

# Hybrid 3D Object Recognition and Tracking Pipeline with Occluded and Cluttered Situation for Service Robotics Applications

Ren C. Luo, Sheng Y. Chen and Keng. C. Yeh

*International Center of Excellence on Intelligent Robotics and Automation Research, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei, Taiwan 106*

**ABSTRACT:** 3D object recognition is one of the most crucial functions in robotics fields. For robot applications, the 6D object information is necessary for motion planning. Differ from the image-based recognition algorithms; using point cloud recognition takes advantage in illumination and color invariants. The histogram based statistical methodology provides a distinctive descriptor of the object and real-time computation speed for robot. However, histogram methodology suffers from the improper segmentation situation like occlusion or cluttered environment. This paper presents a novel methodology which combines particle filter tracking and Viewpoint Feature Histogram (VFH) recognition to enhance the robustness of 3D object recognition. The experimental result shows that it improved the segmentation correctness for object recognition in cluttered situation and keeps the computation efficiency.

**Keywords:** Point Cloud, 3D Object Recognition, Object Tracking