3D Imaging – Locating Multiple Objects in a PointCloud

One of the most challenging tasks in machine vision has been "Random Bin Picking" - RBP. In Tordivel we do not think there is one single solution for this task. Depending on the part shape and more; MonoPose3D, Stereo Vision or 3D imaging can be a solution.

In 2006 we started a large R&D project, Auto3D, together with Kongsberg Automotive, SINTEF and Conoptica to develop a set of tools to conquer RBP. We are now at the end of the R&D project and are proud of our achievements.

We have moved Scorpion Vision Software® from a robust 2D package to a complete cutting-edge 3D framework including:

- 3D visualisation
- 3D toolbox containing 50 tools
- Complete support for 3D stereo vision including numerous 2D improvements to support stereo vision
- A nice toolset for pointcloud processing including ConnectedComponents, PlaneFit, SphereFit and CylinderFit
- 3DMaMa™ - an extremely powerful tool to find multiple objects in a 3D pointcloud
- GCPS - Gray Code Phase Shift Software Module to create 3D models using stripelight and a standard projector

We believe 3DMaMa™ is a breakthrough in 3D part location!

TORDIVEL

Tordivel AS • Phone +47 2315 8700
office@tordivel.com • www.scorpionvision.com

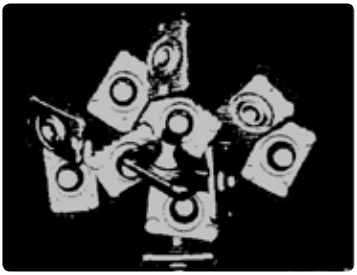
SCORPION VISION SOFTWARE

Random Bin Picking Scene

The image to the right shows a typical automotive part to be picked from a bin.

3D Model captured using Scorpion GCPS™

The model shown is captured using Scorpion GCPS™. The image capture took 7.5 seconds. The model contains 1.2 million 3D points spanning an xyz-area of 1000 mm x 700 mm x 300 mm. The height resolution is 0.1 mm.



Object Location using 3DMaMa™

On a duo core Intel CPU 3DMaMa™ has located 5 parts in 3D, xyz and three angles, in 1.8 seconds. On a Quad-Core processor it will be located in less than 1.0 second.

The basic principle is to select the center of two planes on the parts. 3DMaMa™ then runs an exhaustive search to locate these planes within the 3DImage. For each candidate it calculates a quality measure and match percentage. The dots in the image map the model on top of the image to show where the parts are located.

How to teach 3DMaMa™?

3DMaMa™ locates the parts based on a 3D Model. The model can be imported from a true 3D Model or be created based on points captured by Scorpion GCPS™.