



Aalto University
Media Factory

Digital_Fabrication_Studio.05

3D Scanning – from atoms to bits

Massimo Menichinelli

massimo.menichinelli@aalto.fi

@openp2pdesign

<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.

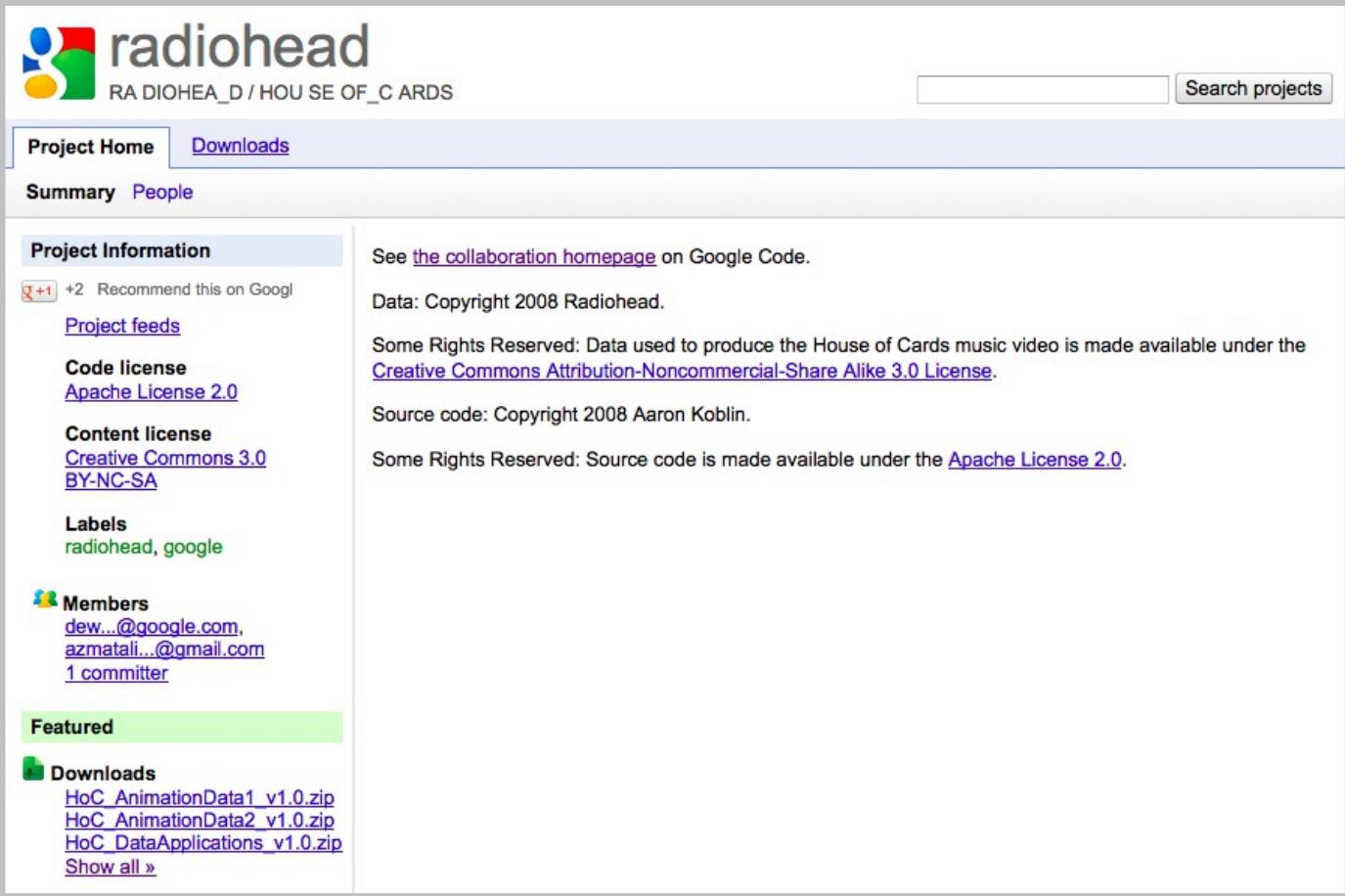
Radiohead: *House of Cards* video

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 'Project Home' page of the 'radiohead' project on Google Code. The page has a light blue header with the project name 'radiohead' and a logo consisting of four colored dots (blue, green, yellow, red) arranged in a square pattern. Below the header is a search bar and a 'Search projects' button. The main content area is divided into sections:

- Project Information**: Includes links to 'Recommend this on Google+' (+2), 'Project feeds', 'Code license' (Apache License 2.0), 'Content license' (Creative Commons 3.0 BY-NC-SA), and 'Labels' (radiohead, google).
- Members**: Shows two committers: dew...@google.com and azmatali...@gmail.com, with 1 committer listed.
- 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, plus a 'Show all »' link.
- Summary** and **People** tabs are visible at the top of the content area.
- A note in the center states: "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.

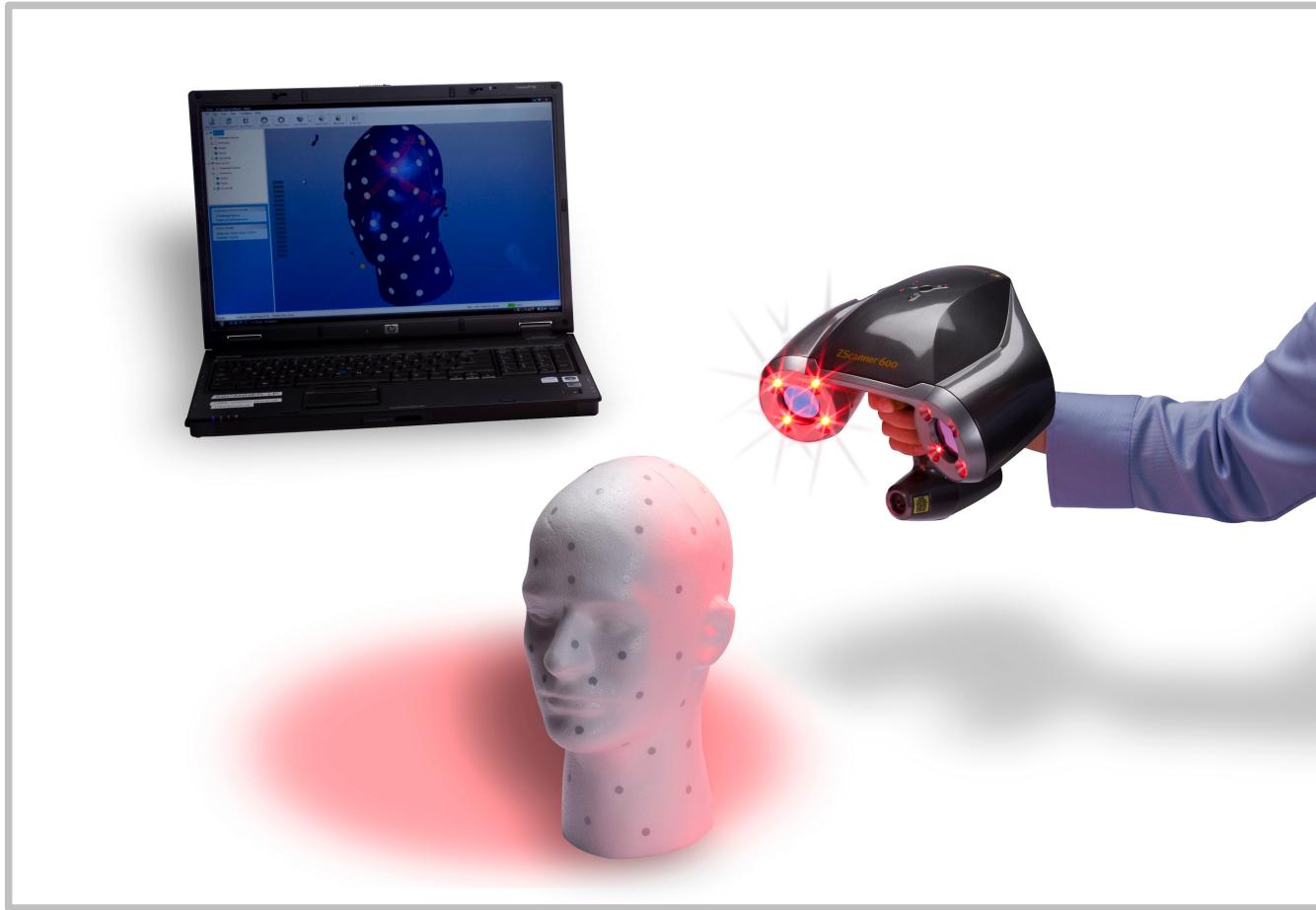
Source: <http://youtu.be/cyQoTGdQywY>



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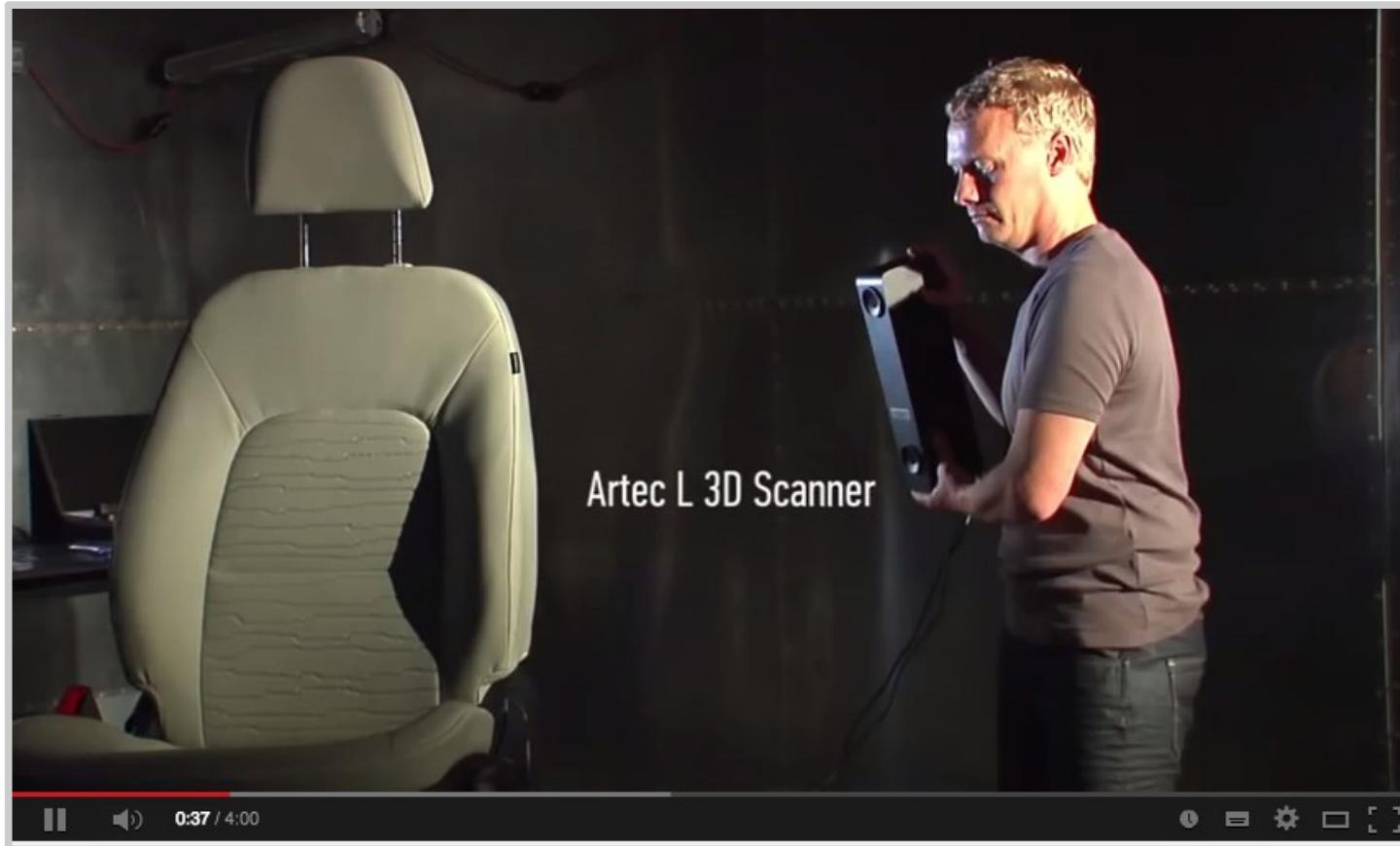
02. 3D scanning: tools and softwares

Hardware: expensive and not complete



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

Hardware: an example



Artec 3D scanners are used by Hyundai in perceived quality for scanning automobile seats.

Source: <https://www.youtube.com/watch?v=dyqlY6kHfnE>

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: starting to be cheaper

A FAST AND EASY WAY TO CREATE 3D MODELS

Quickly turn the things in your world into 3D models that you can modify, improve, share, and 3D print.



MakerBot MultiScan Technology allows you to scan objects from multiple angles to capture the top, bottom, and hidden parts of your object.

Source: <http://store.makerbot.com/digitizer>

Hardware: cheap DIY version

The screenshot shows the DAVID Laserscanner website. At the top left is the DAVID logo with 'DAVID LASERSCANNER' below it. A navigation bar at the top includes links for DAVID Laserscanner, Shop, Wiki, Forum, DAVID Vision Systems, and Contact. A large image of a baby's face is on the right side of the header. The main content area features a section for 'DAVID-LASERSCANNER 3.3!' with the tagline 'Incredibly Low-Cost 3D Scanner for Everyone!'. It includes a product image of the scanner kit and a red button saying 'Order now!'. Below this, there's a list of requirements for building a 3D scanner and information about the DAVID Starter-Kit. A section titled 'FORUM' shows recent posts. To the right, there are 'GALLERY' images, a 'NEWS' section with recent articles, and an 'ONLINE SHOP' section.

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!

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 setup for

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

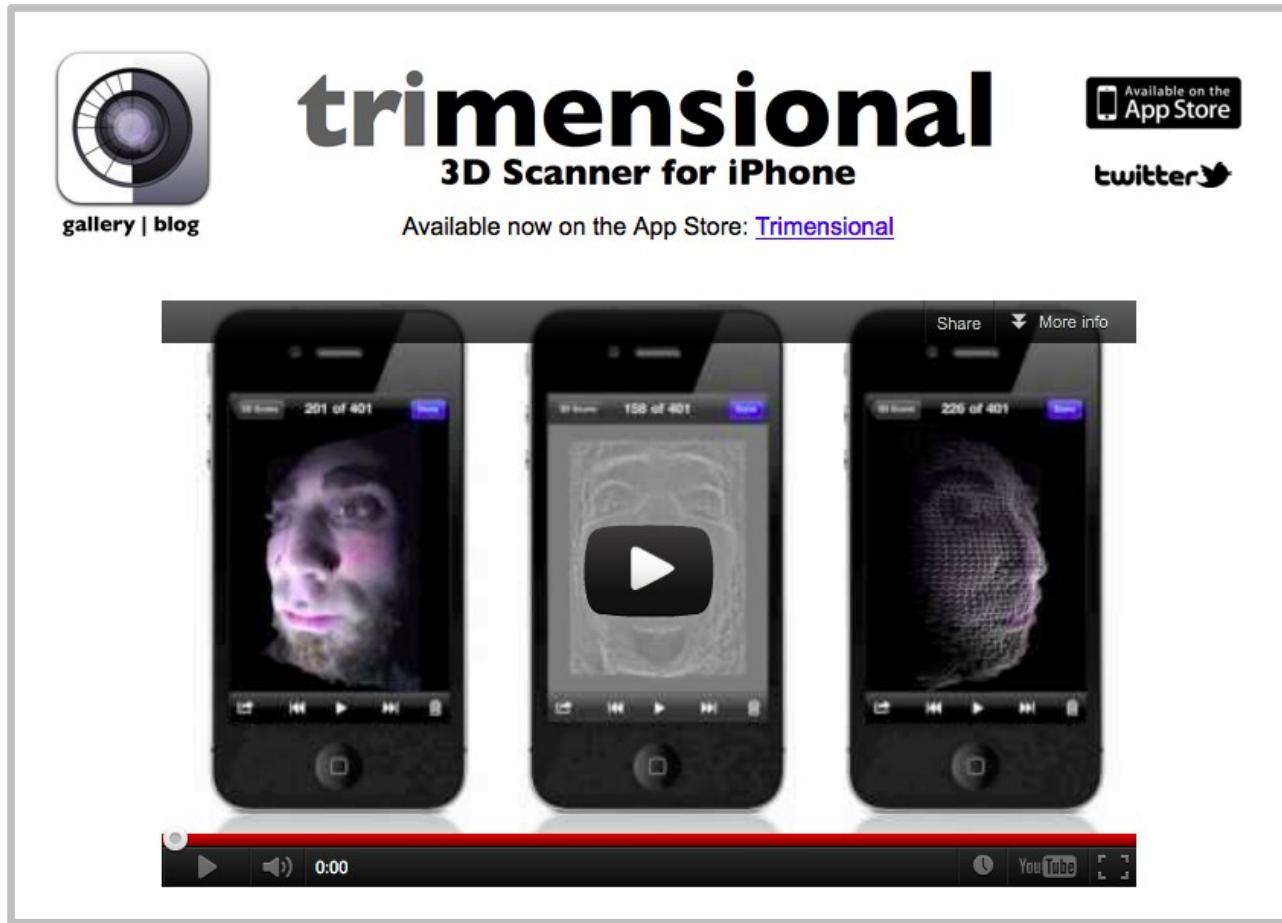
DAVID-laserscanner is a low-cost system for scanning of 3d objects. Requirements are a commercial hand-held laser and a standard camera.

Hardware: Modela MDX-20



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

A 3D scanner app for iPhone

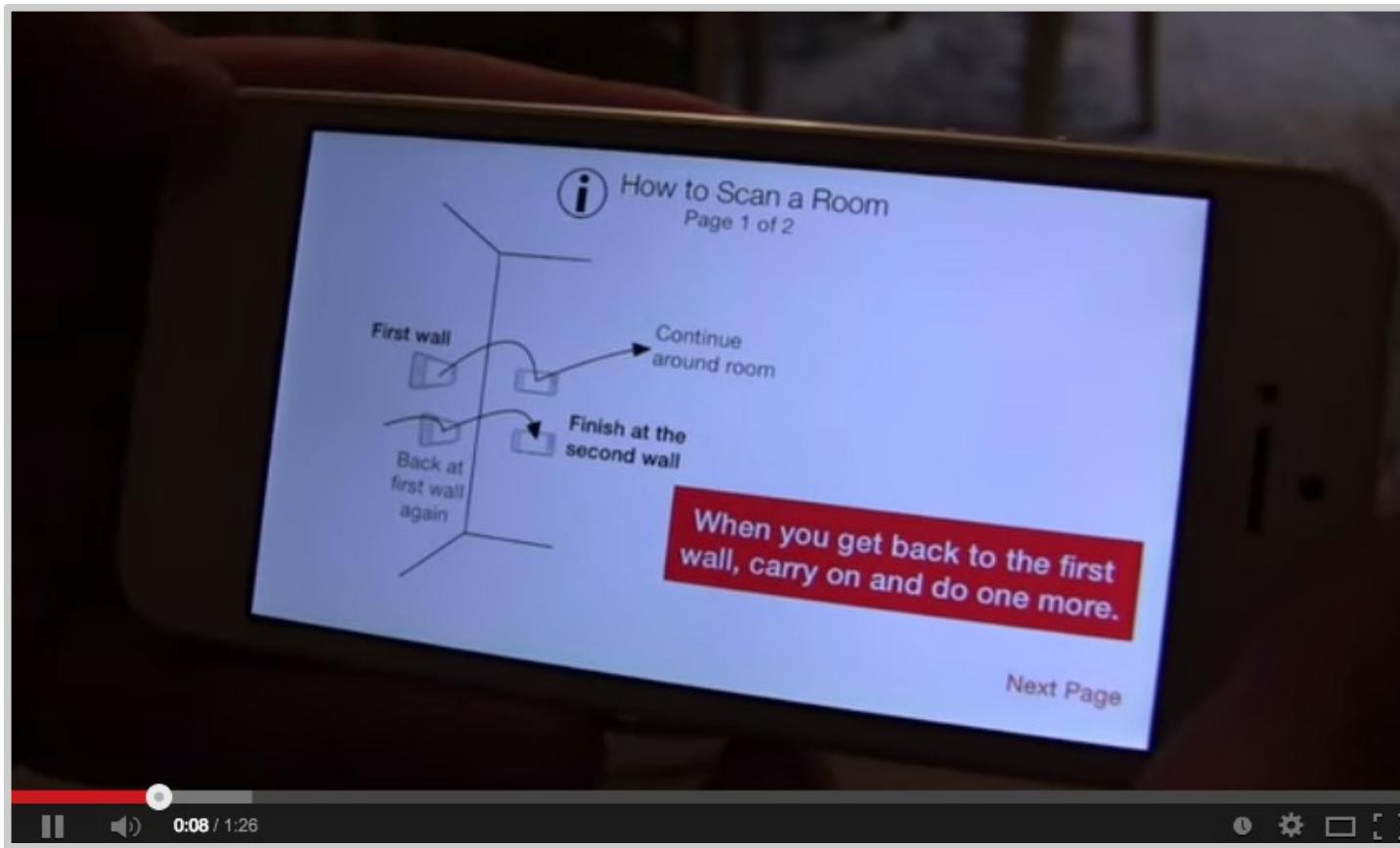


Trimensional uses both the screen and the front-facing camera on an iOS device, detecting patterns of light reflected off your face to build 3D model.

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

<http://youtu.be/lEZtiDrxh-E>

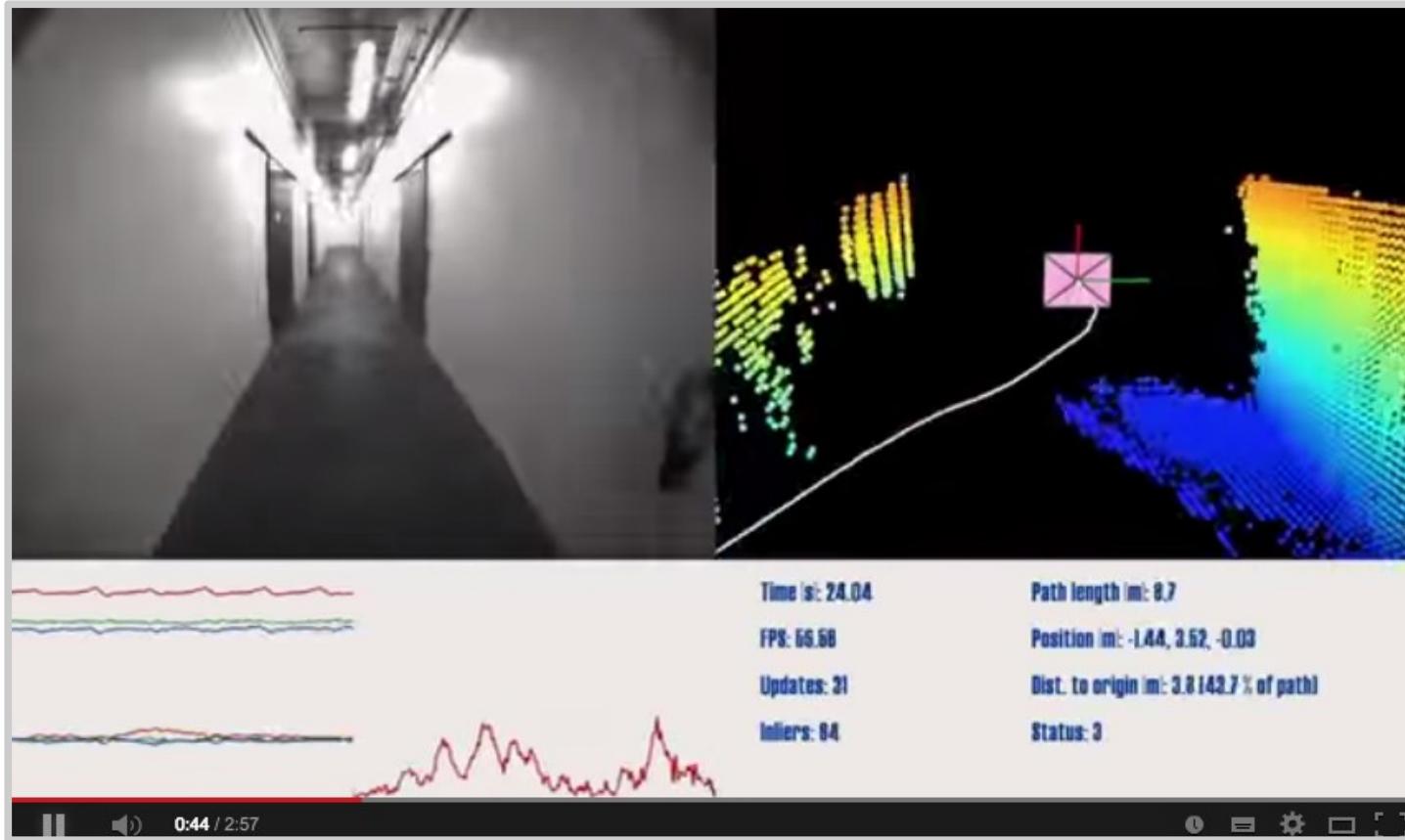
Scan with a mobile: 2D Plans



A mobile app that scans floor plans

Source: <https://www.youtube.com/watch?v=UMSL49Dusz4>

Scan with a mobile: 3D Plans



Project Tango is an exploration into giving mobile devices a human-scale understanding of space and motion.

Source: <https://www.youtube.com/watch?v=Qe10ExwzCqk>

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.

3D Scanning and character animation

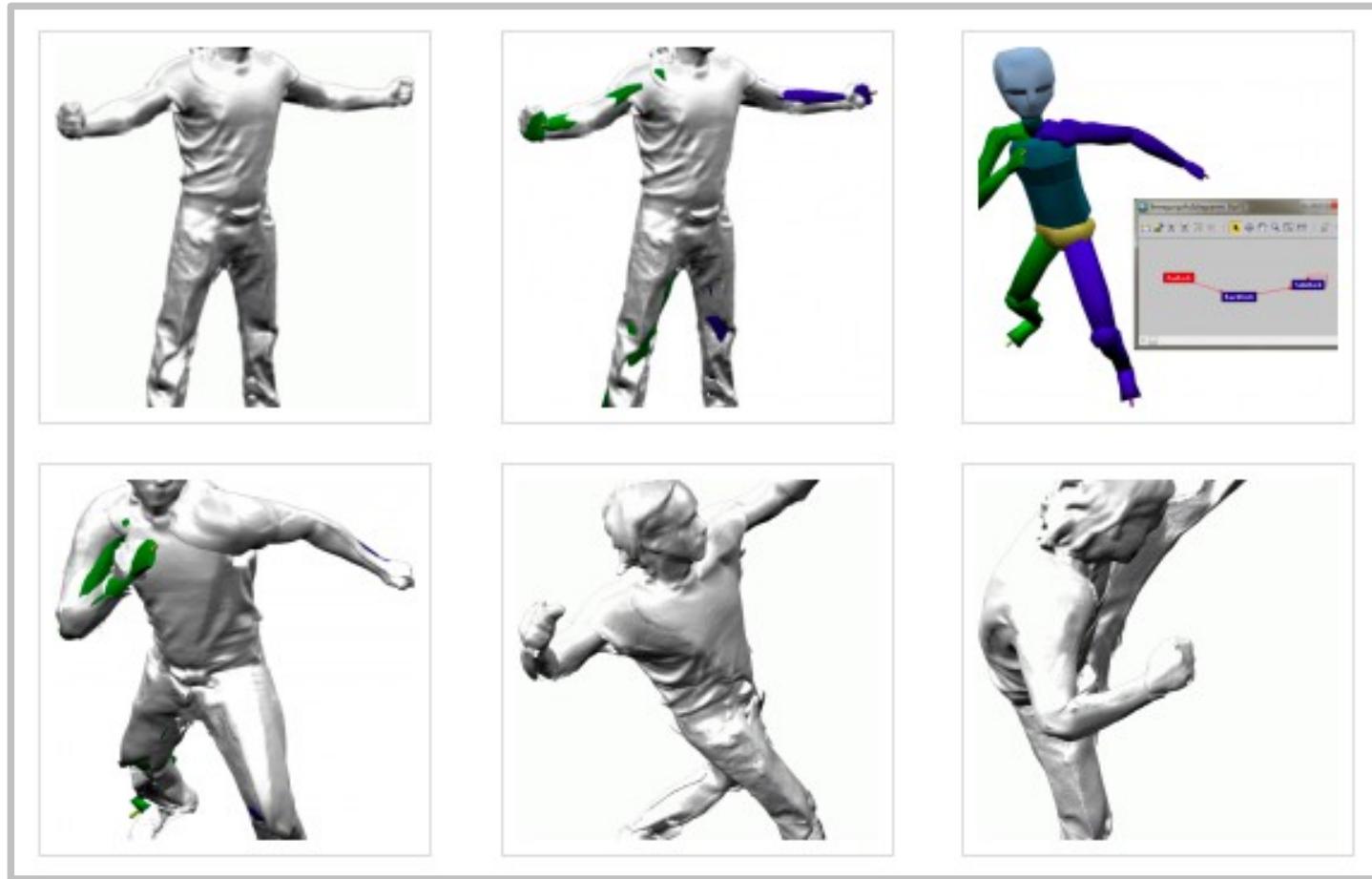


“We have created a full body scan one of our coworkers while using a bigger volume, and he used this as the basis for a character animation.”

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/>

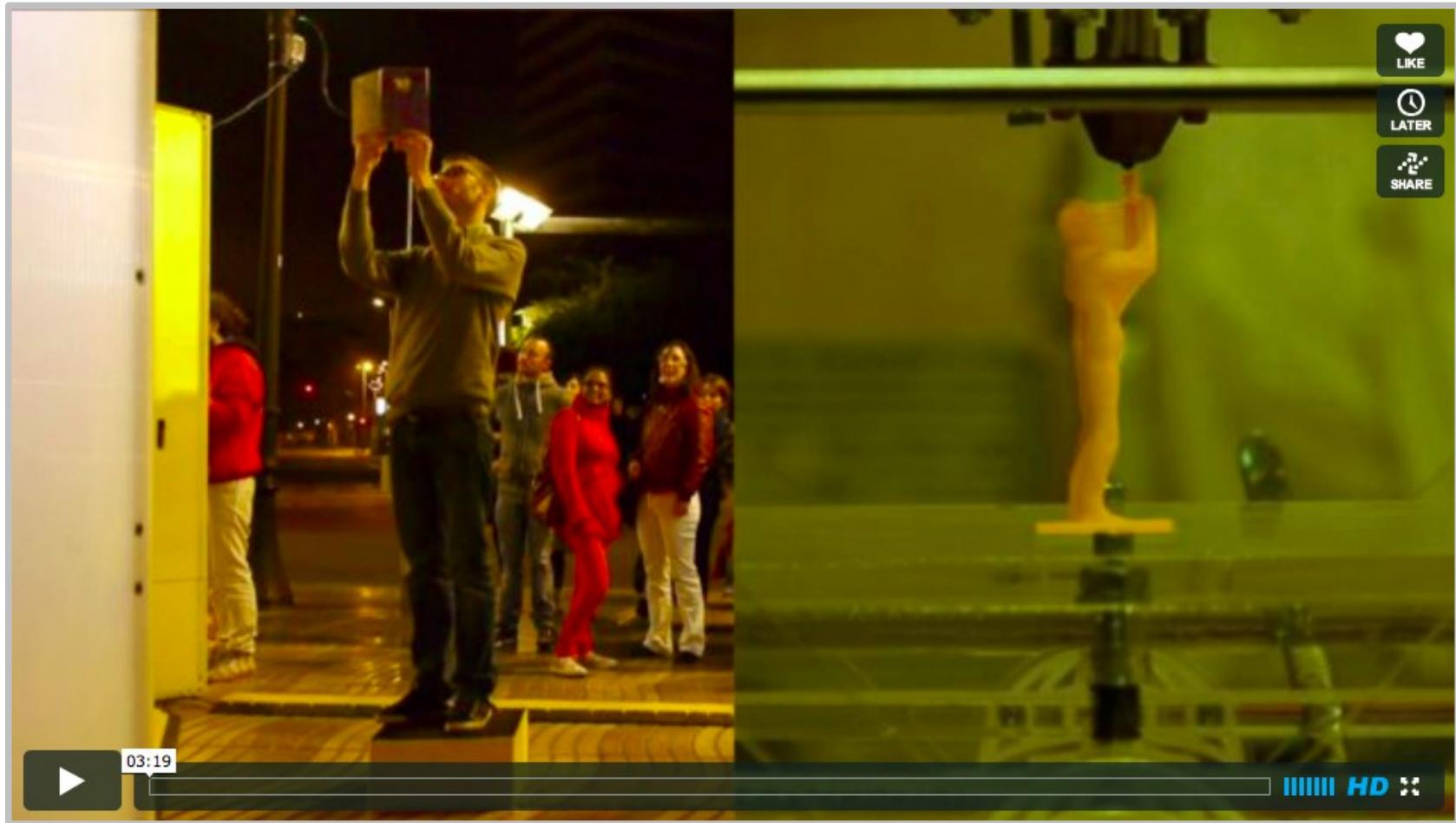
Be your own souvenir



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

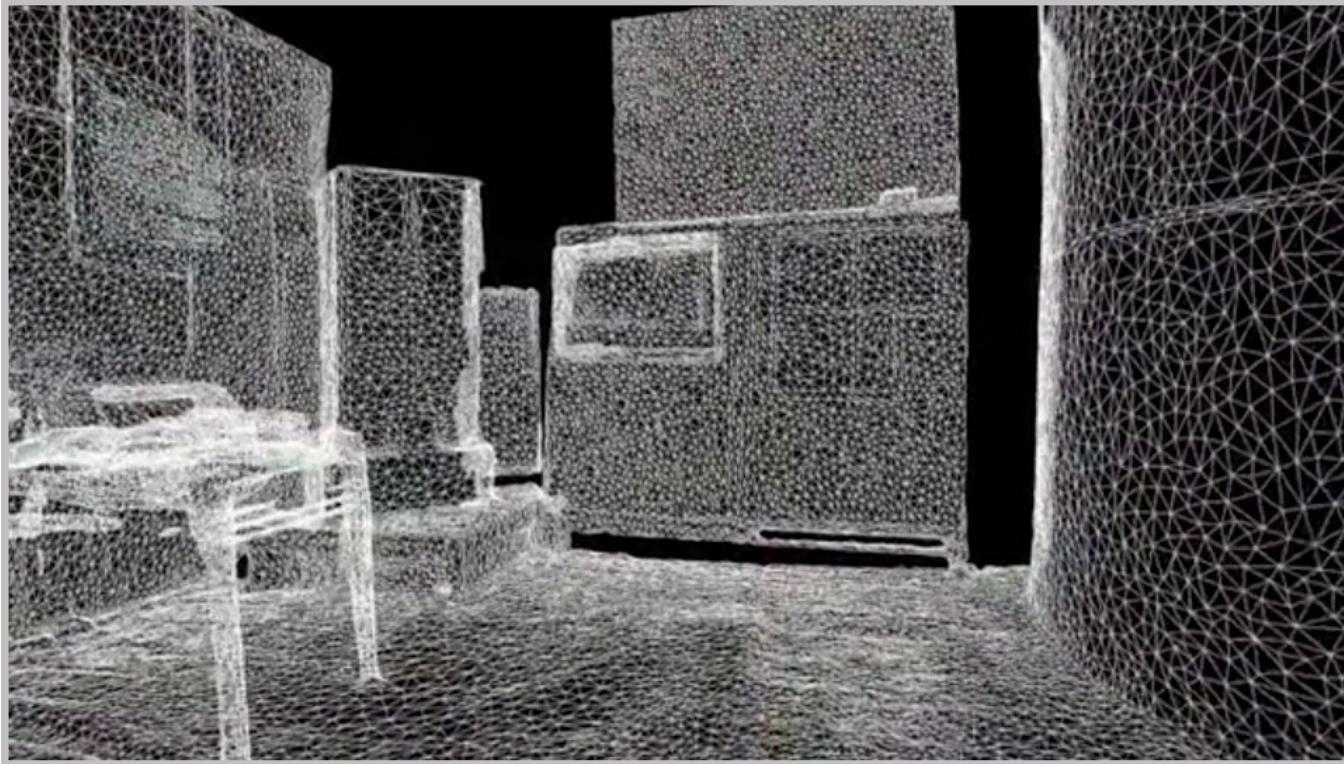


The project from blablabLab uses custom software developed using openKinect and openFrameworks (and Meshlab and Blender).

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

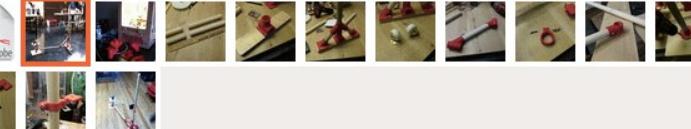
The easiest way: 123D Catch

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 multiple camera angles. At the bottom left of the main area is a blue button labeled "Get Started with 123D Catch".

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

The easiest way: 123D Catch

Camera rig for 123D Catch

[VIEW ALL STEPS ON ONE PAGE](#) [PDF](#) 

13 Followers  Author: **PRO gpvillamil** (Gian Pablo Villamil)  3

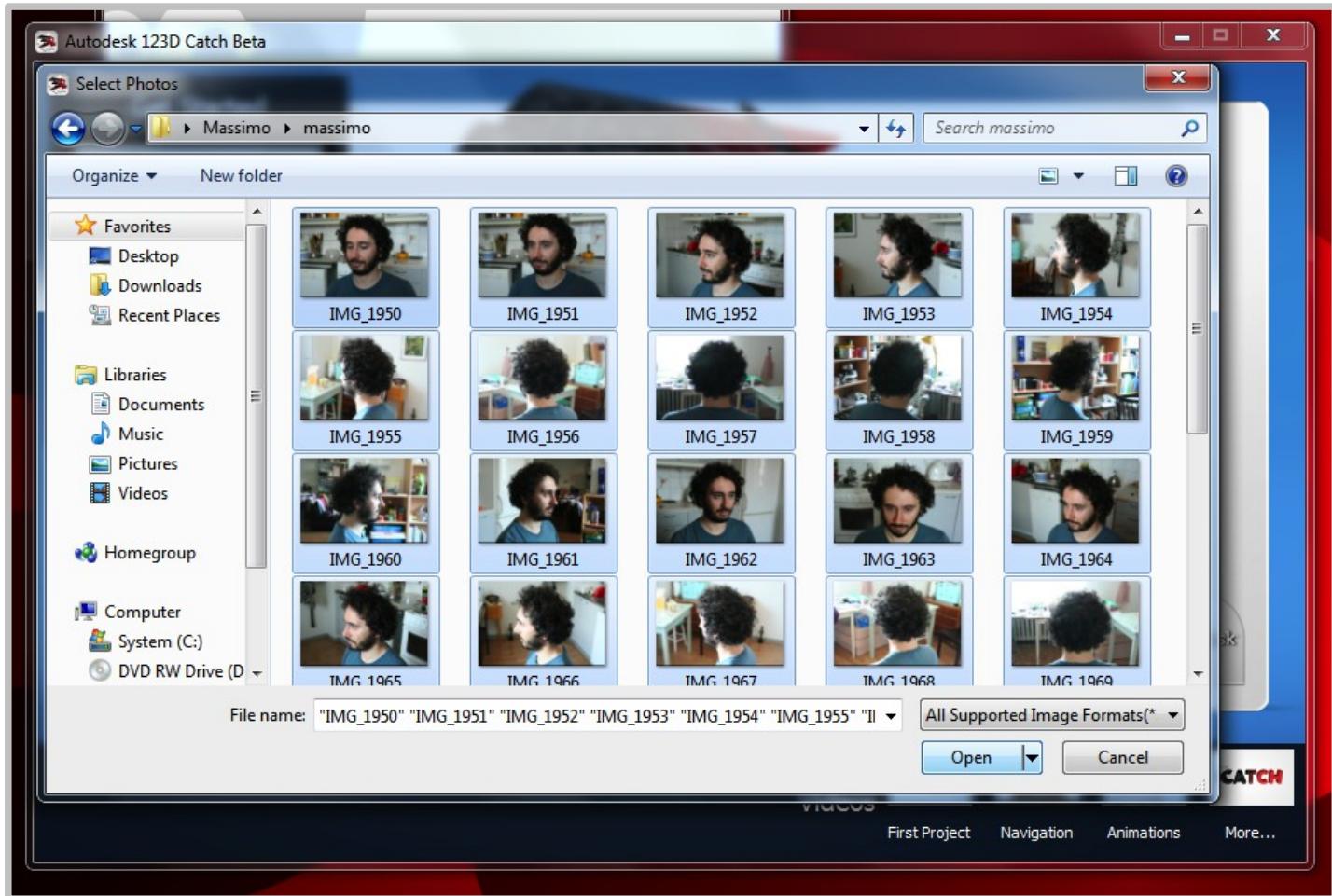


123D Catch is a new application and service from Autodesk that turns a series of photographs into a 3D model of an object or space.

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.

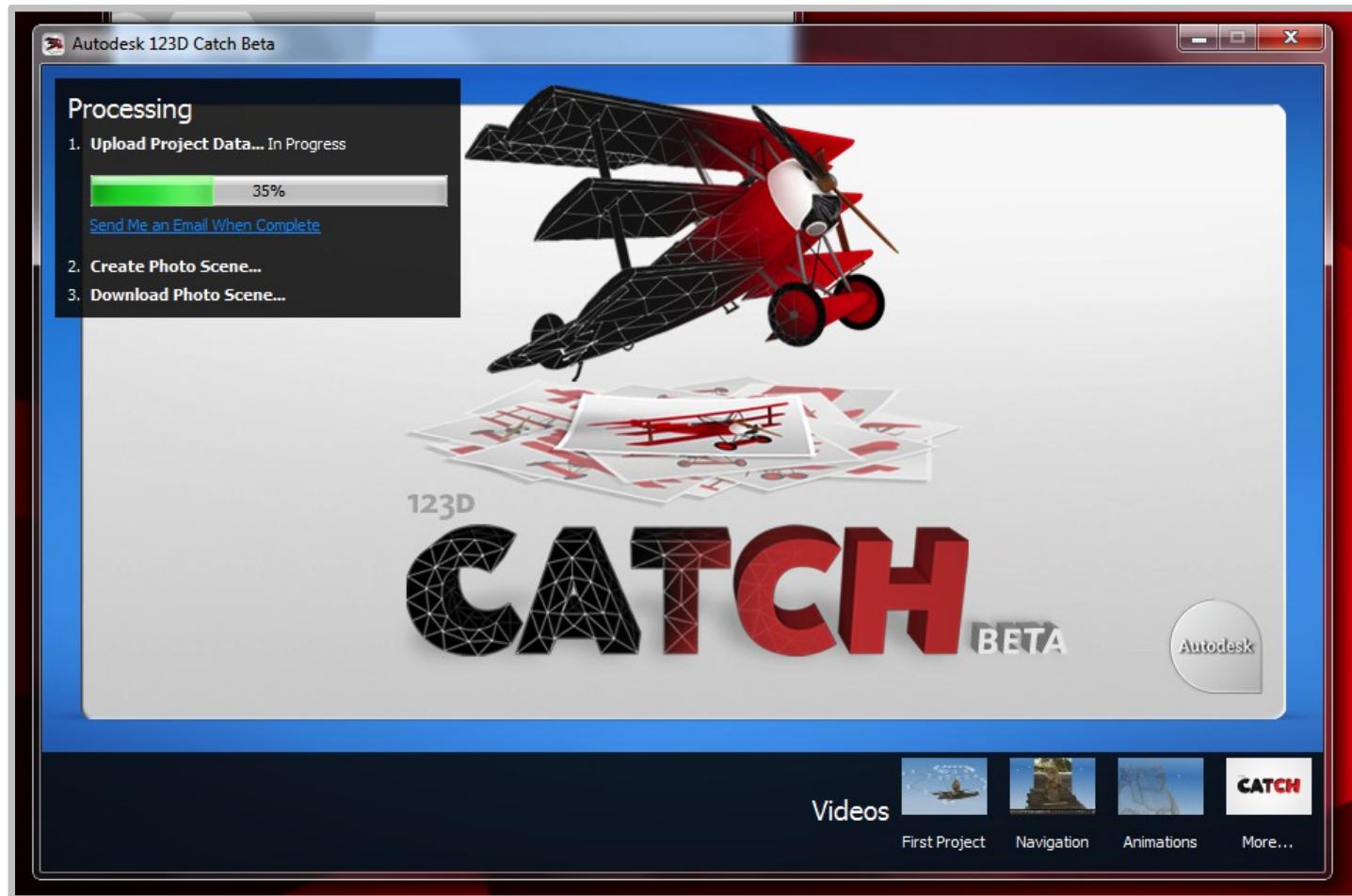
Source:<http://www.instructables.com/id/Camera-rig-for-123D-Catch/>

123D Catch: workflow



Read the whole workflow here (exercise 10):

123D Catch: workflow



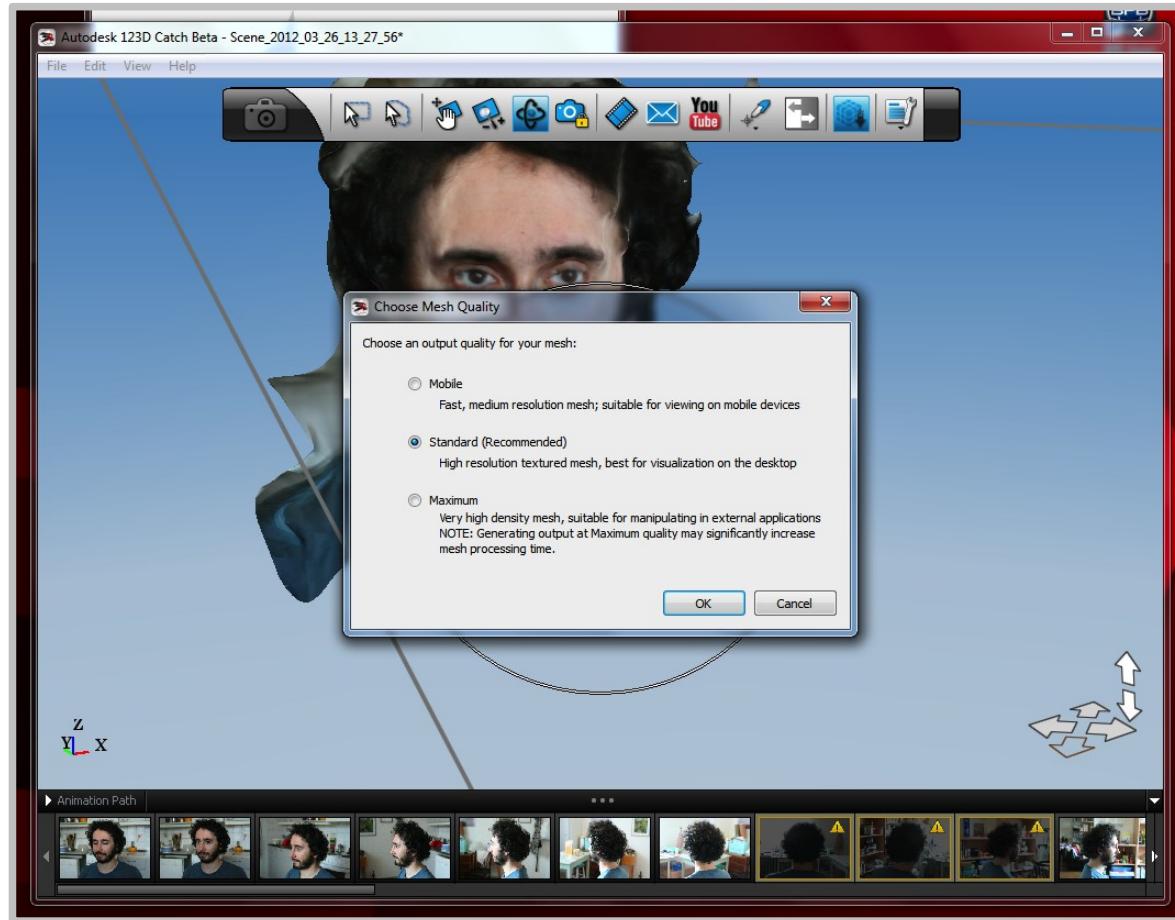
Read the whole workflow here (exercise 10):

123D Catch: workflow



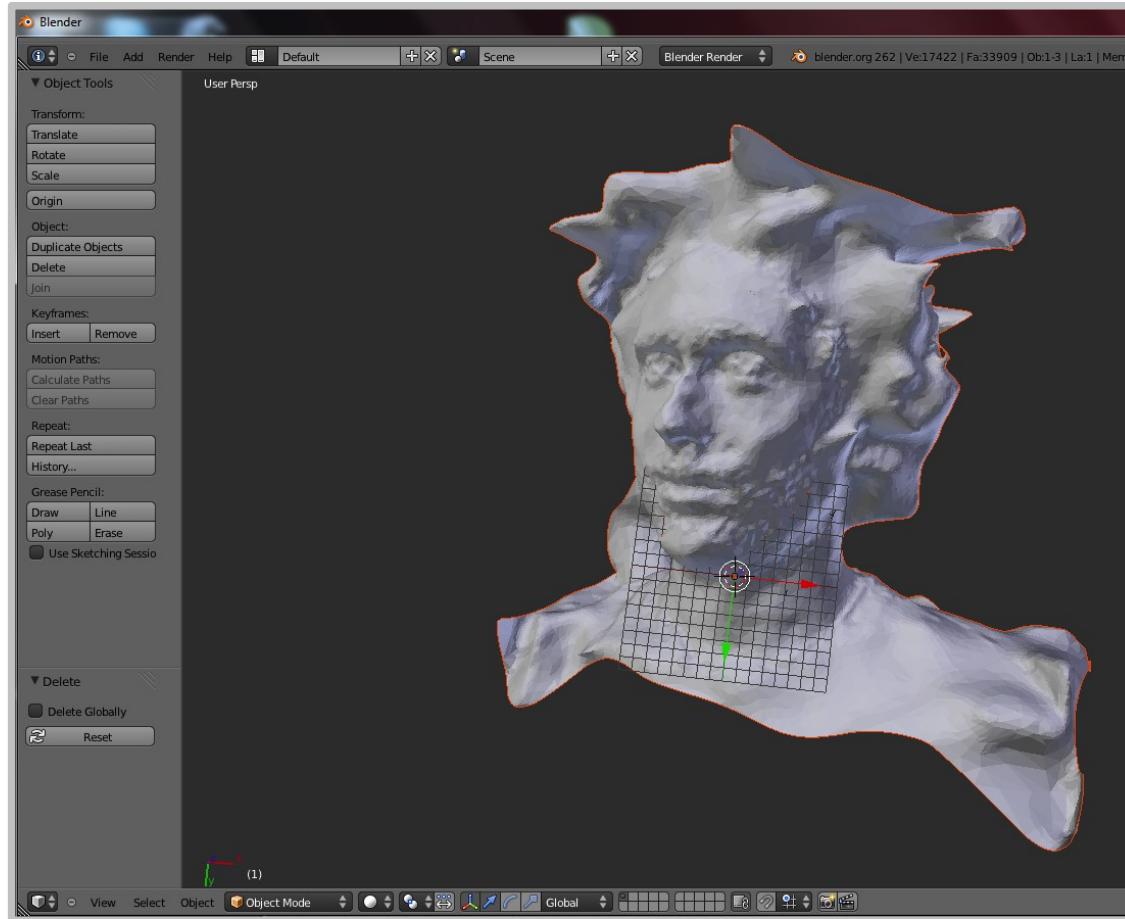
Read the whole workflow here (exercise 10):

123D Catch: workflow



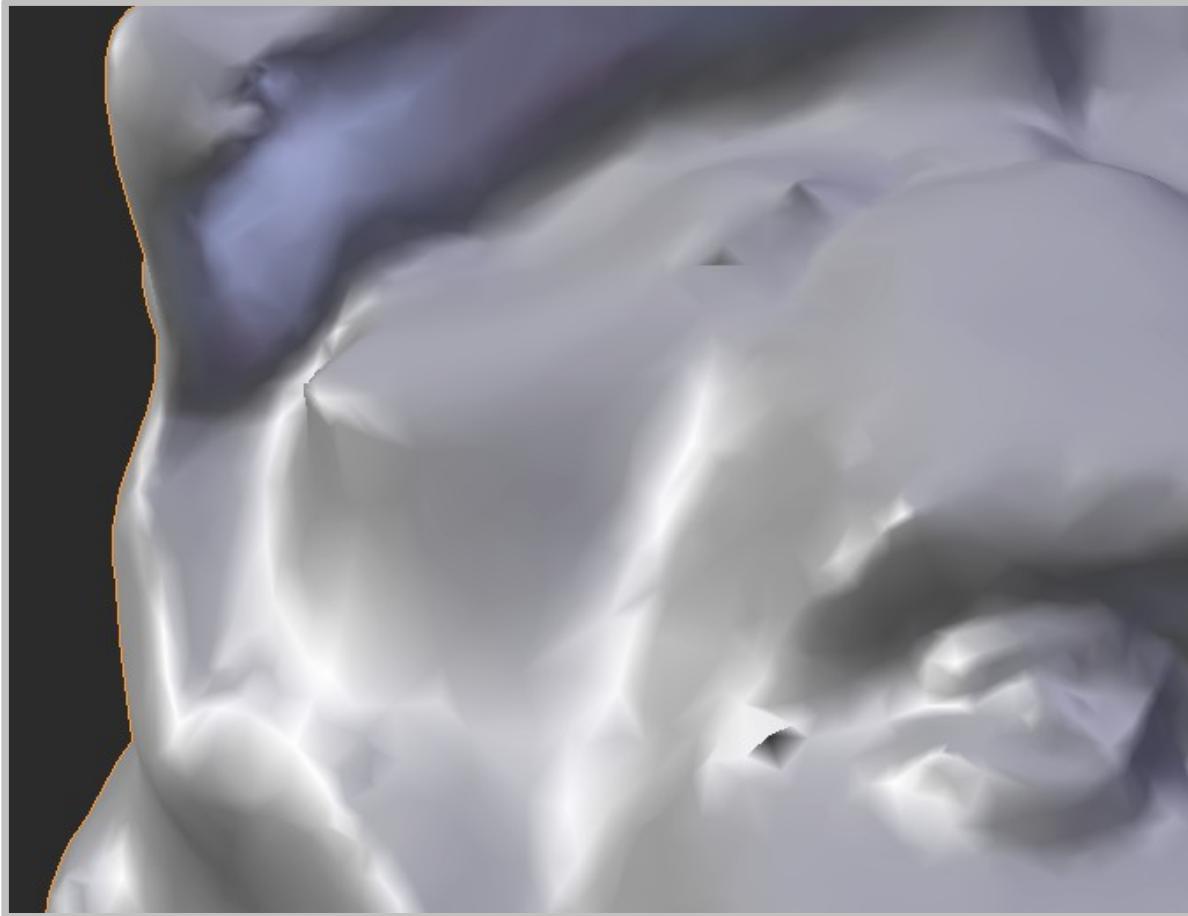
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123D Catch: workflow



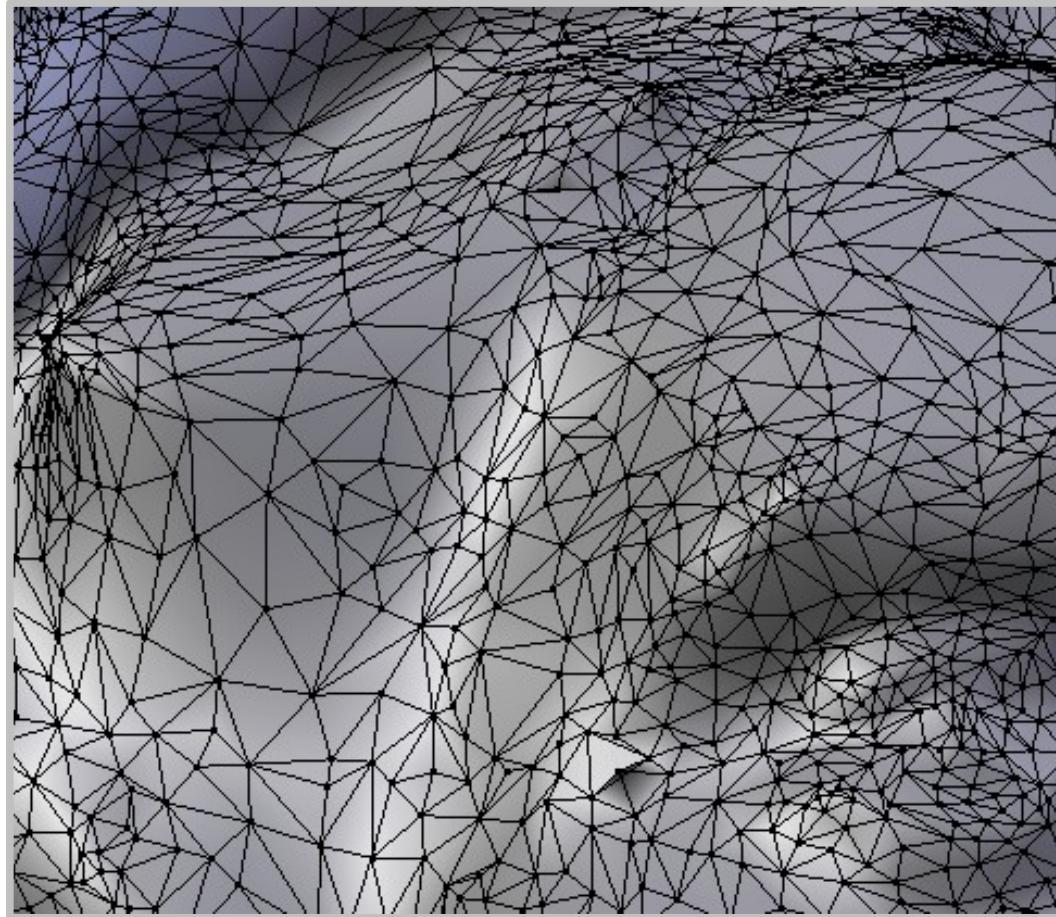
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123D Catch: workflow



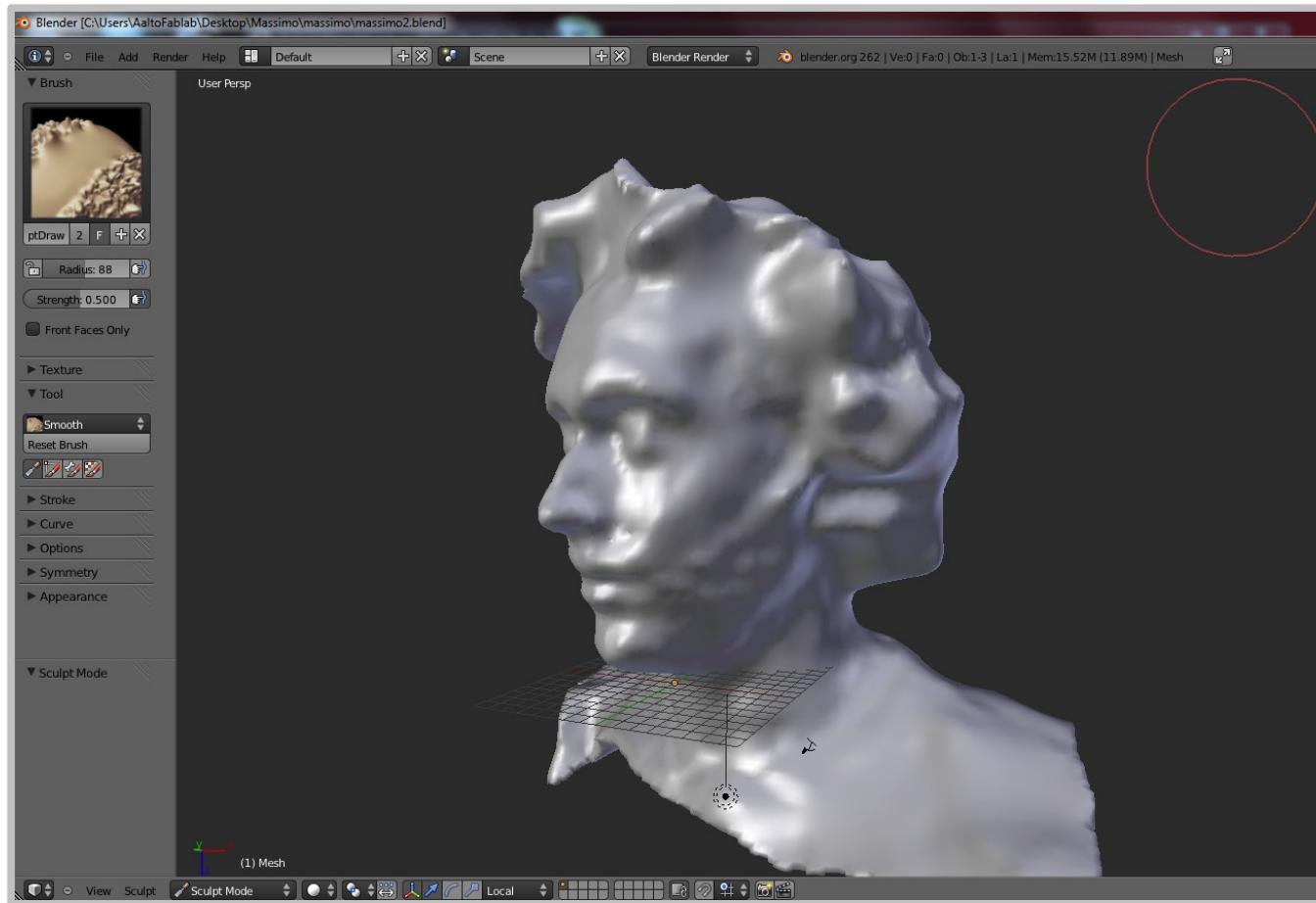
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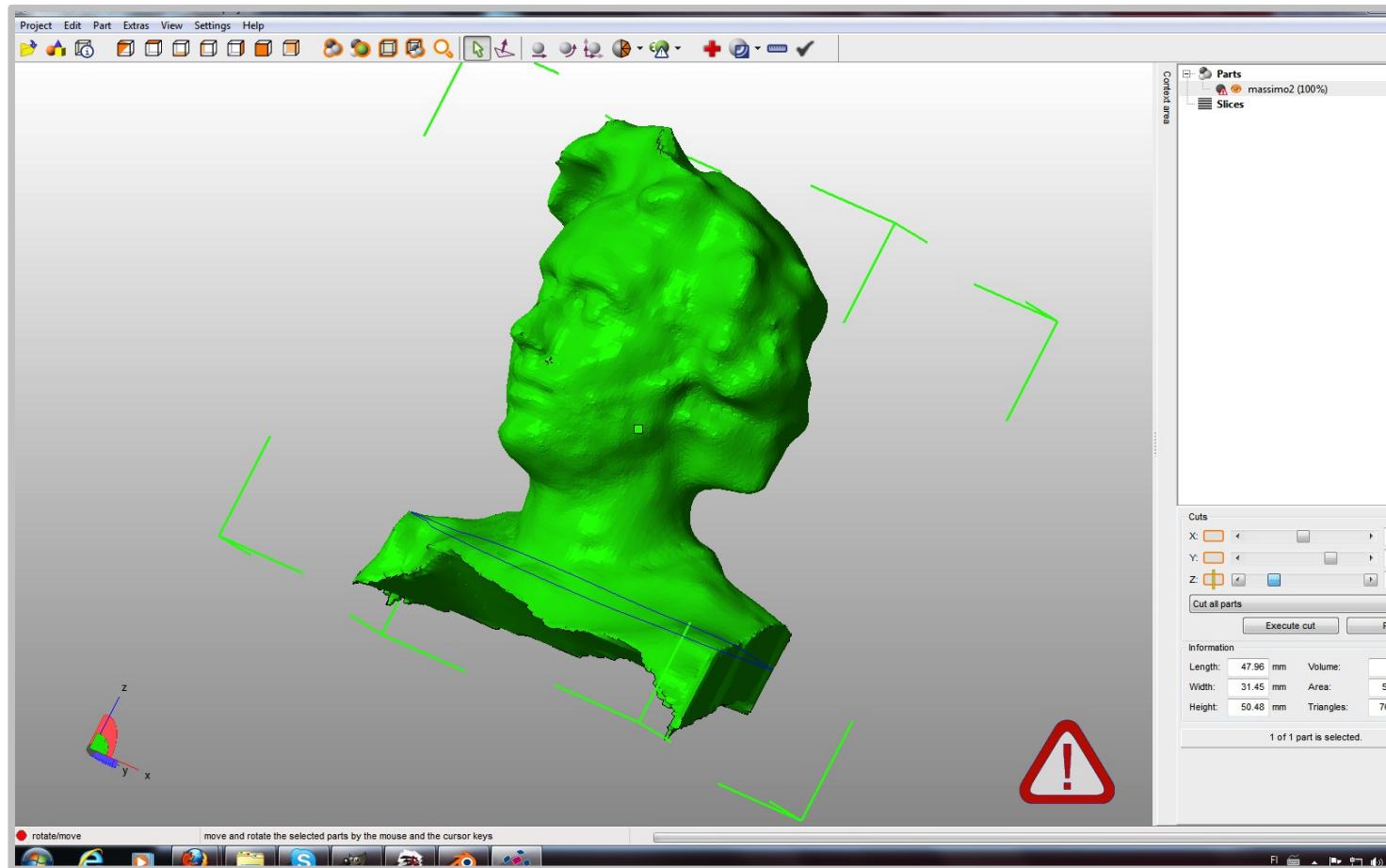
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123D Catch: workflow



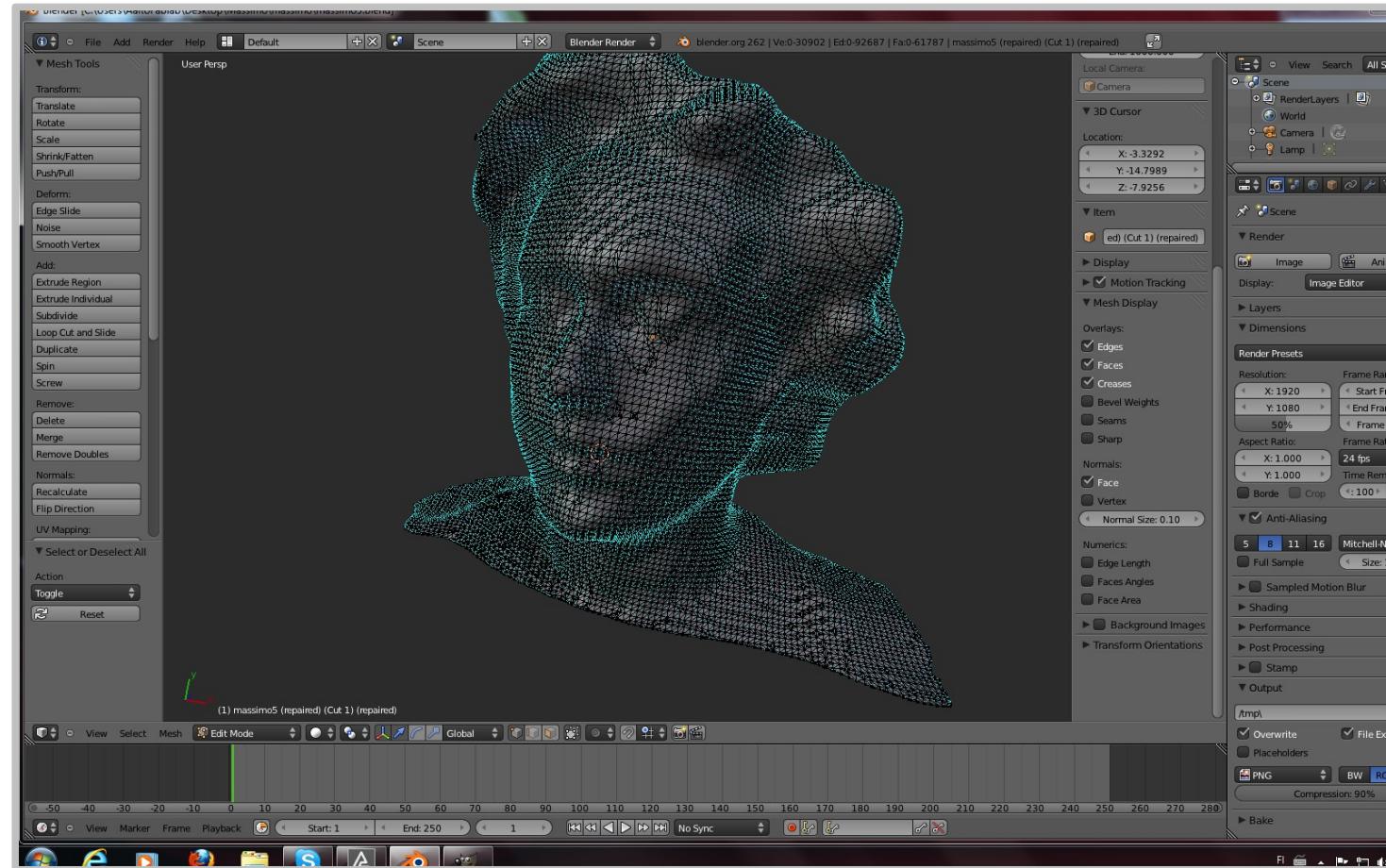
Read the whole workflow here (exercise 10):

123D Catch: workflow



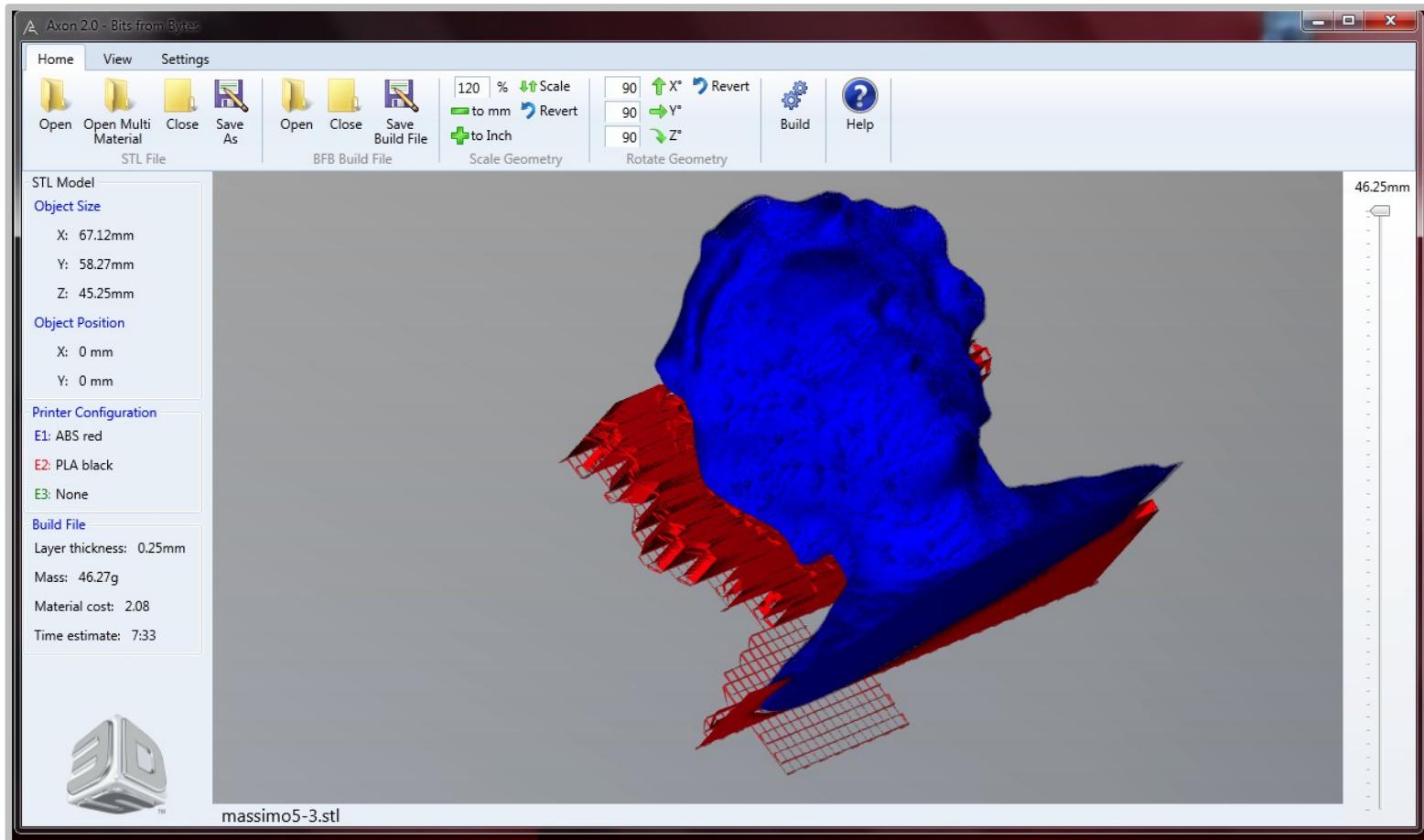
Read the whole workflow here (exercise 10):

123D Catch: workflow



Read the whole workflow here (exercise 10):

123D Catch: workflow



Read the whole workflow here (exercise 10):

Another option: Kinect + Skanect



Skanect transforms your Microsoft Kinect or Asus Xtion camera into an ultra-low cost 3D scanner able to create 3D meshes out of real scenes in a few minutes.

Source: <https://www.youtube.com/watch?v=nbcnRgVNzK>

<http://skanect.manctl.com/>

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

A”

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Thank you!!

Massimo Menichinelli
Aalto Media Factory
massimo.menichinelli@aalto.fi
[@openp2pdesign](https://twitter.com/openp2pdesign)
<http://www.slideshare.net/openp2pdesign>

