





[Login](#) | [Register](#)

[▶ HOME](#) | [▶ TECH BRIEFS](#) | [▶ WHITE PAPERS](#) | [▶ BLOG](#) | [▶ TECH EXCHANGE](#) | [▶ WEBINARS](#)

[▶ PODCASTS](#)


TECH BRIEFS | Media 

[PODCASTS](#) | [WEBINARS](#) | [SUPPLEMENTS](#) | [EXCERPTS](#) | [ISSUE ARCHIVE](#)

[Subscribe to NASA Tech Briefs](#)

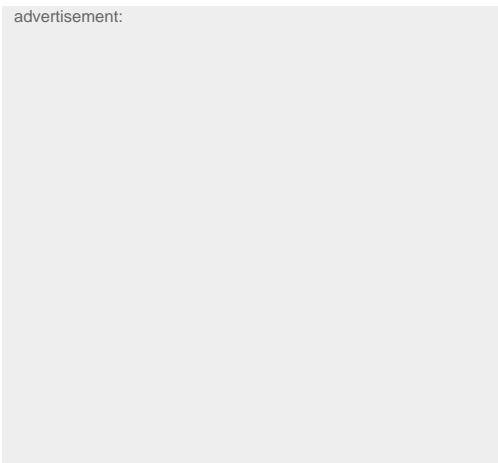
[HOME >>](#) [MEDIA >>](#) [SUPPLEMENTS >>](#) [USING VISION TO ENABLE ROBOTIC RANDOM BIN PICKING](#)

Using Vision to Enable Robotic Random Bin Picking

From the June 2008 Issue of *Imaging Technology*
 Sunday, June 01 2008

Page 1 of 2

The development of a robotic random bin picking system that translates to a real-world factory application has received attention for more than 30 years, and has been called by some the "Search for the Holy Grail." Random bin picking refers to a system where vision-enabled robots locate, grasp, and move single parts from a bin of jumbled or randomly piled parts. In recent years, advances in processing speed, new algorithms, and significant engineering have combined to solve limited versions of the problem, but the more general problem remained.



Semi-Random vs. Really Random

Many of the limited

Related Links from Technology Leaders

- » [PCB success stories from aircraft carriers to university robots](#)
[Sunstone Circuits](#)
- » [Ensuring the best processes for your needs, whatever the volume](#)
[Molded Fiber Glass Companies](#)
- » [Know about our model gallery & tutorials on multiphysics modeling](#)
[COMSOL](#)
- » [Electro-optical adhesives with excellent refraction index & more](#)
[Master Bond, Inc.](#)

[More Related Links >](#)



>> MOST POPULAR

Recent

1. [Solutions for LED Thermal Management - Video White Paper](#)
2. [Fuel-Cell-Powered Vehicle With Hybrid Power Management](#)
3. [Use of Nanofibers to Strengthen Hydrogels of Silica, Other Oxides, and Aerogels](#)

All Time

1. [Electrodialysis To Remove Ammonium Ions From Wastewater](#)
2. [Fiber-Optic Gratings for Lidar Measurements of Water Vapor](#)

solutions handle what the machine vision industry refers to as “semi-random” problems, where parts are not totally randomized, but loosely fitted in a bin. In some cases, parts are roughly stacked, are flat 2D parts, or they arrive in a single layer in the bin creating less variance in part orientation and height. Semi-random picking techniques typically include pattern matching, 2D or 2.5D part location, and a standard approach trajectory for grasping parts.



Random bin picking refers to a system where vision-enabled robots locate, grasp, and move single parts from a bin of jumbled or randomly piled parts.

Truly randomized bins, where parts are situated underneath or on top of one another in any position, create an additional set of problems. Parts jumbled on top of one another increase the number of potential orientations of a part, reduce the visibility of part features used to recognize individual parts, and require additional potential paths for grasping parts. Realworld solutions need to overcome all of these obstacles, and in addition to solving the vision problem, ensure that the robot avoids colliding with other parts or the bin itself.

All vision guidance solutions tackle extremely difficult problems caused by the possibility of harsh lighting conditions. In addition, random bin picking must deal with increased shadowing and specularities caused by reflections from other parts, variation in appearance of the part based on its pose, varying degrees of occlusion by other parts in the pile, and the lack of (a large number of) salient features for recognition — a typical characteristic of rough or unfinished parts that are inexpensive enough to toss together in a bin. Another particularly difficult problem is cascading layers of parts — parts that partially lay on top of one another in a weaving formation — where a vision system must be able to recognize a part as safe to grasp even while under other parts.

In addition to vision issues, there are significant challenges with planning grasping paths for robot grippers that avoid collisions with the bin and the rest of the pile within the robot’s range of movement. Robot tools must be developed to grip parts from various positions, and must grasp parts without colliding with parts above, below, or next to the part. The system must also complete the task as fast as or faster than current manual or semi-manual systems to be commercially viable to customers.

3. Variable-Specific-Impulse Magnetoplasma Rocket

>> RELATED ITEMS

- Developing Signal Pattern Recognition Programs
- Miniature Laboratory for Detecting Sparse Biomolecules
- Wavelet-Based Real-Time Diagnosis of Complex Systems
- Photodetector Arrays for Multicolor Visible/Infrared Imaging
- Applications for Subvocal Speech
- Microspheres in Plasma Display Panels
- Pointing History Engine for the Spitzer Space Telescope

>> NEWSLETTER

Subscribe today to receive the INSIDER, a FREE e-mail newsletter from *NASA Tech Briefs* featuring exclusive previews of upcoming articles, late breaking NASA and industry news, hot products and design ideas, links to online resources, and much more.

Your name:

Your email:

Please Subscribe me to the Insider

Deploying Color Image Capture for MV applications **DALSA**

Haydon
A Tritec Corporation Company

2010 INTERNATIONAL MICROWAVE SYMPOSIUM
The world's premier microwave and RF conference
www.ims2010.org
See you in Anaheim, CA
May 23-28 at IMS2010

PDx/amerimold
May 11-13, 2010
Design Engineering
REGISTER TODAY!

Genesis HIGH SPEED
New name...proven quality*
LDS Nicolet becomes Genesis HighSpeed
Up to 100 MS/s sample rate per channel
Genesis



[About](#) | [Contact](#) | [Advertise](#) | [Subscribe](#) | [Feedback](#) | [Privacy](#) | [Advertiser Links](#) | [Legal](#)

© 2009-2010 NASA Tech Briefs