

## Deep Learning Application for Object Image Recognition and Robot Automatic Grasping

**Authors :** Shih-Jer Huang, Chen-Zon Yan, C. K. Huang, Chun-Chien Ting

**Abstract :** Since the vision system application in industrial environment for autonomous purposes is required intensely, the image recognition technique becomes an important research topic. Here, deep learning algorithm is employed in image system to recognize the industrial object and integrate with a 7A6 Series Manipulator for object automatic gripping task. PC and Graphic Processing Unit (GPU) are chosen to construct the 3D Vision Recognition System. Depth Camera (Intel RealSense SR300) is employed to extract the image for object recognition and coordinate derivation. The YOLOv2 scheme is adopted in Convolution neural network (CNN) structure for object classification and center point prediction. Additionally, image processing strategy is used to find the object contour for calculating the object orientation angle. Then, the specified object location and orientation information are sent to robotic controller. Finally, a six-axis manipulator can grasp the specific object in a random environment based on the user command and the extracted image information. The experimental results show that YOLOv2 has been successfully employed to detect the object location and category with confidence near 0.9 and 3D position error less than 0.4 mm. It is useful for future intelligent robotic application in industrial 4.0 environment.

**Keywords :** deep learning, image processing, convolution neural network, YOLOv2, 7A6 series manipulator

**Conference Title :** ICMRSC 2019 : International Conference on Mechatronics, Robotics and Systems Control

**Conference Location :** Sydney, Australia

**Conference Dates :** December 02-03, 2019