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F O R S C H U N G S P R A X I S  
for  
Chiraz Nafouki  
Student ID 03667752, Degree EI

## **Object recognition and pose estimation from an RGB-D image**

### Problem description:

Although robotic perception has been key a research topic in the last few years, the problems is still open in unstructured environments where multiple sources of uncertainties are present. With the advent of low-cost 3D sensing hardware such as the Kinect, adopting 3D perception in robotics research has become feasible and promising. In the last years, a significant effort has been made by robotics and computer vision communities to develop software to process 3D perception data. A widely-used open source library to elaborate point clouds is PCL (Point Cloud Library) [2]. An important feature of PCL is the use of descriptors, such as Viewpoint Feature Histogram (VFH), to carry out object recognition and pose estimation [1]. Although VFH shows promising recognition result, further improvement can be still achieved. For example, the problem of defining descriptors that efficiently include color information is not solved yet [3]. The aim of this work is to develop efficient global descriptor by including color information, in order to achieve an increased robustness and efficiency. To show the obtained results, an experimental evaluation of the performance in object recognition and pose estimation will be carried out in a real world scenario.

### Work schedule:

- Study the relevant literatures.
- Develop a feature descriptor that combines geometry and color information
- Performing object recognition and pose estimation in a real scenario
- Integrate the developed algorithm into a ROS Node.

Supervisor: Shile Li  
Start: 07.09.2015  
Delivery: XX.12.2015

(D. Lee)  
Univ.-Professor

### Bibliography:

- [1] Aitor Aldoma, Zoltan-Csaba Marton, Federico Tombari, Walter Wohlkinger, Christian Potthast, Bernhard Zeisl, Radu Bogdan Rusu, Suat Gedikli, and Markus Vincze. Point cloud library. *IEEE Robotics & Automation Magazine*, 1070(9932/12), 2012.
- [2] Radu Bogdan Rusu and Steve Cousins. 3d is here: Point cloud library (pcl). In *Robotics and Automation (ICRA), 2011 IEEE International Conference on*, pages 1–4. IEEE, 2011.
- [3] Wei Wang, Lili Chen, Dongming Chen, Shile Li, and Kolja Kuhnlentz. Fast object recognition and 6d pose estimation using viewpoint oriented color-shape histogram. In *Multimedia and Expo (ICME), 2013 IEEE International Conference on*, pages 1–6. IEEE, 2013.