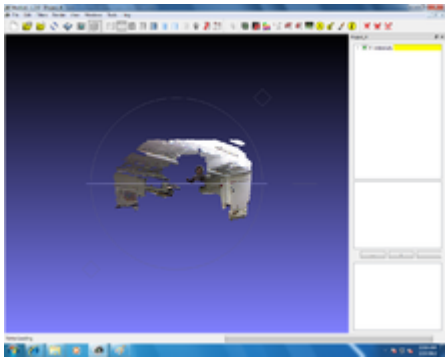
MakerBot/Cleaning Up Point Cloud Meshes in Meshlab For 3D Printing

Purpose

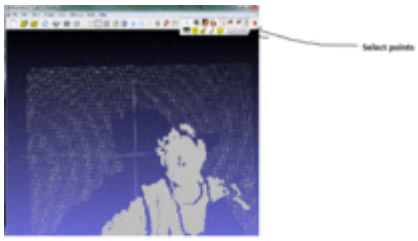
Cleaning up a point cloud mesh of an object in Meshlab so that it can be printed using a 3D printer.

Deleting Unwanted Background Points

1. Open the file that was taken from the Kinect in MeshLab.

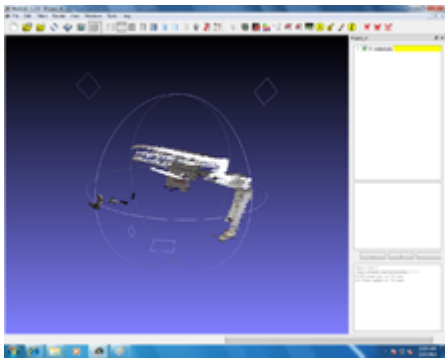


Output Mesh



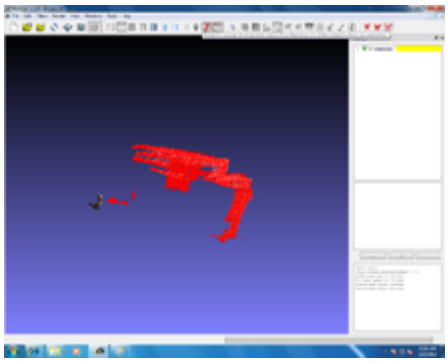
Select Points

2. Select either the desired points or the unwanted points using the **Select Vertices** tool. Rotate the mesh to make selecting easier.

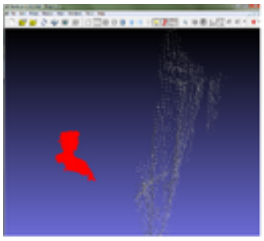


Rotate the mesh to select points for deletion

3. If a selection is made around the points you want to keep, then invert the selection using Filter -> Render -> Invert Selection. Press **ctrl + delete** to delete unwanted points from the mesh.

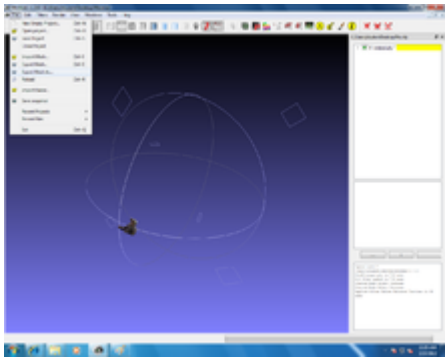


Delete selected vertices



Or, select the points to be kept points, invert the selection, and delete the unwanted points

4. Use **Export as...** (.ply) to save progress. Saving it at this point provides a good backup point, and the image is zoomed and centered when re-opened from the new file.

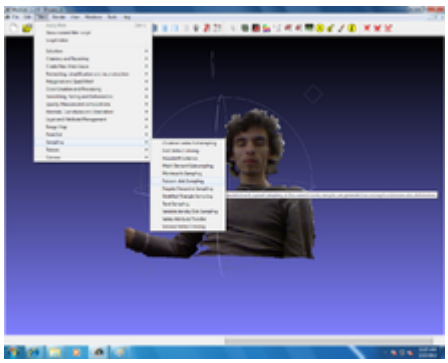


Save the mesh (Use export mesh as... choose .ply)

Rendering the Object

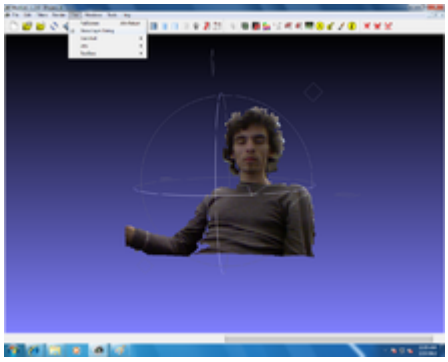
Option "A"

5a. Under the **Filters** tab in the navigation menu choose **Sampling -> Poisson-disk Sampling**. In the **Number of Samples**, pick between 60000 and 100000 sample points(sometimes the system crashes.) Remember to check the **Base Mesh Subsampling** box or you will get an error.

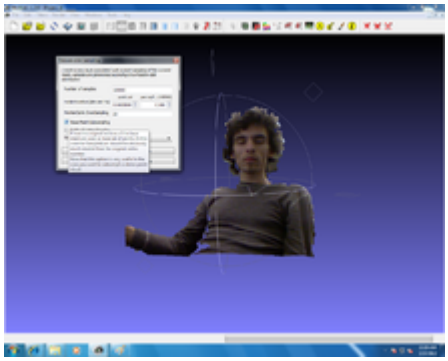


Poisson-disk Sampling

6a. Once the sampling has completed, a new layer will be added. Open the layers window under **View -> Open Layer Dialog** and make sure the **Poison-disk Samples** layer is highlighted.

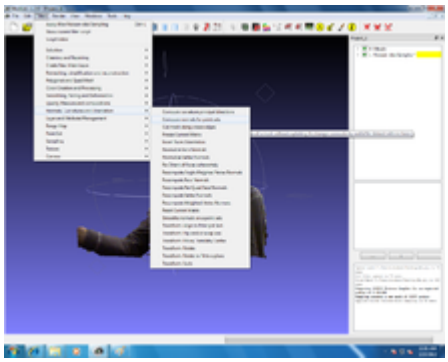


Show Layer Window and select Poisson-disk Samples layer

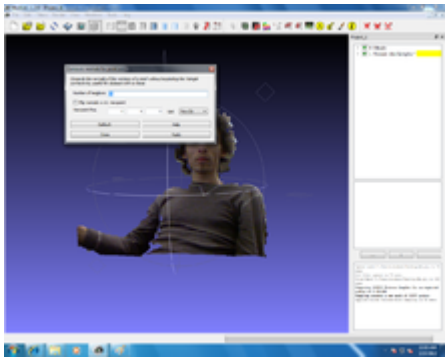


Add two zeros to the Number of Samples and check Base Mesh Subsampling

7a. Next, go to **Filters –> Normals, Curvatures and Orientation -> Compute normals for point sets**. In the new window, put a number greater than 15 for the **Number of Neighbors**.

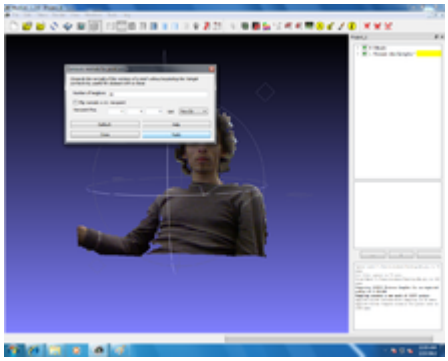


Compute Normals for Point Set

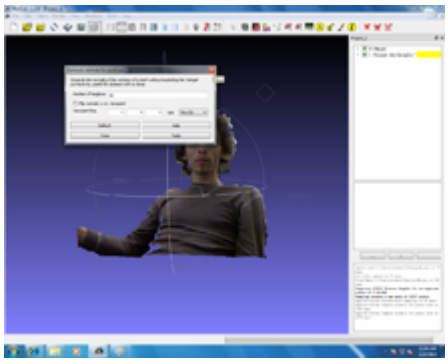


More than 15 for Number of Neighbors

8a. Click **Apply** and manually **Close** that menu.

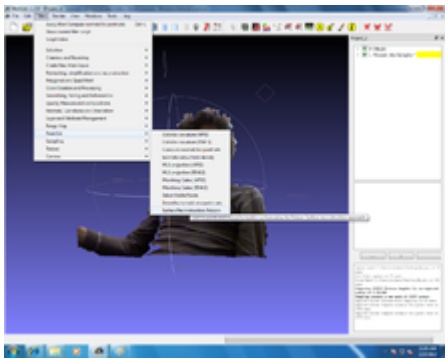


Apply

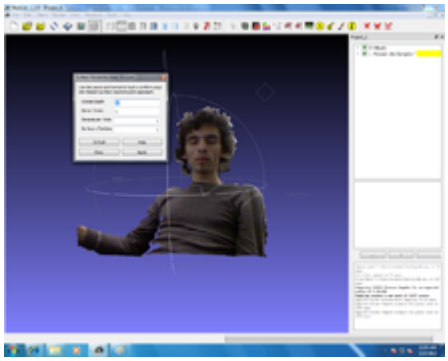


Close menu

9a. Then, go to **Filters —> Points —> Surface Reconstruction Poisson**. This will create a new layer called Poisson Mesh. From there you can add surfaces to the Model.

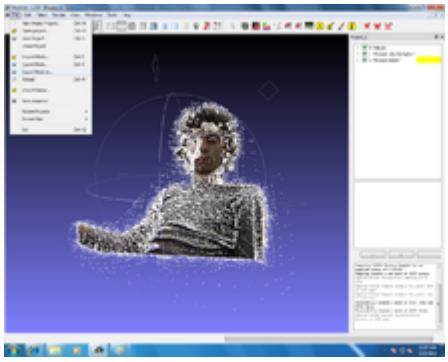


Surface Reconstruction Poisson



Set the Octree Depth to 9 or 10

10a. Finally save the model in a .obj file format to be opened in Maya or Blender.

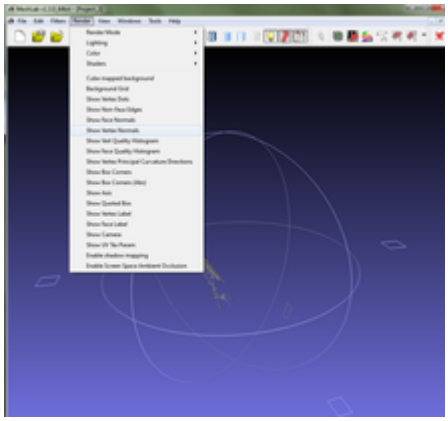


Export the mesh as .obj

Note: Meshlab can export the mesh as a .stl file for 3D printing with the MakerBot. However, further 3D modeling is required to create a base, ground layer, or support platform for the object before a printable code can be generated by the Replicator-G software used by the MakerBot.

Option B

5b. Distribute normals using **Render -> Show Vertex Normals**. This will create normals pointing backwards, so they will need to be recomputed so that the normals are facing forward.



Getting normals

6b. Recompute normals using **Filter > Point Set -> Compute normals for point sets**, change number to 16 for the number of neighbors and also check the box for **Flip Normals**. Change the

camera to -1000 so that the sampling program knows that the cloud point data was taken from a large distance, this would give it a better idea where the normals should go.

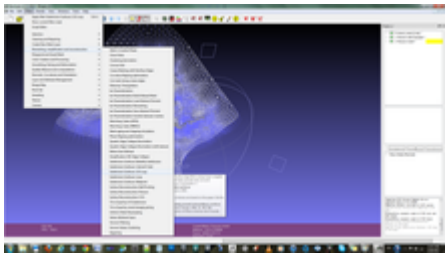
7b. Turn on layers from the top menu bar **View -> Open Layer Dialog**.

8b. Now create a subset of the point cloud, go to **Filters > Sampling > Poisson -Disk sampling**, change the **Number of Samples** to 5000 and check the box for **Base Mesh Subsampling**. This will create an even sampling distribution of the cloud points, and will give a general surface to work with.

9b. Click the **Poisson-disk Samples** layer. Now go to **Filters > Point Set > Surface Reconstruction: Poisson**, set parameters, 12 for **Octree Depth** and 7 for **Solver Divide**, these numbers can be changed depending on the scale of the original point cloud mesh. Make the numbers bigger if the point cloud is big.

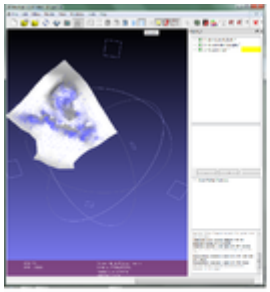
10b. Turn on the **Light** found within the tool bar and also turn on **Smoothing** which is next to the light button.

11b. Now approximate more normals using the point cloud to add more detail. This time distribute points by going to **Filter > Re-meshing-simplification and reconstruction > Use sub-division algorithm called LS3 loop**. This algorithm will add more detail to the mesh. Sub-sample it three times by setting **Iterations** = 3



adding more detail

12b. Use **File -> Export as...** to save the final version of the mesh which can be printed using a 3d printer.



final image
