CPSC 679b   HW 3 – Due Wednesday Feb 24, 2016, 11:55 pm.

Submit code, models and text via classesv2, leave your prints in the "Results" area in the lab.

1. (40pts) Cleaning and processing range scans:
Write programs to clean and convert to a mesh 3pi files from the Shape Grabber scanner. An example set of scans is given in SGone.zip and SGtwo.zip. The files are in ASCII, and record the values found in each of 1000 profiles, which record up to 1280 points. If a line begins with a # it is a comment. The start of each profile starts with a comment. If there are valid points in the profile, they are listed as
    X Y Z Intensity Row
Where (X, Y, Z) are the coordinates of the point, Intensity is the magnitude of reflected light, and Row is which sample it is along the profile (if points were found at each sample there would be Rows 0 to 1279).

a.) First consulting the "man" pages on the Zoo machines, write a program to convert the 3pi file to a 1000 by 1280 ppm image by recording either (0, 255, 0) or (ScaledIntensity, ScaledIntensity, ScaledIntensity) for each Profile and Row location. ScaledIntensity is a value 0 to 255 found by scaling the Intensity values read to fit that range. The ppm you write should be piped to a ppmtotif to write a tif file. For example for scan019.3pi the result will look like the image diag019.tif . You can clean the scan by coloring all of the unwanted points (0, 255,0) (i.e. bright green) and producing an image diag019cleaned.tif using any image editor you like (Gimp, PhotoShop, etc.)

b.) Write a program to take the original 3pi file and the "cleaned" tif file (that you can convert to ppm and pipe to your program) and produces a valid mesh that connects each point to its valid neighbors in obj format.

c.) Select three of the overlapping range meshes you are able to process, and align them using MeshLab, and produce a single mesh .

2. (40pts) Printing and Scanning

a) Scan a new object that you didn't use for HW2 (you choose the scanner you prefer to use), and produce an STL file.

b.) Create a new object that fits the object you scanned – e.g. it could be a customized holder for the object. You can do this by importing the STL file into OpenSCAD using
import("/fullpathname/.../ myscanned.stl")
and then using CSG to subtract your STL file from another shape. To make sure that your new object will fit the scanned object, you should use a small offset to make sure things aren't too tight.

c) Print both your scanned and newly designed object at the same scale from different color materials, and demonstrate that they fit together.

d.) Import your scanned STL file into Blender. Modify the original object by stretching or twisting it. Print out a copy of your new object.

3. (20pts) Technical reading
Read the paper vsfm.pdf and briefly summarize the strategies described for speeding up Structure from Motion.