Automated Picking and Assorting System for Distribution Centers

Robot-empowered picking/assorting system solves labor-shortage

Recognizes and places many kinds of commercial products, and works 24 hours a day in the place of humans. Realize completely-unmanned system integrated with automated storage and retrieval system.

Picking robot

Issues facing distribution centers

Thanks to the remarkable development of the internet business, internet trading has become quite commonplace these days. In order to adjust to a society where it is possible to easily order various products 24 hours a day via the internet, innovative changes are being expected to take place at distribution centers, which are also taking charge of distributing commercial products.

Distribution centers are facilities that temporarily store a large number of products produced by manufacturers and then assort and ship the products to the stores or homes that ordered them. Usually, the number of products necessary for one store is less than the number of products in one box that arrived at a distribution center. This requires the distribution center to pick up the necessary number of products. Because this operation — known as piece-picking — is difficult to automate due to the variety of product shapes, weights and hardnesses, it is currently done manually.

Since distribution centers typically require a huge amount of space, they are often located in the suburbs where less people live. In order to deliver the ordered products quickly, expedited shipments are sometimes required, even at midnight. Considering these circumstances, securing of sufficient manpower is one of the important issues facing the present logistics system. Responding to the increasing

Picking operation
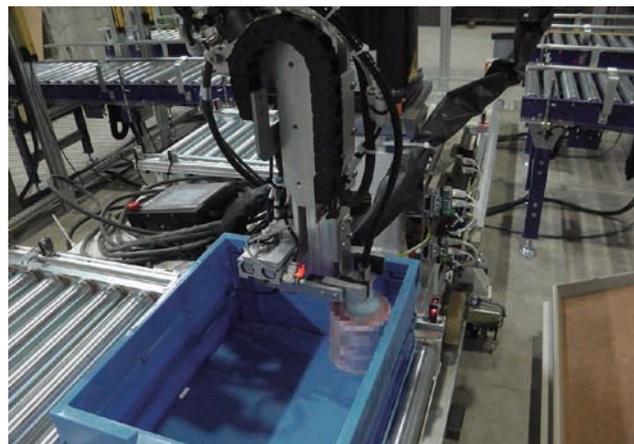
Assorting operation

number of orders requires more piece-picking and shipping-container assorting; however, this can be achieved only after adding more manpower. How to overcome this situation regarding human resources is a key issue in innovating distribution centers.

As a solution for above issue, IHI Logistics & Machinery Corporation has been developing a robot-empowered piece-picking/assorting system that does this work in the place of humans.

Outline of the system

The robot-empowered piece-picking/assorting system automatically picks up the required number of products from boxes, and rearranges into another container for shipping. This system consists of following features and elements:

(1) Recognizing the spatial position of the various products

Because the products in the box are being placed randomly, the position (spatial coordinates) to grip must be specified for each product. A robot vision system is installed in this robot-empowered piece-picking/assorting system to recognize the position of the product automatically.

This robot vision system takes photographs of the objects via a vision camera, and then processes the image information to obtain the position data of the objects. This picking/assorting system employs both two and three dimensional vision cameras to enable position recognition of various products.

(2) Gripping and picking up products adopting suitable robot hand for each one's size, shape and position

In order to pick up recognized products from the box and assort them into containers, exchangeable handling tools adapting to the product's shape are available. This enables stable gripping of the products, and picking and assorting them.

(3) Optimal assorting of products into shipping containers

It is possible to make the best stacking plan of products in shipping containers before assorting them according to

each destination. This robot-empowered assorting process ensures efficient operation.

This stacking plan considers the position of products (standing or lying) and the relationship with other products in the same container (order of stacking or maximum number of packing).

Advantages in deploying the system

By deploying this robot-empowered system, it is possible to realize labor savings in the man-powered piece-picking operation. This system not only provides a solution for serious labor-shortages, but also for automatic picking operations at nighttime. This leads to high productivity in logistics.

Future development

There are other man-powered operations in distribution centers, including going around the warehouse to replenish products that have shipped. We aim to achieve a completely-unmanned system by combining the above piece-picking robot and automated storage and retrieval system.

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