ~ 40.67 x 30.63 in)	310 x 269 ~ 1202 x 1120 mm (12.20 x 10.59 ~ 47.32 x 44.09 in)	520 x 330 ~ 1220 x 730 mm (20.47 x 12.99 ~ 48.03 x 28.74 in)
Working Distance ★★	450 ~ 2000 mm (17.72 ~ 78.74 in)		450 ~ 1000 mm (17.72 ~ 39.37 in)
Spatial Resolution ★	0.24 ~ 1.07 mm (0.01 ~ 0.04 in)	0.24 ~ 1.08 mm (0.01 ~ 0.04 in)	≤ 2%
Scanning Time (Minimum)	0.3 Sec	0.8 Sec	0.033 Sec
Scanning Technology	Static		Dynamic
Projector Light Source	LED		IR Laser
Interface	USB 3.0		USB 3.0
Dimensions (L-W-H)	363 x 202 x 120 mm (14.29 x 7.95 x 4.72 in)		110 x 49 x 22 mm (4.33 x 1.93 x 0.87 in)
External Power Adapter	Input : 100V AC ~ 240V AC / 50 ~ 60Hz Output : 12V DC / 8.5A,102W		USB 3.0
AccuPick Input	12V DC / 7A		USB 5V
Weight	3 kg		0.2 kg
Operating Temperature	0°C - 40°C (32°F - 104°F)		

Hardware Requirements : Operating System Windows 10 (64 Bit) (RAM : minimum 16GB, recommended 32GB)
GPU: Nvidia GTX 1070 (recommended ≥8GB)

★★ Optional
★ The product is not applicable to the transparent objects or objects with over 50% light reflection rate.
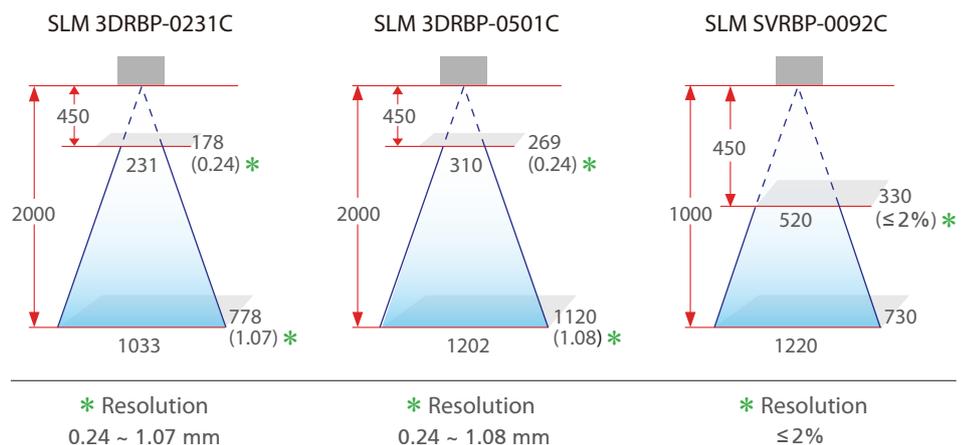
Features

Color Camera	✓
Import CAD File	✓
No CAD File	✓
Point Clouds Match	✓
Deep Learning Recognition	✓
Bin Collision Avoidance ★★	✓
Motion Planning ★★	✓
After-sales training	✓

★★ Optional
Specifications subjects to change without notice.

3D Scanner Field of View (FOV)

unit : mm

SLM 3DRBP-0231C

450
178 (0.24) ✱
231
2000
778 (1.07) ✱
1033

✱ Resolution
0.24 ~ 1.07 mm

SLM 3DRBP-0501C

450
269 (0.24) ✱
310
2000
1120 (1.08) ✱
1202

✱ Resolution
0.24 ~ 1.08 mm

SLM SVRBP-0092C

450
330 (≤2%) ✱
520
1000
730
1220

✱ Resolution
≤ 2%

Vision*Systems*
DESIGN
2019 Innovators
Awards

GOLD

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