



Aalto University
Media Factory

Digital_Fabrication_Studio.05

3D Scanning – from atoms to bits

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<http://www.slideshare.net/openp2pdesign>





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Today:

- * 3D scanning: examples
- * 3D scanning: tools and softwares
- * 3D scanning: process



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01.

3D scanning: bits from atoms

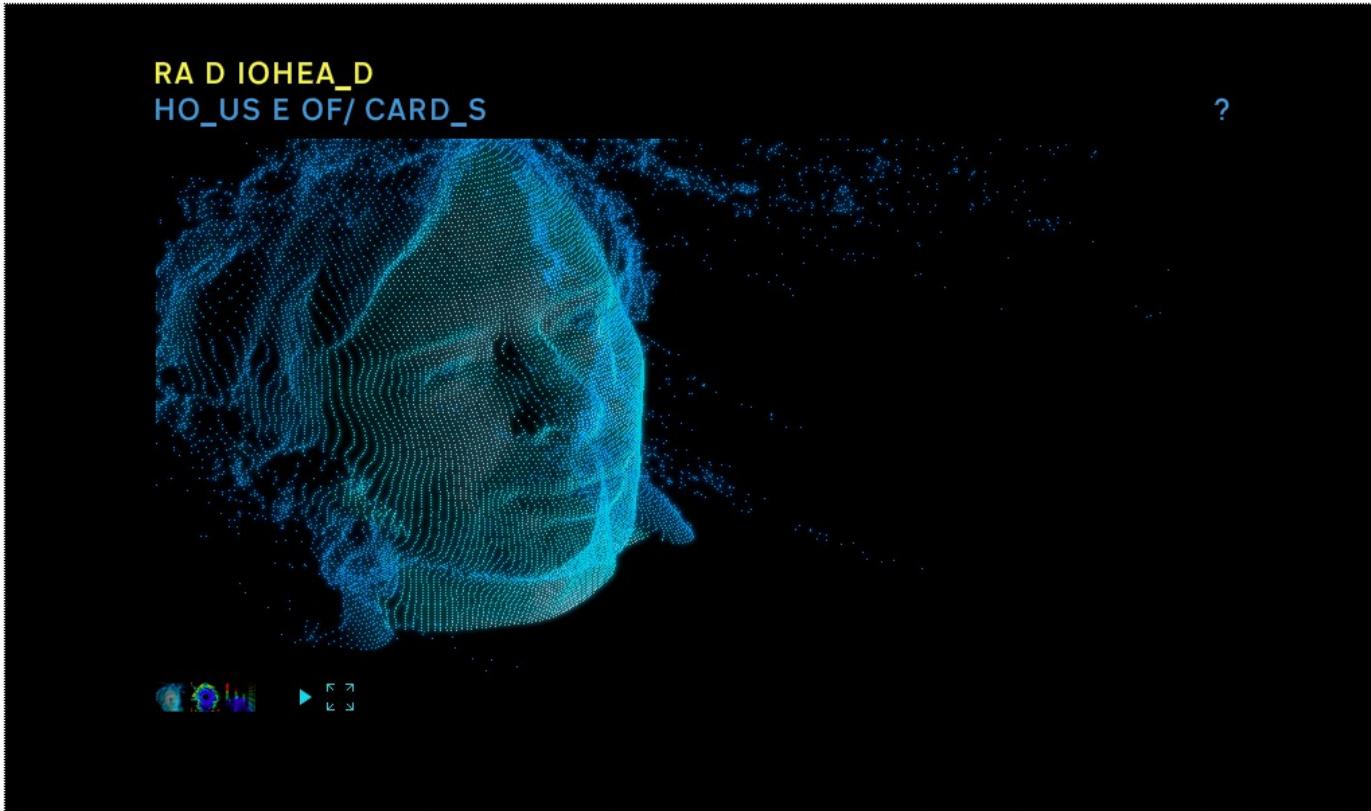
Radiohead: *House of Cards* video



No cameras / lights: 3D scanning collected information about the shapes and relative distances of objects. The video was created with visualizations of the data.

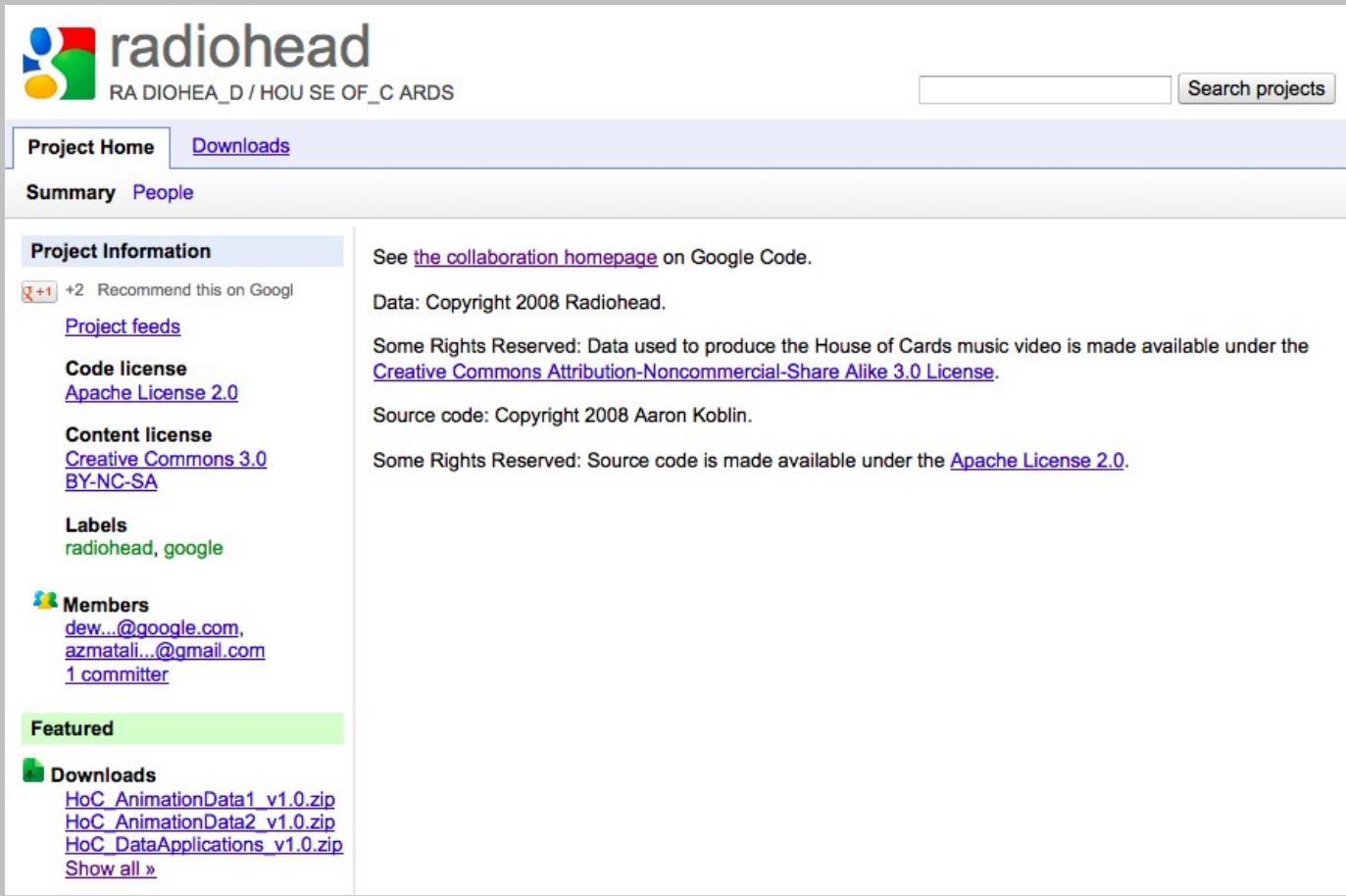
Radiohead: *House of Cards* video

Aaron Koblin



No cameras / lights: 3D scanning collected information about the shapes and relative distances of objects. The video was created with visualizations of the data.

Radiohead: *House of Cards* video



The screenshot shows the 'radiohead' project page on Google Code. The header features the Radiohead logo and the project name. A search bar and a 'Search projects' button are on the right. Below the header, there are tabs for 'Project Home' (which is active) and 'Downloads'. Under 'Project Home', there are links for 'Summary' and 'People'. The main content area is divided into sections:

- Project Information**: Includes a '+2 Recommend this on Google+' button, 'Project feeds', 'Code license' (Apache License 2.0), 'Content license' (Creative Commons 3.0 BY-NC-SA), and 'Labels' (radiohead, google).
- Members**: Shows two email addresses (dew...@google.com, azmatali...@gmail.com) and 1 committer.
- Featured**: Shows a 'Downloads' section with three zip files: HoC_AnimationData1_v1.0.zip, HoC_AnimationData2_v1.0.zip, and HoC_DataApplications_v1.0.zip. There is also a 'Show all »' link.
- See the collaboration homepage on Google Code.**
- Data: Copyright 2008 Radiohead.**
- Some Rights Reserved: Data used to produce the House of Cards music video is made available under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.**
- Source code: Copyright 2008 Aaron Koblin.**
- Some Rights Reserved: Source code is made available under the Apache License 2.0.**

An open data / open source project on Google Code: point cloud data and Processing software are available!

Source: <http://code.google.com/p/radiohead/>

Radiohead: *House of Cards* video



Learn about how the video of "House of Cards" was made and the various technologies that were used to capture and render 3D data.

Smithsonian 3D scans its objects



A new effort under way at the world's largest museum could bring more of its 137 million objects will be publicly available.



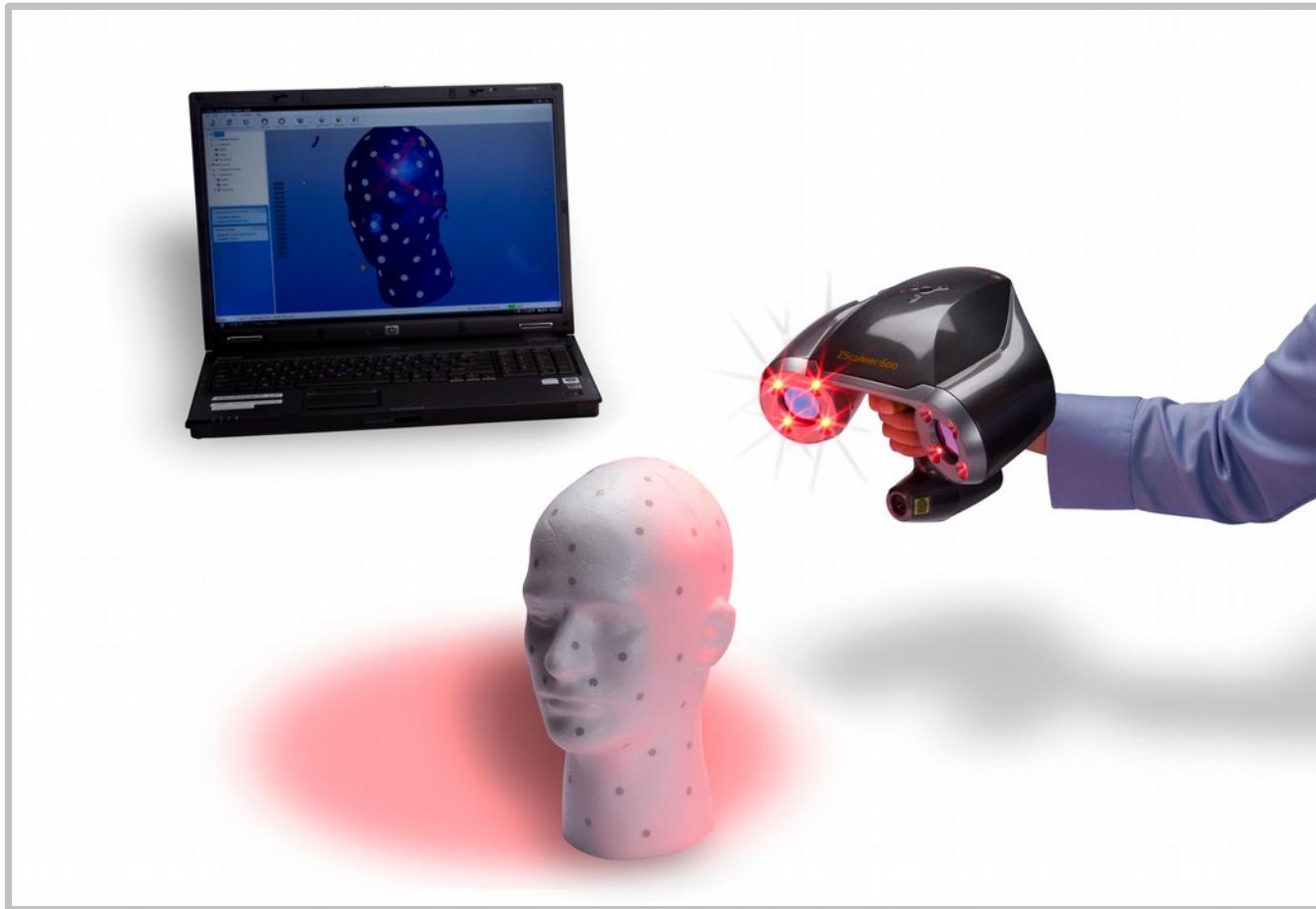
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02.

3D scanning:

tools and softwares

Hardware: expensive and not complete



There is still the problem of stitching together the meshes obtained.

Hardware: a very good option

 **NEXTENGINE**

HOME PRODUCTS APPLICATIONS GALLERY SUPPORT FAQ BUY COMPANY

ASK NEXTENGINE



The #1 Selling 3D Scanner.

The NextEngine 3D Scanner captures objects in full color with multi-laser precision. Breakthrough technology has made it the World's most popular 3D Scanner, with thousands of users in over 80 countries.

In one box is everything you need to digitize 3D models, including ScanStudio HD software. Exports to **STL, OBJ, VRML, XYZ** and other formats.

Output 3D scan models to popular design software like **SolidWorks, 3ds Max, ZBrush, Rhino, Mathematica** and more. Use with **ScanStudio CAD Tools** to quickly make surface files or **RapidWorks** to build solid files. Print models on **Dimension, 3D Systems, zCorp, Objet**, and other 3D printers.

\$2,995 High performance at 1/10th the price.

The NextEngine 3D Scanner captures objects in full color with multi-laser precision.

Source: <http://www.nextengine.com/>

Hardware: cheap DIY version

The screenshot shows the DAVID Laserscanner website. At the top, the DAVID logo is displayed next to a 3D rendering of a baby's head being scanned. Below the logo is a navigation bar with links: DAVID Laserscanner, Shop, Wiki, Forum, DAVID Vision Systems, and Contact.

MAIN MENU

- Start**
- Features
- Starter-Kit
- Downloads
- Manual
- Gallery
- References
- News
- Buy License

FORUM

- 2012-05-20 , 08:07:58 pm Max distance between camera and object
- 2012-05-20 , 11:58:00 am saving depth-map as gray scale image
- 2012-05-21 , 12:37:10 pm Two scans: a sculpture and a person
- 2012-05-20 , 04:38:45 pm what is the best option for

DAVID-LASERSCANNER 3.3!
Incredibly Low-Cost 3D Scanner for Everyone!

What do I need to build a 3D scanner?

- A camera (e.g. web cam)
- A hand-held **line laser** (starting at €19.90)
- Two plain boards in the background
- A Windows PC
- Our free software DAVID-LASERSCANNER

Or use the brand-new DAVID Starter-Kit!

If you don't want to start searching and tinkering, the **DAVID Starter-Kit** contains all necessary hardware and software to set up your own 3d scanner!

Supports both, Laser Scanning AND Structured Light Scanning!

How does Laser Scanning work?

1. Set up background and camera
2. Calibrate your camera with one click
3. Start **scanning** by sweeping the laser line over the object
4. Gaze at the 3D window and export your result to .OBJ
5. Optional: Automatically **stitch** several scans/meshes with DAVID-Shapefusion and export .OBJ, .STL, or .PLY

GALLERY

NEWS

- 2011-12-21 Special X-Mas Prices & DAVID 3.2
- 2011-09-22 DAVID Newsletter: DAVID 3 Released!
- 2010-11-18 DAVID Newsletter
- 2009-10-10 Mesh2Flash and CCD Cameras

ONLINE SHOP

DAVID-laserscanner is a low-cost system for scanning of 3d objects. Requirements are a commercial hand-held laser and a standard camera.

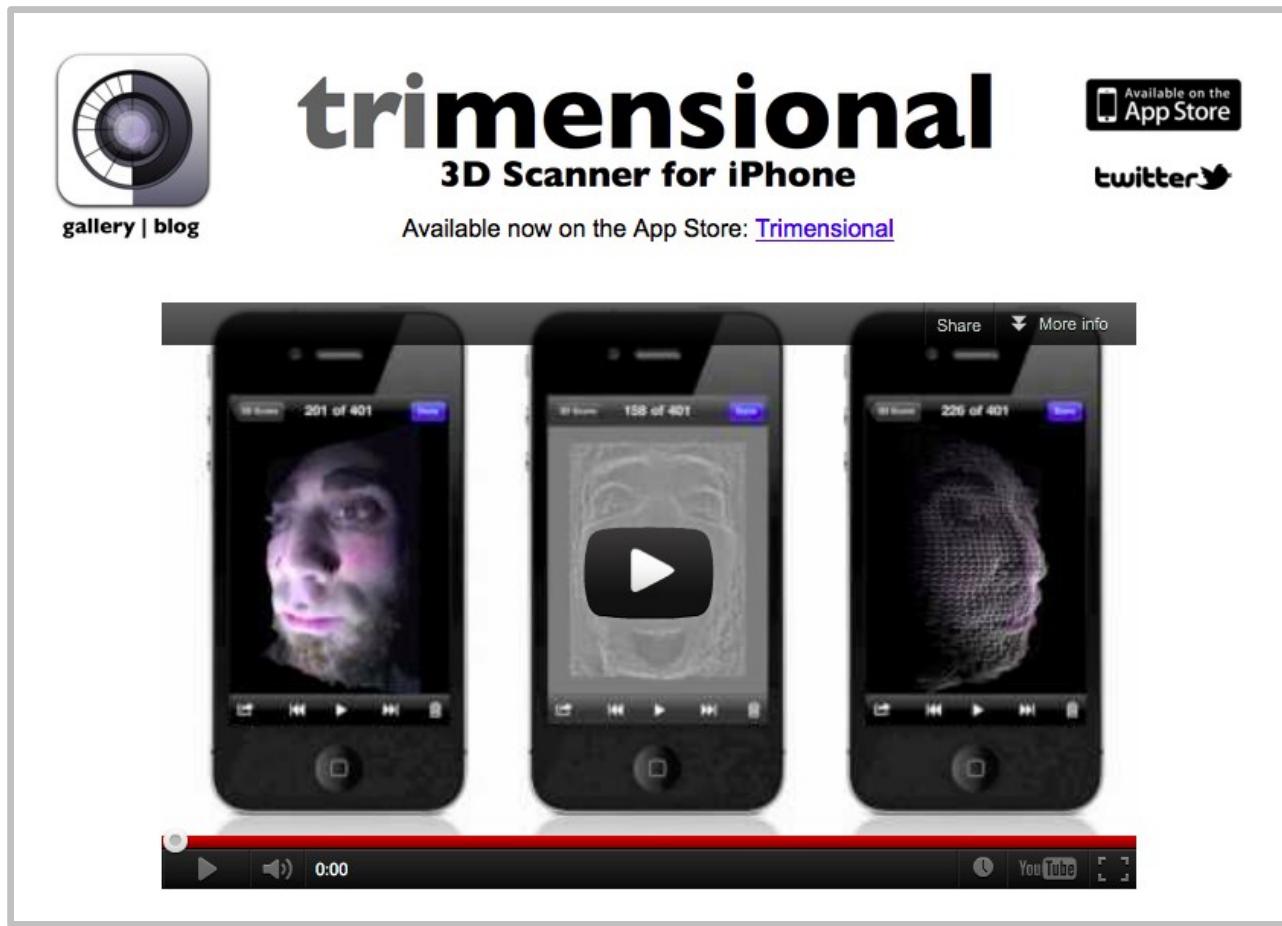
Source: <http://www.david-laserscanner.com/>

Hardware: Modela MDX-20



You can scan also with the Modela, with a special head.

A 3D scanner app for iPhone



Trimensional uses both the screen and the front-facing camera on an iOS device, detecting patterns of light reflected off your face to build 3D model.

Source: <http://www.trimensional.com/>
<http://youtu.be/IEZtiDrxh-E>

A 3D scanner with Kinect: ReconstructMe



ReconstructMe is a software tool for Windows that uses the Microsoft Kinect (or Asus Xtion PRO LIVE) to capture 3D models in real-time.

Source: <http://youtu.be/LZZqffZk0w0>

3D Scanning and character animation

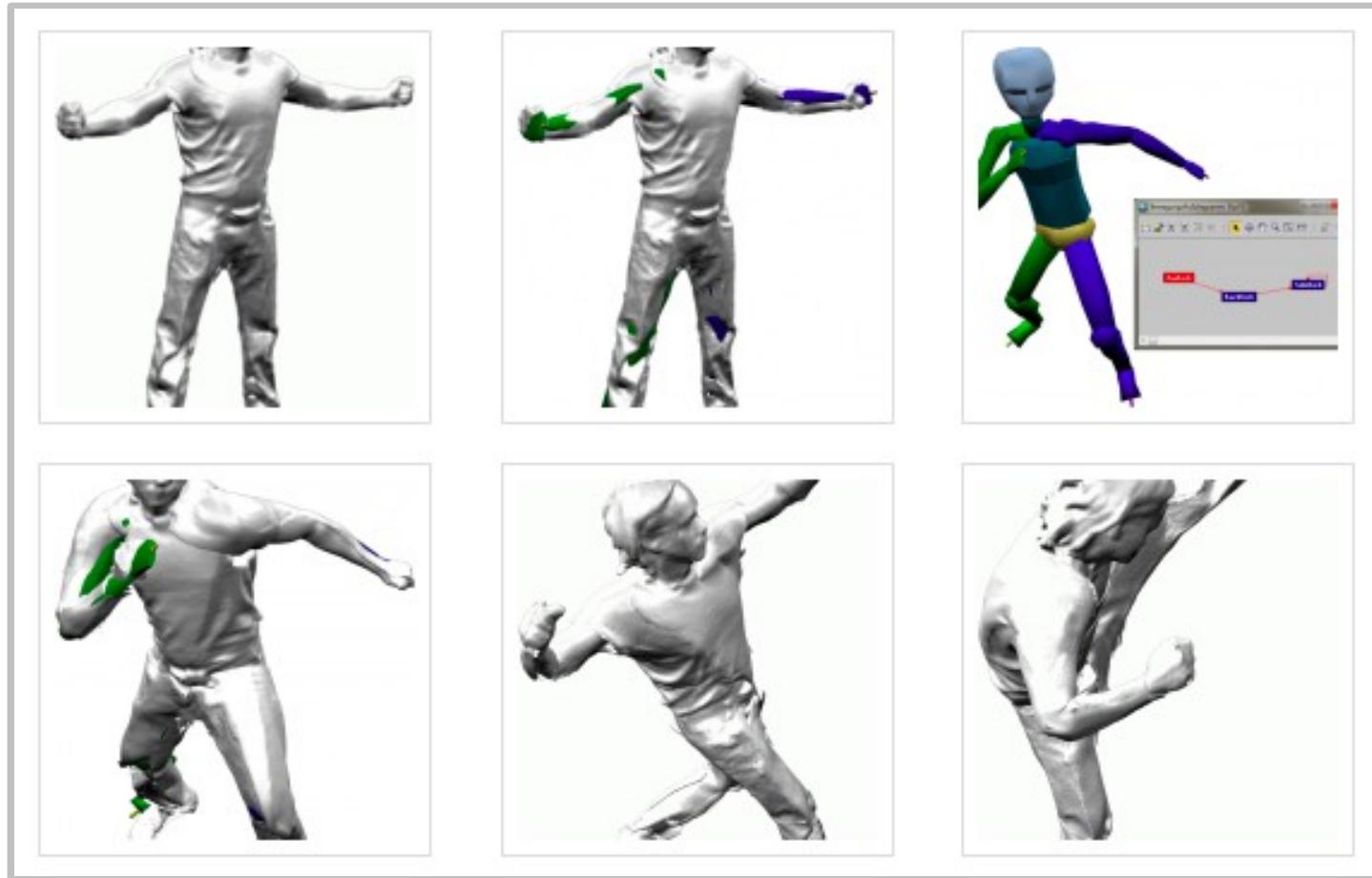


“We have created a full body scan one of our coworkers while using a bigger volume, and he used this as the basis for a character animation.”

Source: http://youtu.be/uimmxD0a_IM

<http://reconstructme.net/2012/03/20/character-creation-with-a-reconstructme-scan/>

3D Scanning and character animation



“We have created a full body scan one of our coworkers while using a bigger volume, and he used this as the basis for a character animation.”

Source: <http://reconstructme.net/2012/03/20/character-creation-with-a-reconstructme-scan/>

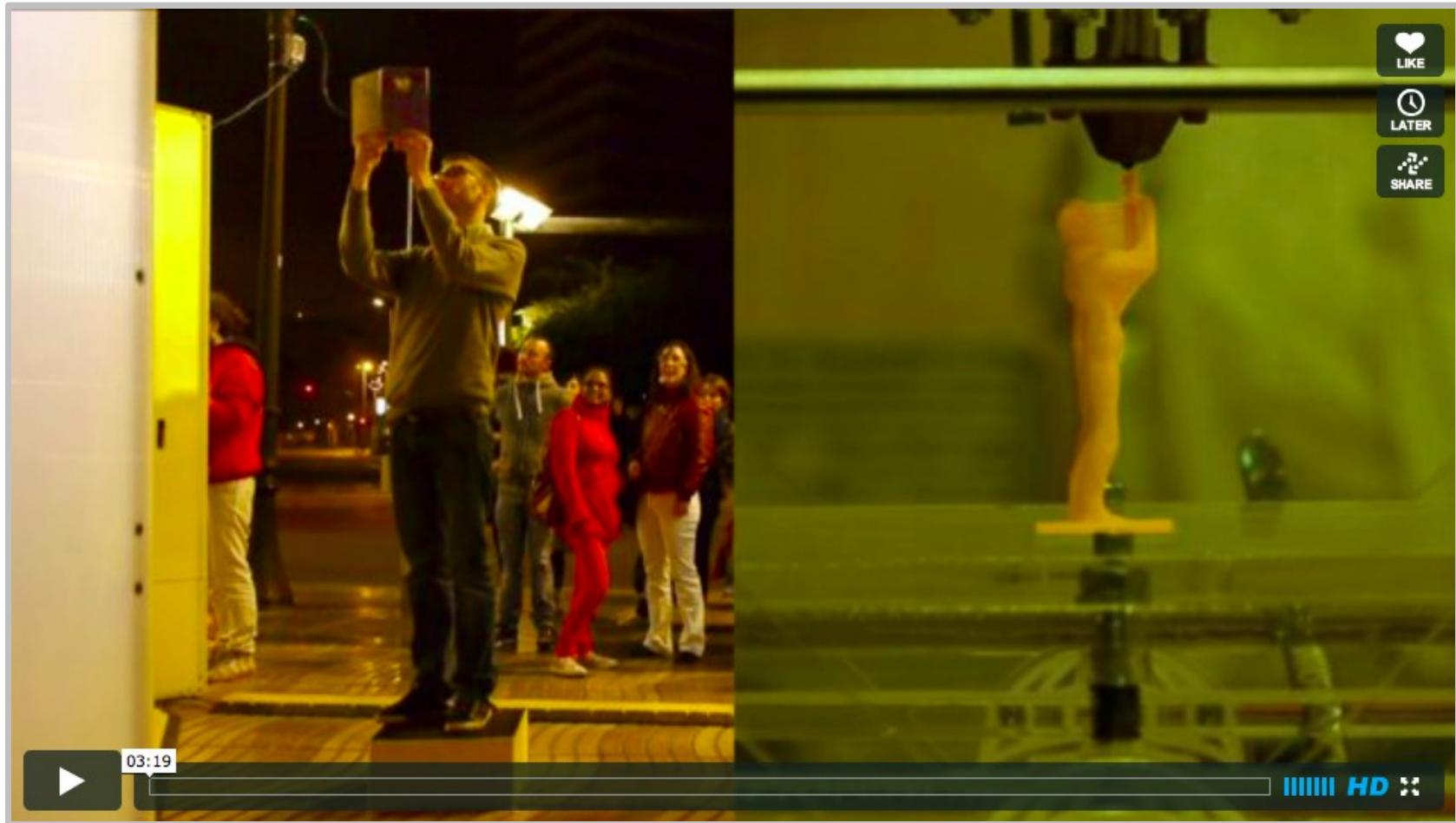
Be your own souvenir



The project from blablabLab uses custom software developed using openKinect and openFrameworks (and Meshlab and Blender).

Source: <http://www.notcot.com/archives/2011/04/be-your-own-souvenir-by-blabla.php>
<http://www.blablablab.org/>

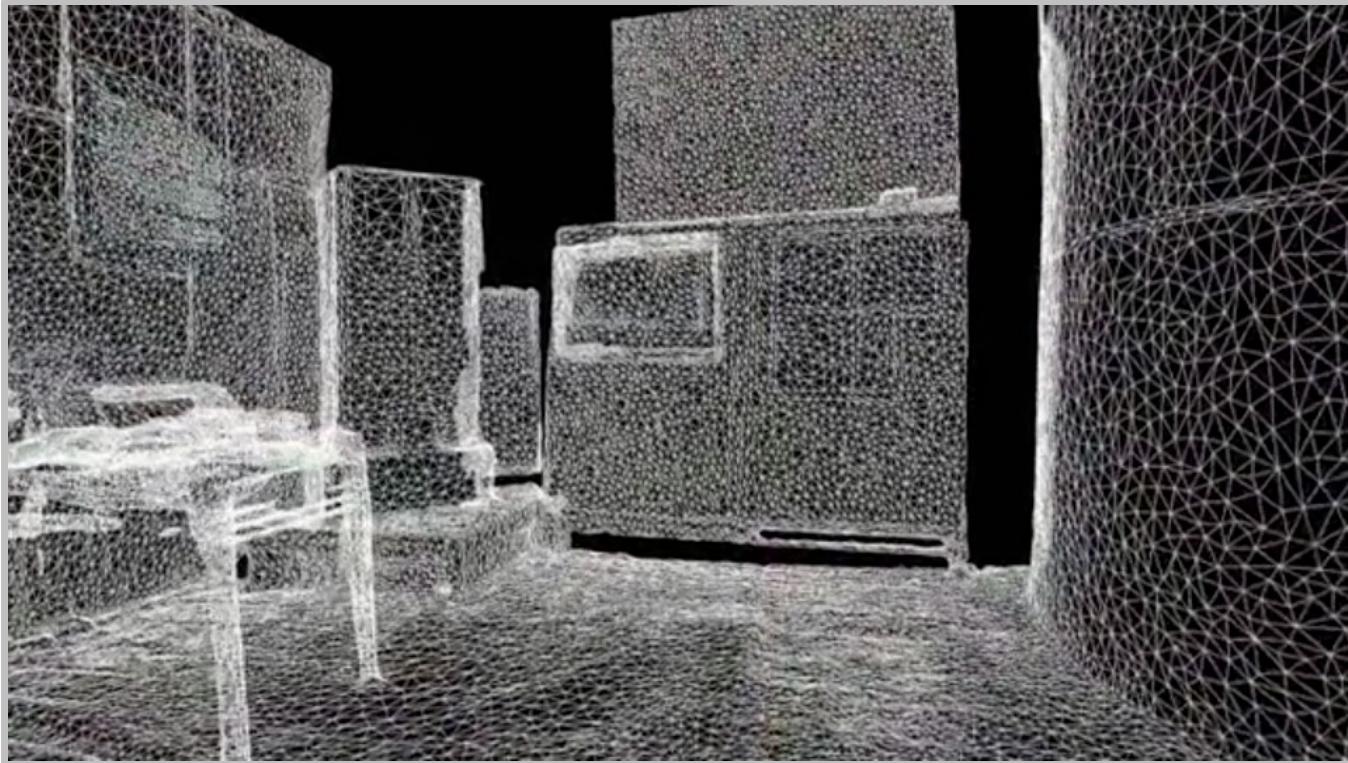
Be your own souvenir



The project from blablabLab uses custom software developed using openKinect and openFrameworks (and Meshlab and Blender).

Source: <http://vimeo.com/21676294>
<http://www.blablablab.org/>

Scan spaces with Kinect



Matterport is creating a 3D reconstruction system that allows anyone to create 3D models of physical objects and interior spaces.

Source: <http://matterport.com>

Scan with light pattern



A technology for measuring objects in 3D, using only a camera and projector: patterned light is projected and read with a camera.

Source:http://www.youtube.com/watch?feature=player_embedded&v=YH-ehE6NVFM
<http://www.diginfo.tv/v/12-0159-r-en.php>

Scan with light pattern



Janne Parviaainen: topographic light paintings circumscribe surfaces and people, creating captivating 3-D models in the process.

Source:<http://www.flickr.com/photos/jannepaint/sets/72157631039444612/>with/[7761613920/](http://www.wired.com/rawfile/2012/08/topographic-light-painting/?pid=3455)

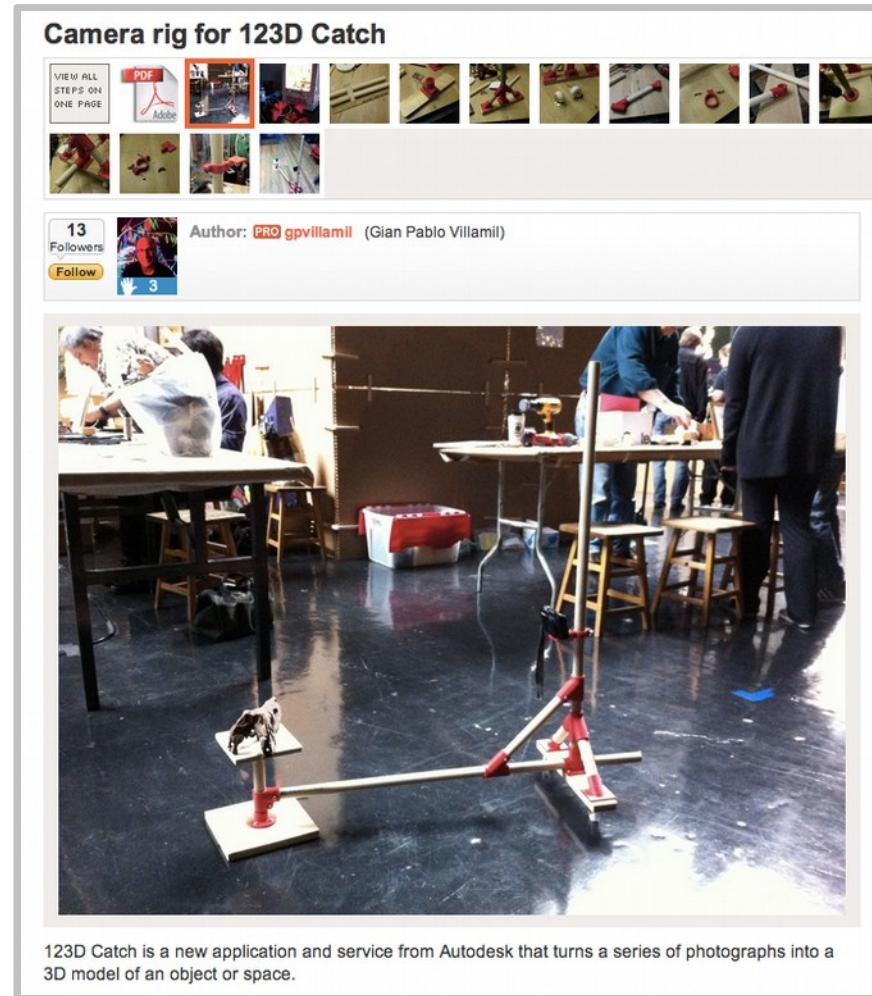
<http://www.wired.com/rawfile/2012/08/topographic-light-painting/?pid=3455>

The easiest way: 123D Catch

The screenshot shows the Autodesk 123D Catch website. At the top is a dark blue header with the 123D logo on the left and navigation links for "apps", "gallery", "fabricate", and "my corner" on the right. Below the header is a white main content area. At the top of this area is a horizontal menu with links: "Autodesk 123D Catch", "get the apps", "at-a-glance", "tutorials", and "forums". The main headline "Take and make." is displayed in large blue text. Below it, a sub-headline reads "Take ordinary photos and turn them into extraordinary 3D models." To the right of the text are two images: a 3D wireframe model of a man's head and shoulders, and a computer monitor displaying a 3D reconstruction of a man's face from a photograph. In the foreground, there is a 3D model of a red cylinder with a blue human head on top, surrounded by small colorful rectangular blocks.

The easiest and cheapest way, just take many pictures
(but no reflective and transparent materials).

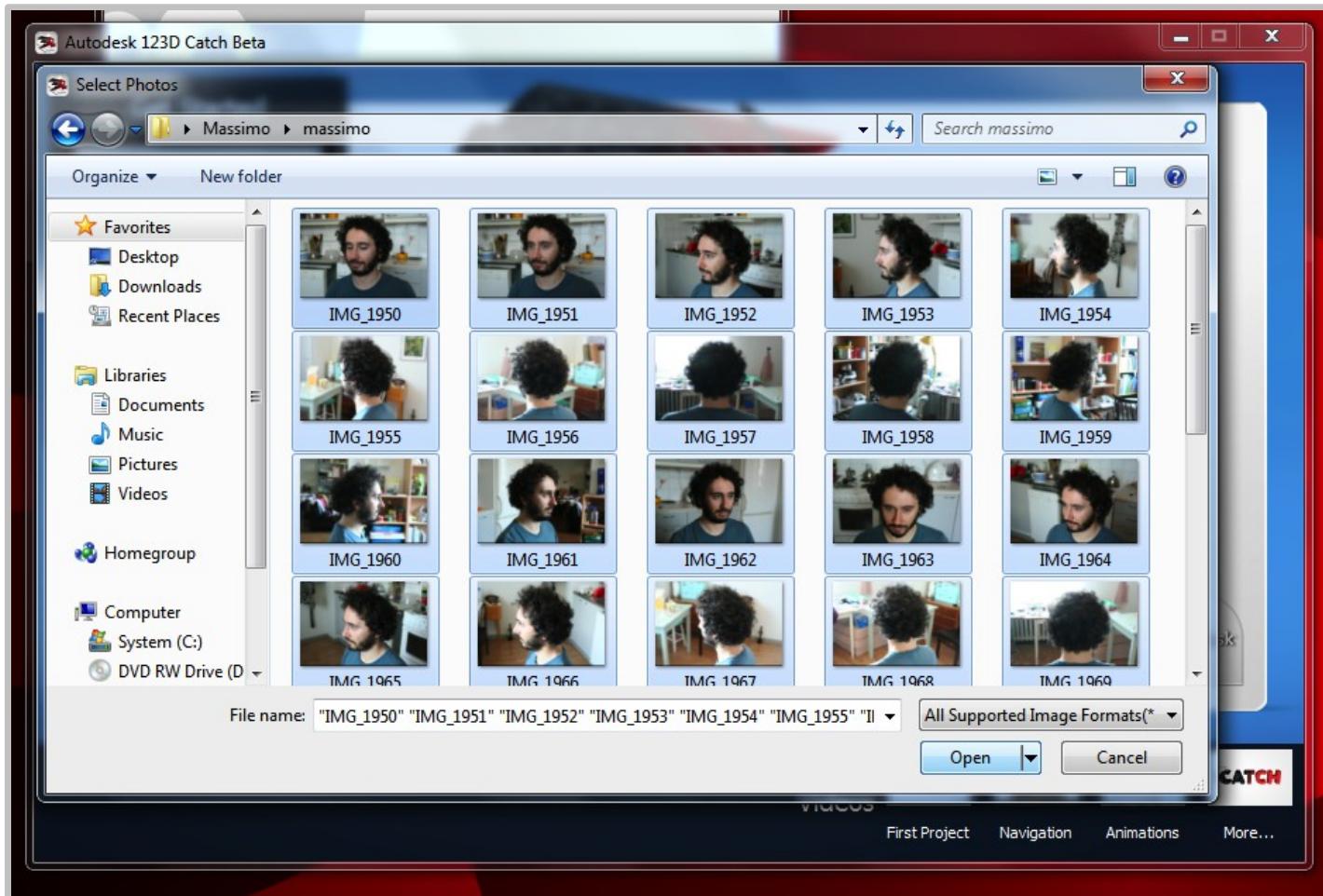
The easiest way: 123D Catch



The rig helps you structure the photos for best results. It lets you spin the camera around the object at a constant height and distance.

Source:<http://www.instructables.com/id/Camera-rig-for-123D-Catch/>

123D Catch: workflow



Read the whole workflow here (exercise 10):

123D Catch: workflow



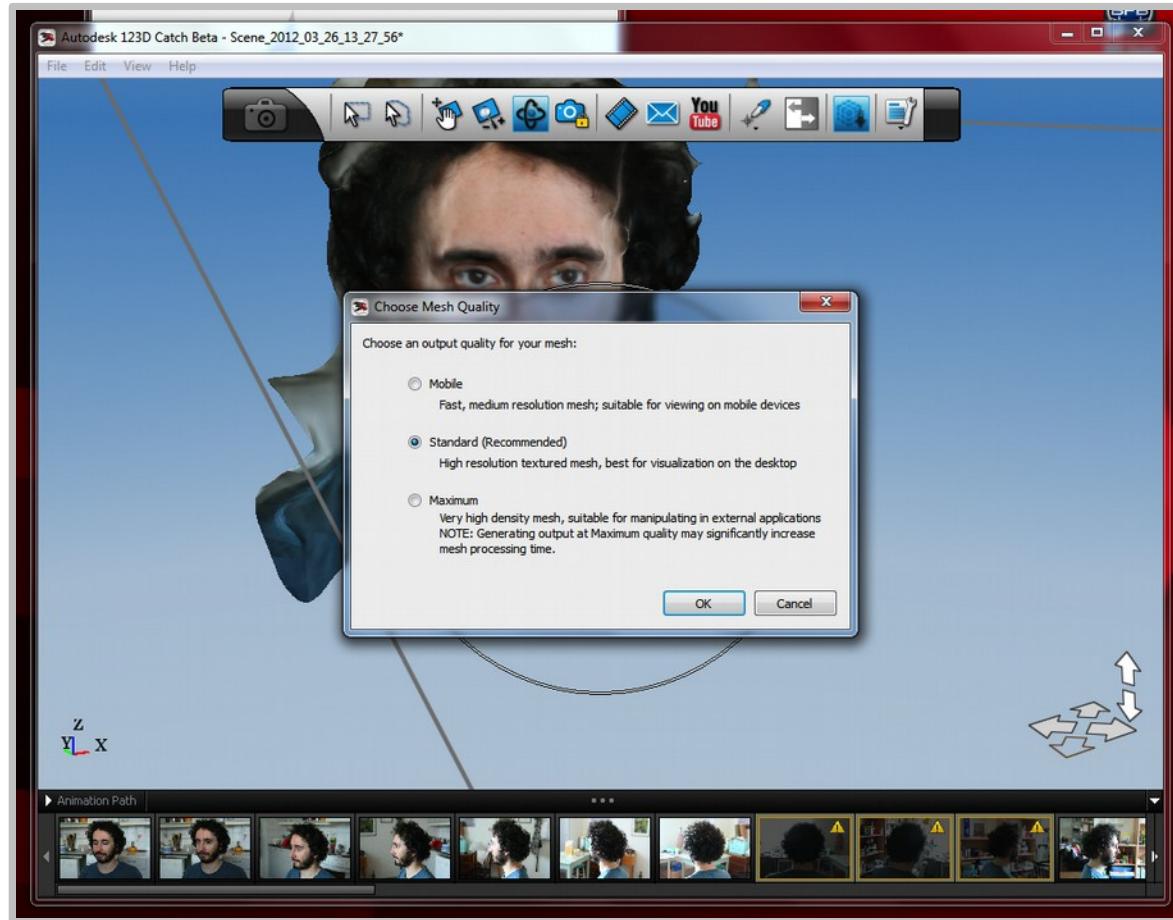
Read the whole workflow here (exercise 10):

123D Catch: workflow



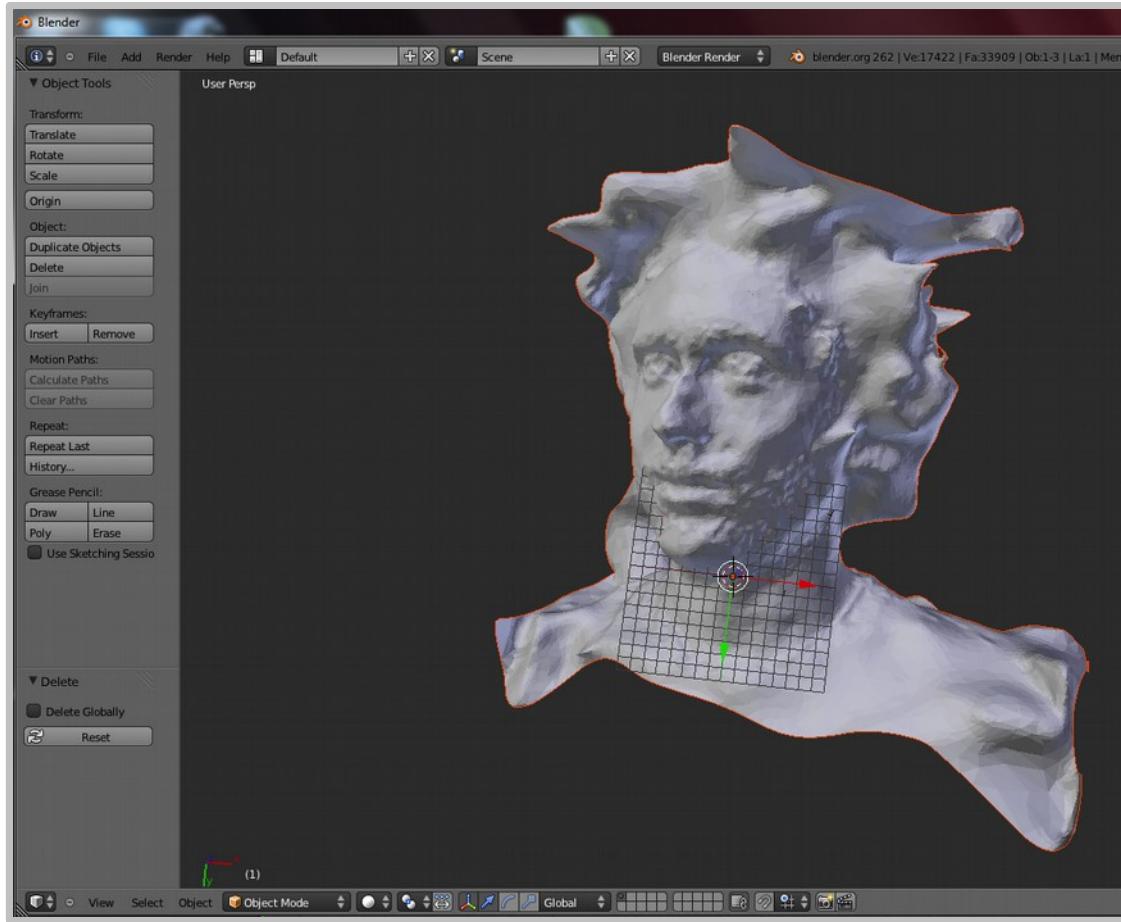
Read the whole workflow here (exercise 10):

123D Catch: workflow



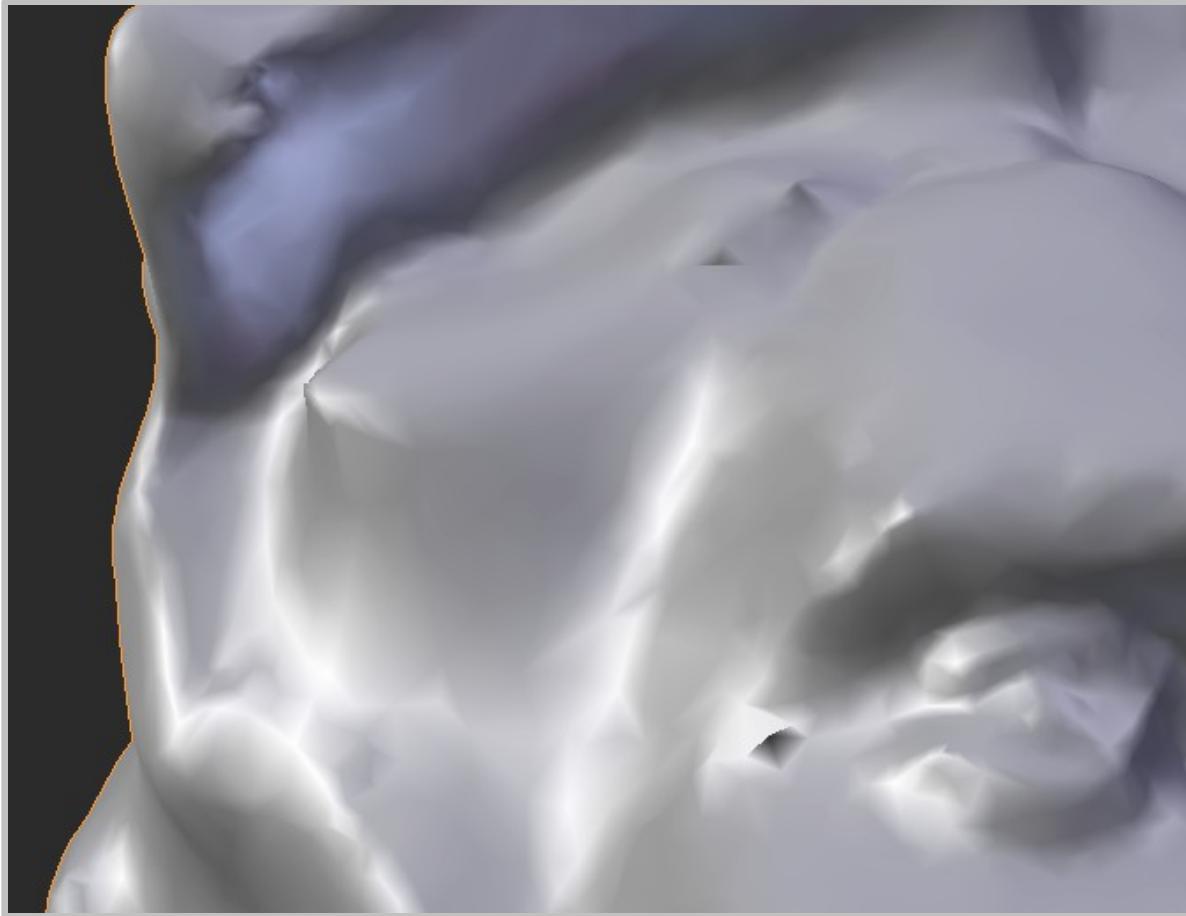
Read the whole workflow here (exercise 10):

123D Catch: workflow



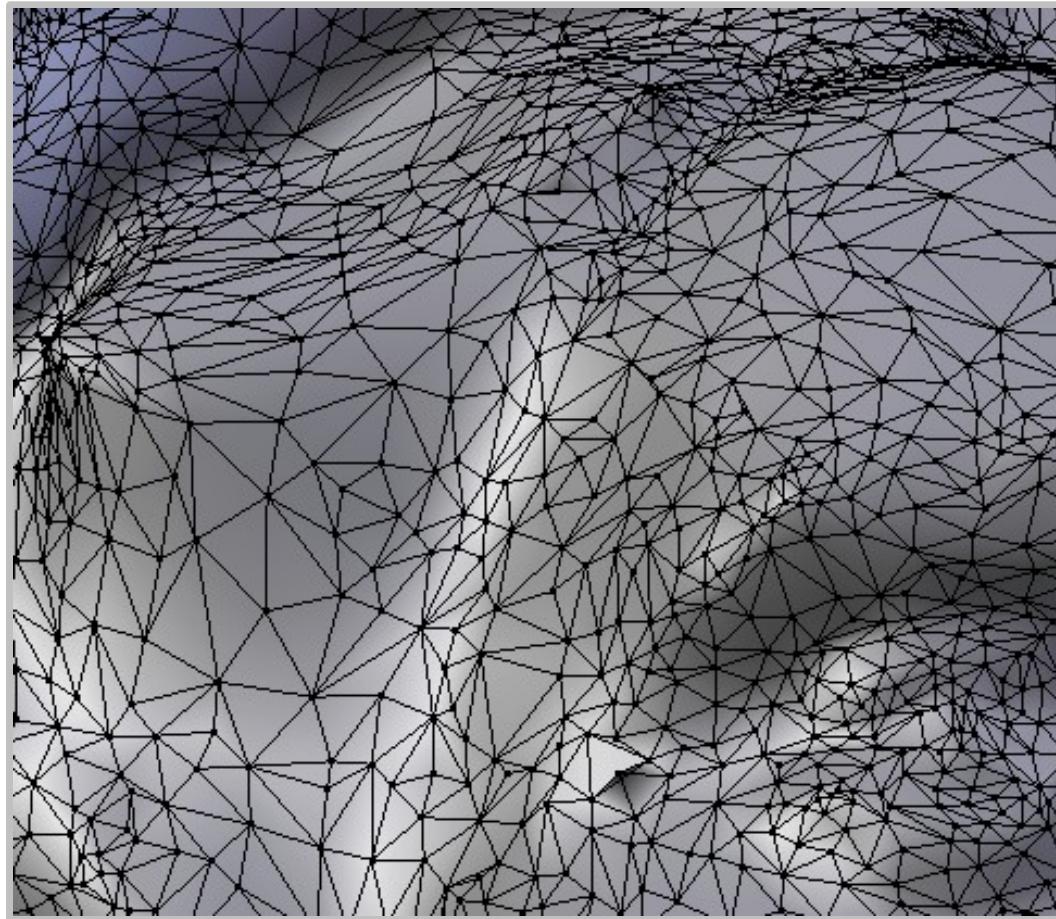
Read the whole workflow here (exercise 10):

123D Catch: workflow



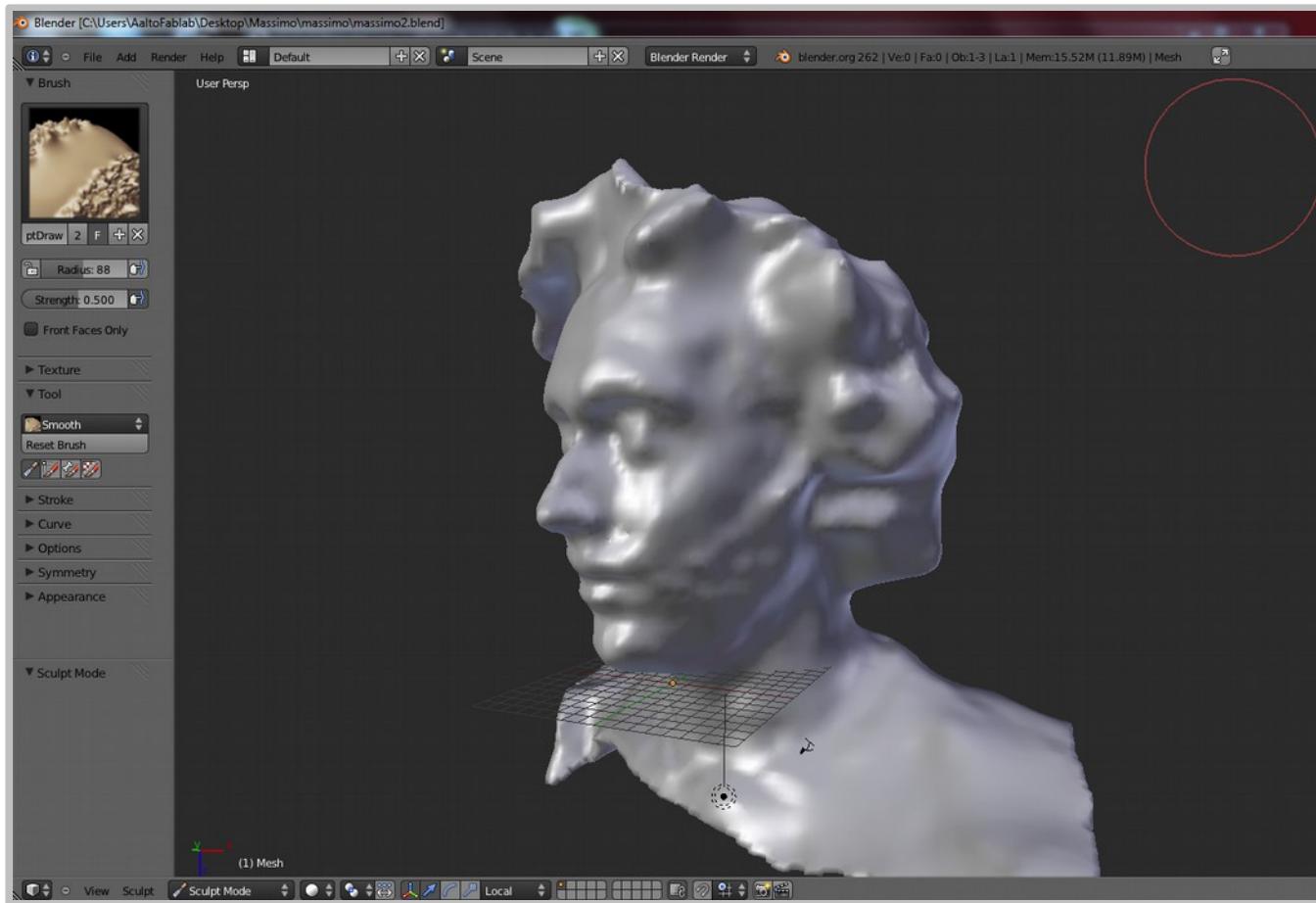
Read the whole workflow here (exercise 10):

123D Catch: workflow



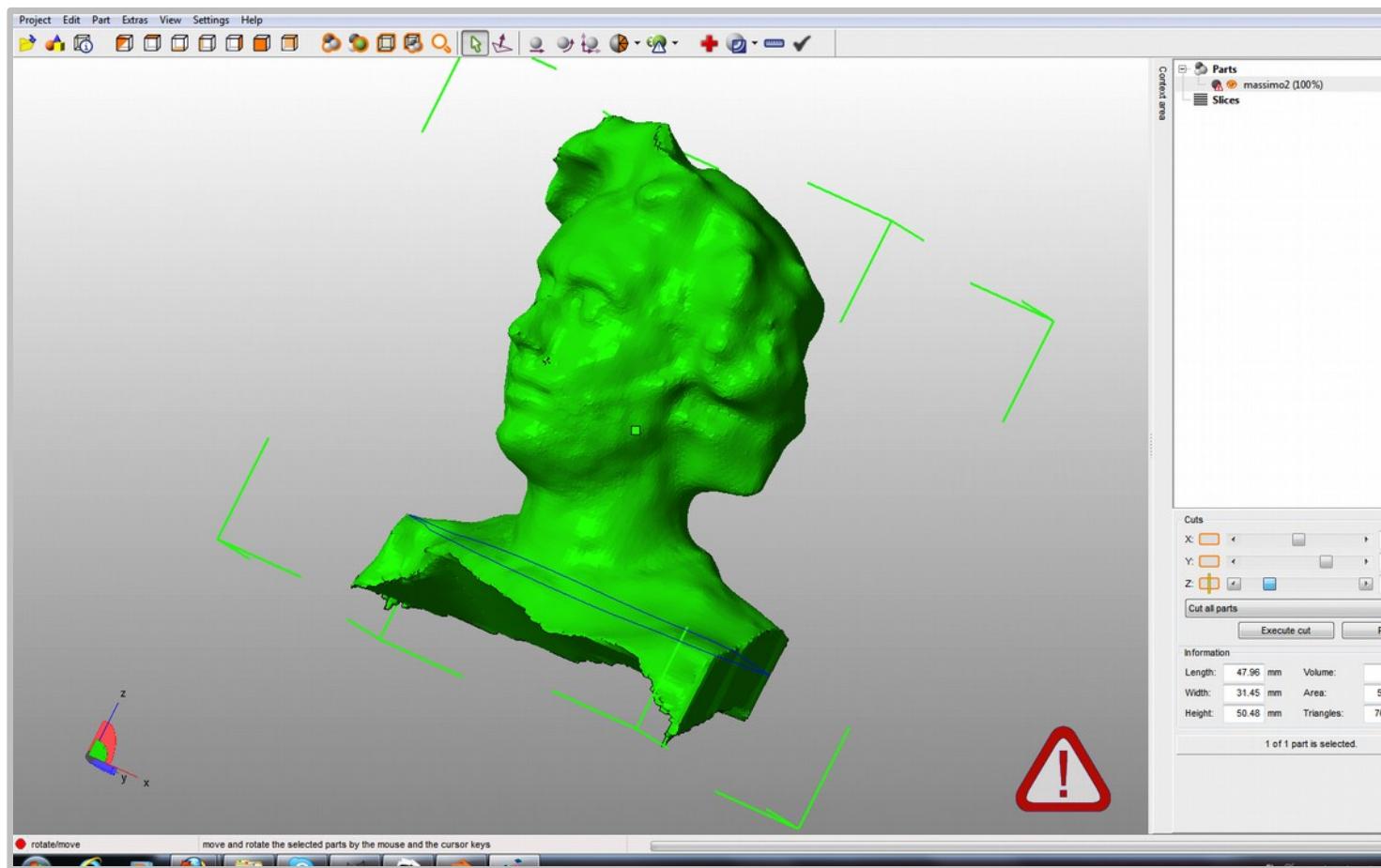
Read the whole workflow here (exercise 10):

123D Catch: workflow



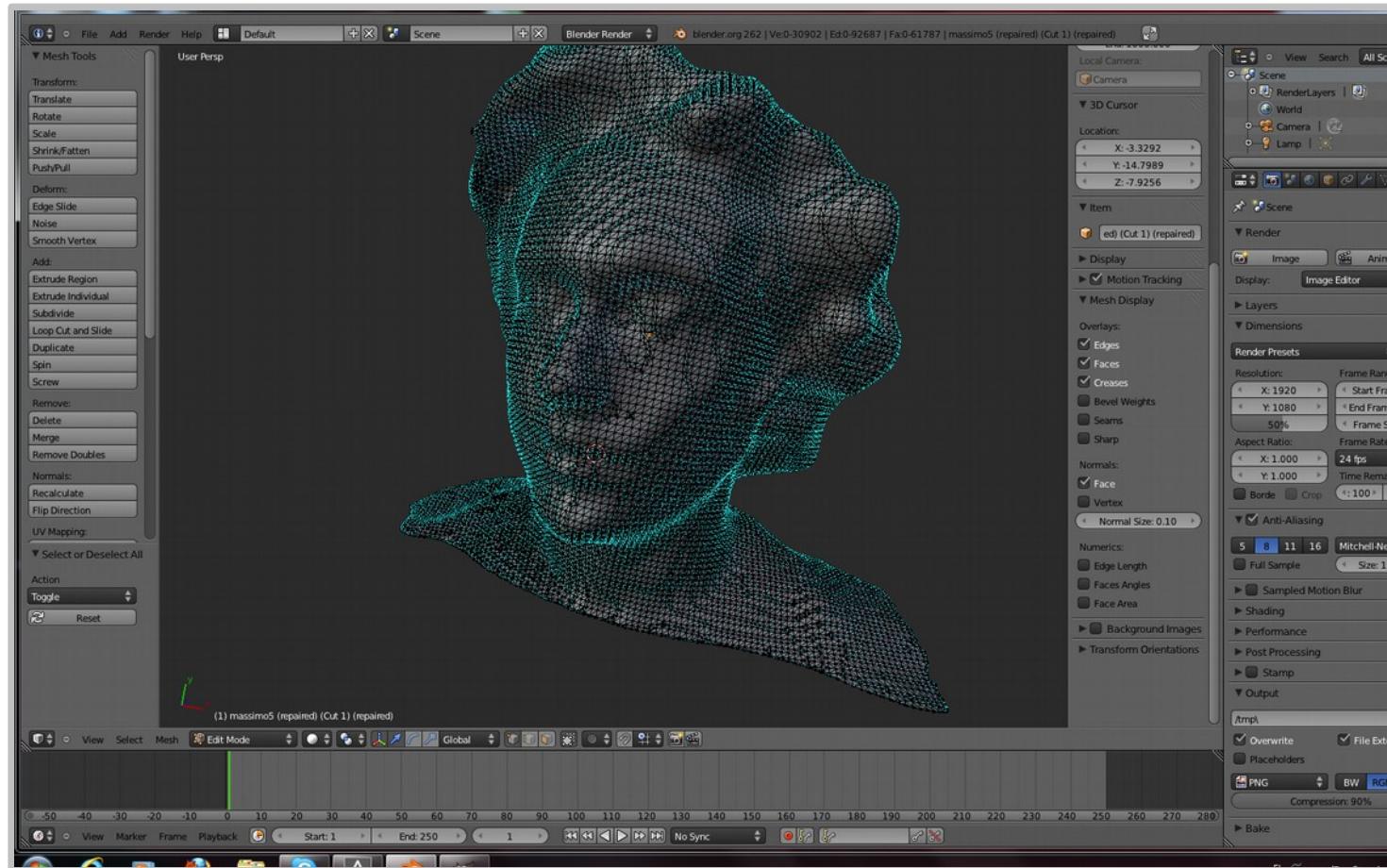
Read the whole workflow here (exercise 10):

123D Catch: workflow



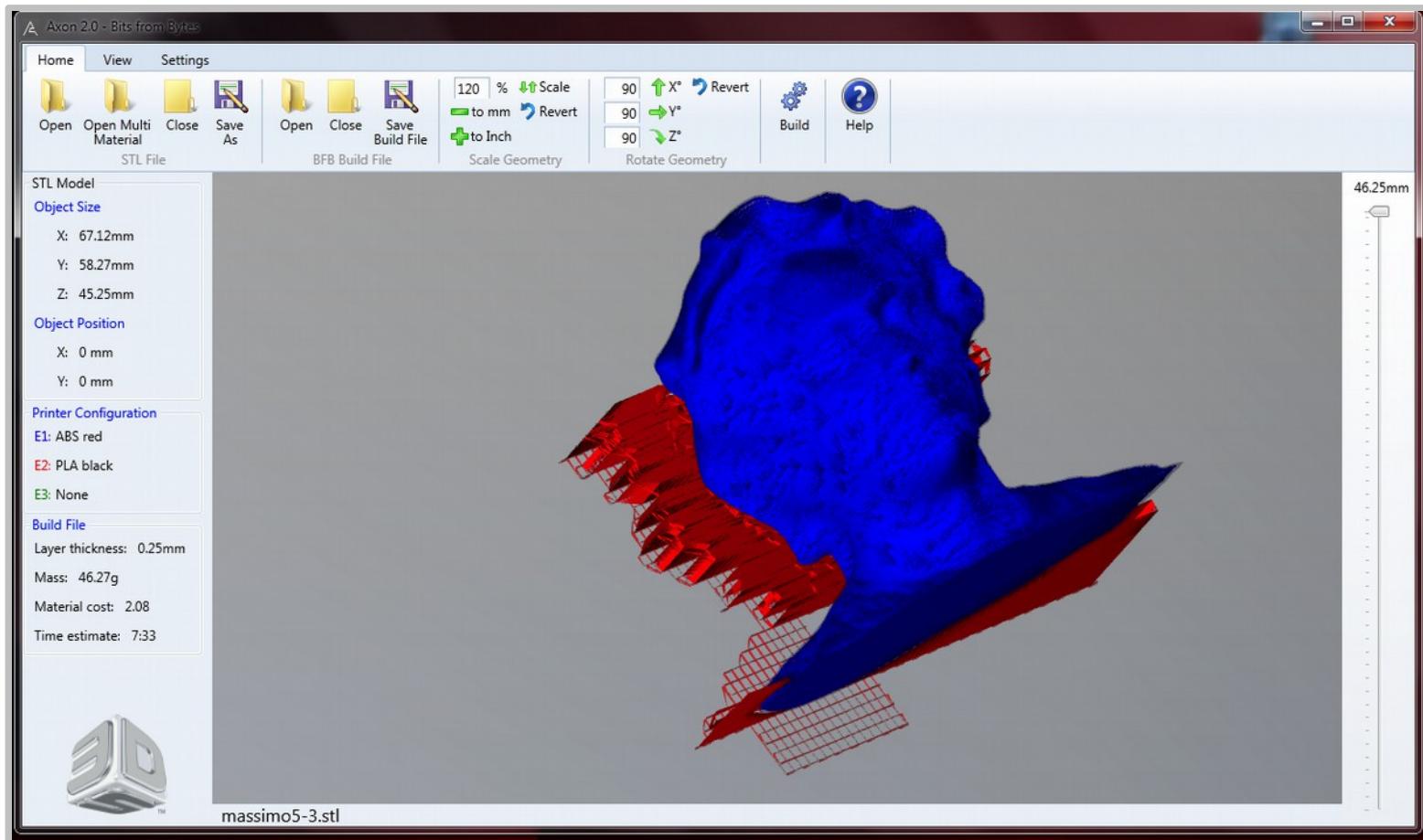
“... and I will probably design and make my own tools” [metadesign]

123D Catch: workflow



Read the whole workflow here (exercise 10):

123D Catch: workflow



Read the whole workflow here (exercise 10):

Source: <http://academy.cba.mit.edu/2012/students/menichinelli.massimo/index.html>

123D Catch: art projects!

THE OPEN CROWD PROJECT

a collaborative project to build a 3D printed crowd

[about](#) / [individuals](#) / [crowd](#) / [participate](#) / [news](#) / [resources](#) / [example image set](#) / [contact](#)

ABOUT

The Open Crowd Project is a collaborative project using 3D scanning and printing technology to create a "crowd" of people printed with 3D printers.



The goal of this project is to collaborate with people who may be in different geographic areas, but who are willing to come together and collaborate through an online space. We encourage everyone that is interested in this project to participate! All you have to do is follow the instructions provided on the "[participate](#)" page of this website and we'll create a 3D model of you, 3D print it, and include you in the crowd!

The Open Crowd Project is a collaborative project using 3D scanning and printing technology to create a “crowd” of people printed with 3D printers.

Source:<http://www.theopencrowdproject.com/>



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05.

Exercise:

3D scan your head or an object



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Thank you!!

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