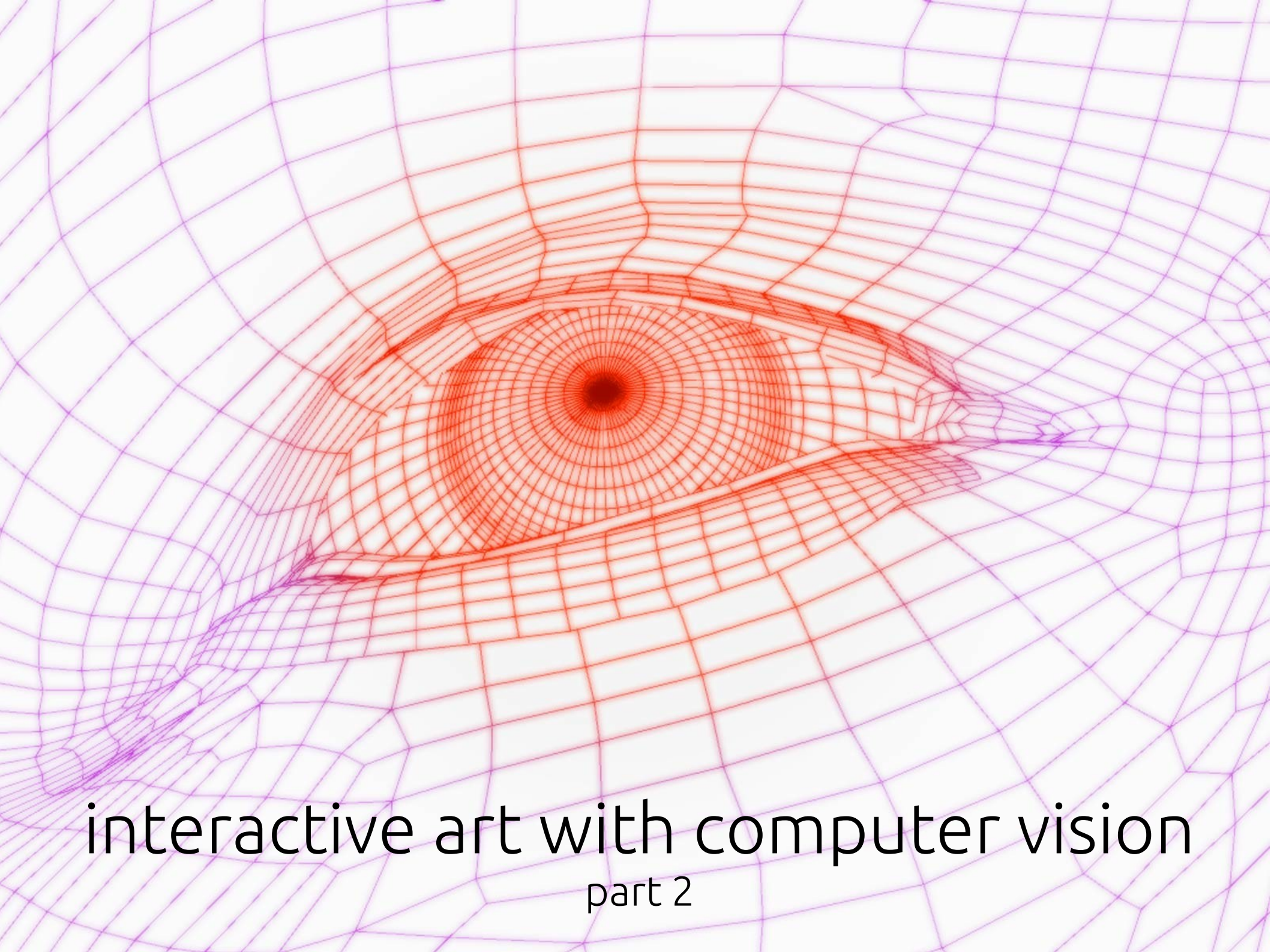
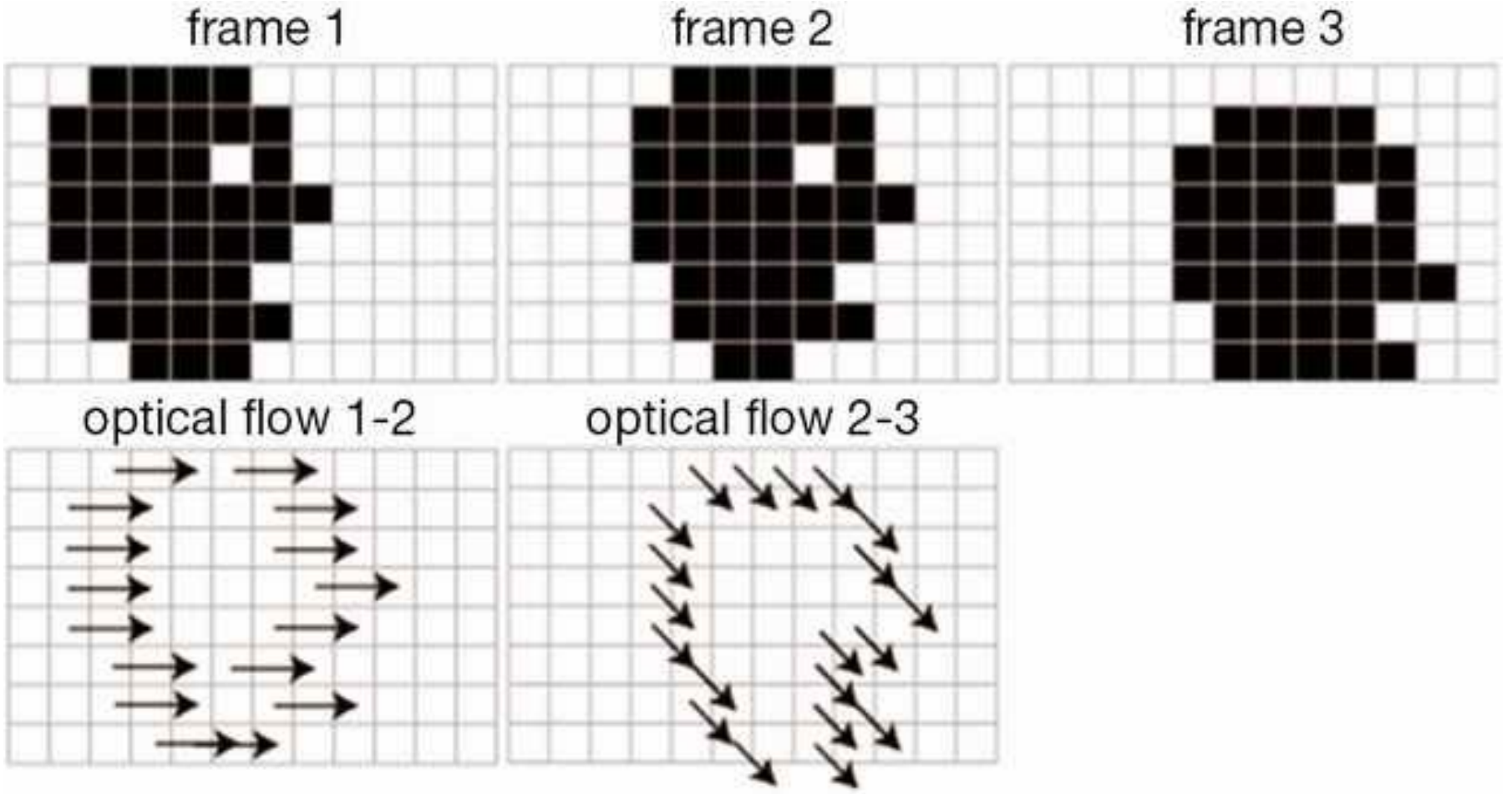


interactive art with computer vision

part 2

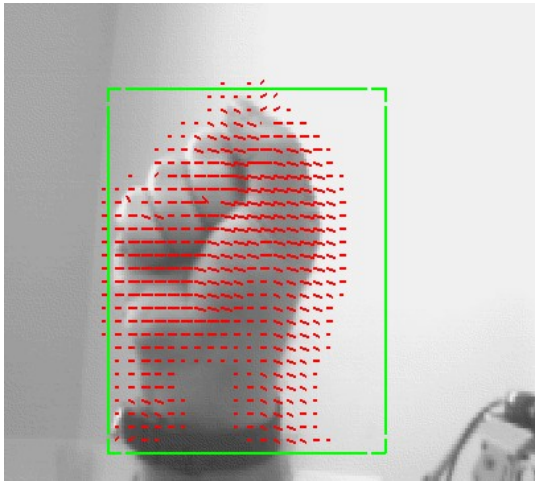
optical flow



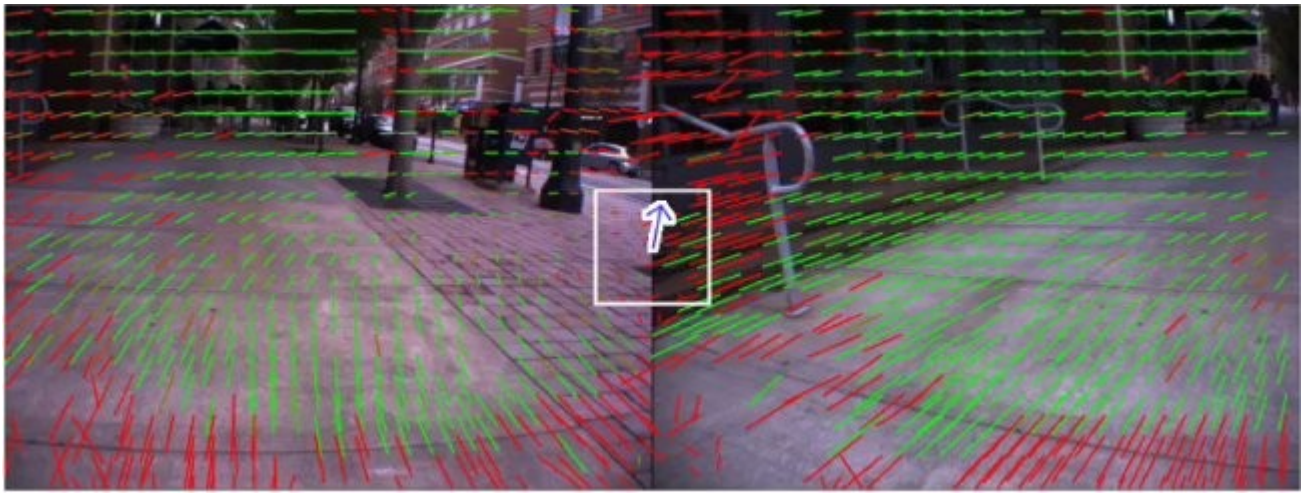
- brightness constancy assumption (not really true in real world)

optical flow

measuring movement
of objects



measuring movement
of camera



data moshing

optical flow

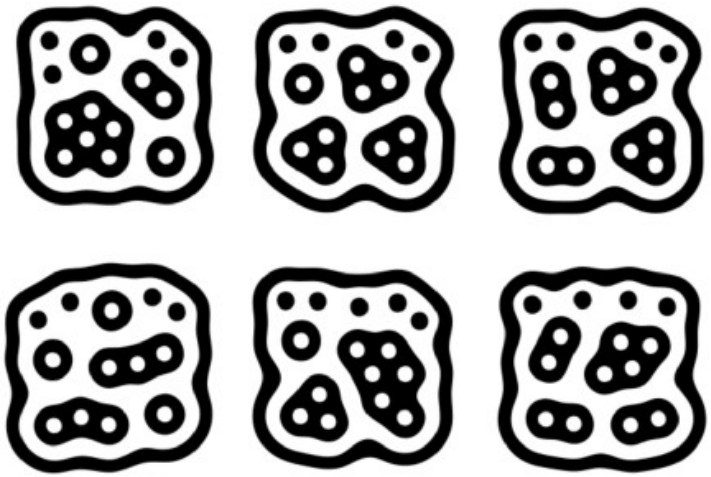
optical flow & fluid simulation

lighting choreographer

simple object tracking

AR tracking

fiducial tracking:



QR tracking:

music with papers

AR_tracking

augmented reality with Processing

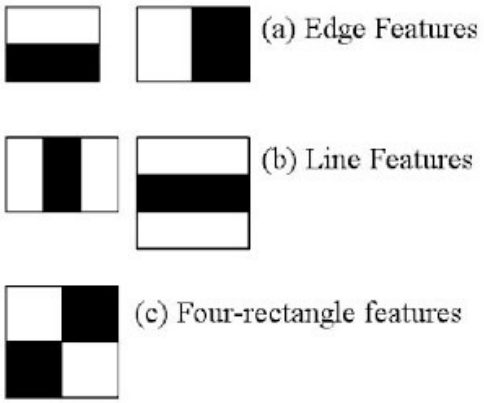
more sophisticated objects:
using Haar cascades

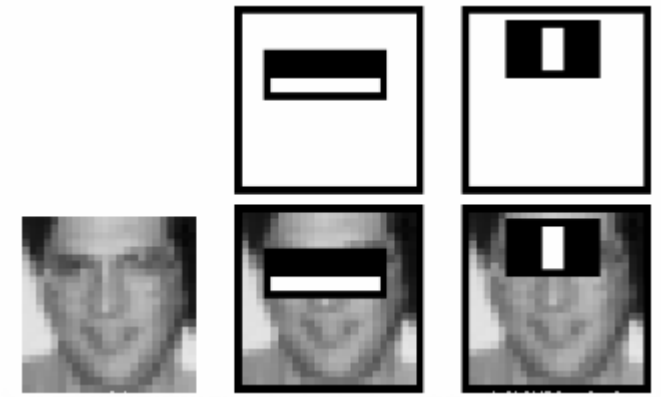
Basic idea:

1. Start with lots of positive & negative examples of a category (e.g., face)

2. Algorithmically determine which simple 2D “features” are predictive of the object, and how they align with the object visually

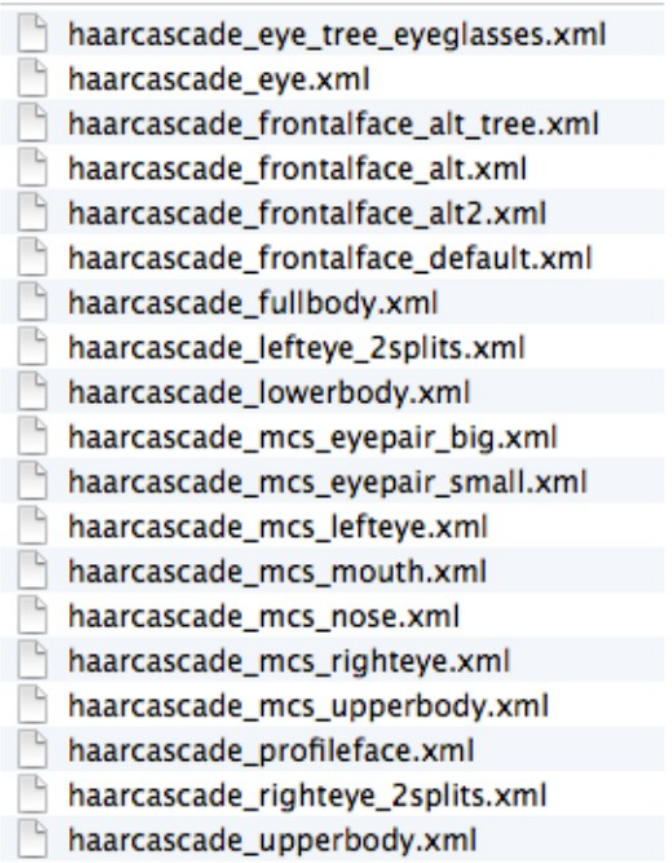
3. For new images, try out features at many alignments



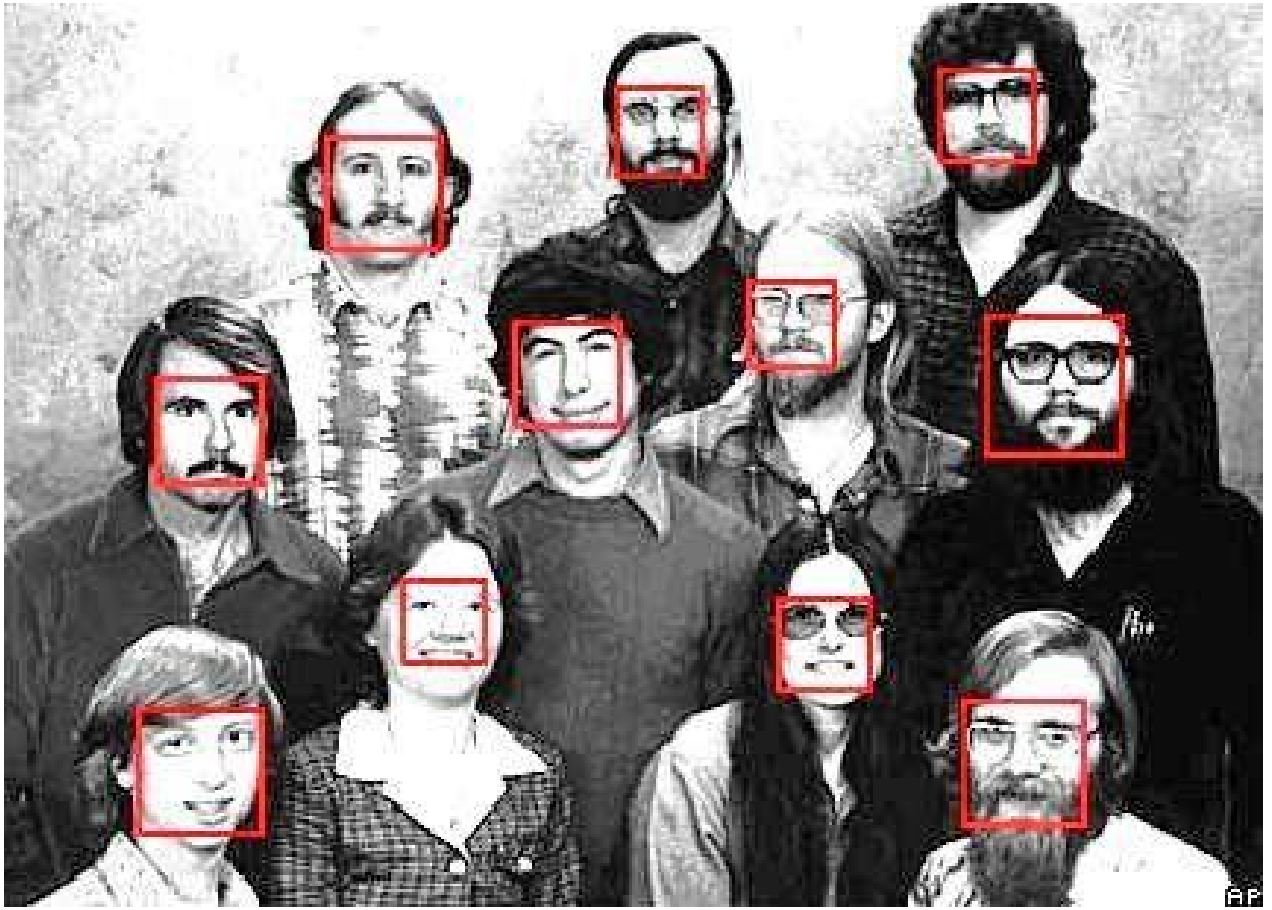


Haar cascades in openCV

- Has pre-trained classifiers
- Or you can train your own
- Viola-Jones algorithm
  - very efficient
  - calculates in cascades
  - more than 1 positive has to be found
  - over 99% accurate
  - particularly good for frontal



face detection
using Haar Cascades



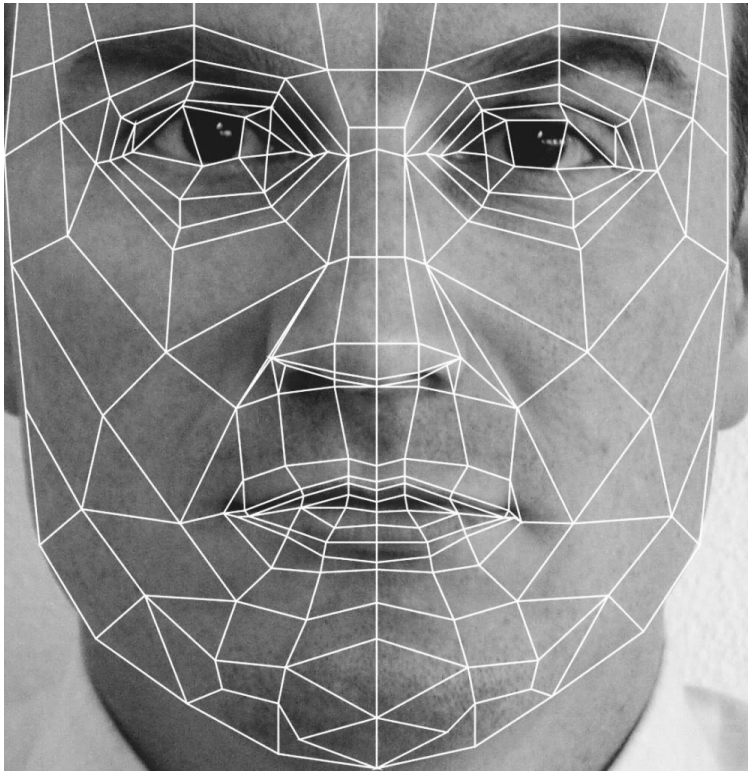
CV Dazzle

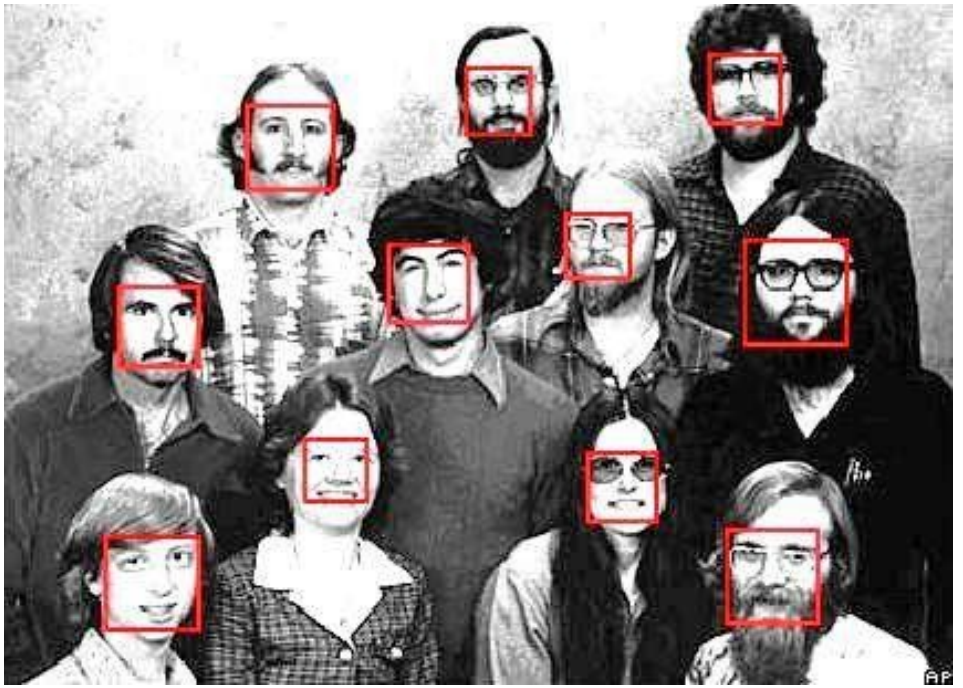
insecurity camera

pixar lamp

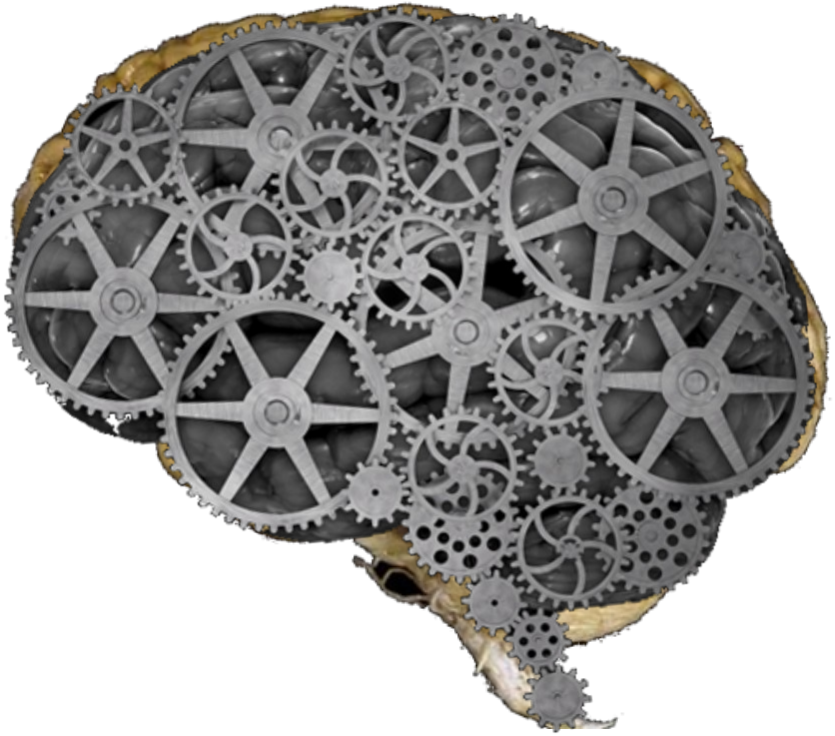
cameraFaceTracker

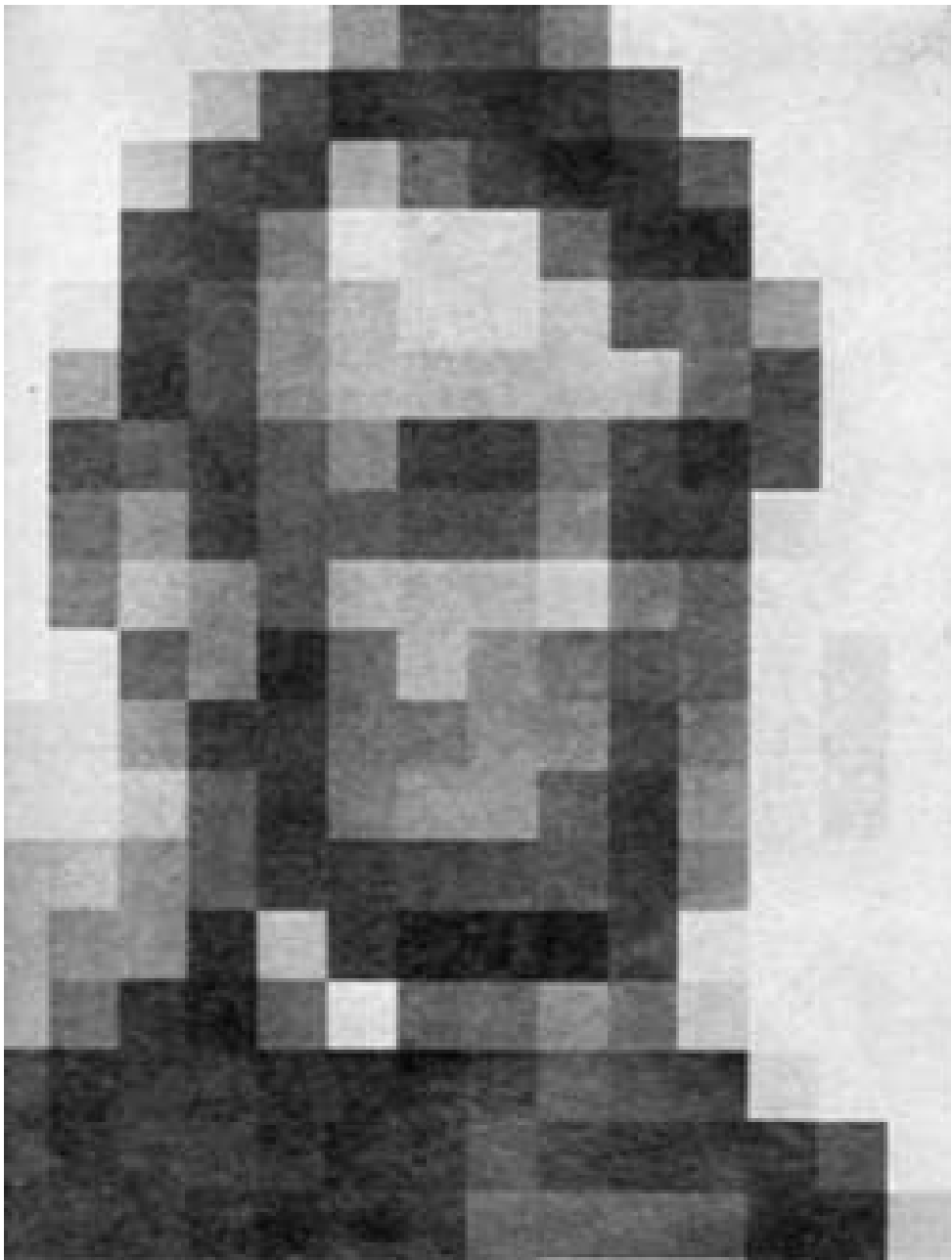
Faces
recognition vs. detection





Face recognition by the brain

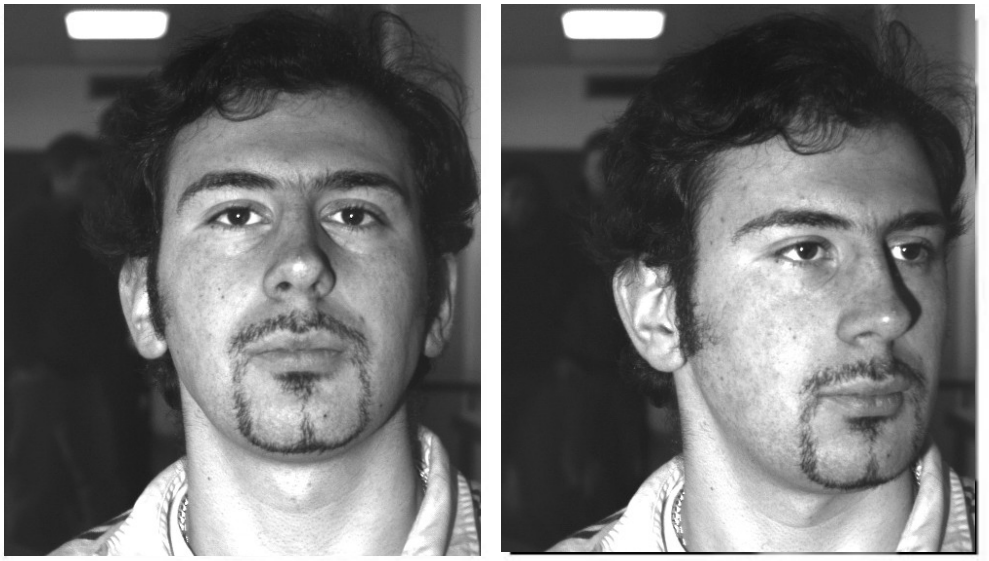




- Particularly good at it
- We're not even aware of it
- Special circuitry

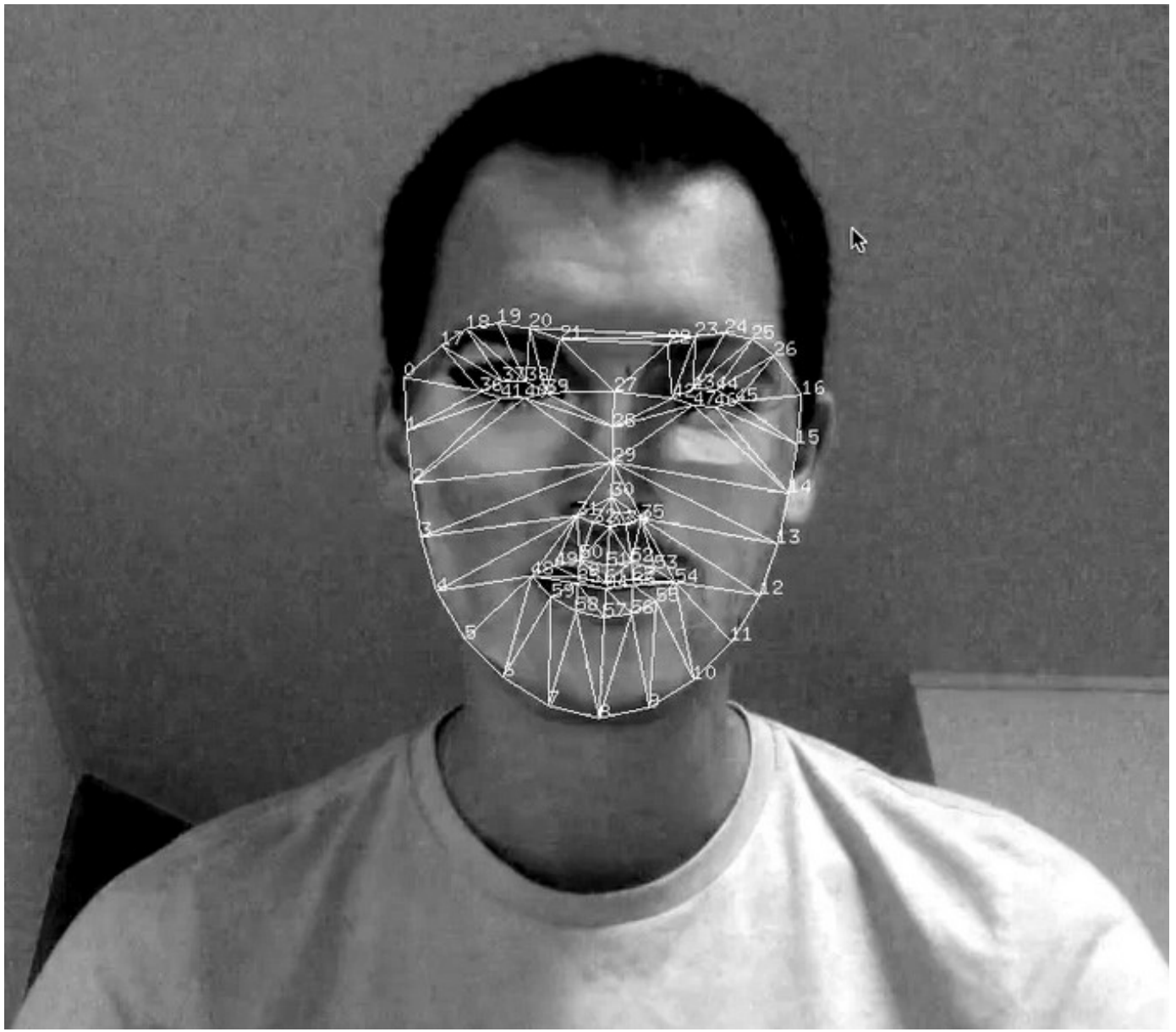
Face: a tricky object

- illumination
- viewing angle



- expressions
- changes over time
- additionally:
  - hair
  - weight change
  - accessories (glasses etc.)

facial expression analysis

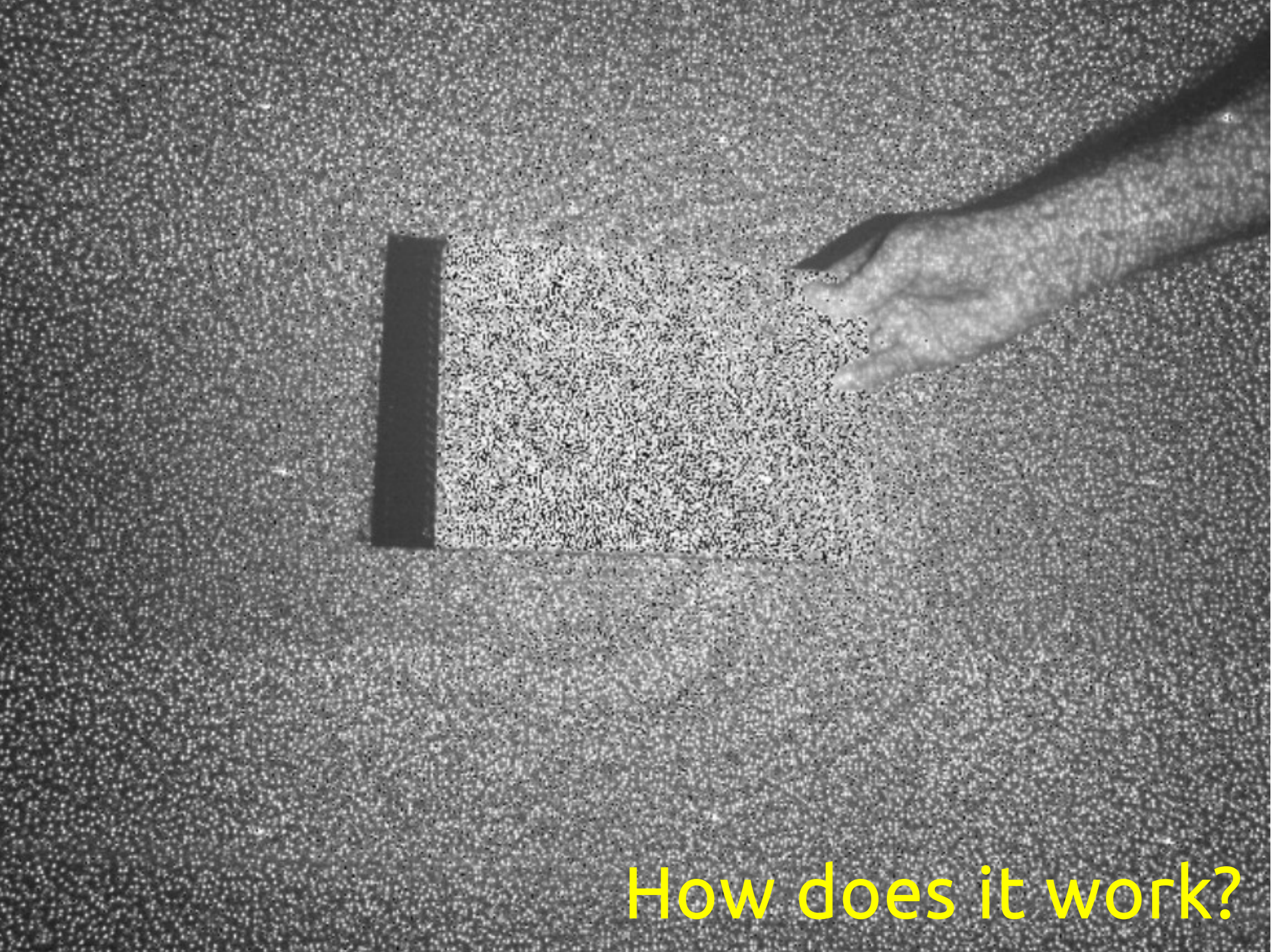


ofxFaceTracker

scanner darkly

KINECT™

adafruit INDUSTRIES

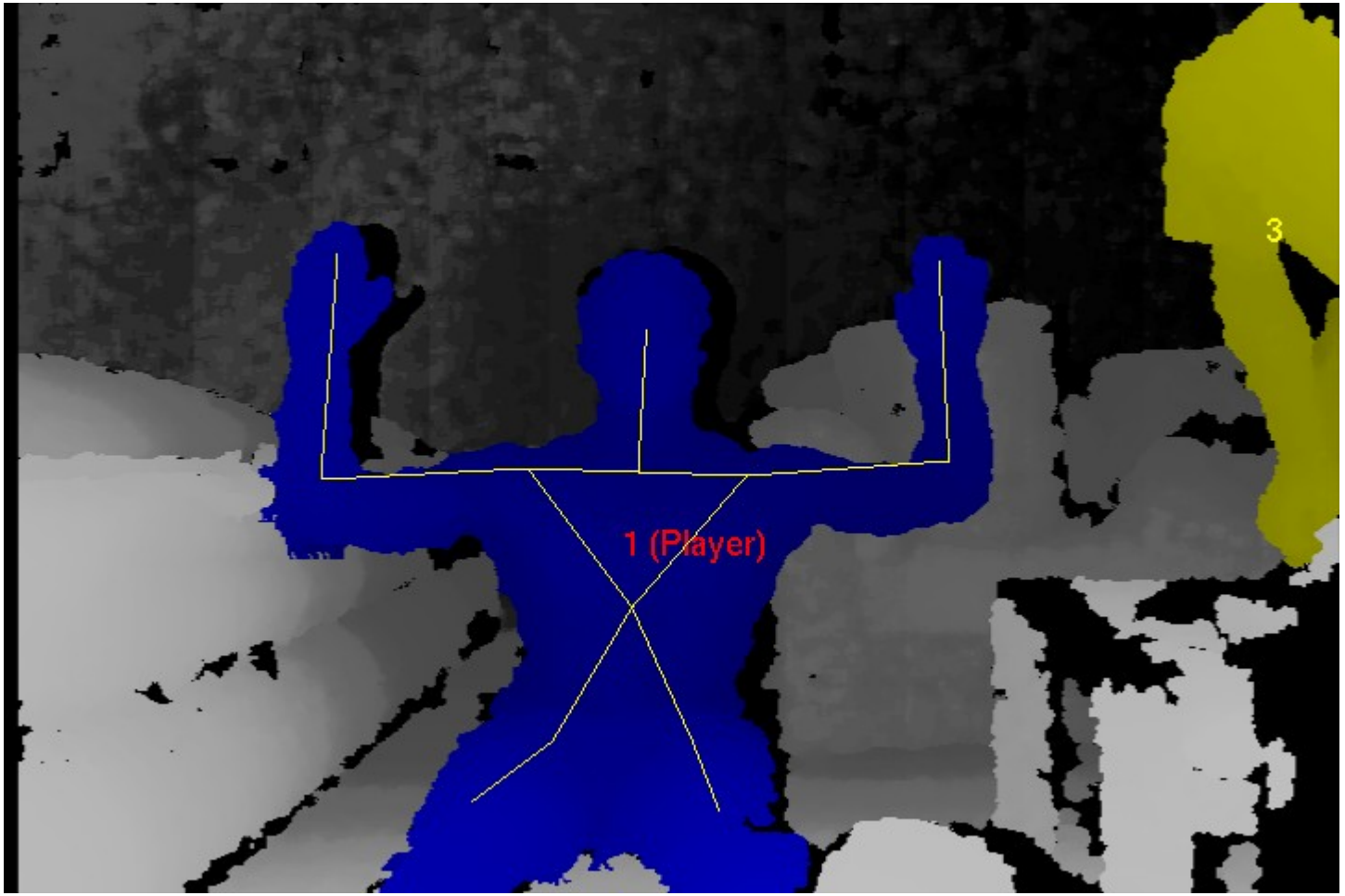

How does it work?

computer vision with the kinect

(find performer in scene)

in the past...

- using openNI... but not any more



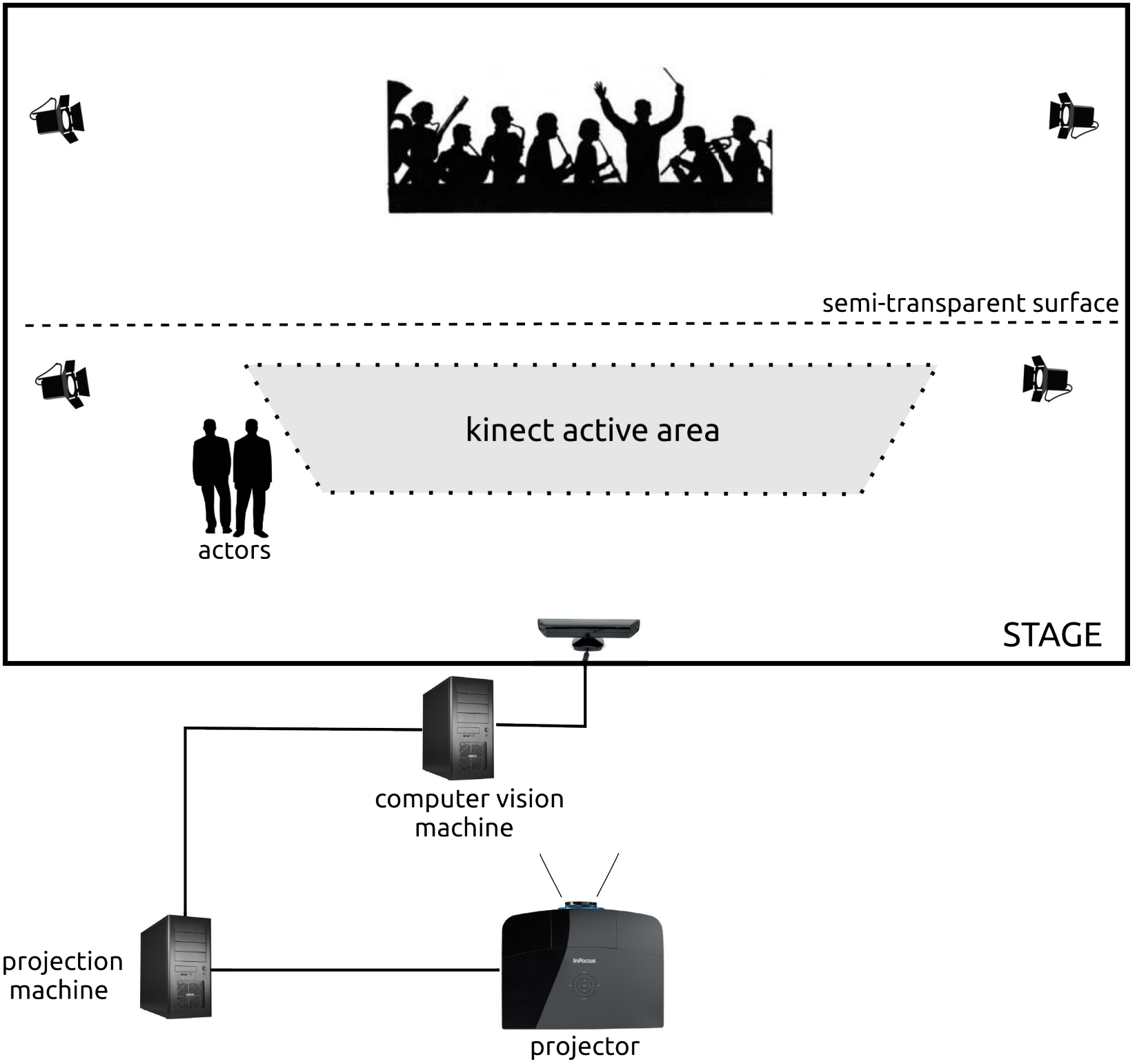
kinectExample (in your oF folder)

kinect v1

- Cons
  - interference from hot light sources
  - limited depth 0.5m-4m (stable) up to 8m (unstable)
  - 90ms delay
  - low res image (640x480)

- Pros
  - cheap (<30 on ebay)
  - good enough for most scenarios
  - pretty good accuracy

more functions in: ofxKinect source


semi-transparent surface
kinect active area
actors
STAGE
computer vision machine
projection machine
projector

computer vision with the kinect

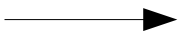
(find performer in scene)

depth-based
segmentation

depth-based segmentation
(find performer in scene)

depth image

0	0	0	0	0	0
0	125	125	125	125	0
0	125	255	255	125	0
0	125	255	255	125	0
0	125	125	125	125	0
0	0	0	0	0	0



after segmentation

0	0	0	0	0	0
0	125	125	125	125	0
0	125	0	0	125	0
0	125	0	0	125	0
0	125	125	125	125	0
0	0	0	0	0	0

computer vision with the kinect

(find performer in scene)

depth-based
segmentation

binarization

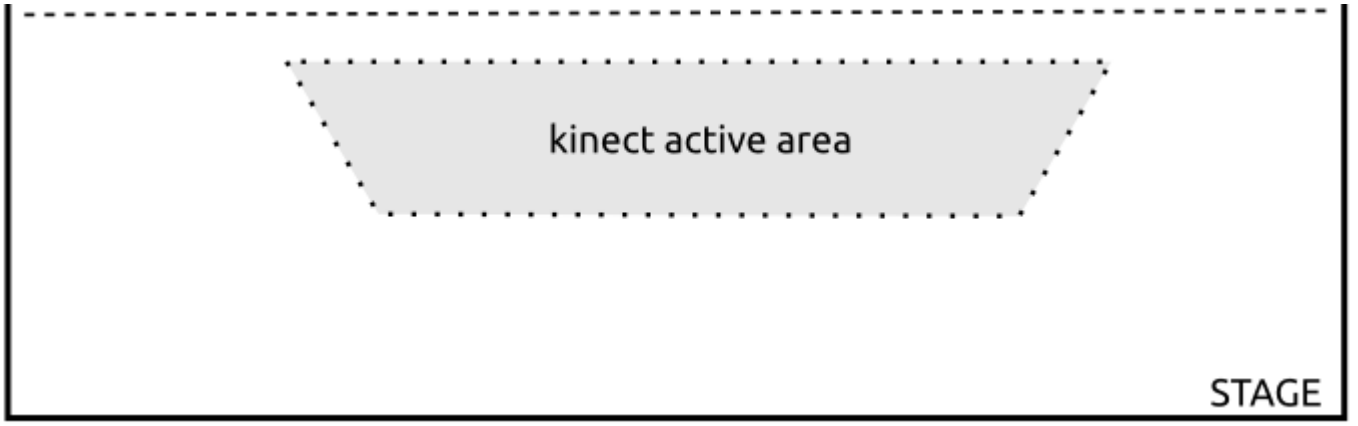
outline
extraction

&
use of
extremes

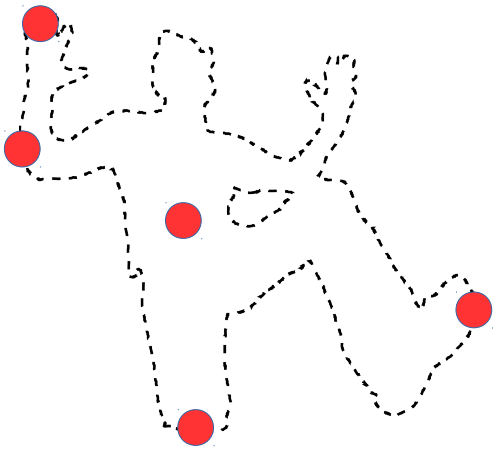
A Christmas Carol

shortcomings

- **limited active area** of kinect (5m x 5m)



- noisy **low-res outline** & limited actor info



Interactive art with the Kinect

- Spandex as visual instrument
- Interactive kinect sandbox
- Lake superior simulation
- Interactive puppet
- Puppet parade
- Treachery of sanctuary