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### **Final Project Proposal**

1. A clear description of the basic problem you are trying to solve.
  - 1.1. My final project will be the default project which requires building a pipeline for constructing high-quality 3D model of an object of my choice. Some of the basic problems I am trying to solve via this project are:
    - 1.1.1. Mesh cleanup and smoothing
      - 1.1.1.1. I am planning to make a mesh out of the points from reconstruct.m, which was used in homework assignment 4. Then remove points that are outside the bounding box by comparing the points to thresholding distances. Then finally I would like to smooth out the final mesh and export it to a .ply file.
    - 1.1.2. Mesh alignment
      - 1.1.2.1. I am planning to complete mesh alignment by using calibrate function that was used in homework assignment 3. The function will ask for user inputs which will give initial estimate of alignment between scans.
    - 1.1.3. Combining meshes into a final model
      - 1.1.3.1. I am planning to combine meshes into a final model by using publicly available software (e.g. Poisson reconstruction) since the professor suggested and informed us that algorithms for combining meshes are fairly tricky to implement.

1.1.4. Rendering final model and adding color.

1.1.4.1. I am planning to render final model by converting the final model into .ply file. But this may require me to simplify the model by down sampling the mesh in order to get it to display efficiently. Then I am planning to add color to the model using the original images provided by professor.

2. Algorithms you will use to process the data.

2.1. In order to process the data, I am planning to use a few algorithms that we learned in class; reconstruct.m, mesh.m, calibrate.m, decode.m, etc.

3. The image data you will collect and descriptions of any hardware you plan to use in collecting them.

3.1. The image data will be provided by professor Charless Fowlkes. He has some good quality scans of several different objects. Once they are available to me, I will choose which object I will work with.

4. A description of how you will evaluate whether your algorithms are correct.

4.1. If homework 3 and 4 grades come out any time soon, I will know whether my algorithms for calibrate.m, reconstruct.m, decode.m, and mesh.m are correct or not. Another way to evaluate whether my algorithms are correct or not is to continuously run my algorithm on the image data provided to see if they produce correct results. Then I will go into office hours to show my results to professor or TA in order to make sure my results are correct and my algorithms are correct.

5. Milestones for each week of the project.

5.1. I would much like to follow the example milestones for default project provided by professor Charles Fowlkes. Once my proposal is approved by professor, I would like to collect set of multiple scans of the object of my choice from professor, and then refine mesh cleanup code from assignment #4, produce cleaned up meshes, and write code for performing alignment using user input before progress report is due. Then prepare progress report and turn it in. Until the final project report is due, I would like to figure out file format for Poisson Reconstruction and align scans, combine scans into final model, and save final model as .ply file and render cool video flyby. Finally, prepare final project report, turn it in, get an A, and GRADUATE! :)