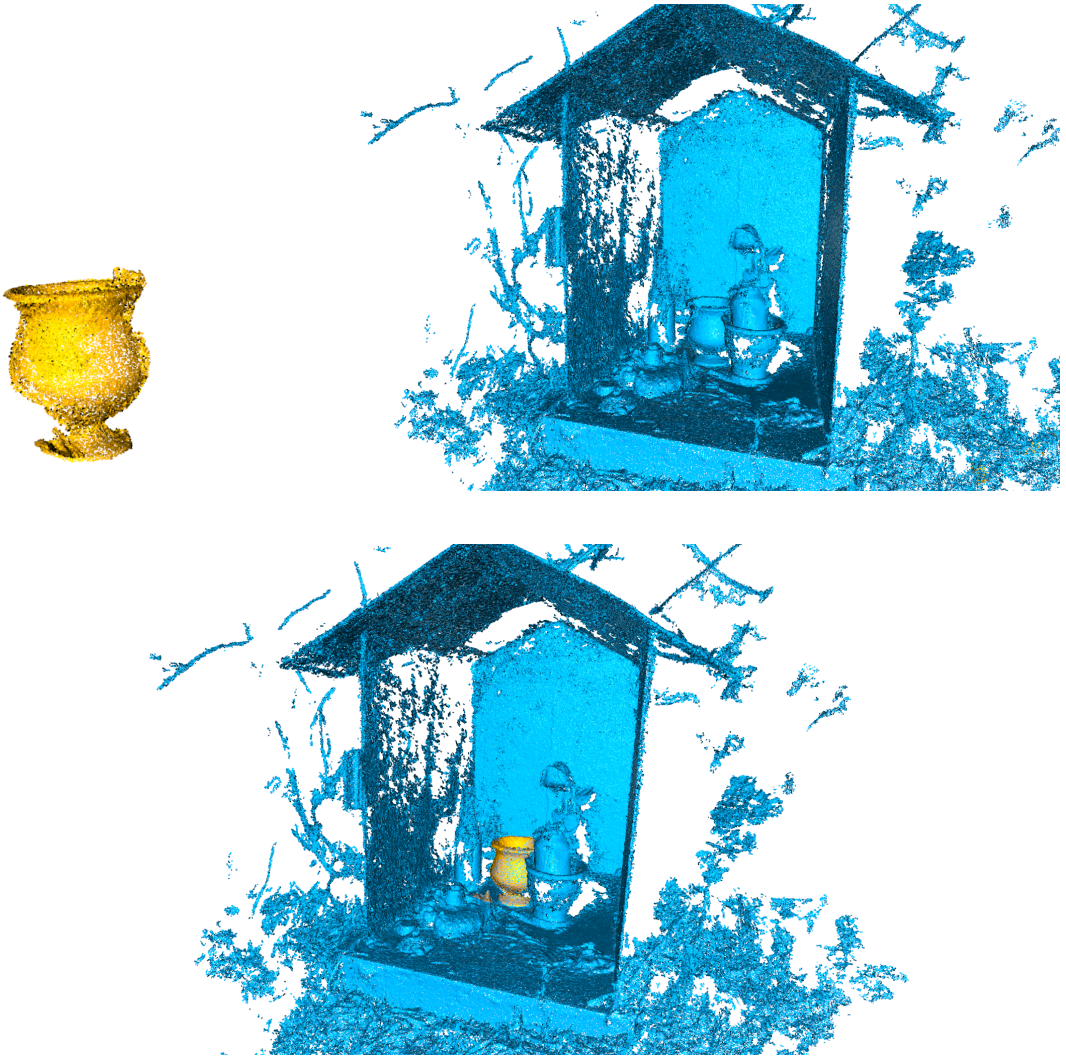
*3D DATA PROCESSING - LAB 3 (**Individual assignment**)*



Topic: Cloud Registration
Goal: Given a source and a target point cloud, find the alignment transformation of the source to the target cloud.

Introduction

Main step of the pipeline:

- Point cloud preprocessing
  - cloud filtering
  - downsampling
  - normals computation
- Global registration
  - Feature (FPFH) extraction and matching
  - Registration based on feature matching
- Registration refinement
  - ICP
- Point clouds visualization

The implementation has to be done in C++ by using PCL or Open3D libraries.

Compilation instruction

- `mkdir build && cd build`
- `cmake ..`
- `make`

Remember to adjust the cmake accordingly if you intend to use PCL.

To execute:
`./registration path/to/source path/to/target path/to/output_transformation_matrix path/to/fused_cloud`

What you need to deliver

- Source code (without objects and executables)
- A .ply file for the two provided datasets, representing the registered clouds
- A short written report with:
    - A brief description of the work done;
    - Some qualitative results (screenshots of aligned point clouds) for the two provided datasets.
    - Quantitative result in term of `inlier RMSE` for the two provided datasets.

HINTS

Either PCL and Open3D provide several utility functions and implemented algorithms for point clouds registration:

https://pointclouds.org/documentation/group__registration.html

http://www.open3d.org/docs/latest/python_api/open3d.pipelines.registration.html