The above four images of captured geometries were submitted last year using the outdated software (Autodesk’s 1-2-3D Catch). This should give you an idea of the quality we expect for the final submission.
Submission Requirements

Physical Submission -
1. Photograph of the Object
2. Pictures of the Acquired Model
3. Text - Explain the causes of the difference and what could be done to improve the geometric acquisition? (1 printed page)

Digital Submission -
4. Uploaded Model w/ textures to sketchfab.com

Introduction

We have now spent several lectures and lab recitation sections describing methods for capturing complex, three-dimensional geometries of existing objects. Several of the methods have been demonstrated or described, including projected patterns from a handheld device (Microsoft’s early Kinects), laser projections combined with a regular camera (Cyberware scanner), capturing lightfields with digital photography (the Lytro camera). We have also discussed the recent availability of time-of-flight sensors currently used in autonomous driving vehicles or with expensive cameras such as Matterport. Last but certainly not least, digital photography with multiple photographs and multiple camera positions has become very popular. We will use Autodesk’s ReMake Software, which has replaced Autodesk’s 1-2-3D Catch and was shown in the laboratory.

Autodesk has made this software available for students and academic research. Details of this software and how to use it are described in the section “Helpful Hints” (below).

Background Information

When the photographs are all taken from the same camera, it is first necessary to algorithmically identify the location of the camera for each image. This is automatically accomplished within the software by identifying sufficient common features in multiple photographs. Using this information to determine the camera parameters, camera positions, and view directions, then multiple view rays are used to capture the geometry. With a reasonable number of images from appropriate positions, and after a significant amount of computer processing, it is possible to obtain a cloud of three-dimensional points representing vertices
on the surface of the object being photographed. Early approaches using this technique did this by human intervention, but today the same procedures have been algorithmically implemented and use optimization algorithms to obtain the “best” answer.

The algorithmic technology being used is no longer based on feature detection only. Useful information can be obtained from textures, colors, illumination, material properties, etc., all of which may be utilized to improve the geometric interpretation resulting in very accurate measurements obtained through photographic means only. The denser the cloud of points, the more accurate the representation, but simultaneously, the longer and more complex the computation time to create an image. Thus, one issue is to use a coarser mesh and techniques such as texturing to reduce the vertex and polygon count in order to obtain excellent digital representations of three-dimensional objects.

Your goal is to scan a complex model using the ReMake software, one which can be used again for display in a virtual reality environment. Autodesk does not guarantee a specific turn-around time, so you should start with your experimentation as early as possible, but within the next few days. You will need to capture a model which represents a face, sculpture, doll, or an inanimate object to which personal human attributes, emotions, or comic expressions could be assigned. This model may be scaled in its dimensions (either larger or smaller), and will be exhibited within your final environment for the last homework in virtual reality.

This assignment will be graded as both an art and technical project. It is not enough to simply follow the directions. We will reward students who have taken extra initiatives to make aesthetically pleasing or intellectually stimulating scans. We will consider the amount of effort, difficulty of the model, and your ingenuity.

HELPFUL HINTS

This is a relatively simple process depending on the lighting, textures, and the geometry of the object you wish to scan.

Our suggestion is to review the information and instructions on the app’s website: https://remake.autodesk.com/resources before you choose the object you wish to scan. We highly recommend the ‘How to Shoot Photos for Photogrammetry’ video. Once you have read the instructions and the limitations and pitfalls of the software, we suggest that you scan a simple object first to understand what the process entails. Also, please be careful! Do Not attempt to scan scenes from precarious positions!
To get the software, go to the “Try” link at the top of the page and look for the ‘Free for Students and Education’ link. Once there, simply follow the instructions.

**PLEASE NOTE:** There is a known bug for model creation using the offline mode on Windows 10. If it doesn’t work for you, you must use the Online mode to process your model. This will prompt you to upload your photos and then your computer will Download the finished model when it is ready.

**DIGITAL SUBMISSION PROCESS**

Once ReMake has created a .crm file from your photos, we want you to submit your digital model using an online platform called Sketchfab. In order to do this, go to quick export, choose optimize for ‘Unity – FBX’ and click ‘Export’. Once exported, go to sketchfab.com and create an account. You don’t need to make your username your NetID, but it is more convenient if you do.

Once you’ve created an account, upload your model. During the upload for the model, you must include the tags ‘art2907’, ‘your netid’, and ‘fa16’. This is how we will find your models. Last year’s class uploaded their models this way, under the tag ‘art2907’. Important note: even if you are enrolled in the course number for engineering, or any other school, it is important that you tag your model with art2907.

**References**