

# Computer Vision

## 计算机可视化

Day05\_01

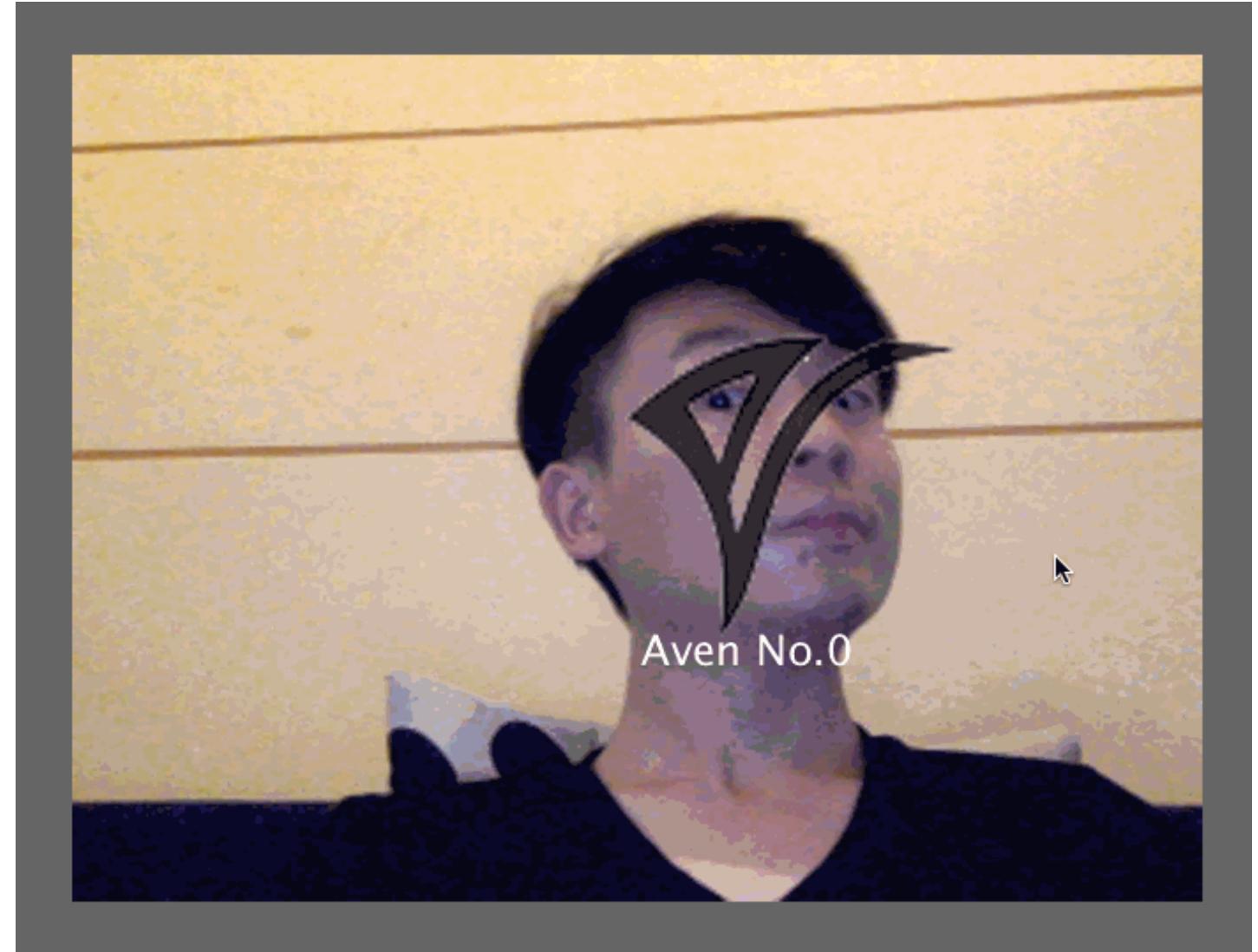


# Computer Vision

# COMPUTER VISION

Computer vision (CV) involves creating algorithms that enable a computer to analyze video, extract information, and make decisions based on content contained within the video frame.

CV can be used to detect events, track movement, and even recognize objects or people.



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OpenCV

# OPEN CV

Launched in 1999, Open Source Computer Vision (Open CV) is a cross-platform library of programming functions that was originally produced by Intel but is now free for use under an open source license.

Open CV uses range from interactive art, detecting mines and bombs, and advanced robotics.

<http://opencv.org/>

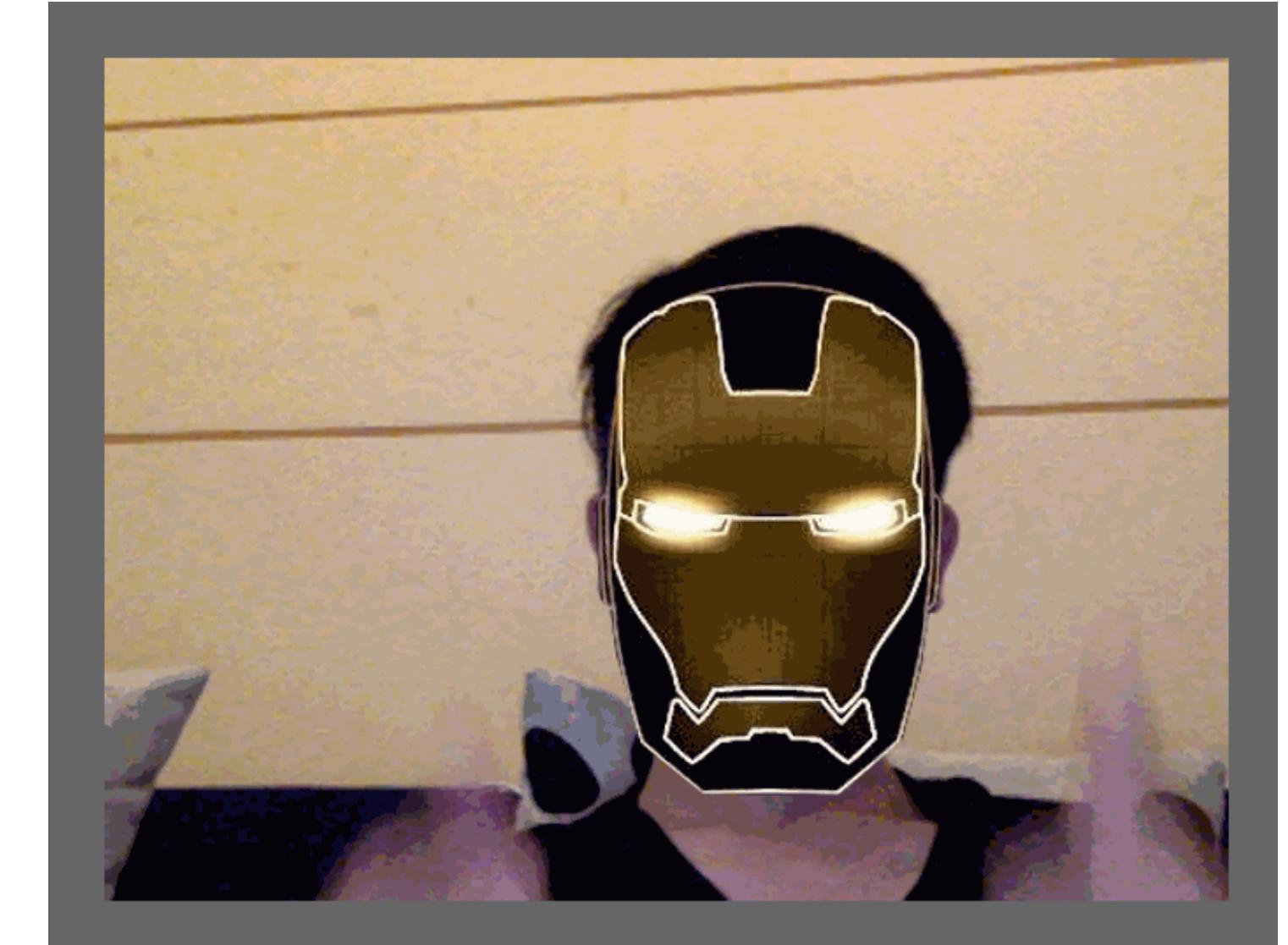


# OPENCV FOR PROCESSING LIBRARY

Greg Borenstein maintains a library for Processing based on the original OpenCV Java API.

Possibilities include: Face Detection, Brightness Contrast, Contour Finding, Background Subtraction, Color Tracking and more.

<https://github.com/atduskgreg/opencv-processing>



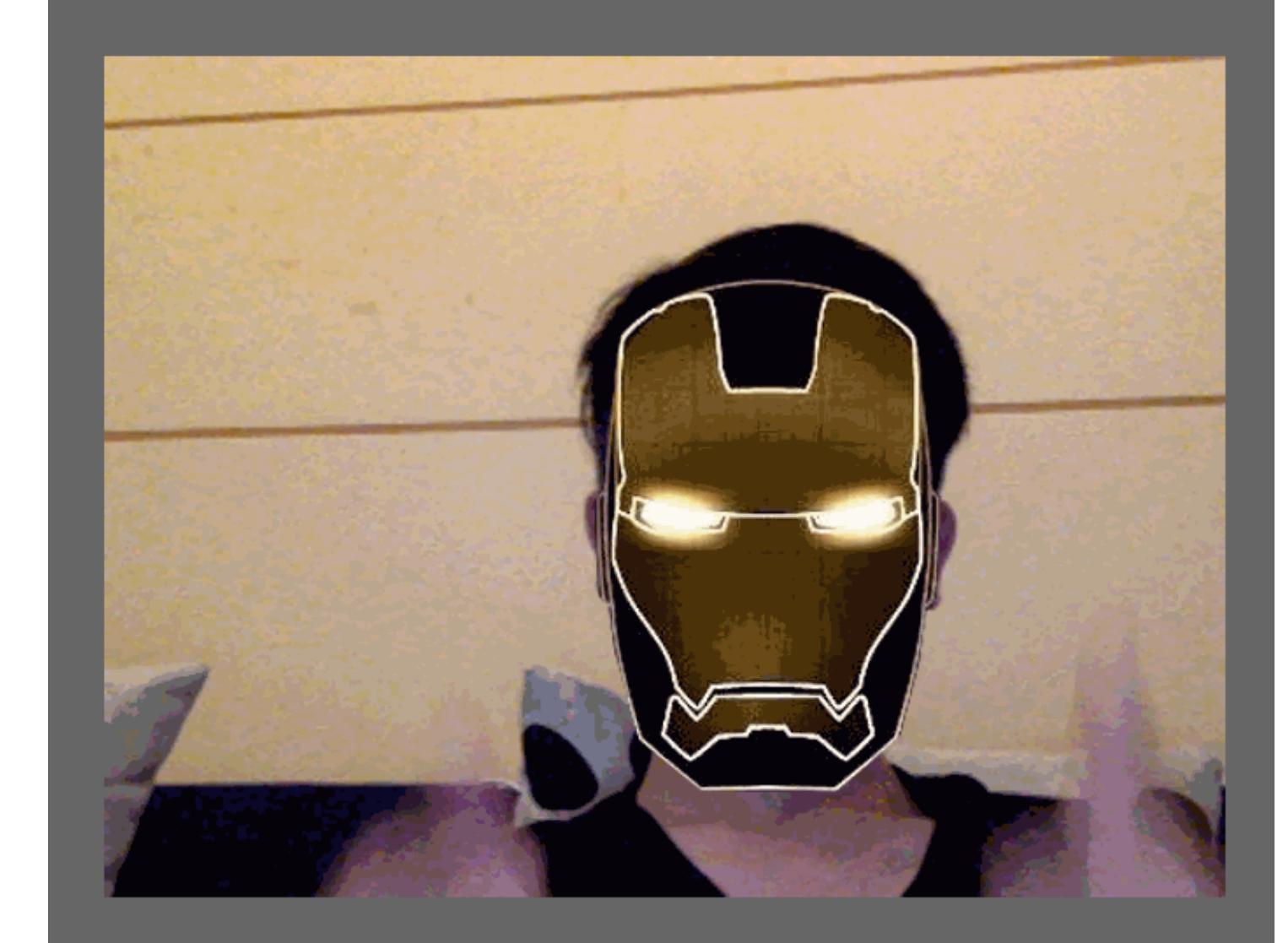
# Face Detection

# FACE RECOGNITION

Face detection, recognition and tracking methods are now accessible to the general public thanks to the development of computer vision. Open CV is one solution for face detection.

For more advanced face detection methods, try ofxFaceTracker by Kyle McDonald based on Jason Sarah's Face Tracker.

[http://facetracker.net/downloads/  
FaceOSC-Mavericks.zip](http://facetracker.net/downloads/FaceOSC-Mavericks.zip)



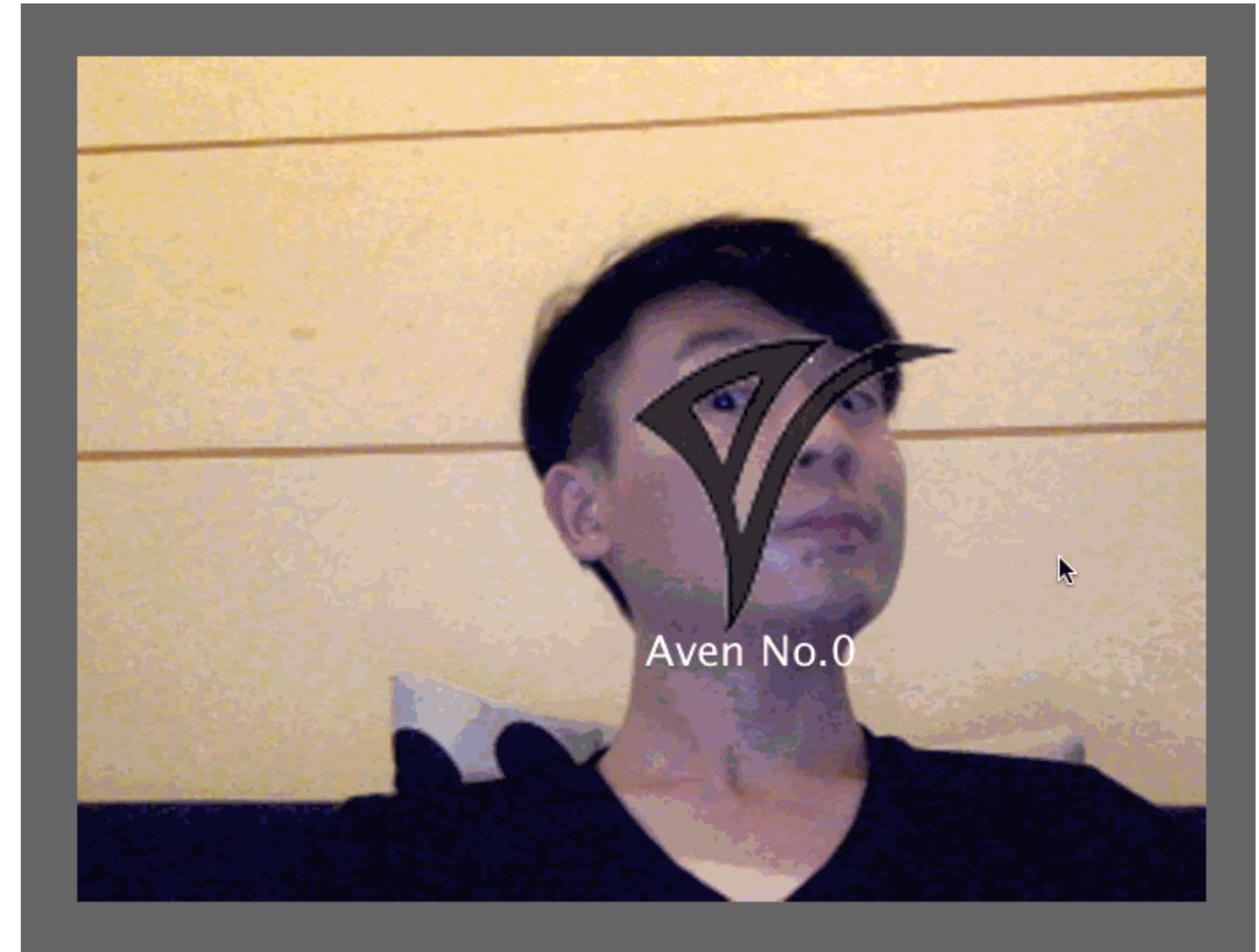
# FACE TRACKING + OPEN SOUND CONTROL

Open Sound Control (OSC) is a protocol originally created for musical performance. Because of its speed, accuracy and flexibility, programmers have appropriated it for their own use, such as tracking facial features for other programs.

<https://github.com/shiffman/Face-It>

The FaceOSC program sends out messages about faces detected via OSC. You need to install the OSCp5 library to receive it inProcessing.

<http://www.sojamo.de/libraries/oscp5/>



# INTERACTIVE MIRROR

'Perfect Creatures' is an interactive mirror that mimics a viewer's movement and expressions with an animal head overlaid on the viewer's reflection.

Made by Karolina Sobecka with FaceTracker library from Jason saragih, ofxFaceTracker by Kyle McDonald, openFrameworks, Unity3D and Blender.



EXCERPT FROM PERFECT CREATURES BY KAROLINA SOBECKA



# CV DAZZLE

CV Dazzle is a series of make up designs meant to camouflage people from face-detection technology.

Developed by Adam Harvey as part of his master's thesis at the Interactive Telecommunications Program (ITP) at NYU.

<http://ahprojects.com/projects/cv-dazzle/>



EXCERPT FROM PERFECT CREATURES BY KAROLINA SOBECKA



# 3D Sensing Cameras Body Sensing with Kinect

# RGB + DEPTH = 3D SENSING CAMERAS

So far, we have only discussed traditional cameras that sense red, green, and blue color values and translate them into digital signals.

But computers can see colors that human beings cannot, such as infrared. Recently, cameras have been developed that can analyze infrared light and then infer depth from the analysis.

Using this method and machine learning, we now have smarter cameras that can see 3D and identify people and objects.



FROM KINECT FOR WINDOWS SDK QUICKSTARTS



# THE MICROSOFT KINECT

The Kinect sensor is a motion sensing controller designed to be used with the Xbox 360 video game console.

Shortly after it's release, AdaFruit, a company actively involved in the Open Source Hardware movement, offered a \$1000 (eventually \$2000) bounty to the first person to produce an open source driver for the Kinect.



# DIFFERENT KINECT MODELS

Kinect 1414 is the original Kinect made for Xbox 360. This works across platforms. Kinect 1473 made for Xbox 360 looks identical but does not work on macs.

Kinect for Windows has “Microsoft” written on it and only works on windows machines.

Kinect Version 2 came out for the XBOX One Kinect. It works with Most libraries



**KINECT™**  
for Windows®



# SIMPLEOPENNI LIBRARY

SimpleOpenNI is an OpenNI and NITE library for Processing that allows you to use a Kinect Sensor with Processing. NITE is a piece of software, developed by PrimeSense, to facilitate motion tracking. The OpenNI framework provides a set of APIs for voice and gesture recognition, as well as tracking body movement. OpenNI was acquired by apple. It is no longer in development.

<http://wwwopenni.org/>



PHOTO BY GREG BORENSTEIN



# OPEN KINECT AND LIBFREENECT

An alternative to using SimpleOpenNI  
is Daniel Shiffman's OpenKinect for  
Processing library, based on the  
libfreenect open source drivers.

Tutorial:

<http://shiffman.net/p5/kinect/>

Github:

<https://github.com/OpenKinect/libfreenect>

Google Group:

<https://groups.google.com/forum/#!forum/openkinect>

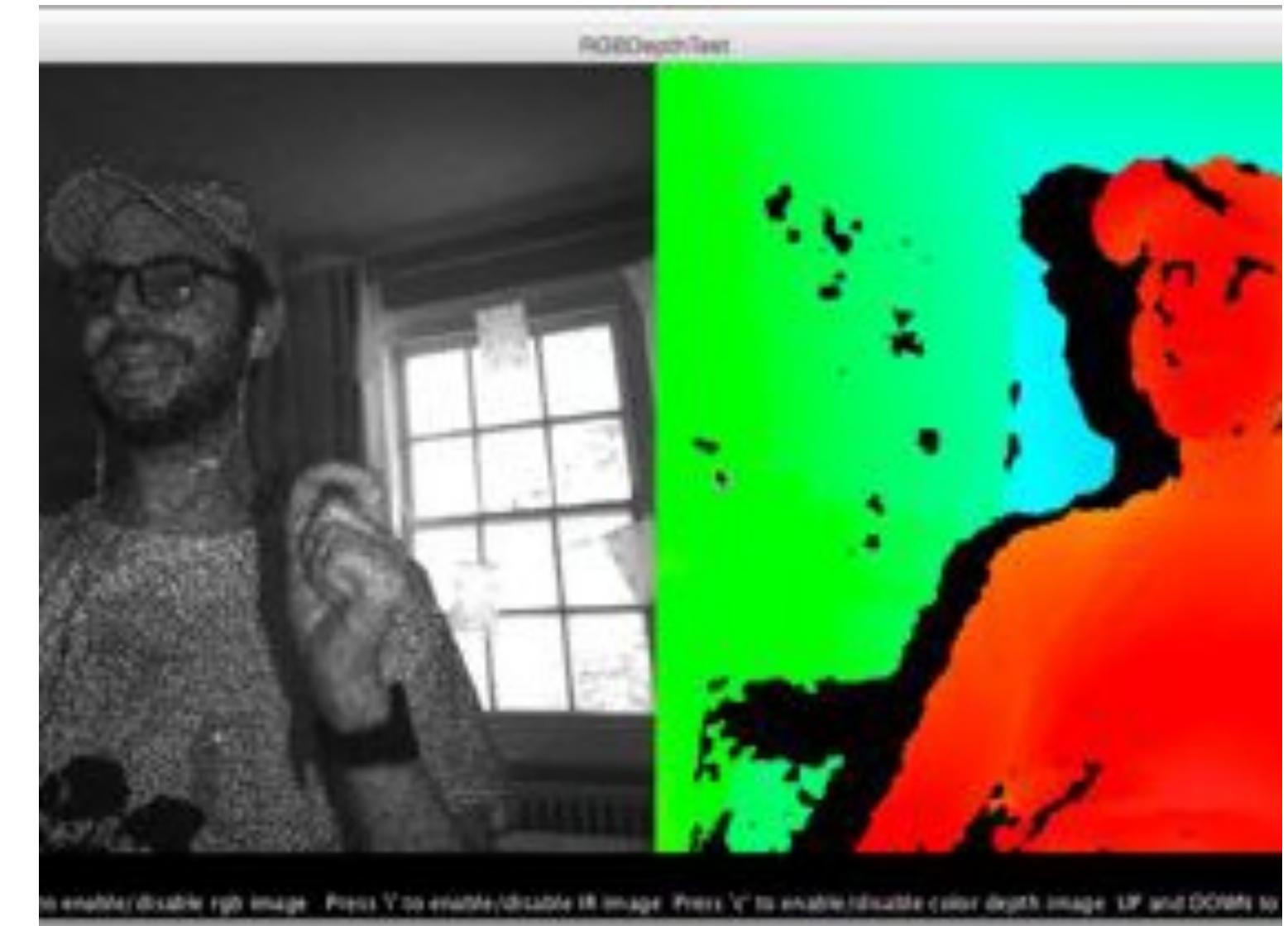


PHOTO BY DANIEL SHIFFMAN



# RGB + DEPTH = RGBD

James George, Alexander Porter and Jonathan Minard created the DepthKit for ‘volumetric filmmaking’ on Kickstarter.

The toolkit allows filmmakers to attach 3D sensing cameras to high definition 2D cameras.

<http://www.rgbdtoolkit.com/>

The technology was used for the documentary Clouds



PHOTO BY RGB+D TOOLKIT



3D Sensing Input Device  
Hand Sensing With Leap Motion

# LEAP MOTION

An experimental controller that uses 3D sensing infrared camera technology to specialize in sensing hand movements.

<https://www.leapmotion.com/>



PHOTO BY QUBODUP



# ORION: LEAP MOTION + VR

Leap Motion saw a potential to introduce their product with Virtual Reality headsets. Project Orion is tailored for virtual reality headsets. Instead of having the Leap Motion on the table, it is attached to the headset.

<https://developer.leapmotion.com/orion>



PHOTO FROM THE VERGE

