

strange things people do with cameras
dave griffiths





```
(require "lazybotz.scm")

(go-laziness)

(define (a) (* 45 (sin (* 4(time))))))
(define (a) (* 45 |)))

(texture (load-texture "textures/1.png"))

(bot 'fred
  (x 0
    (x 4 (x 2) (x 3 a) (x 2 (x 3 a)))
    (x 0
      (x 2 (x 4)))
      (x 2 (x 4)))
    (x 0))) "go")
```





LIVING WITH ROBOTS
AND INTERACTIVE COMPANIONS



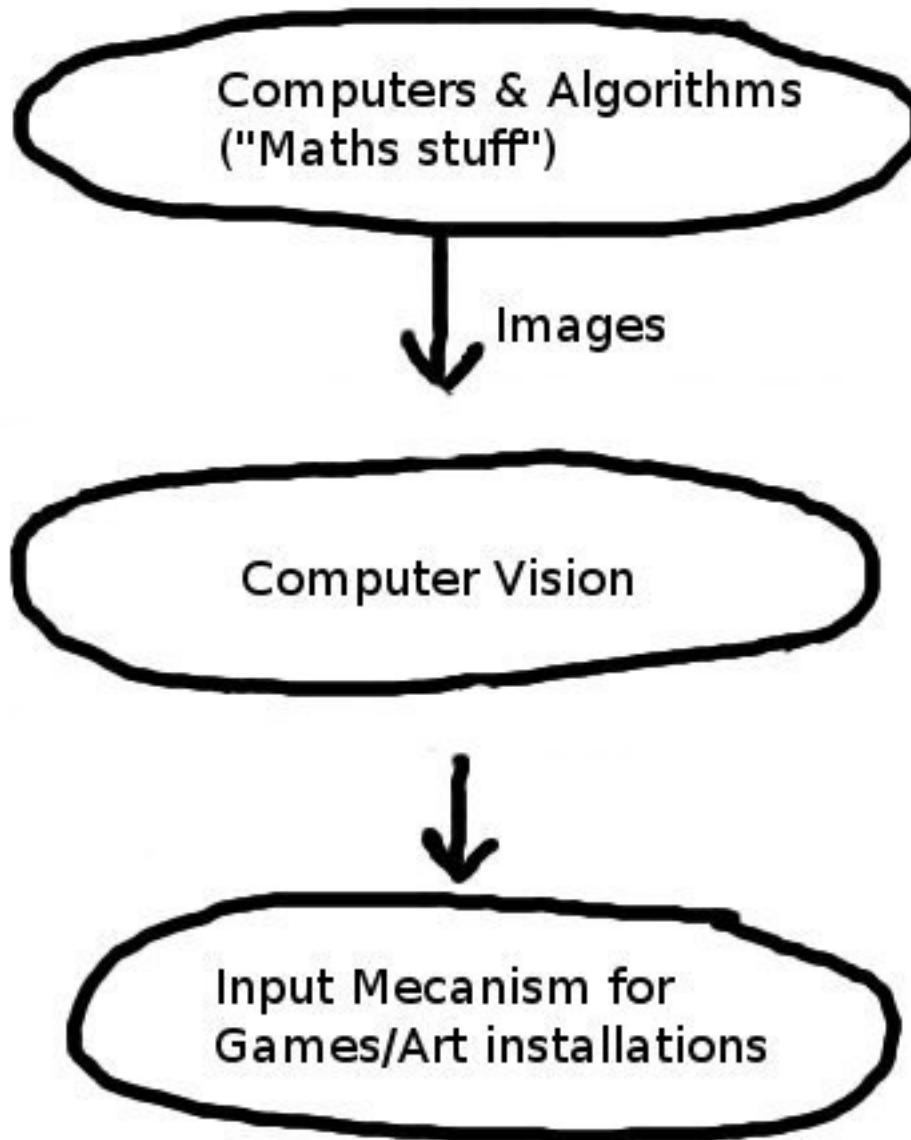
computer vision
or
algorithmic understanding of images

what has this got to do with computational photography?

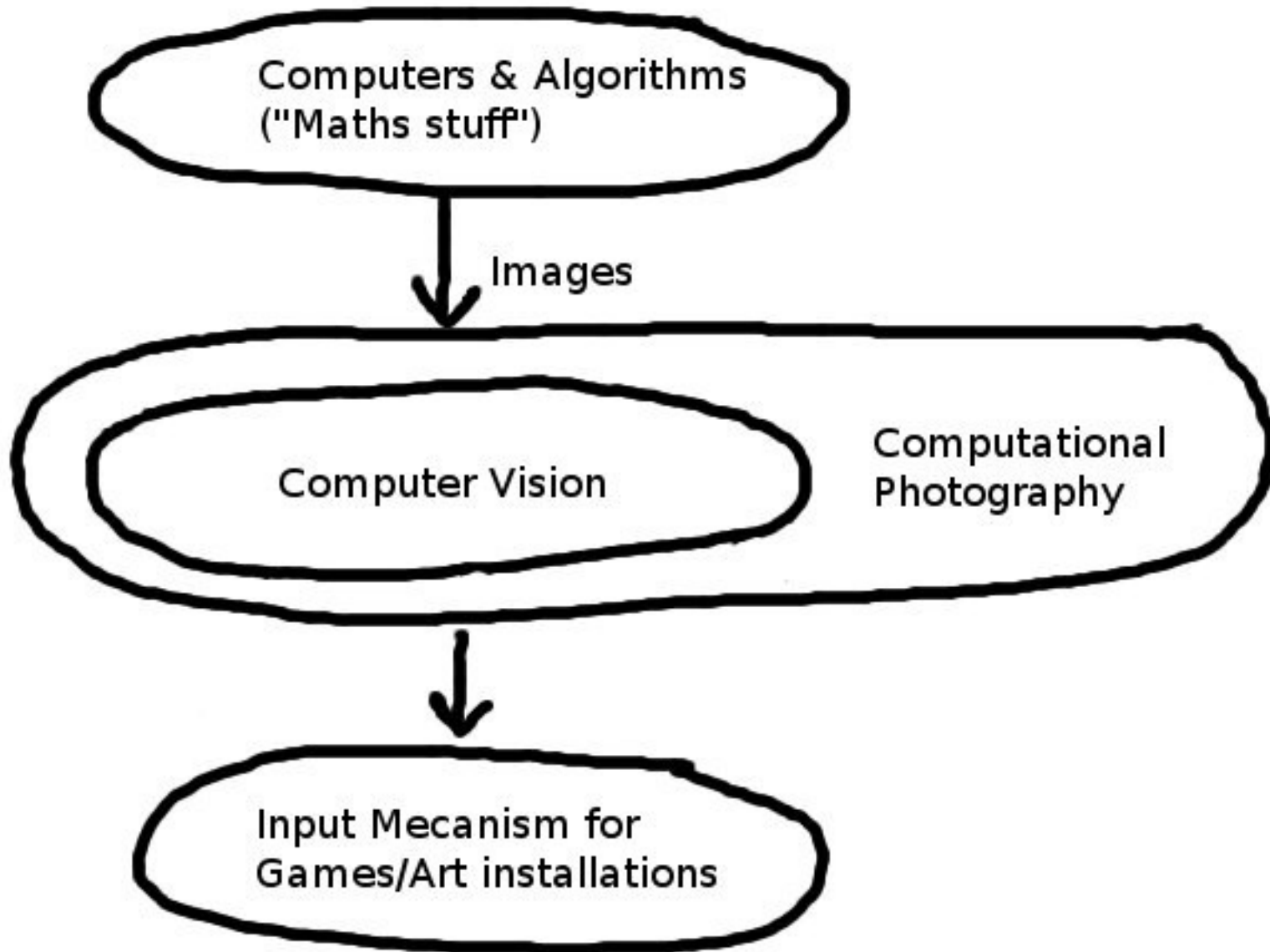
- this is a computer
- it runs software
- computer vision algorithms



a map

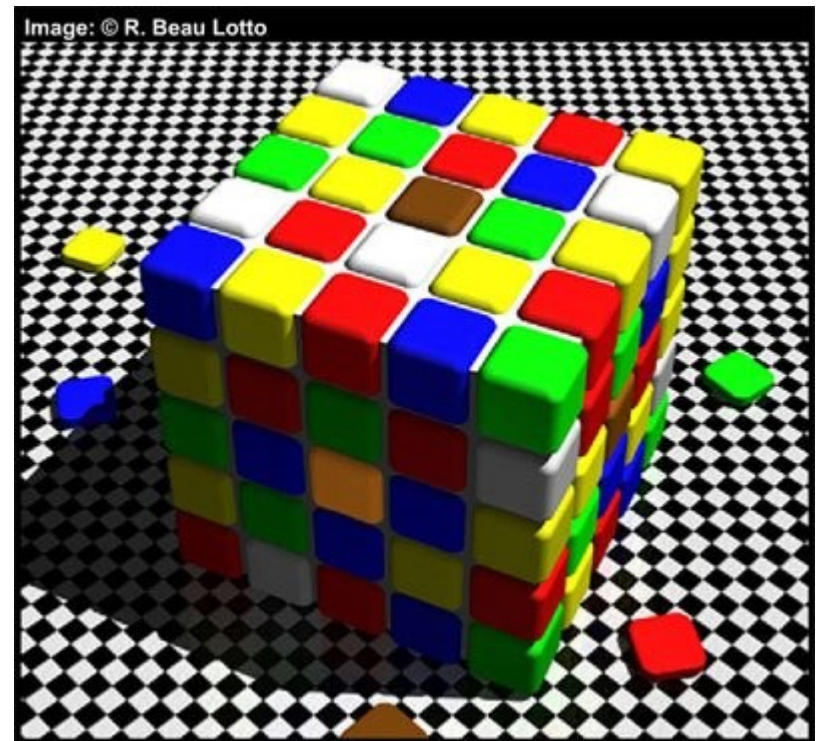


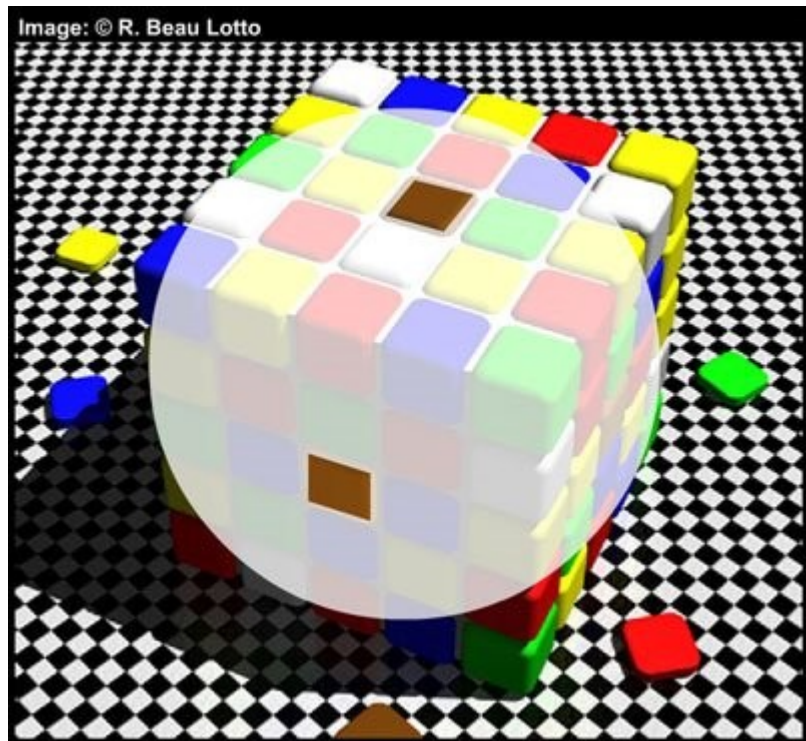
a map



what is computer vision?

- algorithmic understanding of images
- not anything to do with neuroscience
- it's all statistics
- vibrant research field



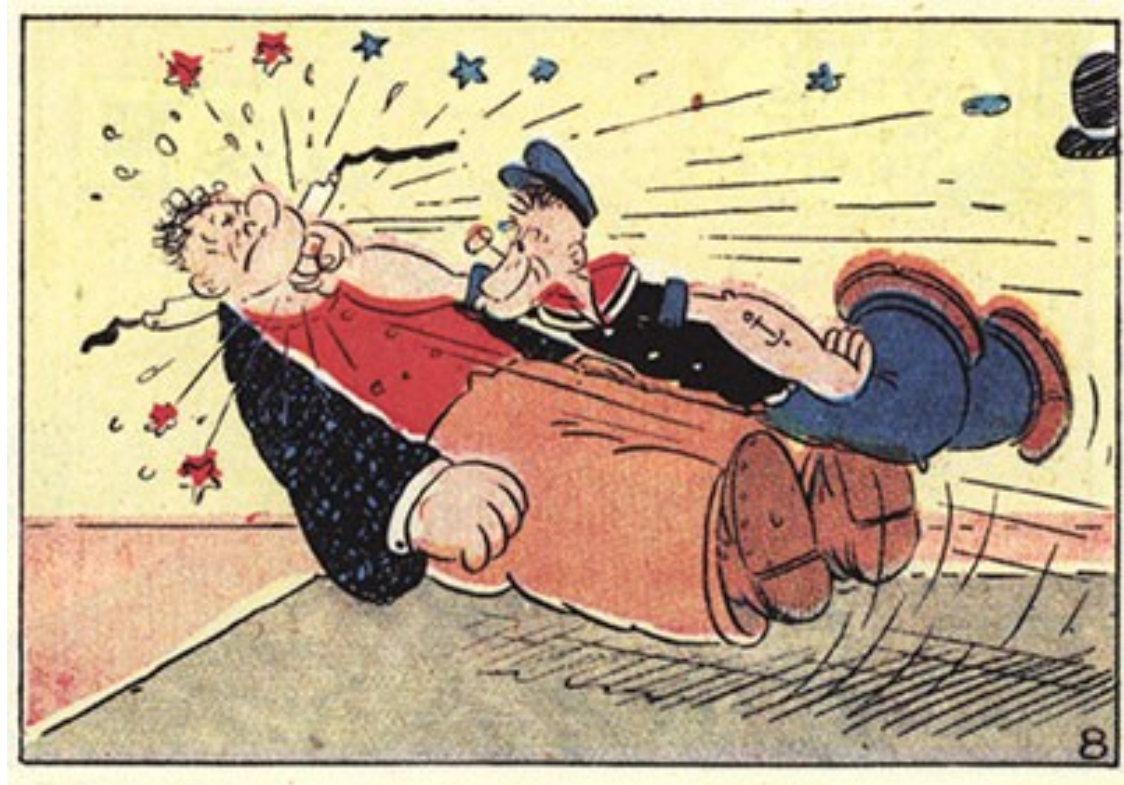


some examples



- Good computer vision library to get started with
- C++, Python
- Has a lot of algorithms “ready to use”
- Also good as an app framework – hardware abstraction
- <http://opencv.willowgarage.com/wiki/>

motion detection



find all the things in an image sequence that are moving

frame differencing



- take one image away from the other
- left with what's changed
- still things dissapear

robust

- camera wobble
- lighting changes
- all EyeToy games use this technique



background subtraction

- separate a person from the background of an image



background subtraction

- take a reference image
- subtract from current image
- left with what is not in reference image



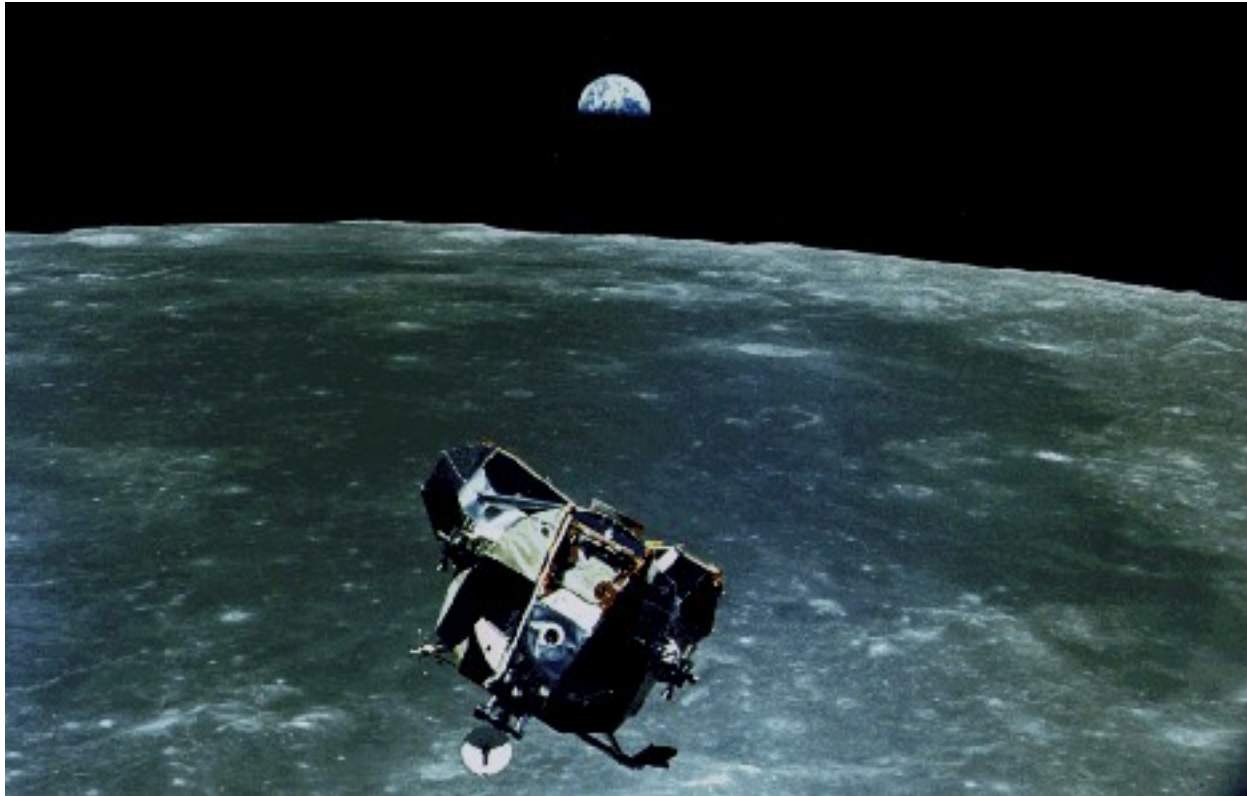
not so robust



- time is a factor
- the longer it's running the worse it gets

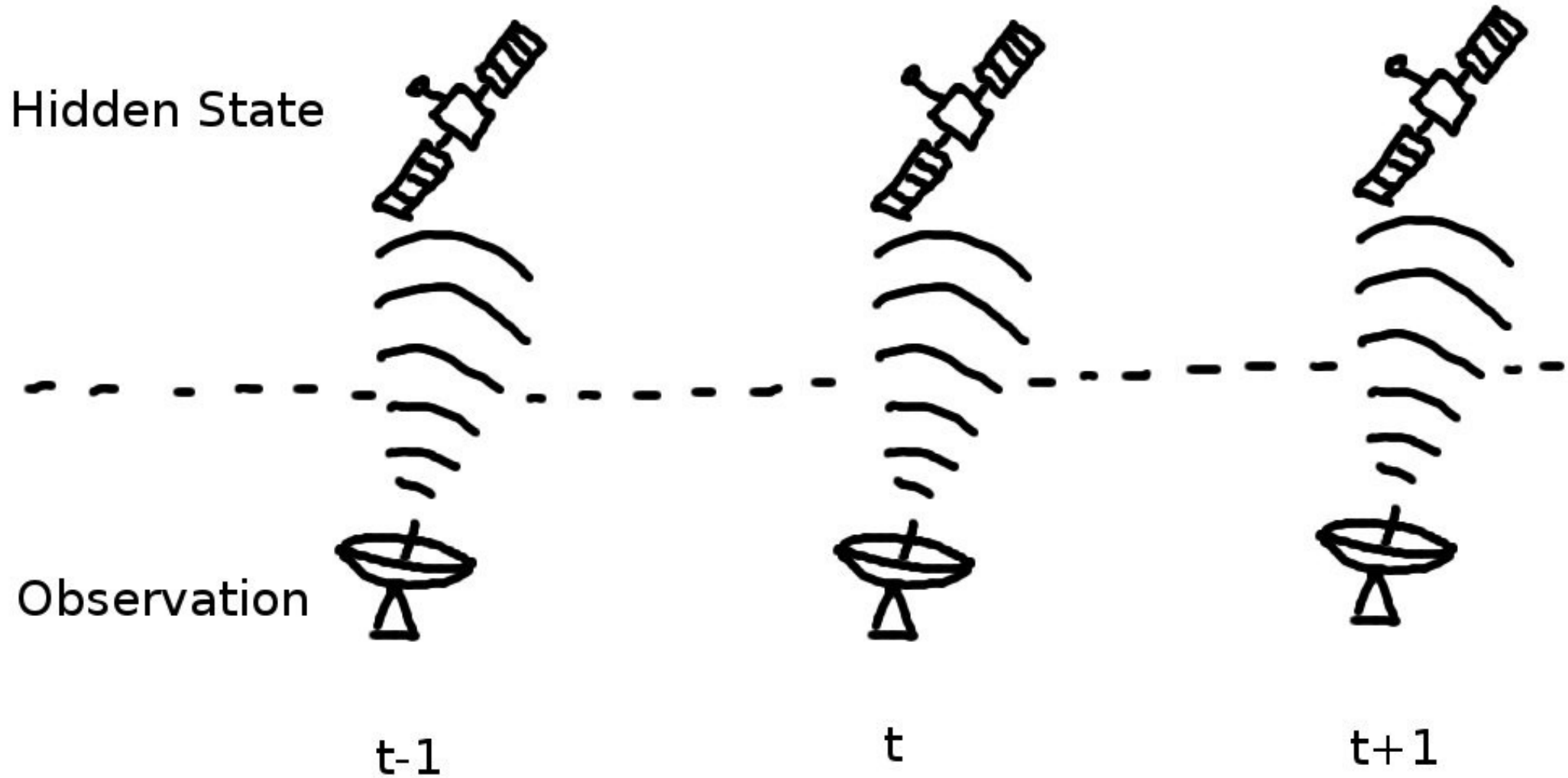
tracking things

tracking objects

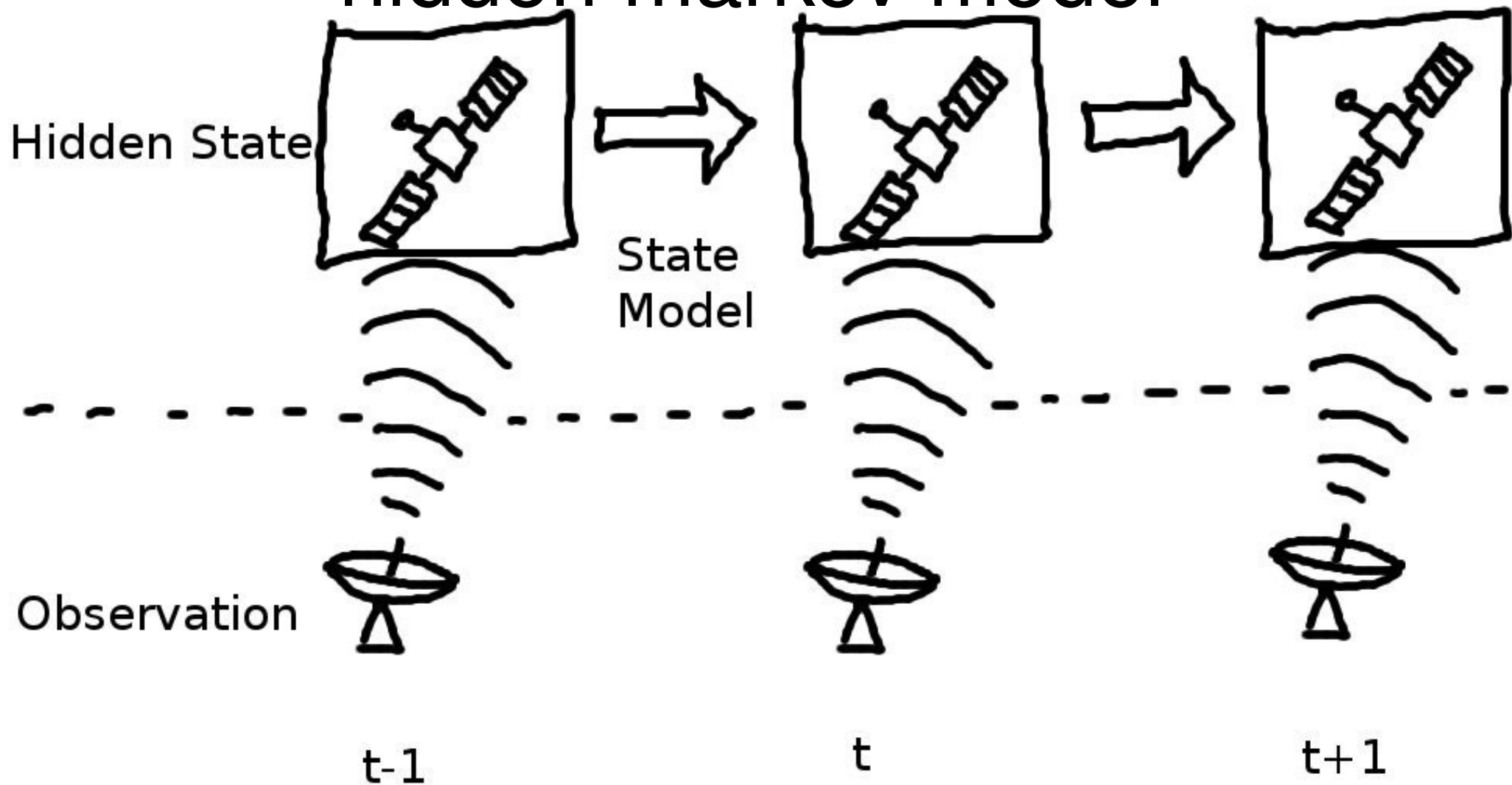


- tracking objects – kalman filter, particle filter
- Rudolf E. Kalman, used in the Apollo missions (1961)

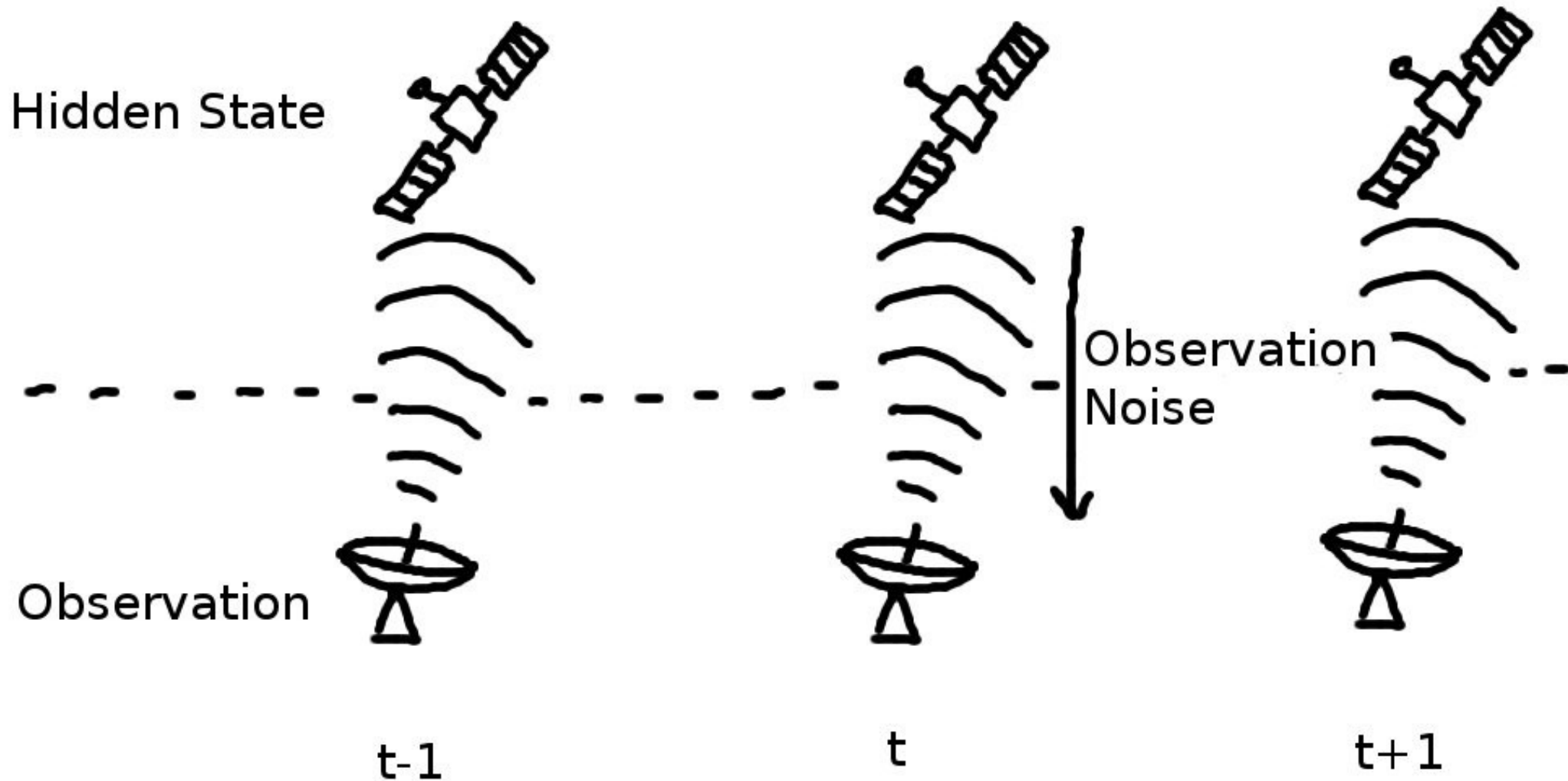
hidden markov model



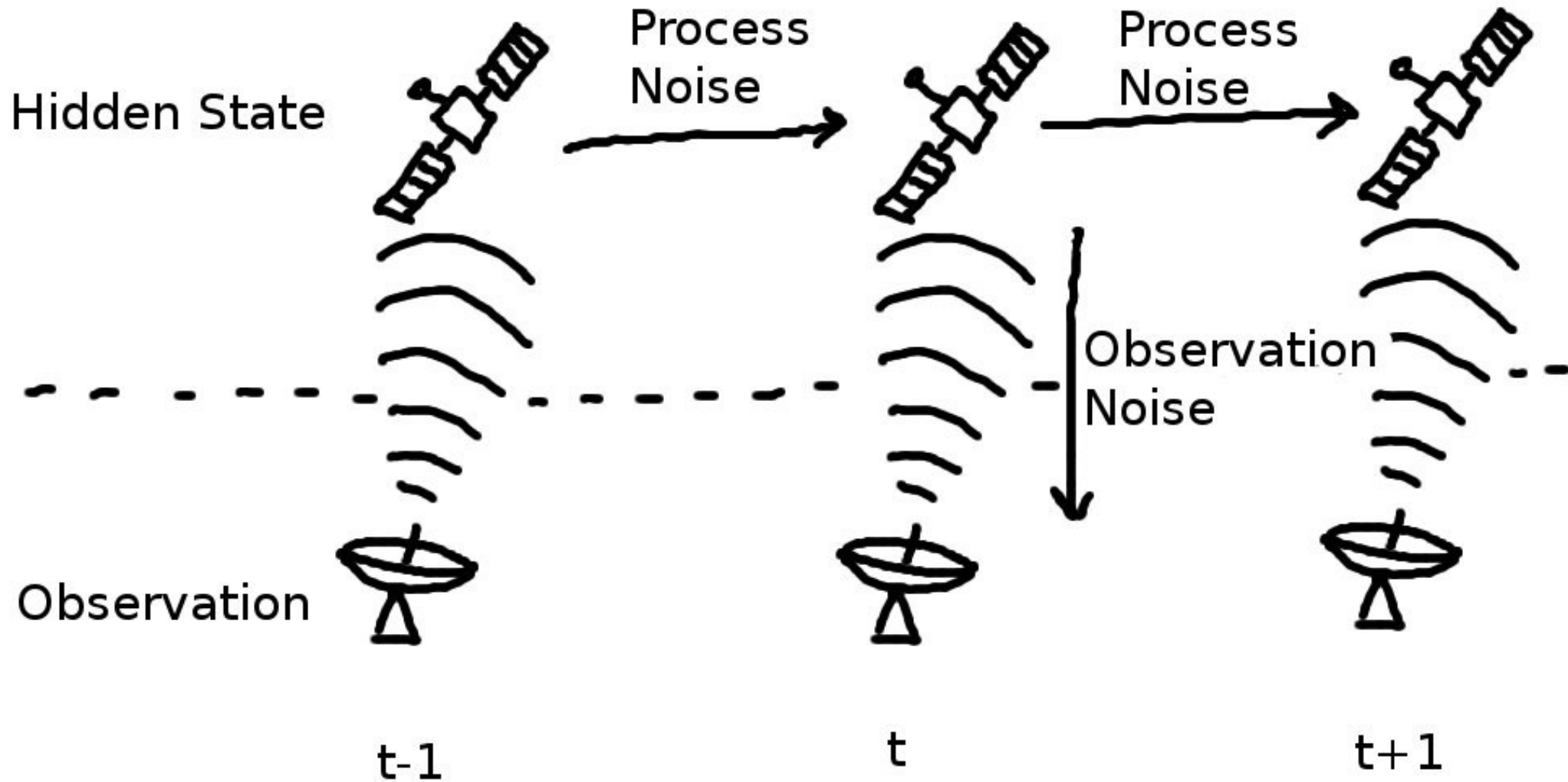
hidden markov model



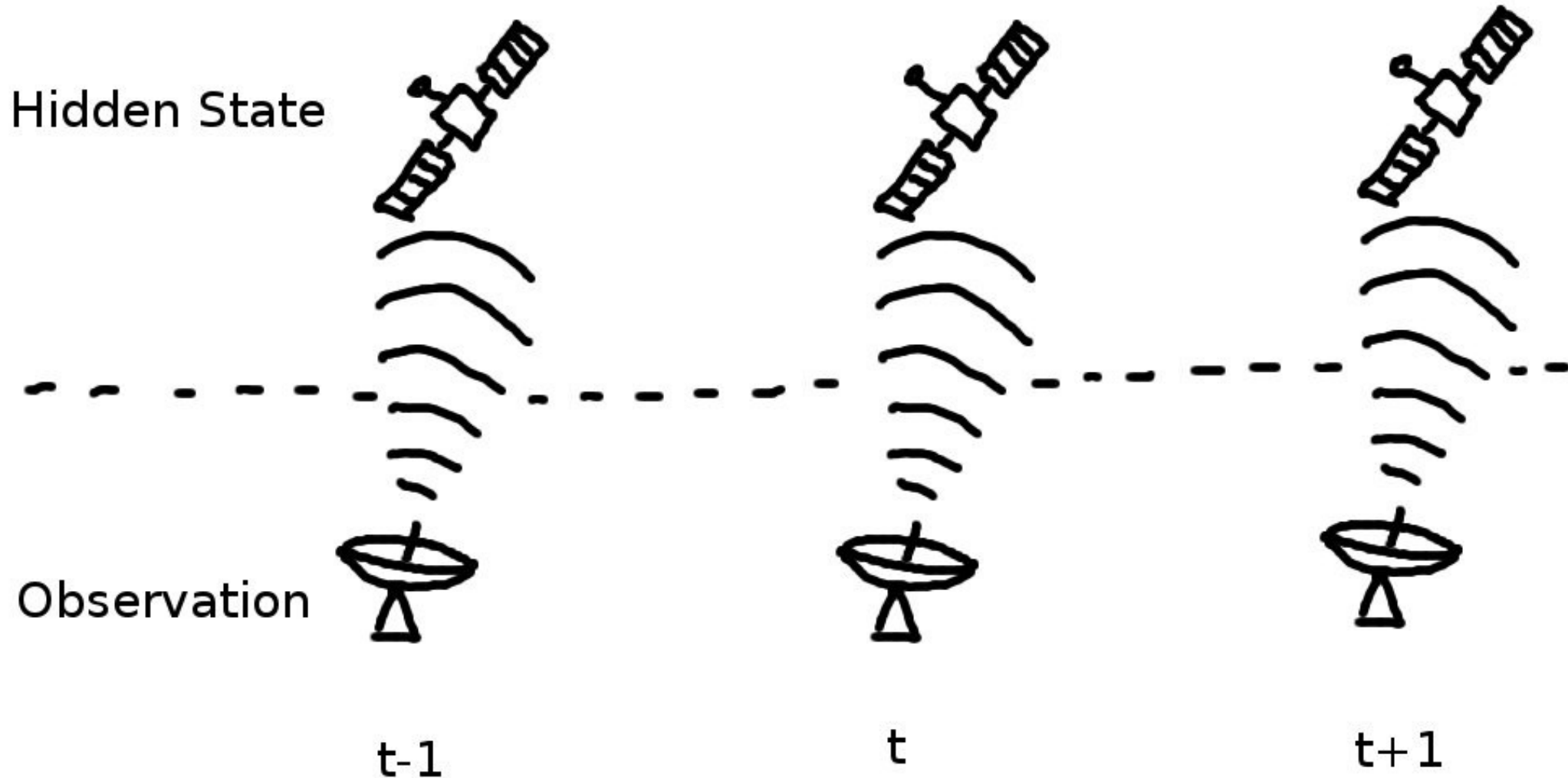
hidden markov model



hidden markov model



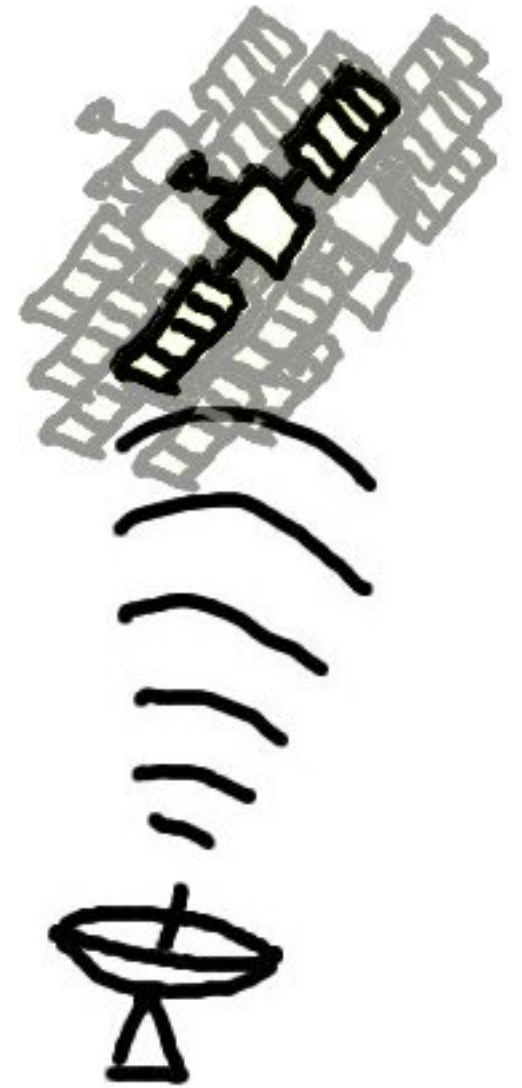
hidden markov model



- Predict the next state
- Correct based on observation

particle filter

- many estimates at once
- use each to predict the next step
- correct based on actual observation
- estimate is weighted average
- demo



faces

faces

faces are good for computation photographers:

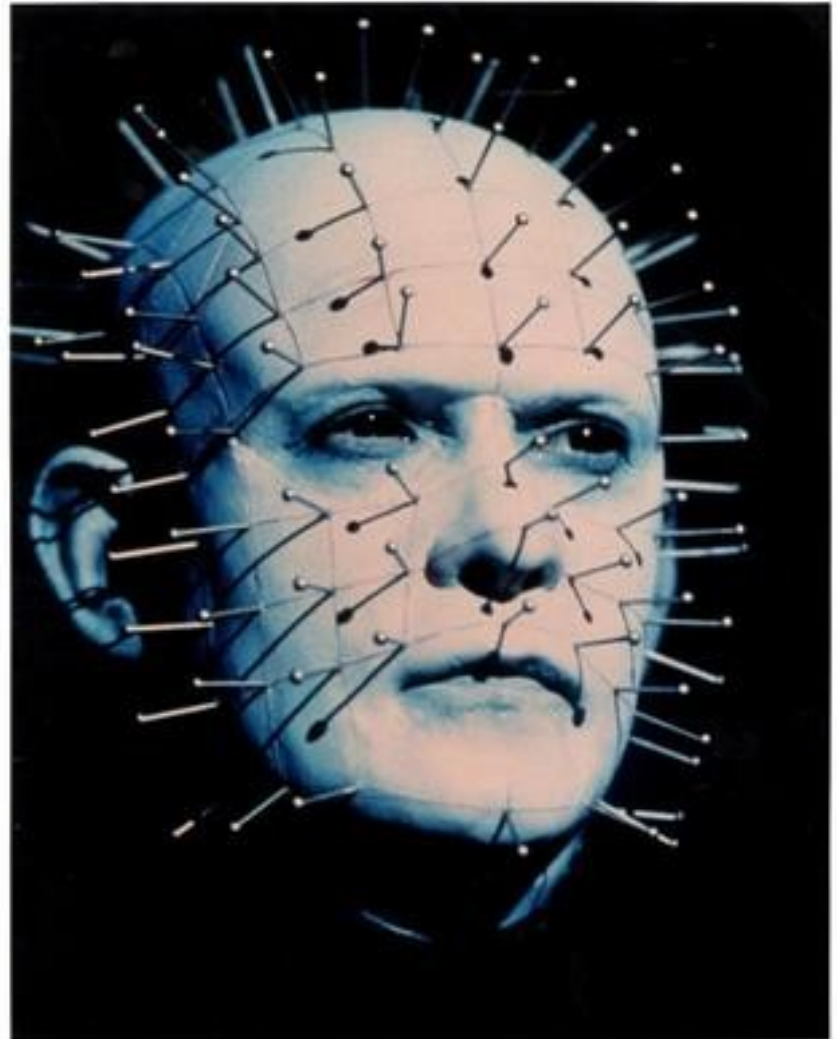
- most images have some in
- everyone has one
- we are highly attuned to understanding them
- there is lots of research in this field which as artists we can use (security industry!)

face algorithms

- face finding – locate faces in an image
- face recognition – who are they?

what a face can tell you?

- Identity
- Expression
- Gender
- Ethnicity
- Pose
- Lighting



space of all possible images

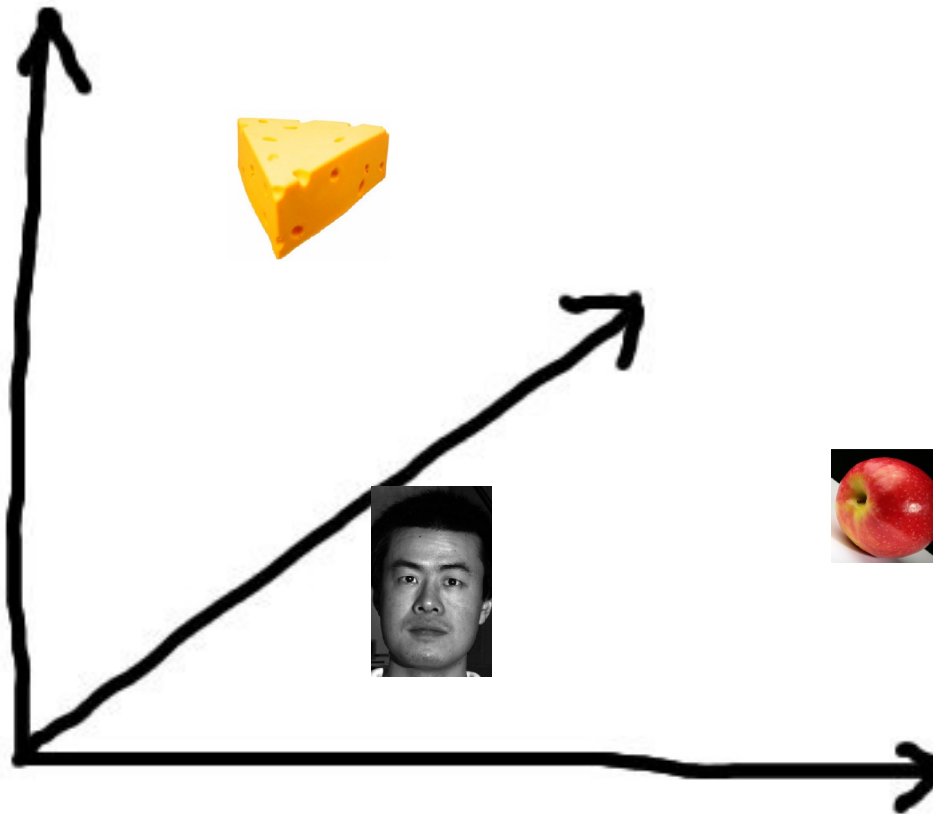
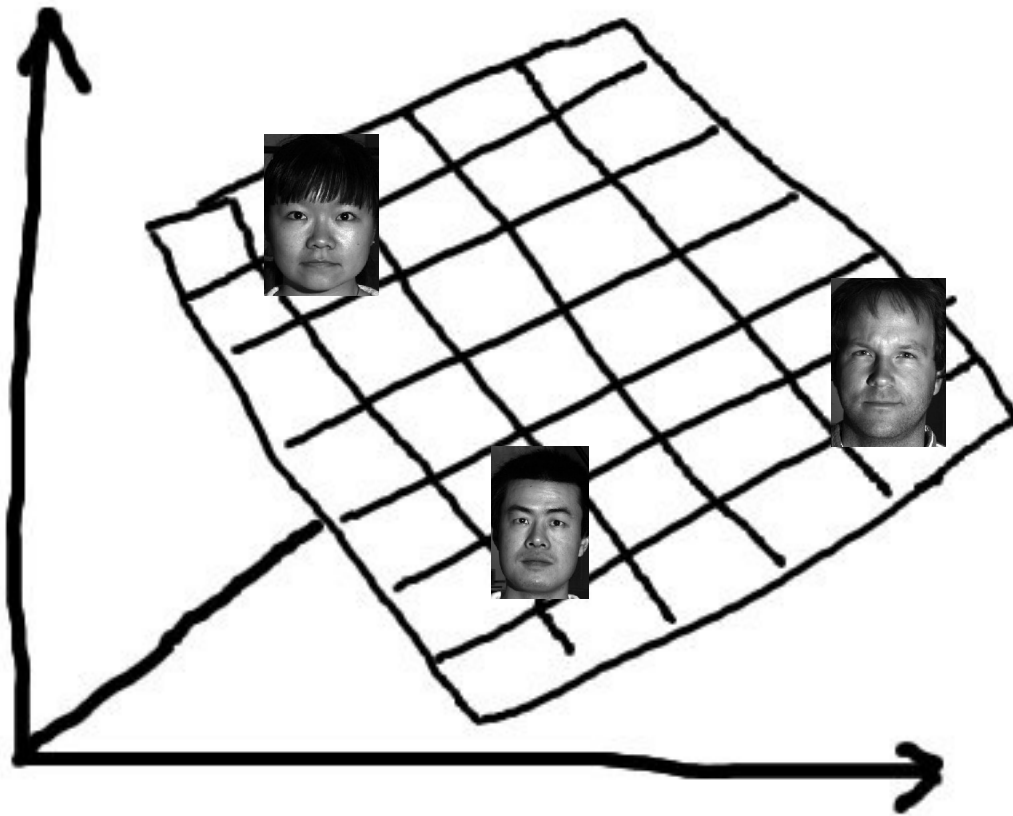
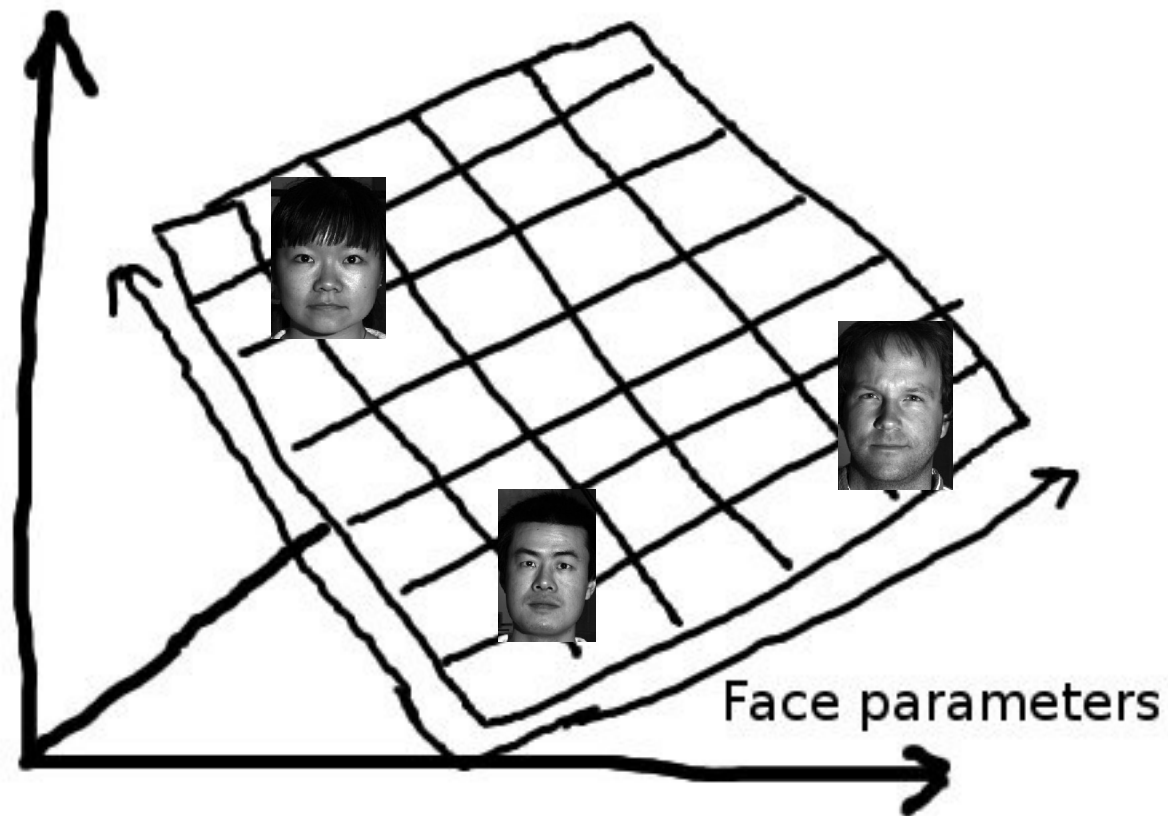


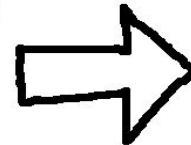
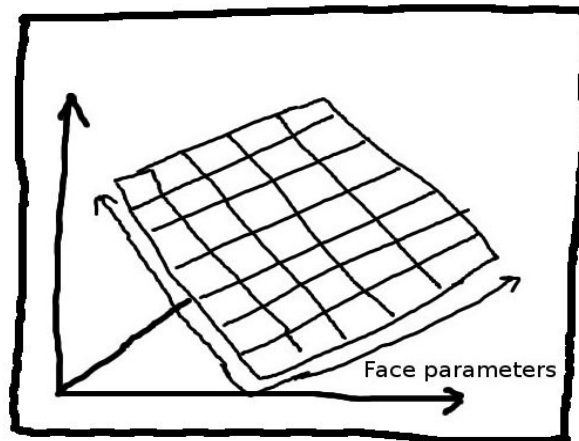
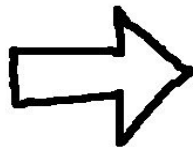
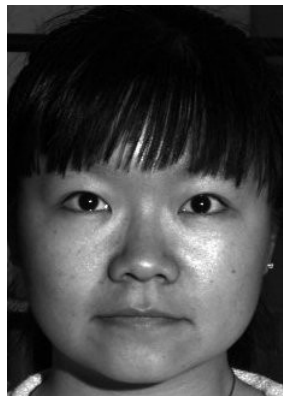
image space contains a face space



the axes have meaning



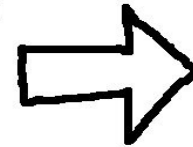
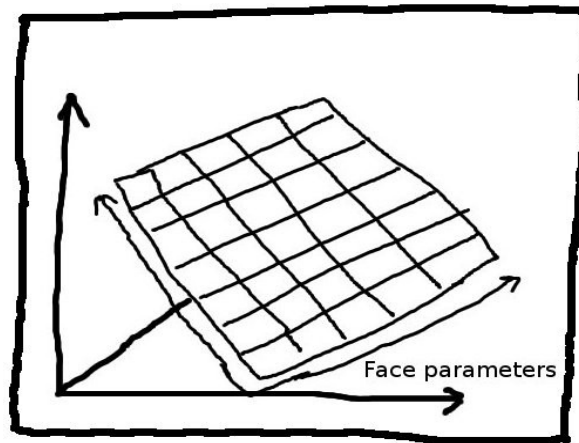
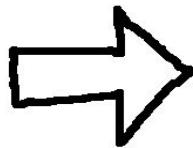
understanding a face



0.341212333
-0.123123753
-0.223494335
0.825233942
...

synthesising a new face

0.341212333
-0.123123753
-0.223494335
0.825233942
...



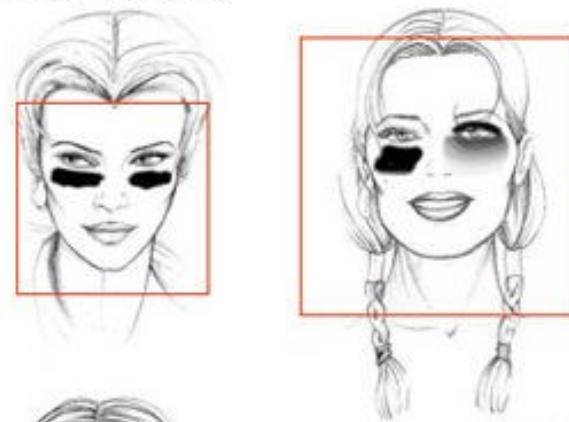
?

videos...

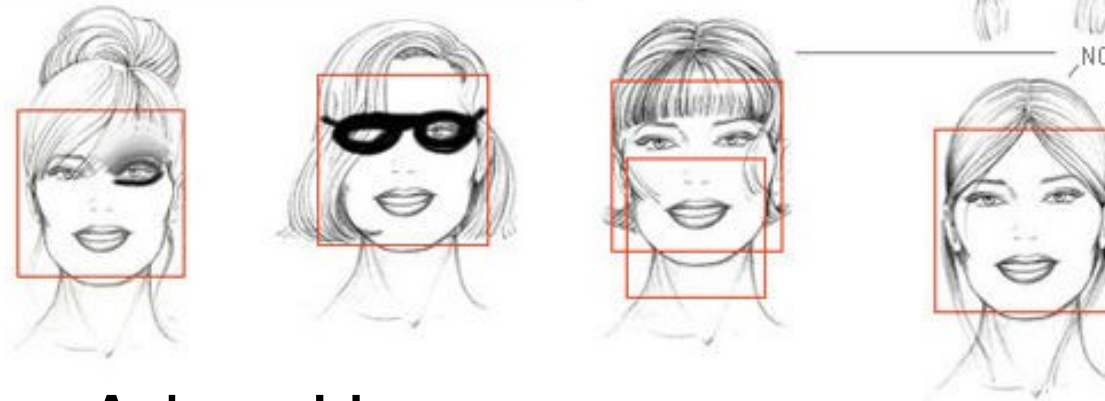
TEST PATTERNS



RANDOM PATTERNS

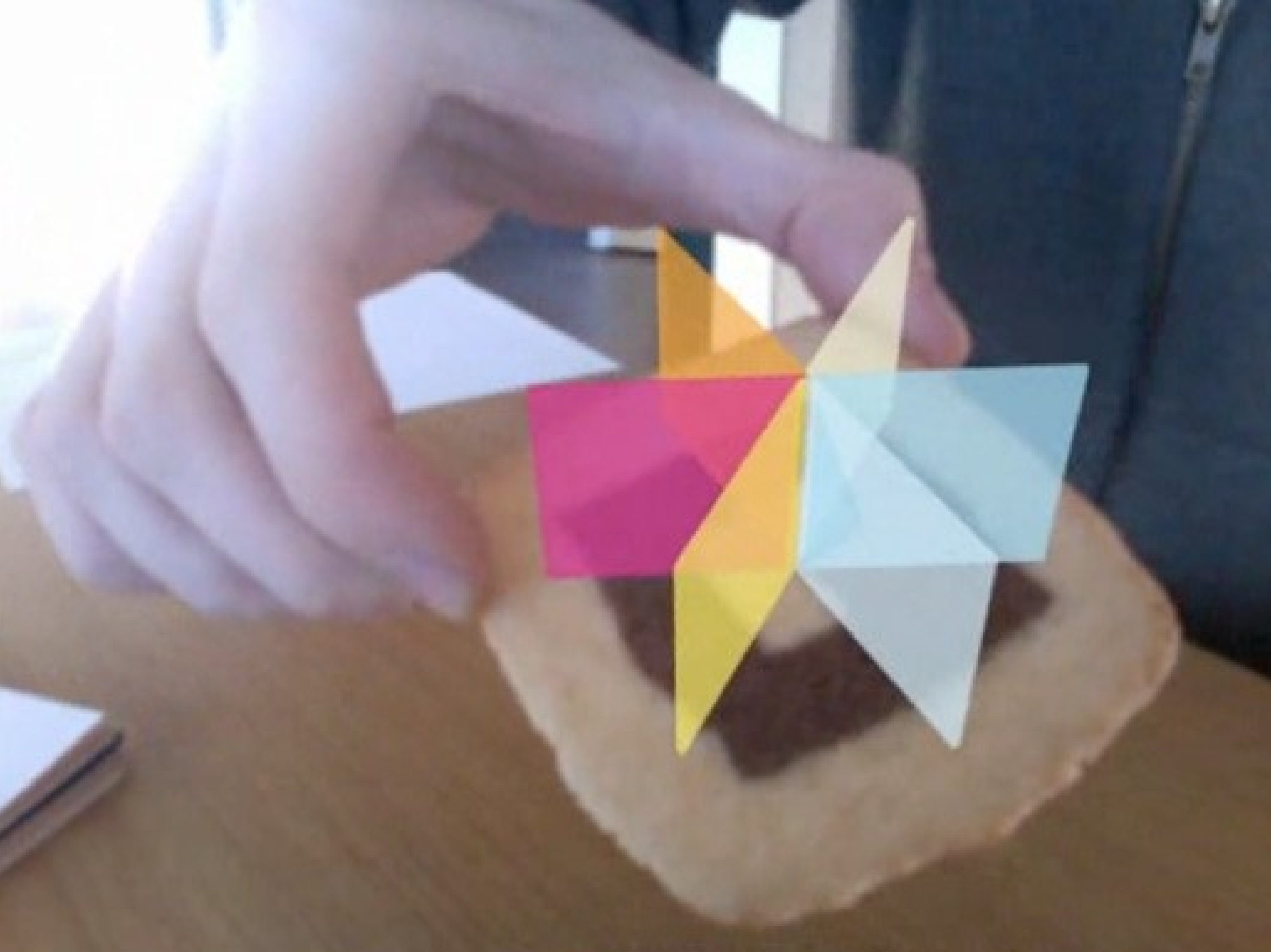


NO PATTERN



- CV Dazzle: Adam Harvey
- <http://ahprojects.com/c/itp/thesis>

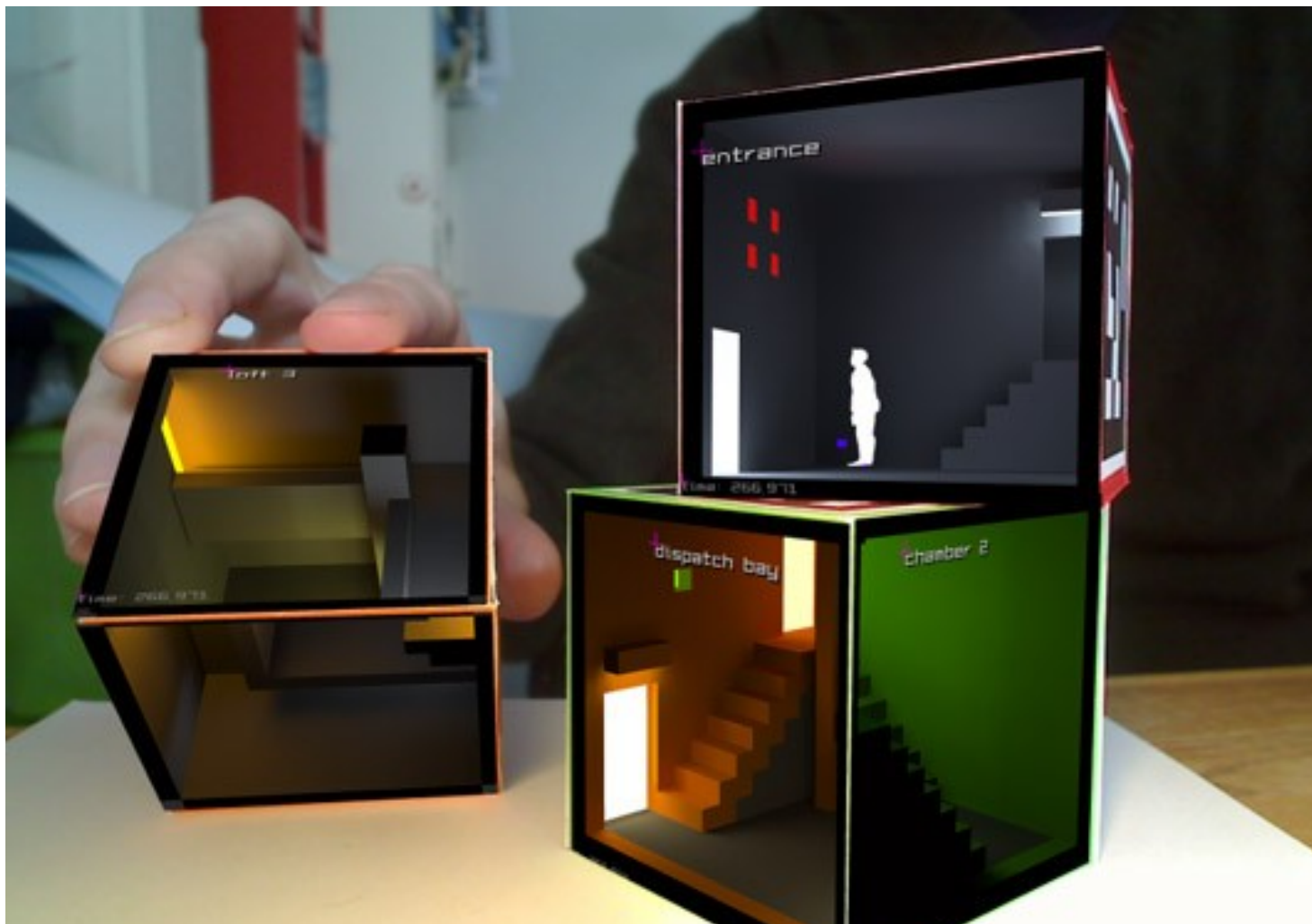
augmented reality





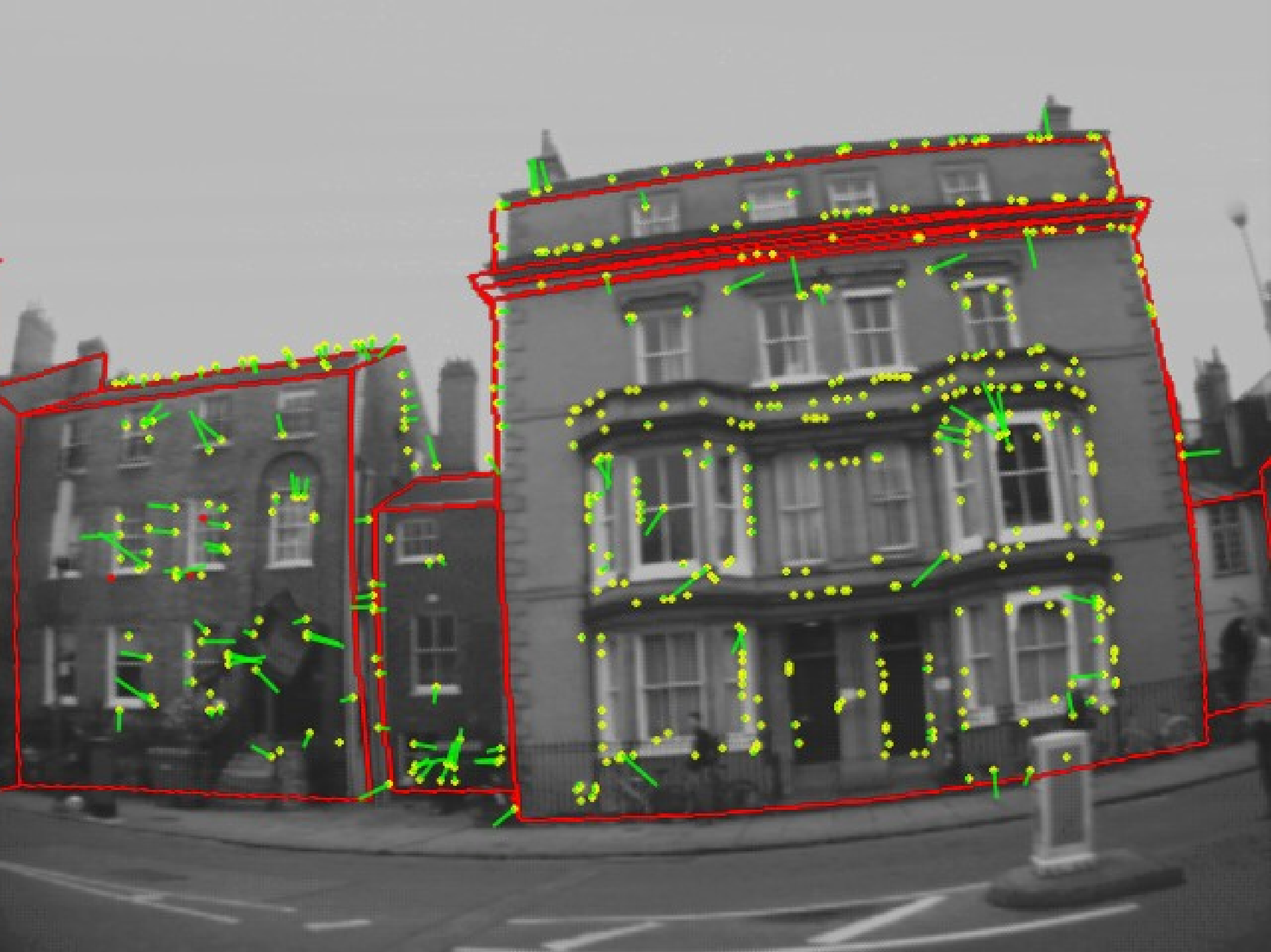
levelhead by Julian Oliver

- <http://selectparks.net/~julian/levelhead/>
- arttoolkit:<http://www.hitl.washington.edu/artoolkit/>



artvertiser



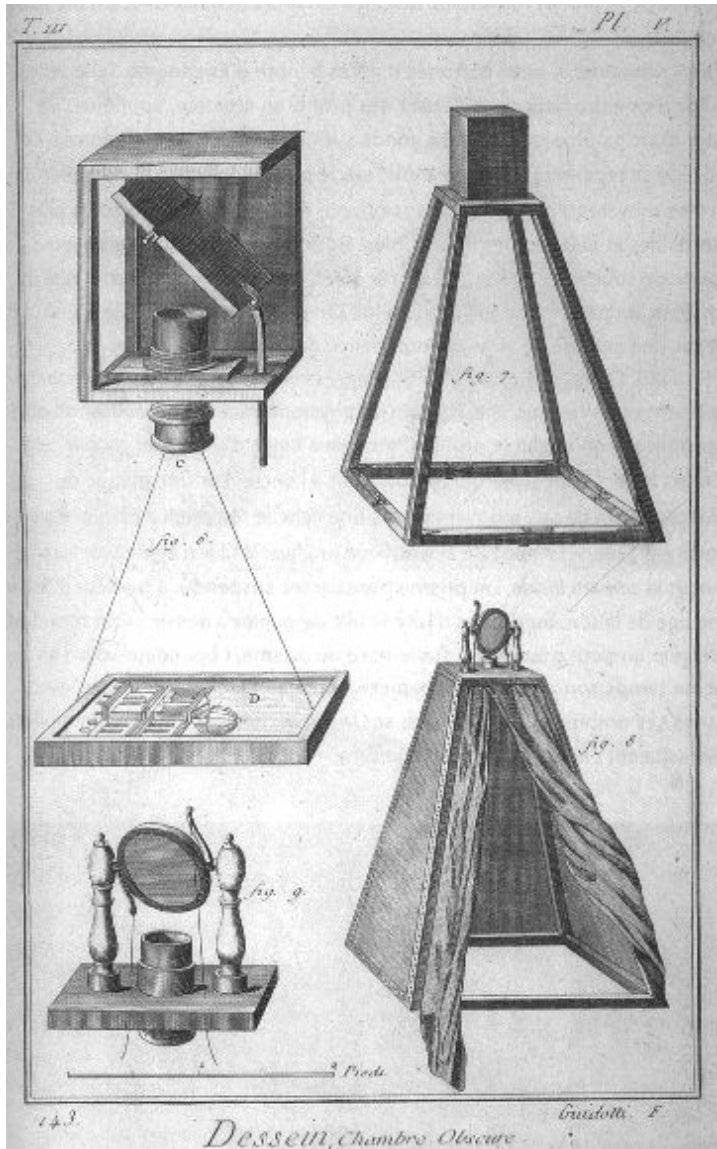


Depth Cameras

- RGB-D per pixel
- Microsoft Natal/Kinect



how can I use this as an artist?



- not difficult to get interesting things happening
- lots of code out there (free software/open source)
- think how you could (ab)use them artistically
- talk to researchers, use their stuff for art!

links

- <http://trac.lirec.org/wiki/MagicSquares>
- <http://www.pawfal.org/dave>
- dave@fo.am
- <http://opencv.willowgarage.com/wiki/>
- <http://www.hitl.washington.edu/artoolkit/>