

“Advanced 3D Point Cloud Processing with Point Cloud Library (PCL)”

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Abstract: Point clouds are one of the most fascinating and challenging sensor streams, leading to countless publications. The advent of low cost 3D cameras, such as the Microsoft Kinect, has led to a wide range of new ideas and projects in this field. The PCL community tries to bring together all these activities to produce one open source library. Backed up by leading institutions and researchers around the world, as well as dedicated senior level programmers, this gives us the opportunity to join all the loose ends in point cloud processing. The point cloud library gives every researcher the opportunity to try new ideas fast as well as discuss them with and get support from a big community. Most of this is done through electronic communication, including mailing lists and chat systems, but to share it with the broader robotics community, as well as to get more people involved, we propose a one day tutorial. We will give an introduction to the library, guide the attendees in their first steps using it, as well as show what great results have been achieved with it already. PCL is a truly open community with a low administrative structure. We have especially designed our documentation to guide new users and have created help channels to give them the opportunity to rapidly become contributors.

Bios: Michael Dixon is a research engineer at Willow Garage, where he serves as developer and maintainer of the Point Cloud Library. His interests include 3D features, keypoints, and registration algorithms for range images and 3D point clouds. He has recently helped to organize and conduct tutorial sessions at RSS, IROS, and ICCV. Prior to his appointment at Willow Garage, he served as a research associate at Washington University, where he worked on a variety of projects, including video analysis, tracking, robot perception, and industrial machine vision. He received his M.S. and B.S. in computer science at Washington University in St. Louis in 2003.

Alexandru E. Ichim is a graduate student at EPFL. He obtained his Bachelor of Science in 2011 at Jacobs University in Bremen, Germany, having received the President's List Award every year for outstanding academic achievements. During his undergraduate studies, he closely worked with the Jacobs Robotics Group, concentrating on 3D perception for AUV/UAV applications. He collaborated with institutions such as the German Research Center for Artificial Intelligence (Robotics Innovation Center and Cognitive Systems) and the Computer Graphics and Geometry Laboratory at EPFL, where he is currently working as a research assistant. His collaboration with the Point Cloud Library was funded by the Google Summer of Code and Toyota Code Sprint

programs. He reviewed publications participating in the International Conference on Robotics and Automation and the Robotics and Automation Systems Journal.

Zoltan-Csaba Marton obtained a degree in industrial informatics from the Technical University of Cluj-Napoca. Since 2007 he is at the Technische Universitaet Muenchen, working on his PhD degree at the Intelligent Autonomous Systems Group under the supervision of prof. Michael Beetz. His main research interests are semantic mapping, multi-cue classification, and 3D model fitting. He started working on the predecessor of PCL during his Master studies with Dr. Radu Bogdan Rusu, and was involved in its development ever since.

Radu Bogdan Rusu is a Research Scientist at Willow Garage. Dr. Rusu received his Ph.D. in Computer Science from the Technische Universitaet Muenchen (TUM), Germany in 2009 with summa cum laude. He teaches a course on Perception for Manipulation at Stanford University. During his Ph.D., Dr. Rusu was affiliated with the CoTeSys (Cognition for Technical Systems) excellence cluster at TUM, the AIC (Artificial Intelligence Center) at SRI (Stanford Research Institute) as an International Fellow Researcher, and more recently, Willow Garage, working on 3D point cloud processing techniques. During the last few years, Dr. Rusu has been on the board of many workshops and scientific events in the field held at prestigious conferences, such as RSS, ICRA, IROS, and AAI. He has authored over 60 scientific publications, including 1 book, and two best paper award nominations (ICAR 2009, RSS 2011). His doctoral dissertation was awarded the 2nd prize on the George Giralto EURON PhD award, and is being published as a book with Springer.

Jochen Sprickerhof is a PhD student at the University of Osnabrueck, where he received a diploma in applied system science in 2009. He was a member of the team Deutschland 1 at RoboCup, and is one of the developers of 3DTK as well as PCL. After interning at Willow Garage in 2011 he helped to organize PCL tutorials at RSS and ICCV. His interests are point cloud processing in the field of robotics and SLAM, which is reflected by a number of publications on this topic.

Alex Trevor is a graduate student at the Georgia Institute of Technology's center for Robotics & Intelligent Machines. His interests include SLAM and semantic mapping. At the PCL tutorial, he will discuss techniques for fast segmentation of planar regions in organized point cloud data (as from a Kinect/Xtion), as well as how to fuse such planar regions segmented from multiple views into 3D maps of the environment. The related tools available in PCL will be demonstrated.