

Creative Coding

Professor Danne Woo

creativecode.dannewoo.com

ARTS 249

Spring 2020

Thursday 2:00 PM – 5:50 PM

I-Building 213

Motion and Interaction

Week 08: Kinetic Forms

Week 09: Drawing and Interaction (Mouse)

Week 10: Interaction and Image Import (Keyboard and Events)

Week 11: Work from Home

Week 12: 3D

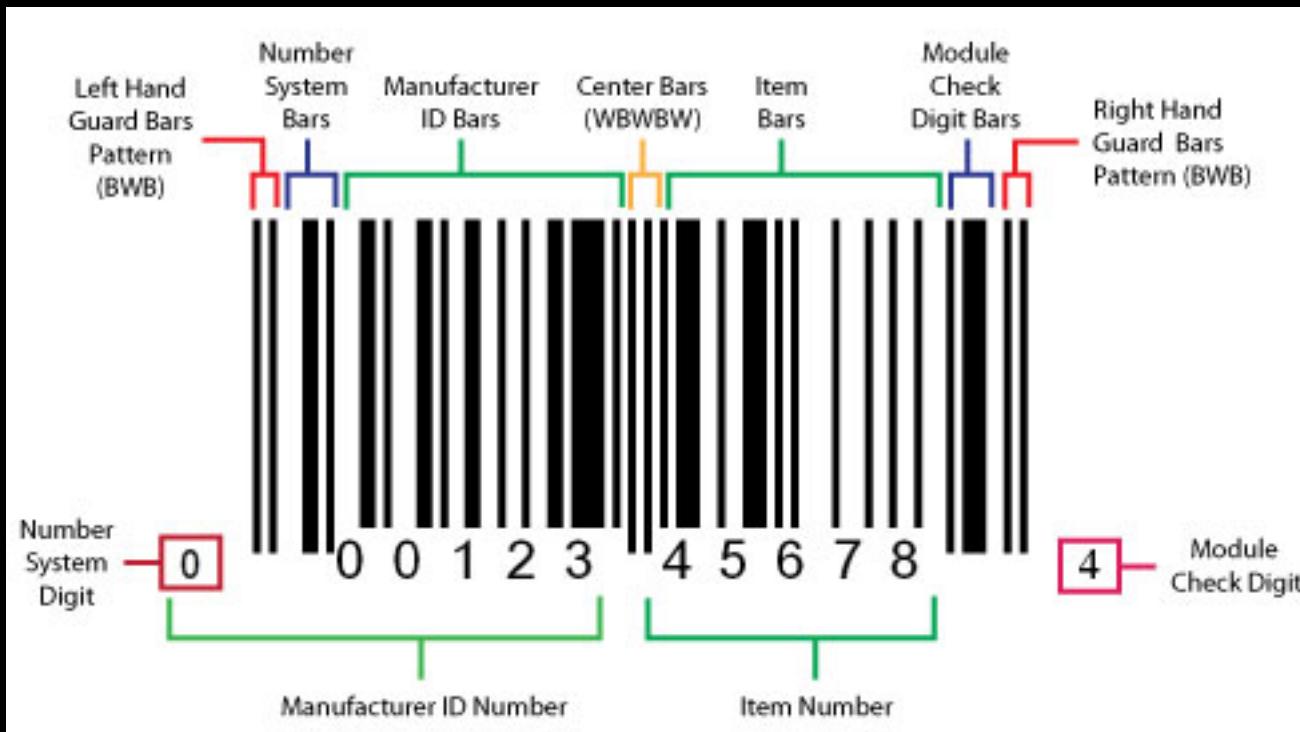
Week 13: Audio and p5.Sound

Week 14: Computer Vision

Week 15: Final Presentation

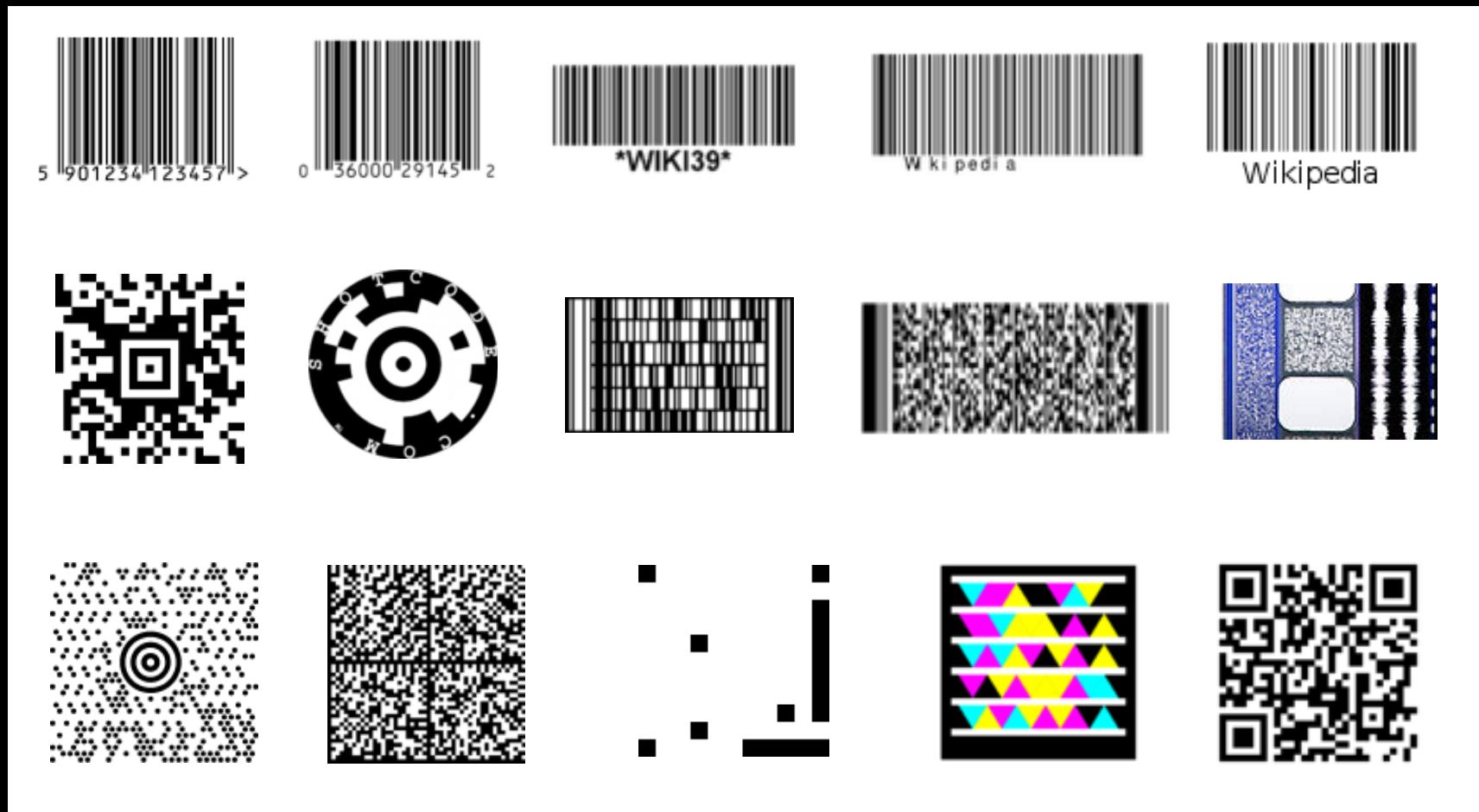
Origins

Barcodes



Origins

Barcodes



Background Subtraction

Green and Blue Screens



Background Subtraction

Complex Backgrounds



Background Subtraction

Consumer Software



Background Subtraction

Bocce Draw



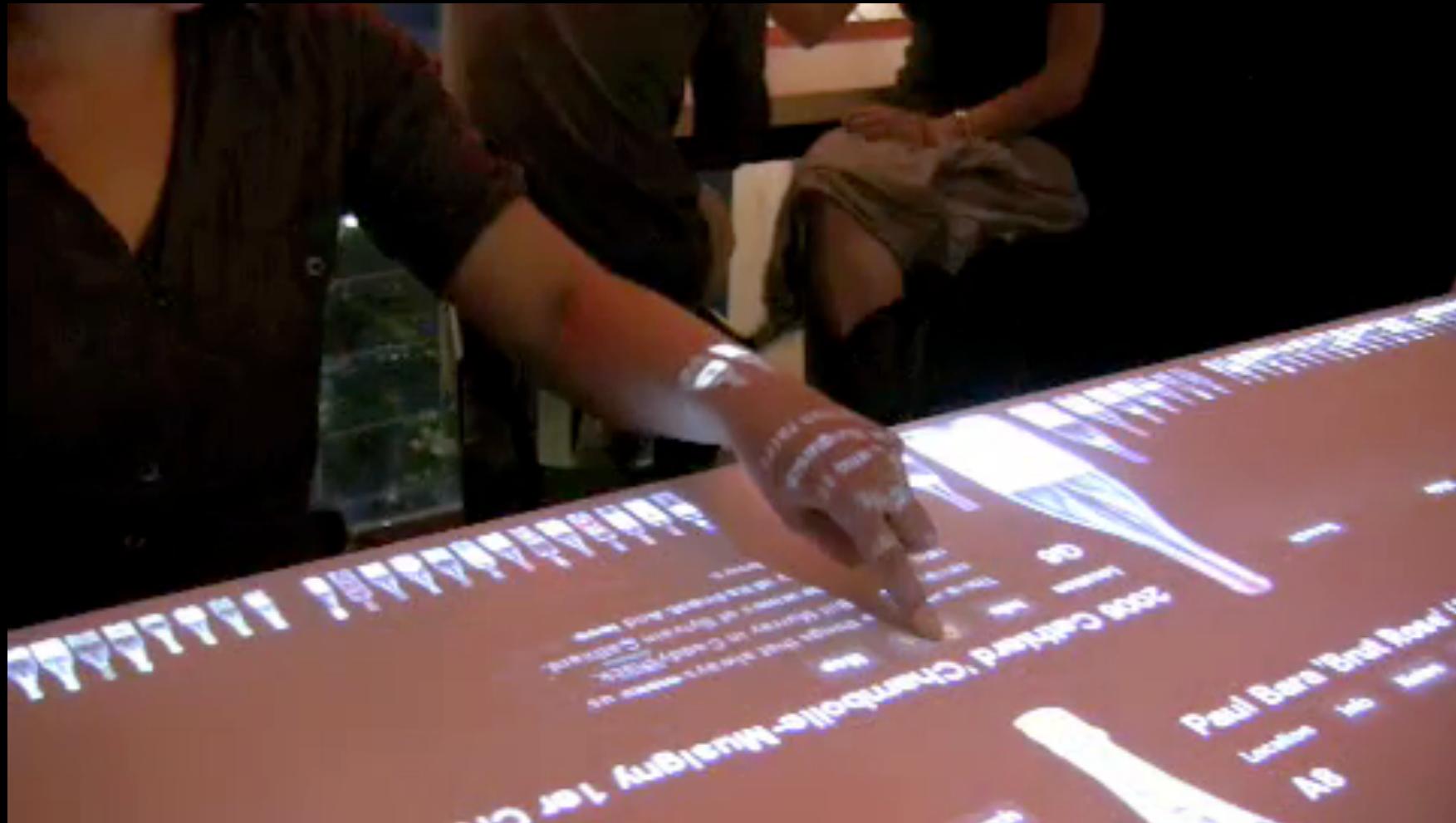
Background Subtraction

Bocce Draw Setup



Background Subtraction

Potion Design

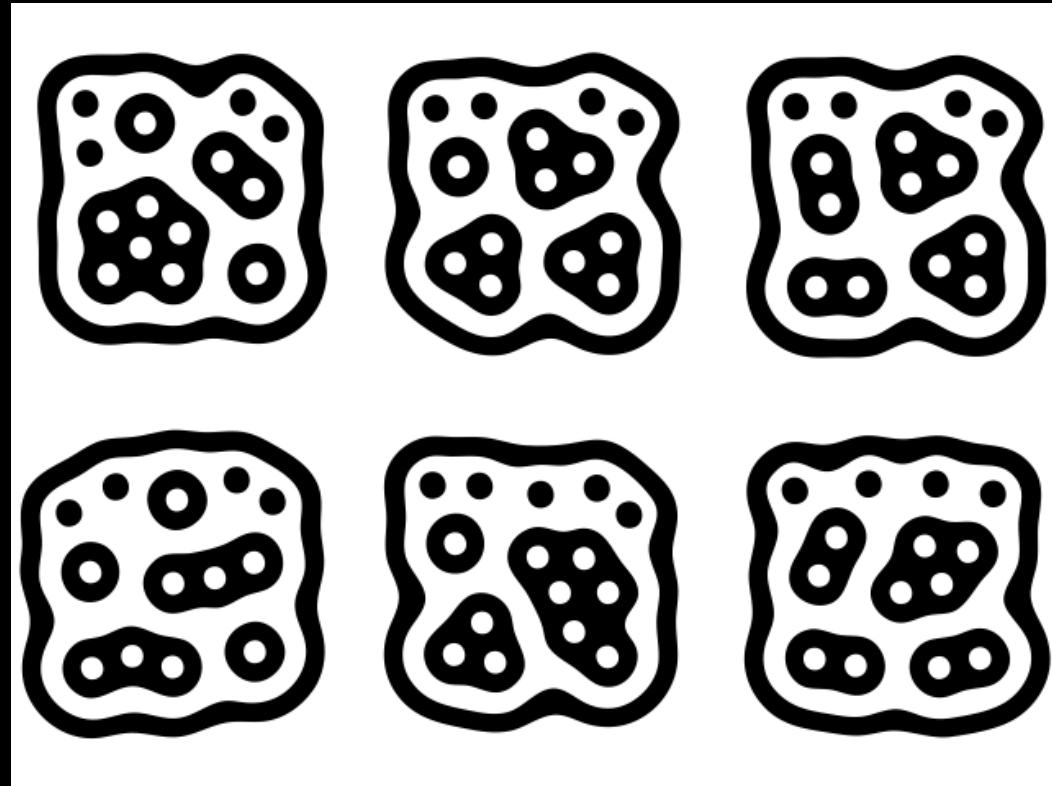
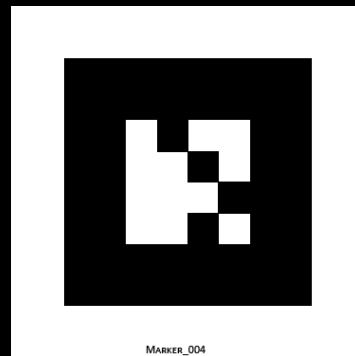


Background Subtraction

Potion Design



Fiducial Markers



Fiducial Markers

Doritos Augmented Reality



Fiducial Markers

Blippar, Layar and Vuforia SDKs



Fiducial Markers

Time Machine



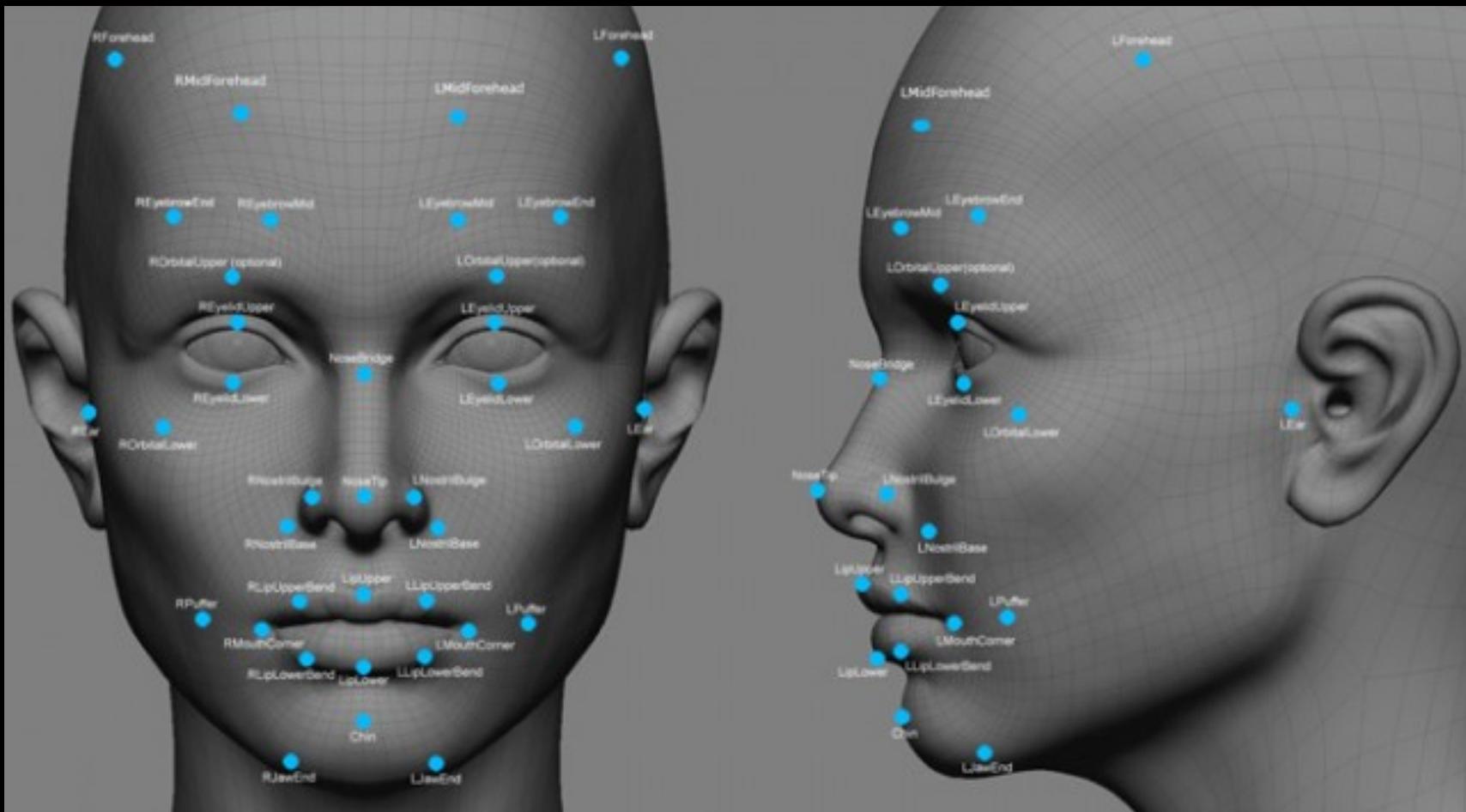
Fiducial Markers

Vuforia Smart Terrain



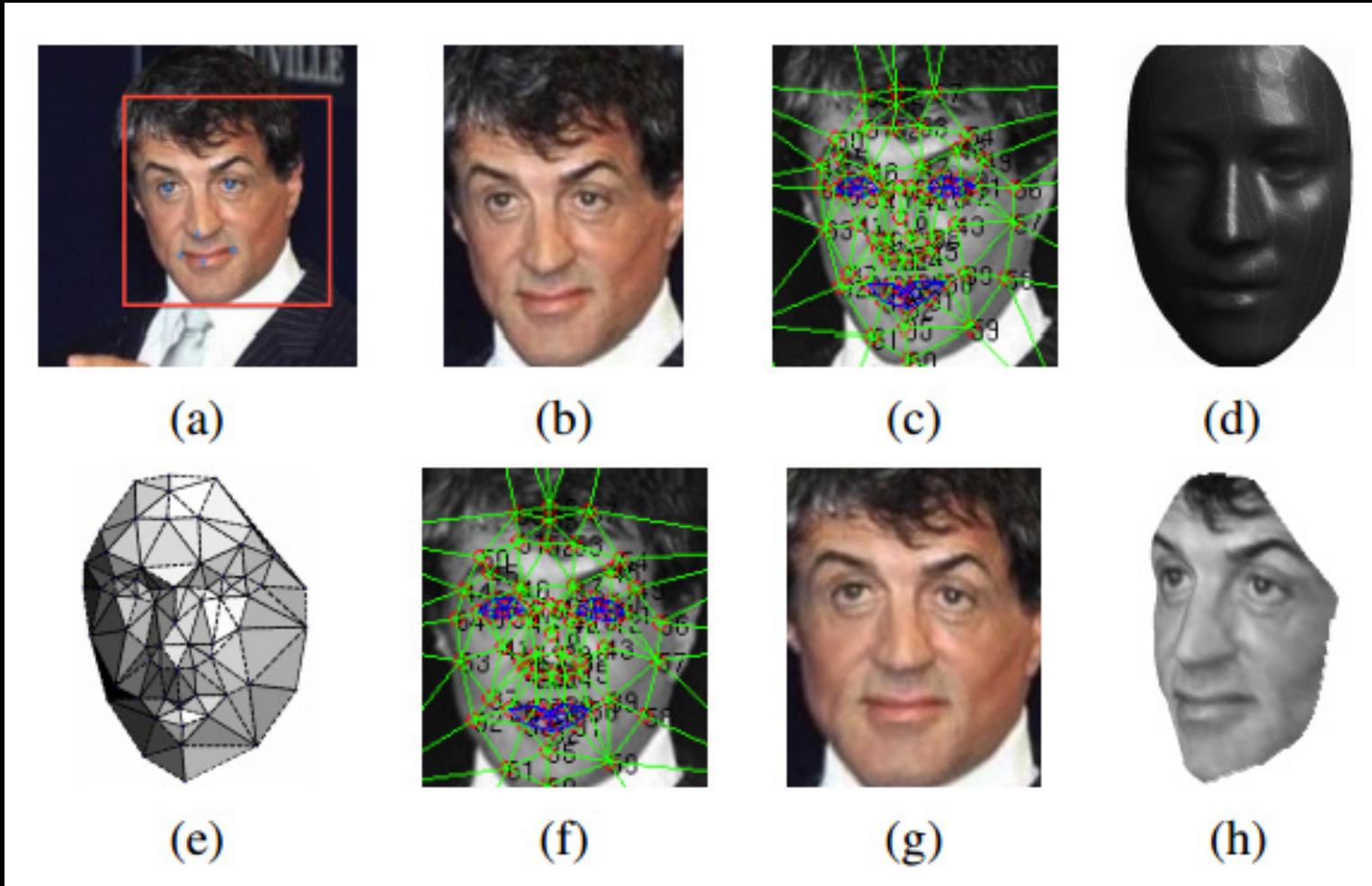
Face Detection

Facebook's Deepface Algorithm



Face Detection

Facebook's Deepface Algorithm



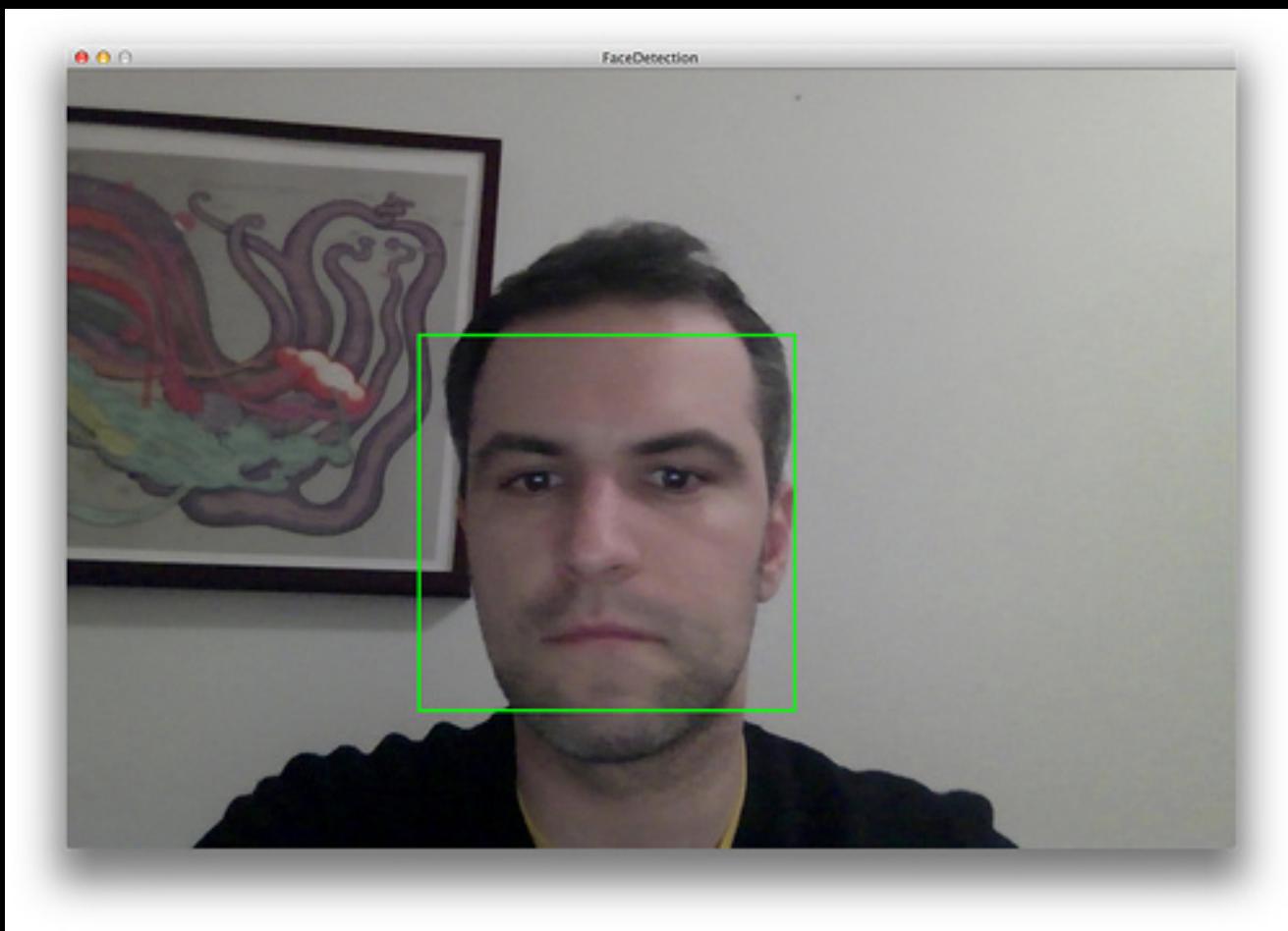
Face Detection

Machine Learning Face Detection



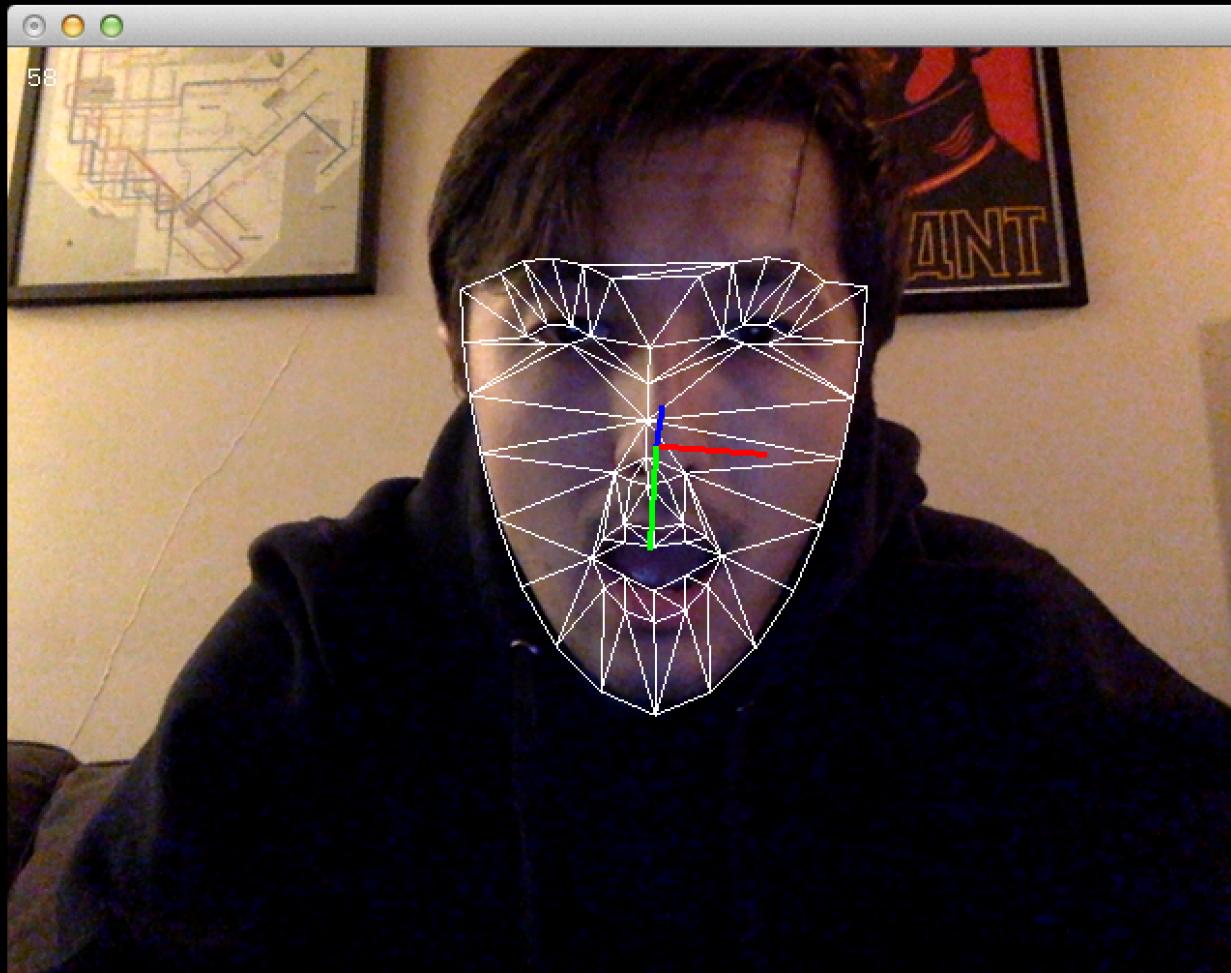
Face Detection

Open CV



Face Detection

Facial Expressions using FaceOSC



Face Detection

Kyle McDonald – Face Substitution



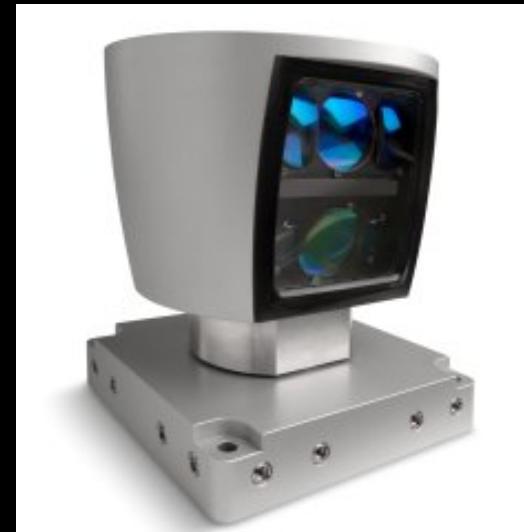
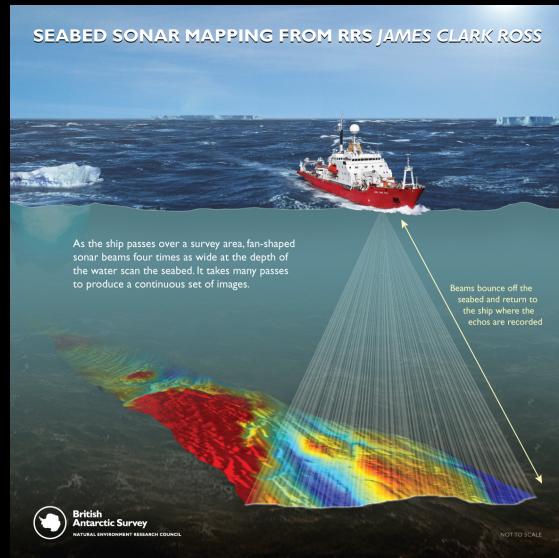
Face Detection

Andy Clymer – Font Face



Depth

Radar, Sonar and Lidar



Depth

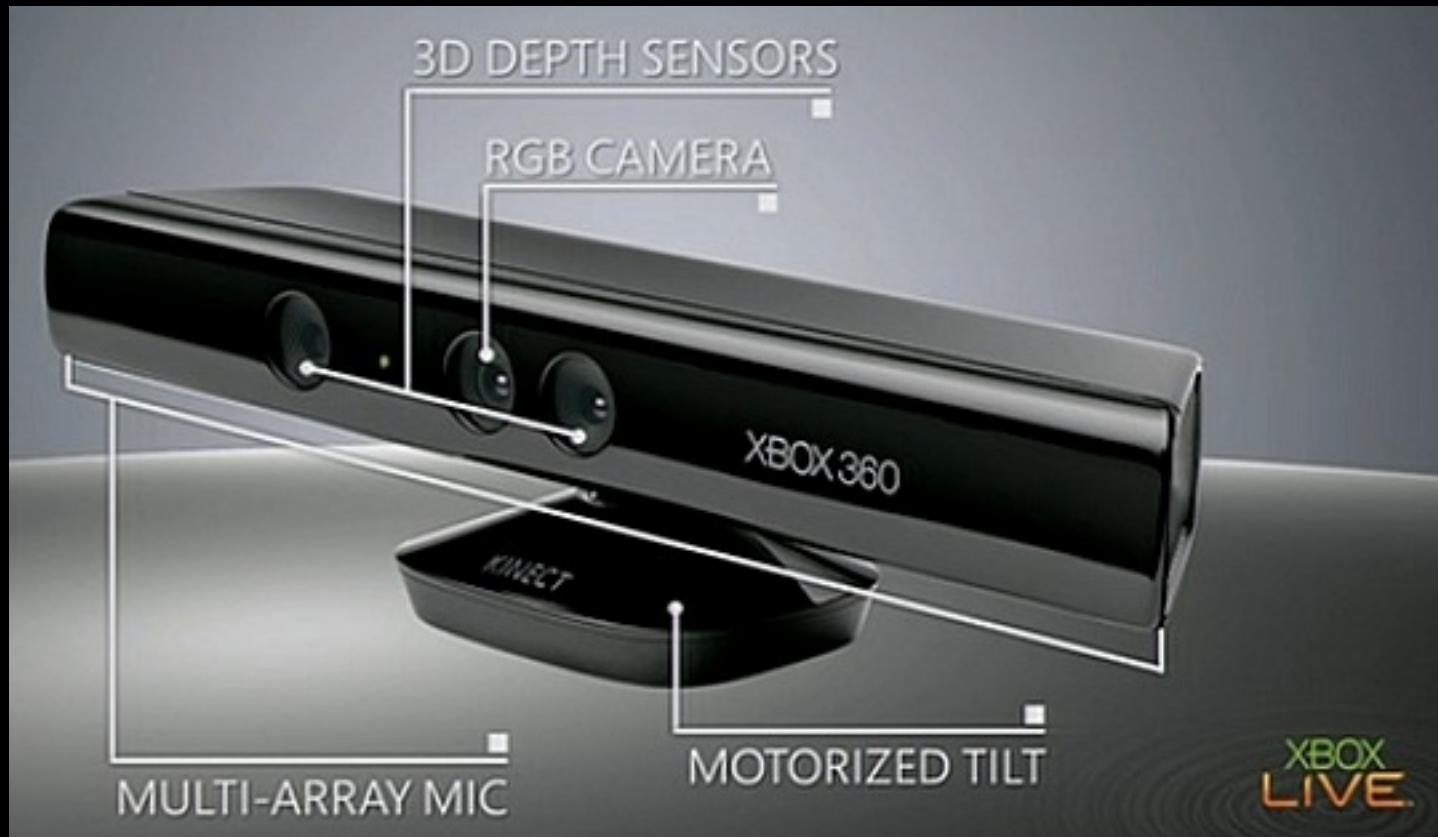
Radiohead – House of Cards



<https://www.youtube.com/watch?v=8nTFjVm9sTQ>

Depth

Microsoft Kinect Model 1414



Depth

Leap Motion



Depth

Data Dump

Frame Info:
Frame [id:334913 | timestamp:6314371003 | Hand count:(1) | Pointable count:(5) | Gesture count:(0)]

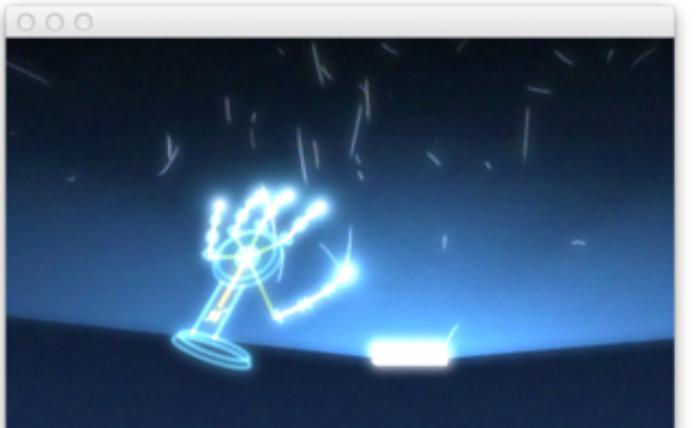
Hands:
Hand [id: 66 | palm velocity:3.77886,15.1489,-24.529 | sphere center:-136.536,60.4831,3.04632]

Pointables:
Pointable [id:52 59.248mmx | direction: 0.224507,0.121777,-0.966834]
Pointable [id:19 69.2484mmx | direction: 0.26486,0.226988,-0.93719]
Pointable [id:70 43.2998mmx | direction: 0.293493,0.142967,-0.94521]
Pointable [id:61 52.1668mmx | direction: -0.0391018,0.52615,-0.849492]
Pointable [id:33 44.1464mmx | direction: 0.640445,0.495132,-0.587089]

Gestures:

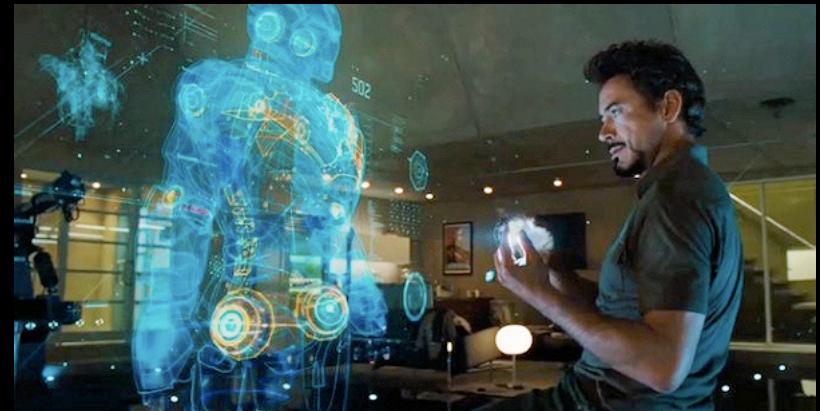
Raw JSON:

```
{"currentFrameRate":114.072,"gestures":[],"hands":[{"direction":[0.313014,0.639296,-0.70237],"id":66,"palmNormal":[0.14983,-0.763511,-0.628174],"palmPosition":[-149.671,142.887,66.8759],"palmVelocity":[3.77886,15.1489,-24.529],"r":[[0.995901,0.0589441,0.0686041],[-0.0543495,0.996271,-0.0670145],[-0.0722984,0.0630113,0.995391]],"s":0.955652,"sphereCenter":[-136.536,60.4831,3.04632],"sphereRadius":120.066,"stabilizedPalmPosition":[-149.862,140.872,69.4242],"t":[-14.8819,42.7805,-21.0442],"timeVisible":13.5985}, {"id":334913,"interactionBox":{"center":[0,200,0],"size":[221.418,221.418,154.742]}}, {"pointables":[{"direction": [0.224507,0.121777,-0.966834],"handId":66,"id":52,"length":59.248,"stabilizedTipPosition":[-128.563,180.973,-5.01705],"timeVisible":13.441,"tipPosition":[-128.29,180.623,-4.82169],"tipVelocity":[-2.35712,-4.26639,-4.01276],"tool":false,"touchDistance":0.0934792,"touchZone":"hovering"}, {"id":19,"length":69.2484,"stabilizedTipPosition":[-156.475,180.541,3.65415],"timeVisible":13.3818,"tipPosition":[-0.26486,0.226988,-0.93719],"handId":66,"tipVelocity":[-7.6495,5.61019,0.299168],"tool":false,"touchDistance":0.333333,"touchZone":"hovering"}, {"id":70,"length":43.2998,"stabilizedTipPosition":[-94.8772,170.673,10.6655],"timeVisible":13.3903,"tipPosition":[-94.5667,170.126,10.9502],"tipVelocity":[-1.72318,-6.45621,0.94887],"tool":false,"touchDistance":0.0627013,"touchZone":"hovering"}, {"id":61,"length":52.1668,"stabilizedTipPosition":[-195.428,172.473,11.4543],"timeVisible":13.3383,"tipPosition":[-195.424,172.448,11.3066],"tipVelocity":[-10.9704,14.0982,-12.1418],"tool":false,"touchDistance":0.333254,"touchZone":"hovering"}, {"id":33,"length":44.1464,"stabilizedTipPosition":[-69.0904,122.444,85.2054],"timeVisible":12.1763,"tipPosition":[-69.0013,122.24,85.3095],"tipVelocity":[-43.328,-3.89473,-3.03312],"tool":false,"touchDistance":0.307096,"touchZone":"hovering"}]}, "r": [[-0.0926669,0.920067,-0.380643], [-0.551227,-0.365765,0.74991], [-0.829194,0.140329,0.54106]], "s": -297.984, "t": [5674.59,18350.4,5571.85], "timestamp":6314371003}]
```



Depth

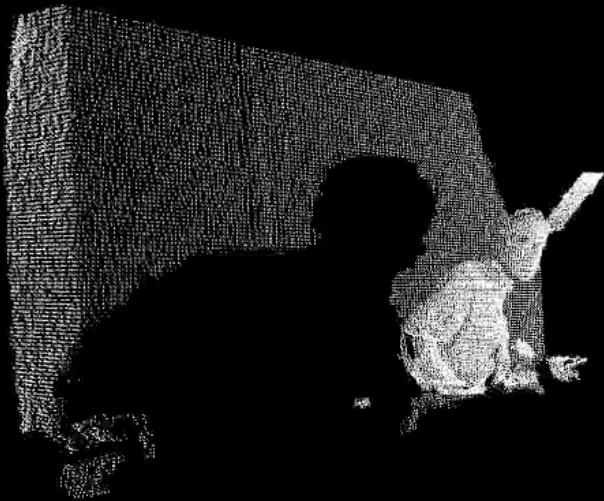
Sci Fi UI



Depth

Depth and Microsoft Kinect

Kinect FPS: 30



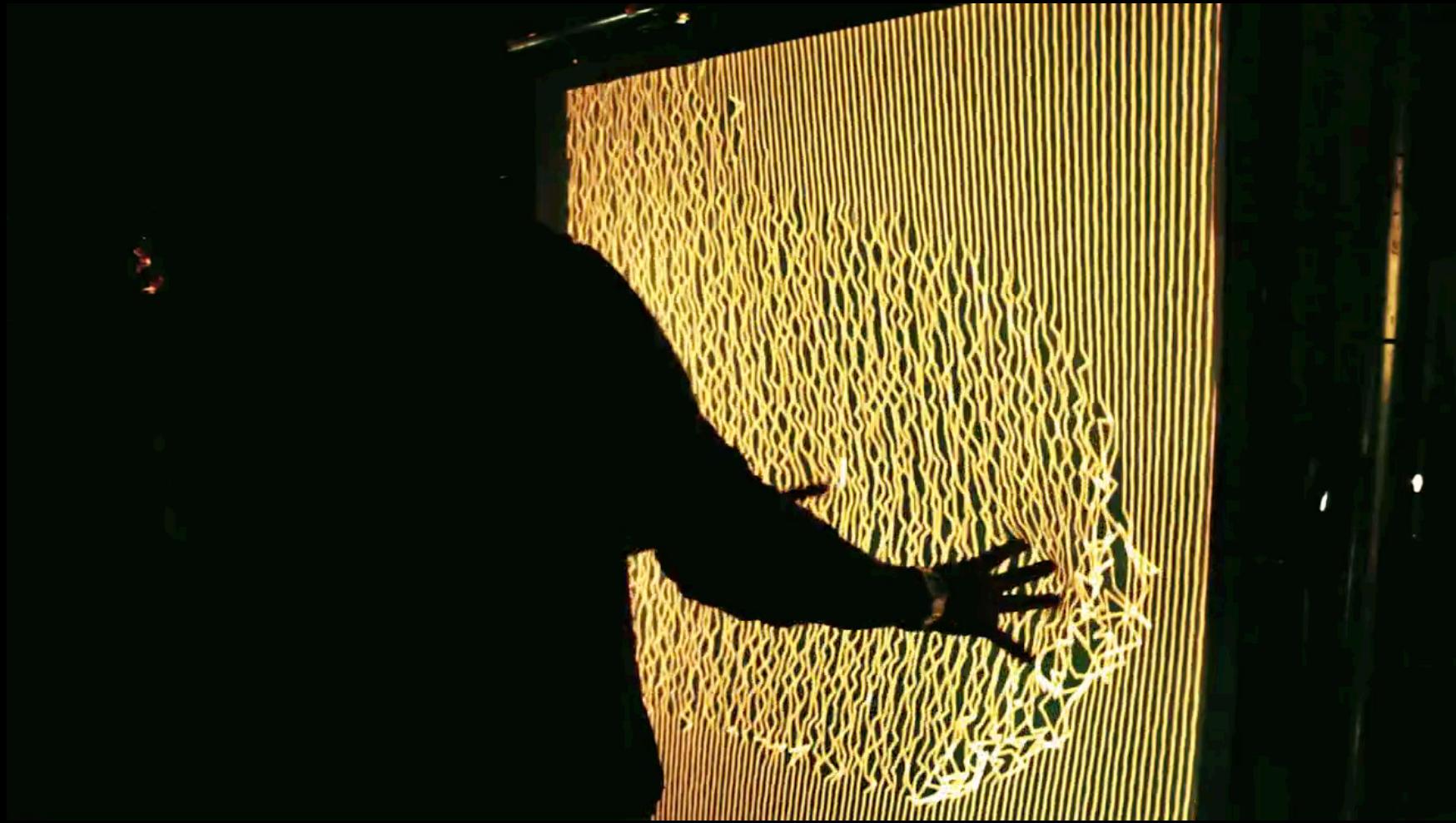
Depth

Robbie Tilton – Iron Man 2 Interface



Depth

Firewall – Mike Allison and Aaron Sherwood



<https://vimeo.com/54882144>

Depth

The V Motion Project – Assembly



<https://vimeo.com/45417241>

Computer Vision

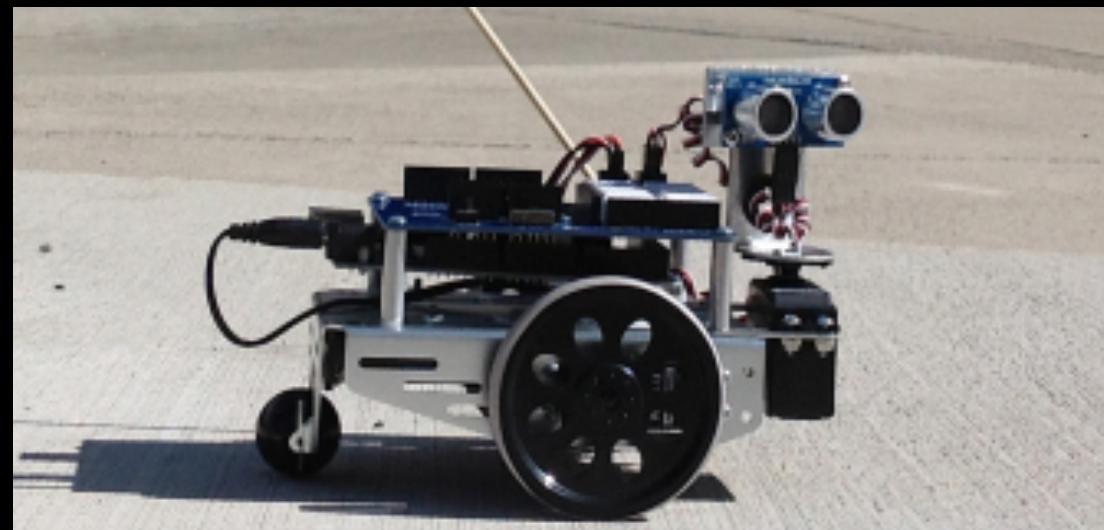
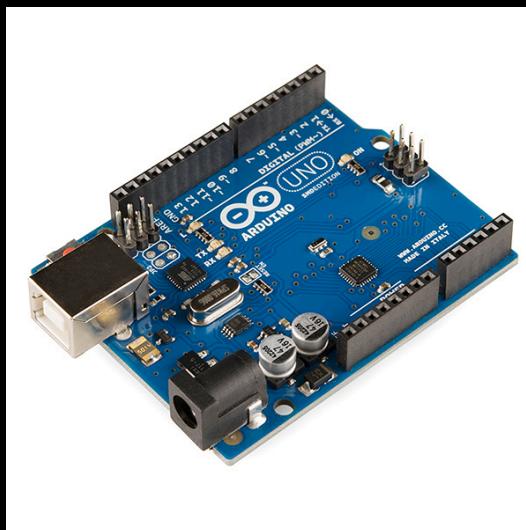
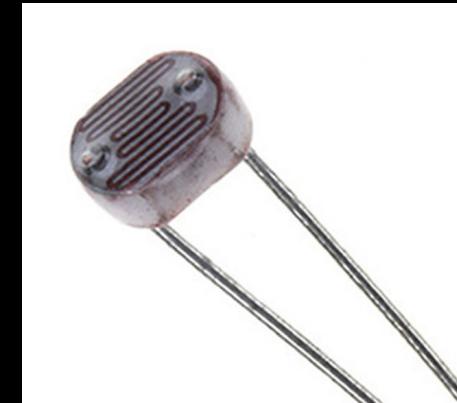
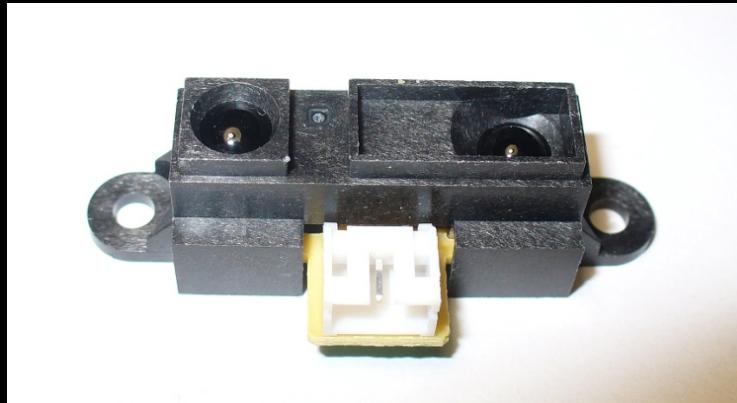
Wooden Mirror – Danny Rozin



<https://www.youtube.com/watch?v=BZysu9QcceM>

Computer Vision

Other Sensors



Computer Vision

Origins – Barcodes

Background Subtraction – Web Cams for Sight

Fiducial Markers – Web Cams and 2D Barcodes

Augmented Reality – Digital World Layered on Reality

Facial Detection – Open CV and Machine Learning

Depth (3D Space) – Kinect and Leap

Computer Vision



Computer Vision Libraries

```
// Processing Video Library (Comes with Processing)
```

```
import processing.video.*;
```

```
// Open CV for Processing (Need to Install)
```

```
import gab.opencv.*;
```

```
import java.awt.*; // For face detection
```

```
// Kinect and Processing (Need to Install)
```

```
import SimpleOpenNI.*;
```

```
// Read QR Codes (Need to Install)
```

```
import com.google.zxing.*;
```

```
import java.awt.image.BufferedImage;
```

Computer Vision Libraries

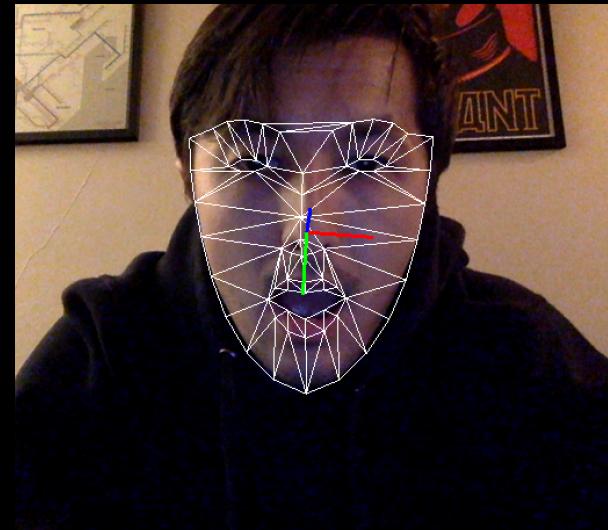
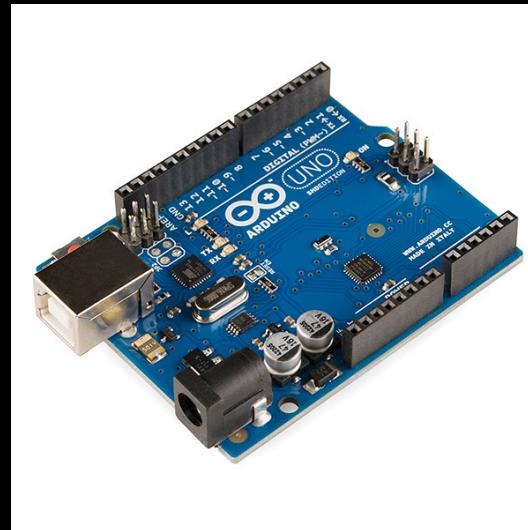
// FaceOSC Plugin by Kyle McDonald (Need to Install and Run, Link for Mac Mavericks)

<http://facetracker.net/downloads/FaceOSC-Mavericks.zip>

// oscP5 a Protocol for Communicating among devices and software (Need to Install)

import oscP5.*;

Computer Vision



Camera

Functions

Camera – createCapture(VIDEO), hide(), size(), image(), get()

Camera

Loading Web Cam

```
var capture;

function setup() {
  createCanvas(640, 480);
  capture = createCapture(VIDEO);
  capture.hide();
}

function draw() {
  background(0);
  image(capture, 0, 0, width, height);
}
```

Camera

Get Pixel Colors

```
var capture;  
  
function setup() {  
  createCanvas(640, 480);  
  ellipseMode(CORNER);  
  noStroke();  
  capture = createCapture(VIDEO);  
  capture.hide();  
}  
}
```

```
function draw() {  
  background(255);  
  s = 60;  
  // noprotect  
  for (var x = 0; x < capture.width/s; x++) {  
    for (var y = 0; y < capture.height/s; y++) {  
      var c = capture.get(x*s, y*s);  
      fill(c);  
      ellipse(x*s, y*s, s, s);  
    }  
  }  
}
```

Camera

Get Pixel Brightness

```
var capture;

function setup() {
  createCanvas(640, 480);
  ellipseMode(CORNER);
  noStroke();
  capture = createCapture(VIDEO);
  capture.hide();
}
```

```
function draw() {
  background(0);
  s = 30;
  // noprotect
  for (var x = 0; x < capture.width/s; x++) {
    for (var y = 0; y < capture.height/s; y++) {
      var c = capture.get(x*s, y*s);
      var b = ((c[0] + c[1] + c[2])/3);
      fill(255);
      ellipse(x*s, y*s, b/10, b/10);
    }
  }
}
```

Camera

Photobooth

```
var capture;
var count = 0;

function setup() {
  createCanvas(320, 240);
  capture = createCapture(VIDEO);
  capture.size(320, 240);
  capture.hide();
}

function draw() {
  background(255);
  image(capture, 0, 0);
}

function mousePressed() {
  save("myCanvas-" + count + ".jpg");
  count++;
}
```

Creative Coding

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