3D Photography
Project 2
Due: Oct. 24th

The goal of this homework is the experimentation with the ICP algorithm for the registration of two point clouds.

a) The **first** task is to use a range image R1 and then create the range image R1' by applying a known rotation R and translation T to it (use the formula that provides a rotation matrix from a set of three angles-see online notes). Select now a random set of points from R1. Since points between R1 and R1' are in one to one correspondence, you have now a set of perfect correspondences between the two images. Using the algorithm described in the online notes you can now compute the rotation and translation between R1 and R1'. Verify you're your computation is correct (you can easily compare it with the known R and **T**).

b) Now you are ready for implementing a simple version of ICP. Since you have a method for the computation of a transformation from a set of correspondences, your **task** now is to automatically determine the set of corresponding points. You can use any of the variations described in class. The fastest would be the one that given a random set of points from R1 computes the closest points in R1' based on a simple projection. Otherwise, you should use a KD-Tree data structure. In C++ a good choice (no compilation required) is: https://github.com/jlblancoc/nanoflann

You can then do a pruning by discarding correspondences whose distance is larger than a threshold, and whose normals do not agree (again you need to use an angle threshold).

Experiment with different sets of random selection of points from R1 and display the final result by showing the two point clouds after registration (use a different color for each cloud). Also display the set of correspondences with its own color.

Provide a report with your results. You can choose a point-to-point or point-to-plane implementation.