

CS 485 - Project Option, *Jana Košecká*  
**Motion Estimation Iterative Closest Point Algorithm.**

The goal of this homework is to exercise is to complete the implementation of Iterative Closest Point Algorithm (ICP) for aligning (computing rigid body transformation) between two 3D clouds of points. In the `code` directory there is an `icp` tar file, with a complete implementation of ICP algorithm and data recorded from Kinect sensor. Your goal will be to change the front end of the algorithm with increasingly more difficult data association problems.

1. **Data association** By changing the point set in line 42 of `test icp.m` you can test it on four different datasets. It already works well for datasets with known correspondences (i.e. P1 and P2), but it does not work for datasets with unknown correspondences (i.e. P3 and P4). If the correspondences between the points are unknown, they have to be estimated at first. Implement closest-point matching in the file `closest point.m` and test it using the two data sets P3 and P4.
2. **ICP with Kinect** In this second exercise you will be provided a sequences of depth views and associated video frames. For the depth images each coordinate  $(x, y)$  has associated depth value in the camera coordinate system. Estimate the displacement between all consecutive views, by testing the variants of closest point correspondence algorithm from previous exercise.
3. **ICP with RGB-D data** Used SIFT matching developed in the previous homework for video frames to initialize correspondences between 3D points in consecutive depth maps.