MULTITOUCH

DIY - MULTITOUCH

WE ARE...

JURI WOLF

B.A. Student

JORDI TOST

M.A. Student

FABIAN MORÓN ZIRFAS

Interface Lab Supervisor

PROJECT AIM

PROJECT AIM

learn multitouch basics by using:

Computer Vision (Bare Bones)

Physical Computing (Capacitiv & Acoustic)

Open CV (Adavanced)

TUIO

Exhibition 17.10.2014

PROJECT TIMETABLE

Day 1 || Mo 06.10 LW 126:

Introduction, Juri, Jordi, Fabian, MT, Examples

- Workshop
- Form groups
- Exercise

Day || 2 - 5 Di 07.10 - Do 10.10 LW 126:

- development and prototyping LW 126

Day 6 - 10 || Mo 13.10 - Do 16.10 Home & Hallway:

- development and prototyping home and LW hallway

Day 10 || Fr. 17.10 Exhibition

4 TYPES OF
TOUCH(SCREEN) TECHNOLOGY

http://www.ijcaonline.org/volume6/number8/pxc3871433.pdf
https://ecs.victoria.ac.nz/foswiki/pub/Groups/Elvis/Multi-touchTable/schoening2008multitouch.pdf

RESISTIVE

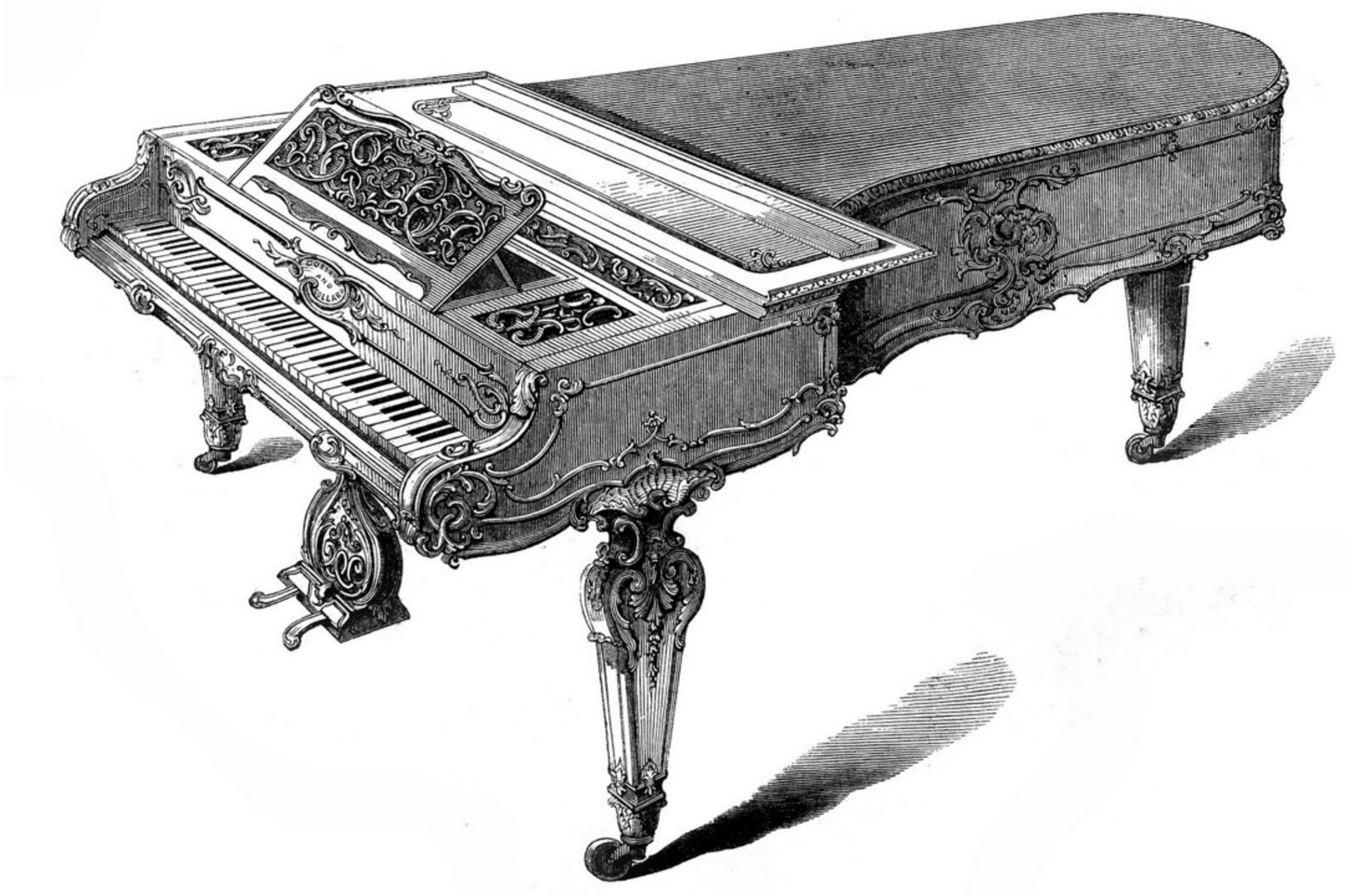
CAPACITIVE

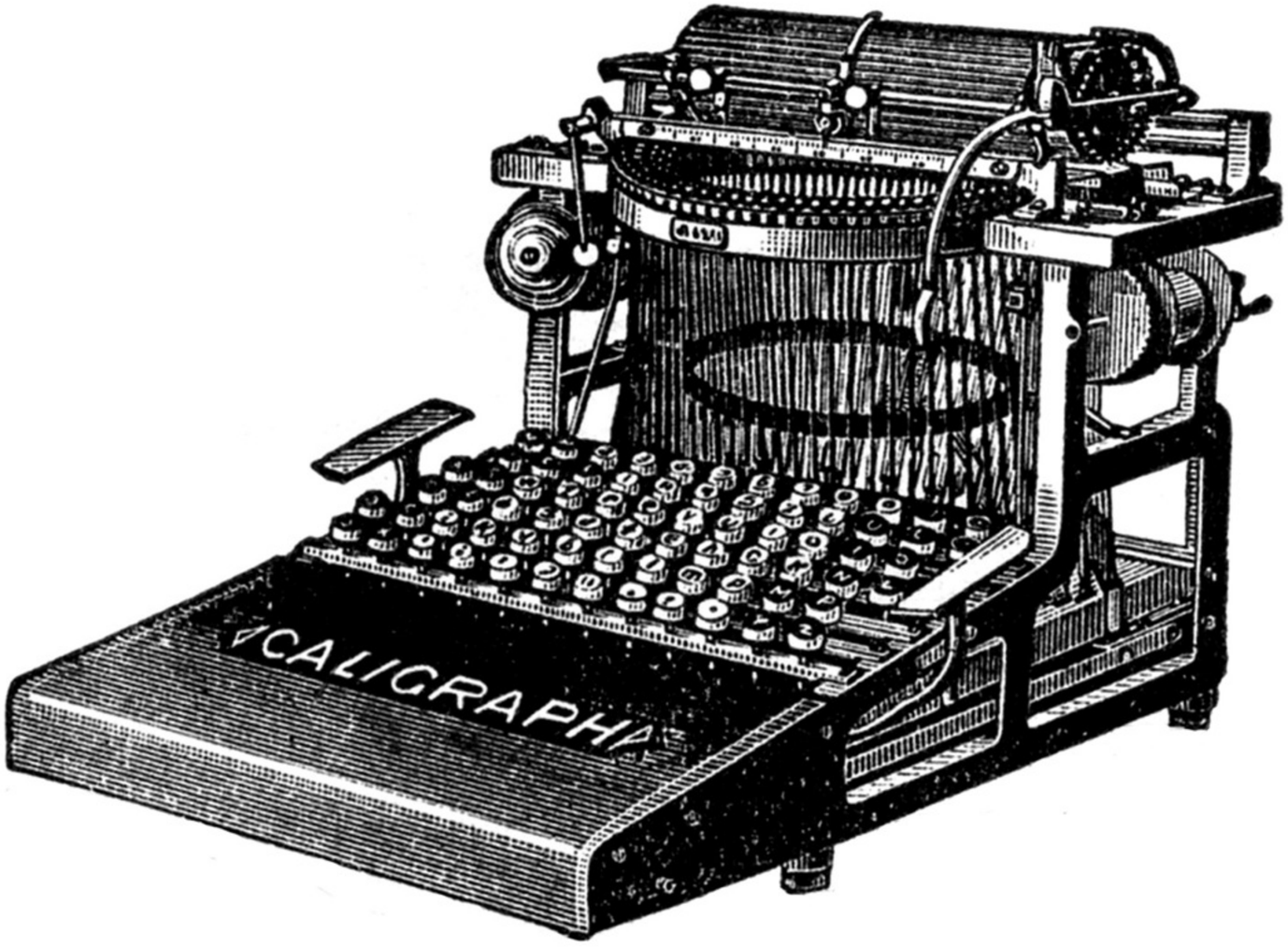
OPTICAL

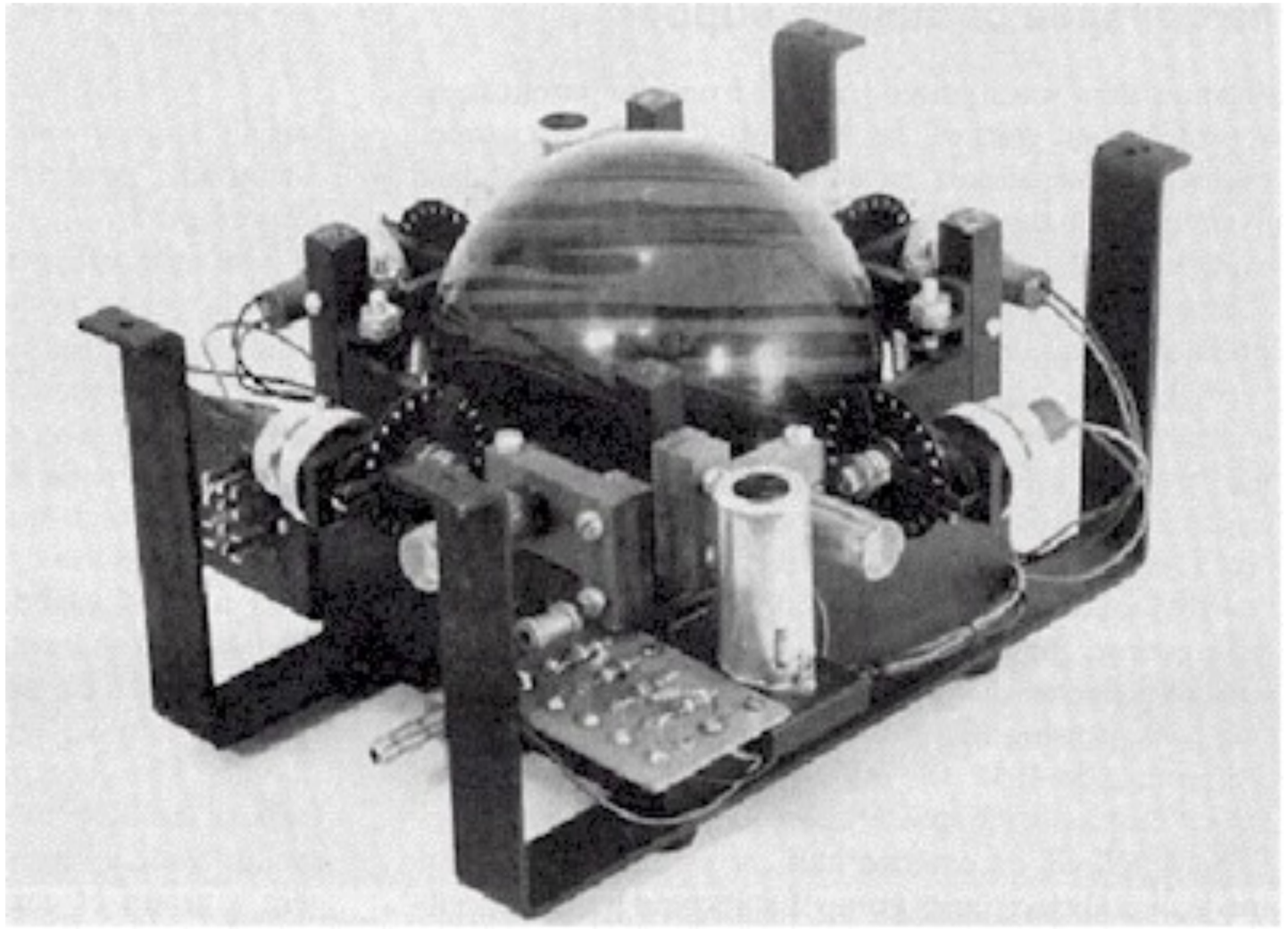
ACOUSTIC

HISTORY OF (M)T

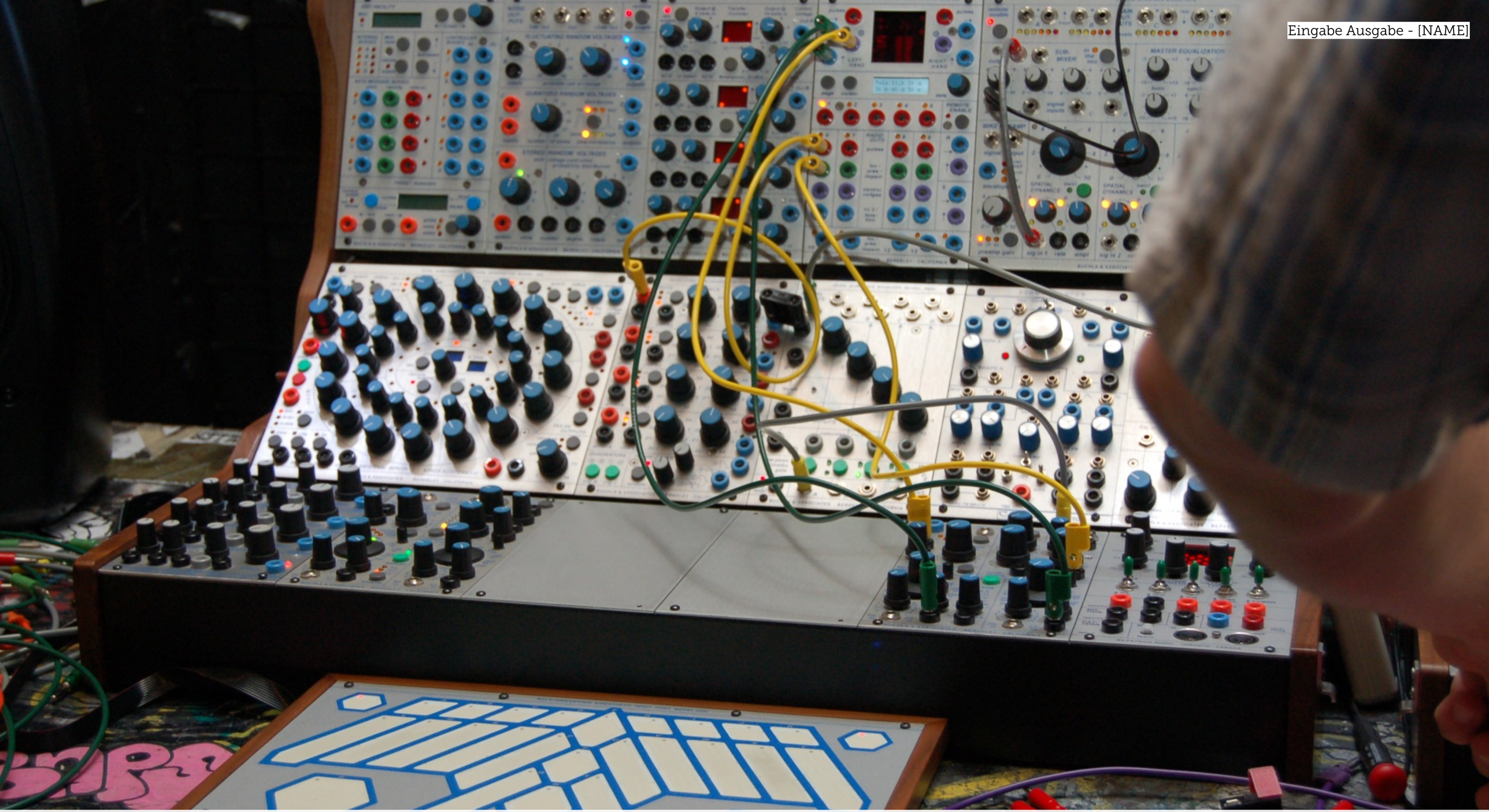
Bill Buxton: Multi-Touch Systems that I Have Known and Loved



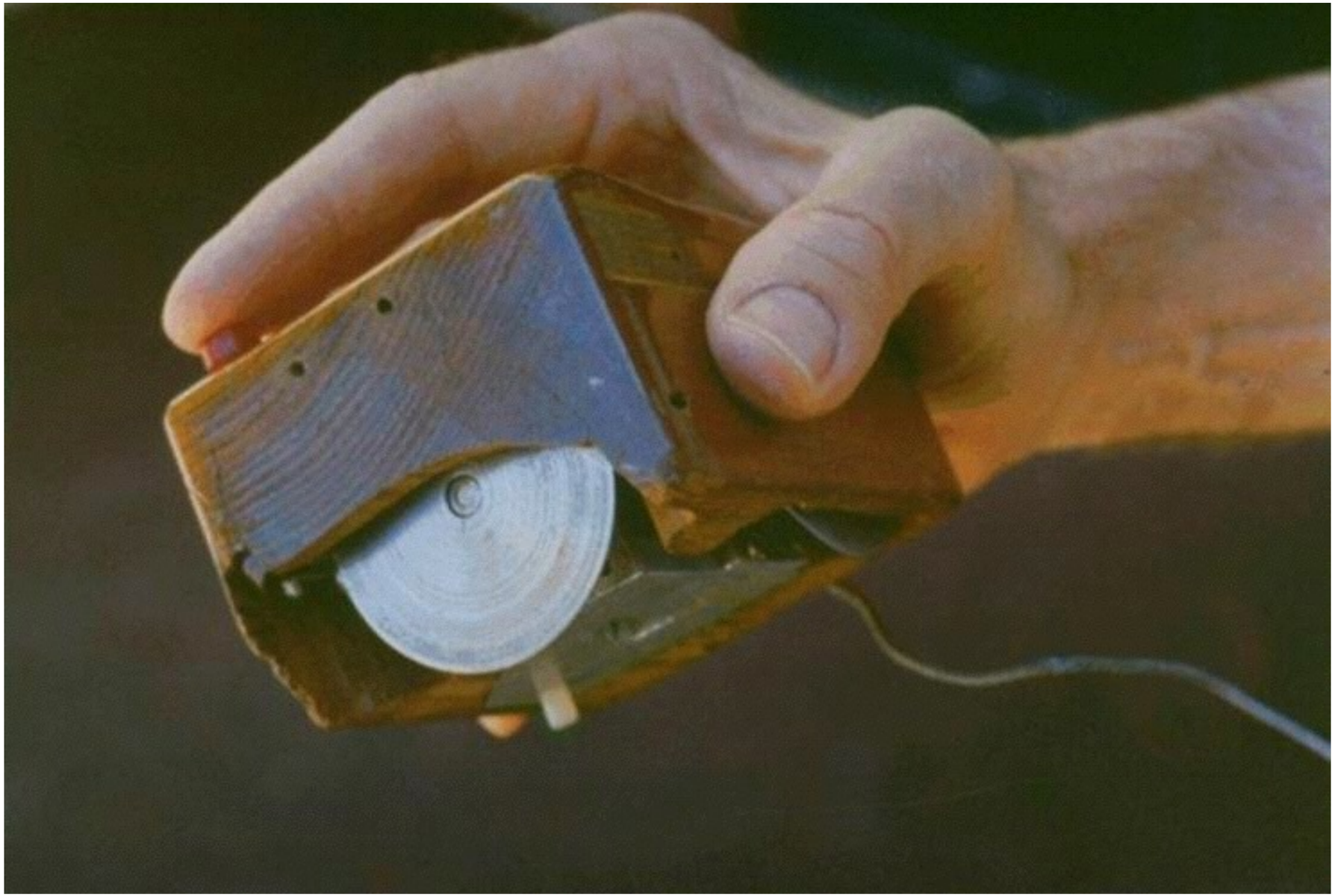

CALIGRAPH



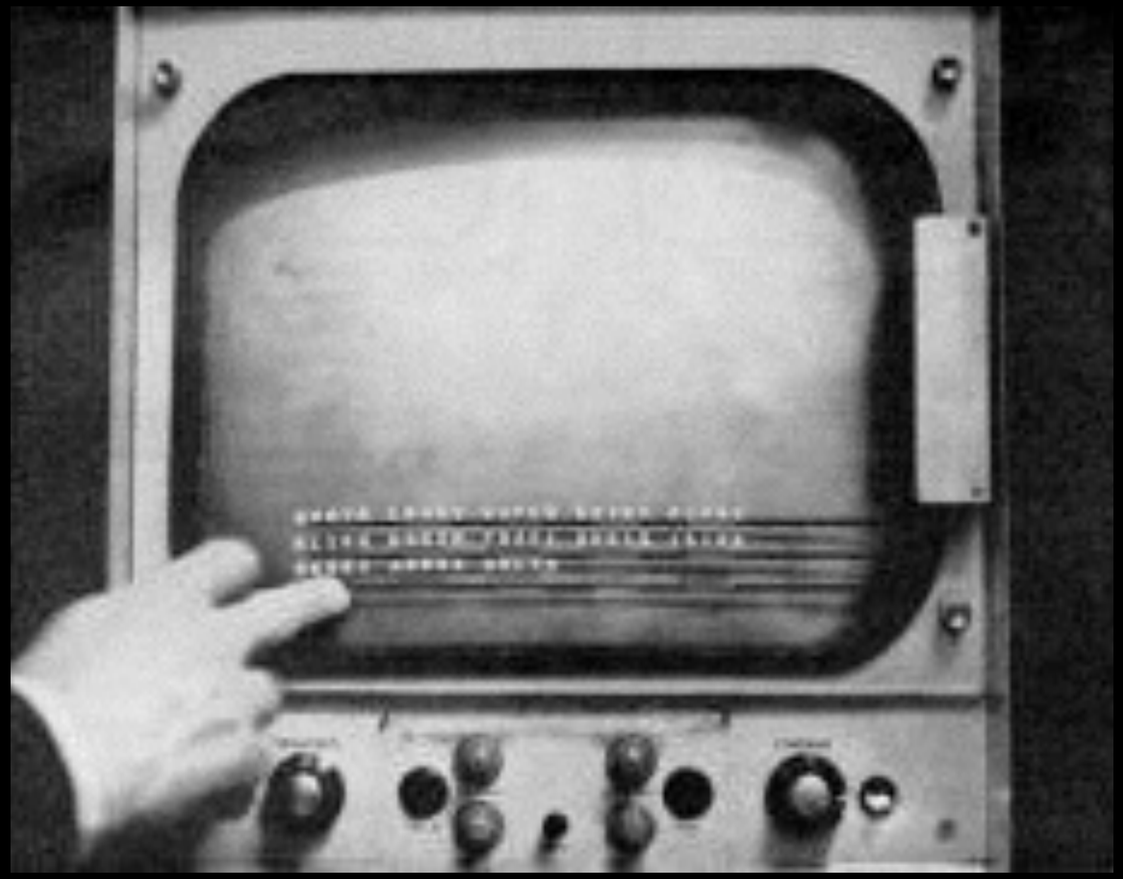
1945: Trackball (Ralph Benjamin)



Electroacoustic Music: The Early Days of Electronic Touch Sensors (Hugh LeCaine , Don Buchla & Bob Moog)



1960s: Mouse (Douglas Engelbart & Bill English)



1965: Touch Screen Technology (E.A. Johnson of the Royal Radar Establishment)

1972: PLATO IV Touch Screen Terminal

1983: Video Place / Video Desk (Myron Krueger)

1984: Multi-Touch Screen (Bob Boie, Bell Labs, Murray Hill NJ)

Multi-Touch Tablet (Input Research Group, University of Toronto Bill Buxton)

1985: Sensor Frame (Carnegie Mellon University Paul McAvinney)

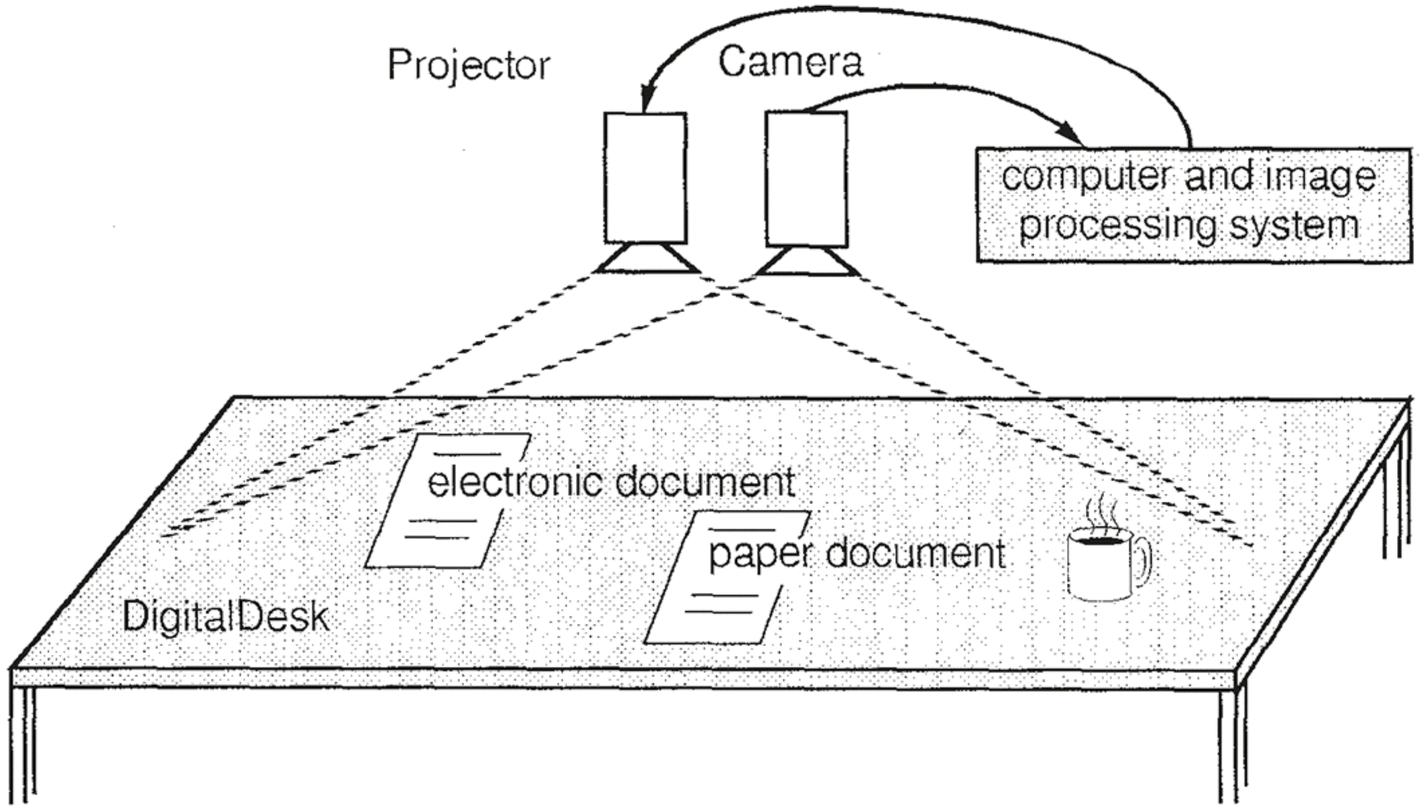


Figure 1. A DigitalDesk system

1991: Digital Desk (Pierre Wellner, Rank Xerox EuroPARC, Cambridge)

1992: Simon (IBM & Bell South)

AND MANY MORE

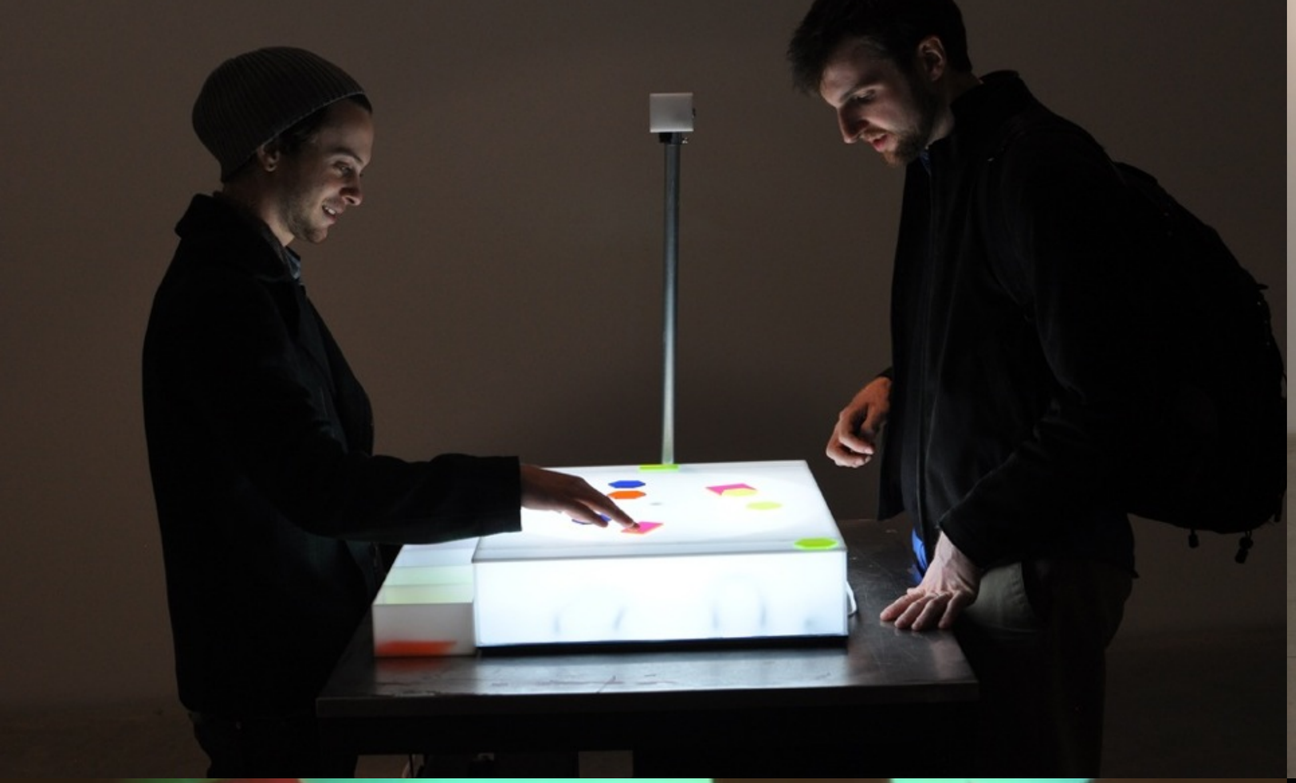
see Bill Buxtons site for further research

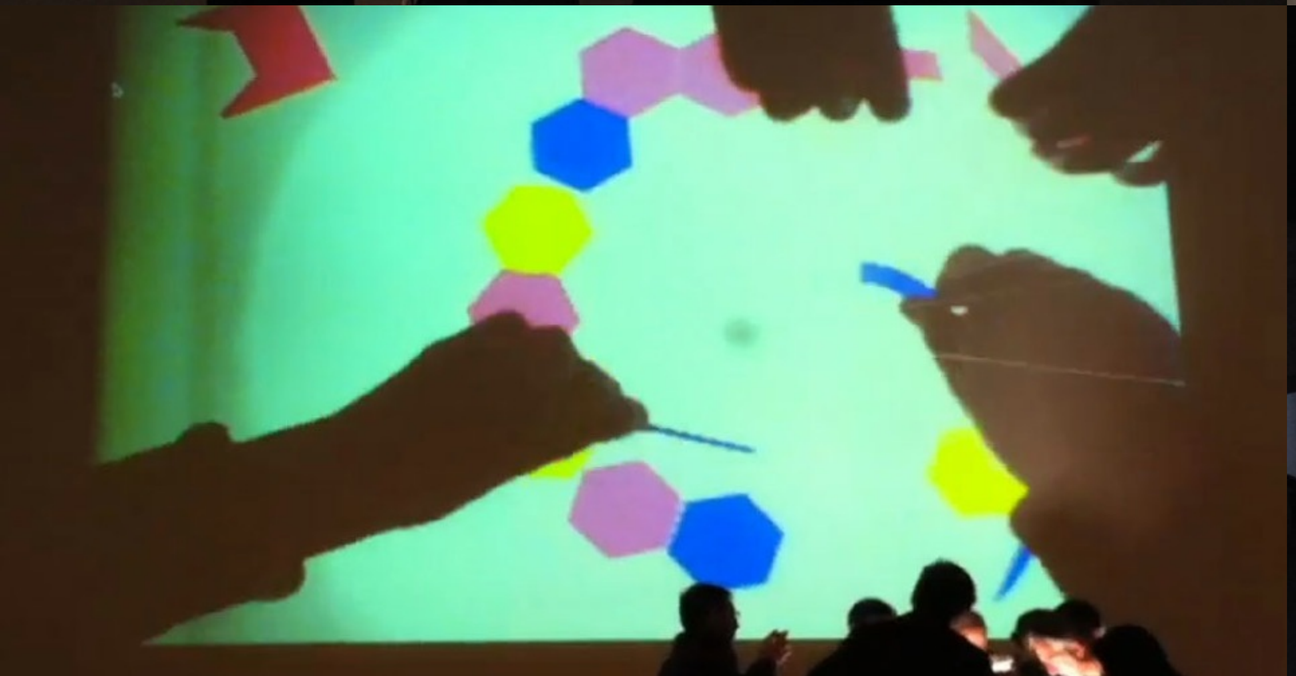
1992: Wacom, 1992: Starfire, 1994-2002: Bimanual Research, 1995: Graspable/Tangible Interfaces, 1995/97: Active Desk, 1997: T3, 1997: The Haptic Lens, 1998: Tactex Controls, ~1998: Fingerworks, 1999: Portfolio Wall, 2001: Diamond Touch, 2002: HandGear + GRT. DSI Datotech, 2002: Jun Rekimoto Sony Computer Science Laboratories, 2003: University of Toronto, 2003: Jazz Mutant, 2004: Neonode N1 Mobile Phone, 2004: TouchLight, 2005: Reactable, 2005: Blaskó and Steven Feiner, 2005: PlayAnywhere, 2005: Jeff Han, 2005: Tactiva, 2005: Toshiba Matsusita Display Technology, 2005: Tomer Moscovich & collaborators, 2006: Benko & collaborators, 2006: Plastic Logic, 2006: Synaptics & Pilotfish, 2007: Apple iPhone, 2007: Microsoft Surface Computing, 2007: ThinSight, 2008: N-trig, 2011: Surface 2.0

EXAMPLES

RHYTHMSYNTHESIS

by Ryan Raffa





VIDEO

SCRAPPLE

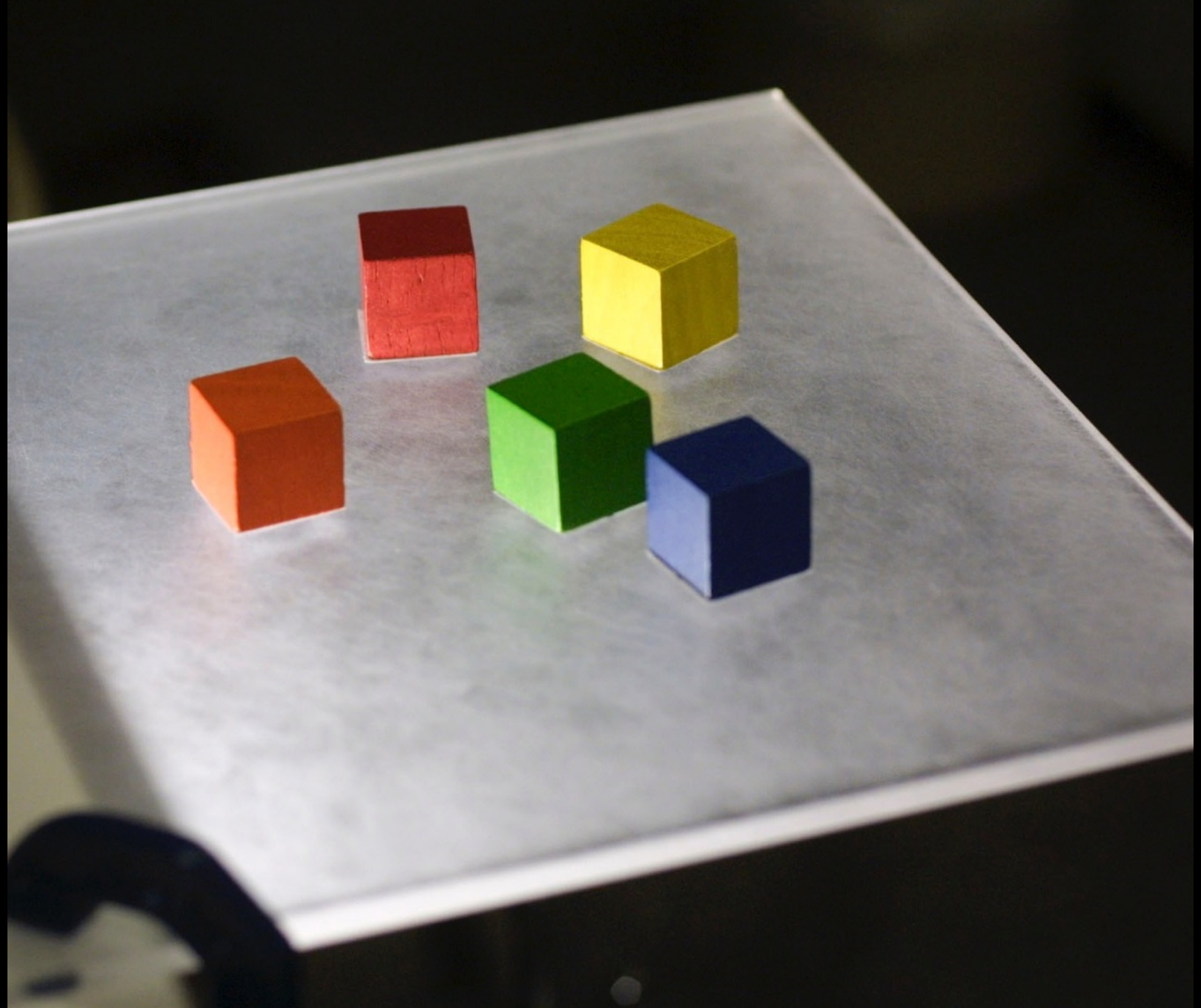
by Golan Levin
and Collaborators


Eingabe Ausgabe - [NAME]

VIDEO & VIDEO

TRACKMATE

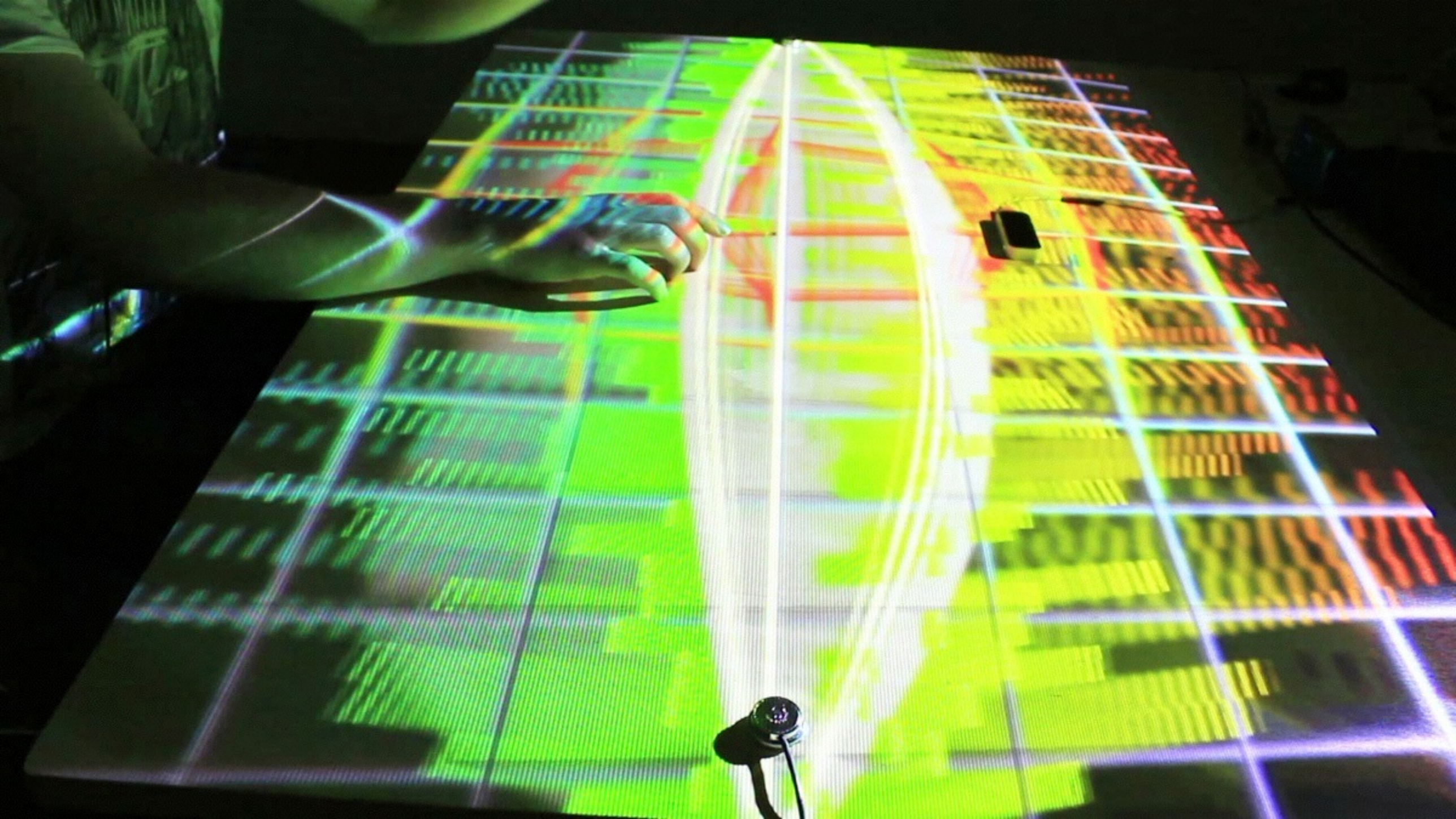
Adam Kumpf, Jean-Baptiste Labrune, Keywon Chung, Daniel Leithinger, Jamie Zigelbaum, Hiroshi Ishii / 2009 @ MIT Media Lab - Tangible Media Group



VIDEO

CONTACT

by Felix Faire



VIDEO

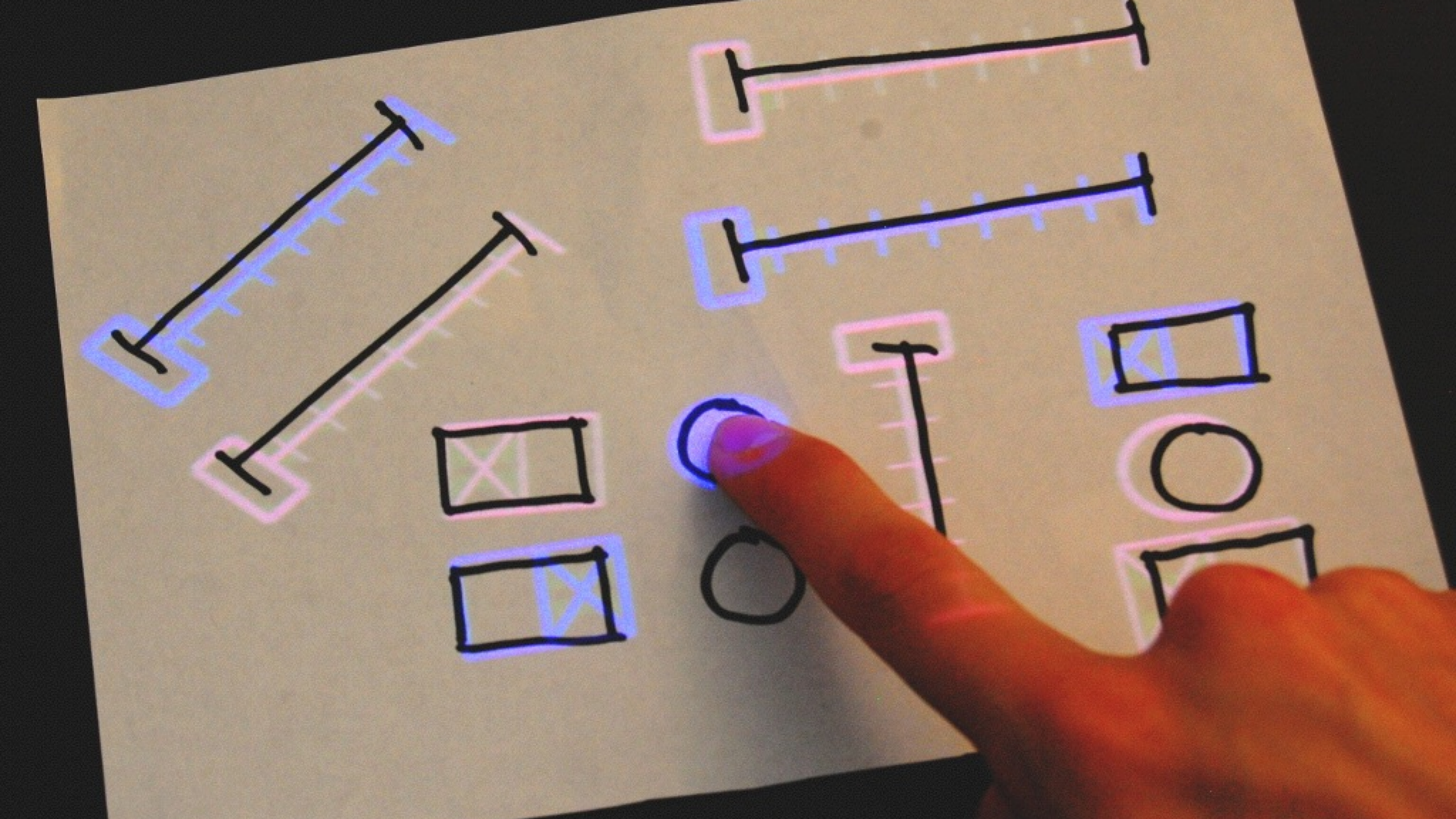
DRAWN

by Zachary Lieberman

VIDEO

SKETCHSYNTH

SketchSynth: A Drawable OSC Control Surface by Billy Keyes



VIDEO

WORKSHOP

Bare Bones Computer Vision

WHAT ELSE IS IN THE BOX?

OPENCV

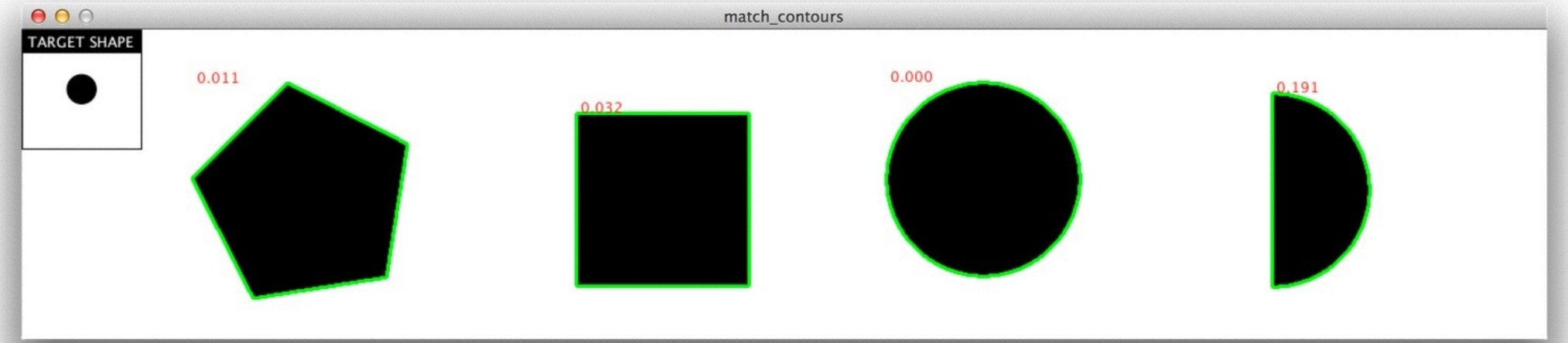
OPENCV

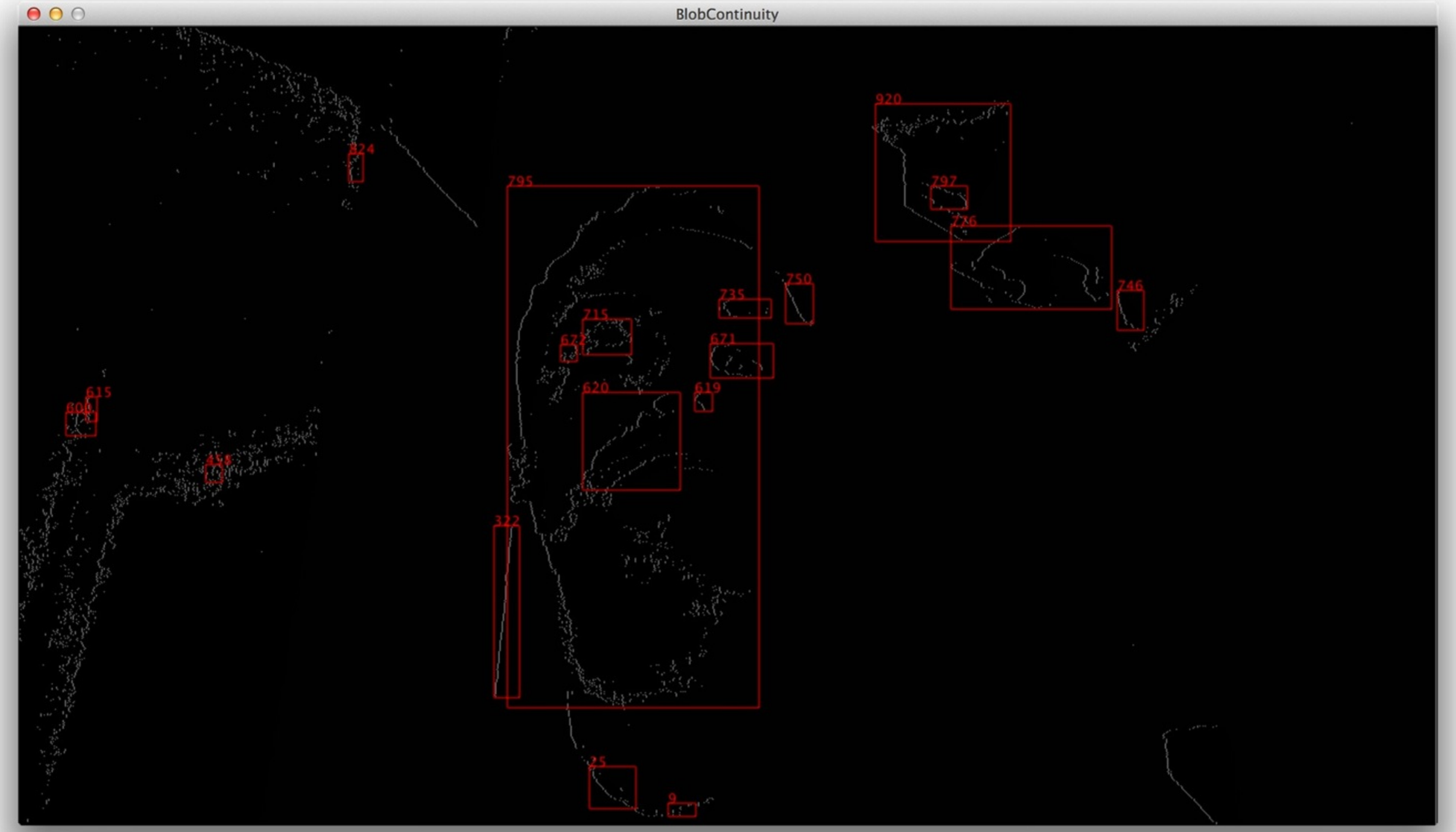
(Open Source Computer Vision Library)

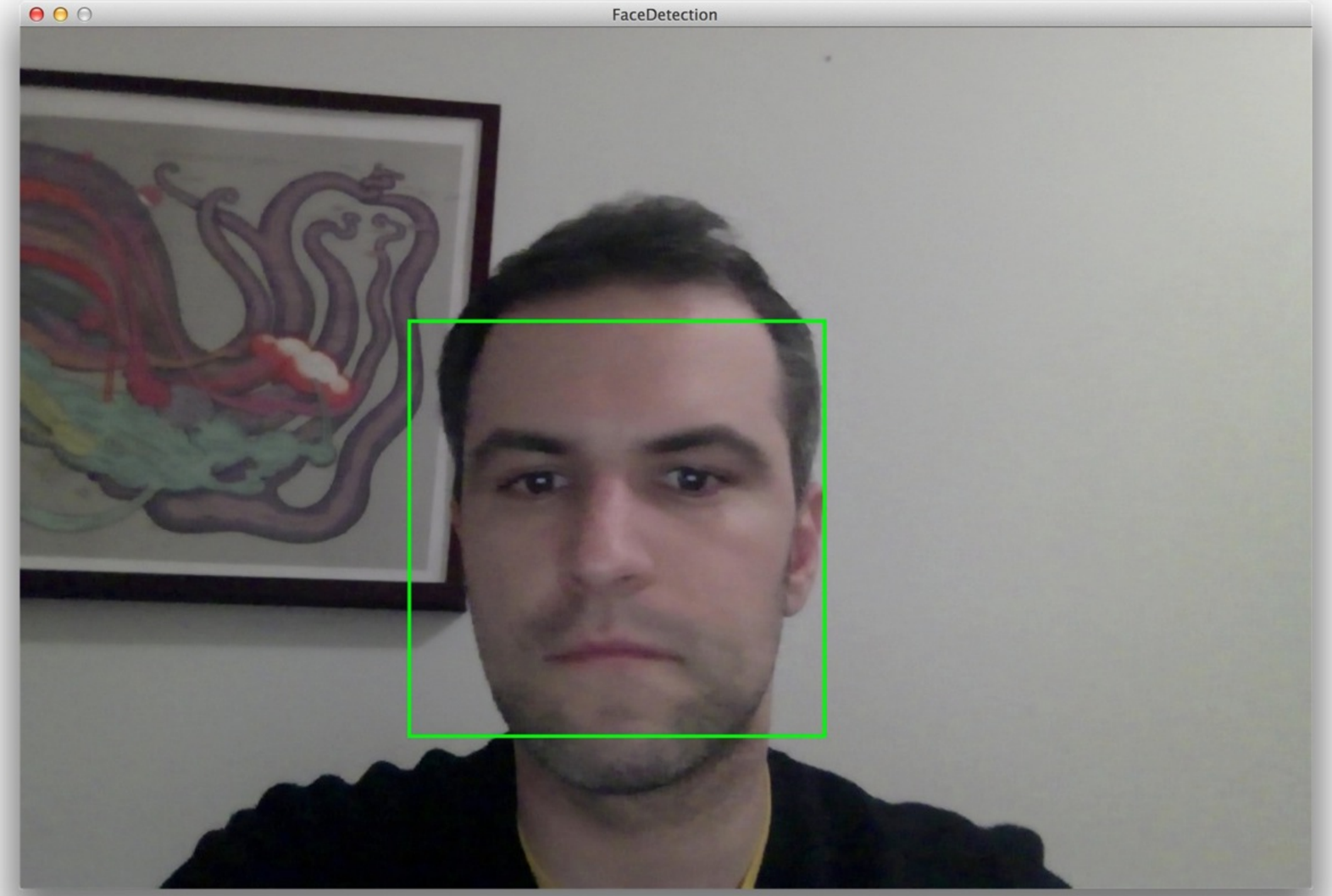
is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.

OPENCV-PROCESSING

https://github.com/atduskgreg/opencv-processing by Greg Borenstein

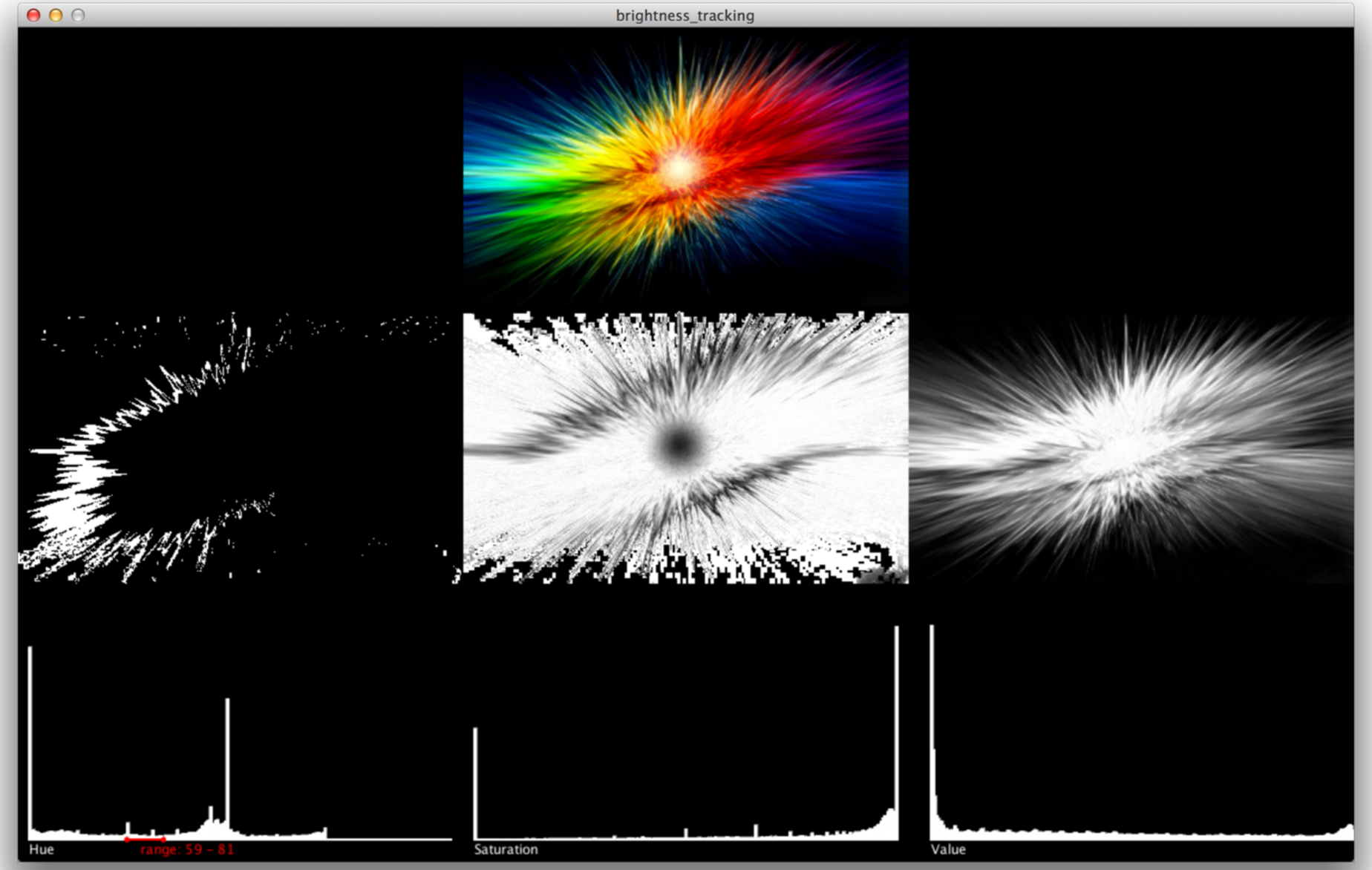

match_contours
TARGET SHAPE
0.011
0.032
0.000
0.191

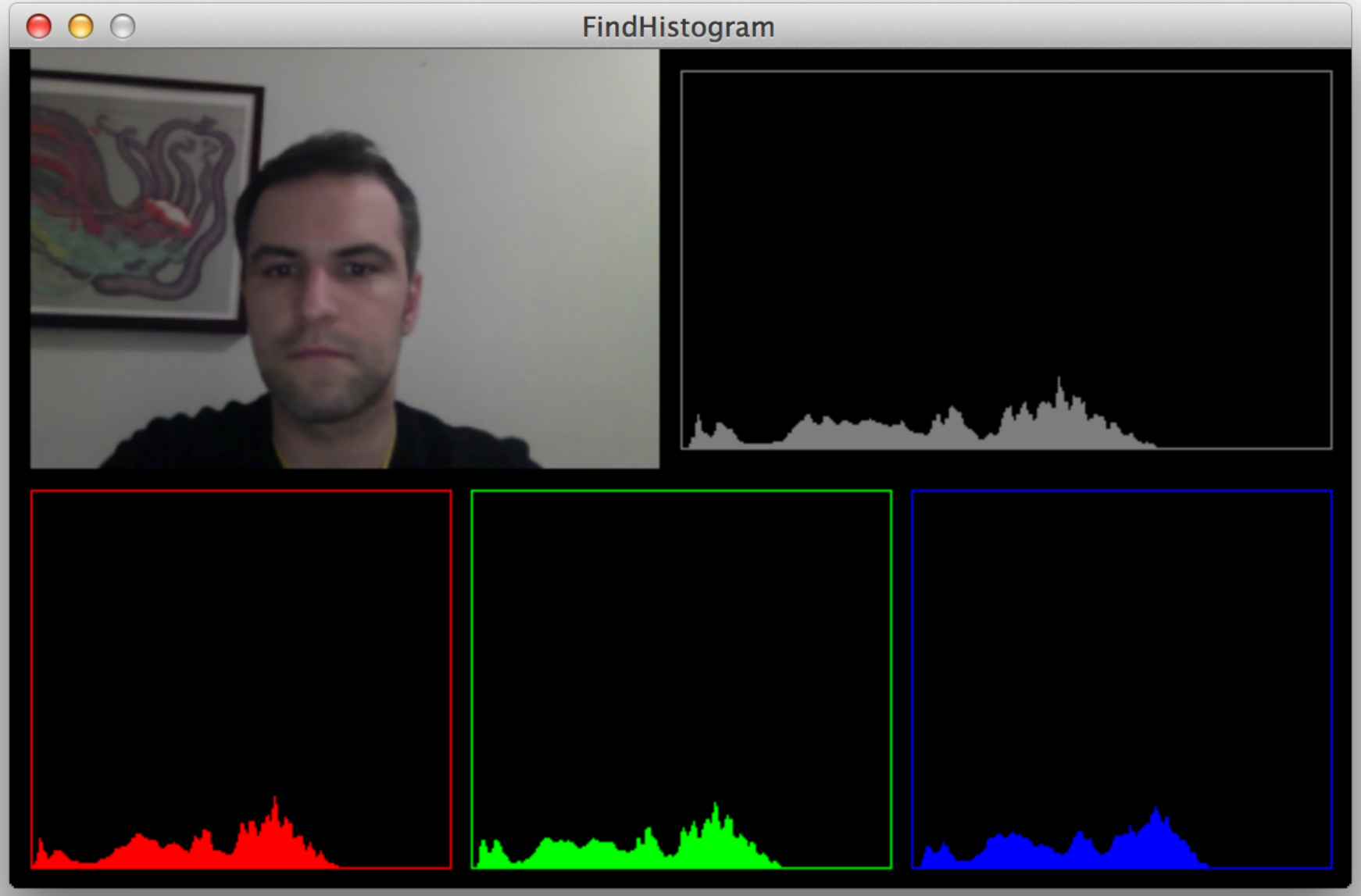

BlobContinuity
920
824
795
797
736
750
746
735
715
622
671
620
619
615
606
454
322
25
9


FaceDetection


multiface

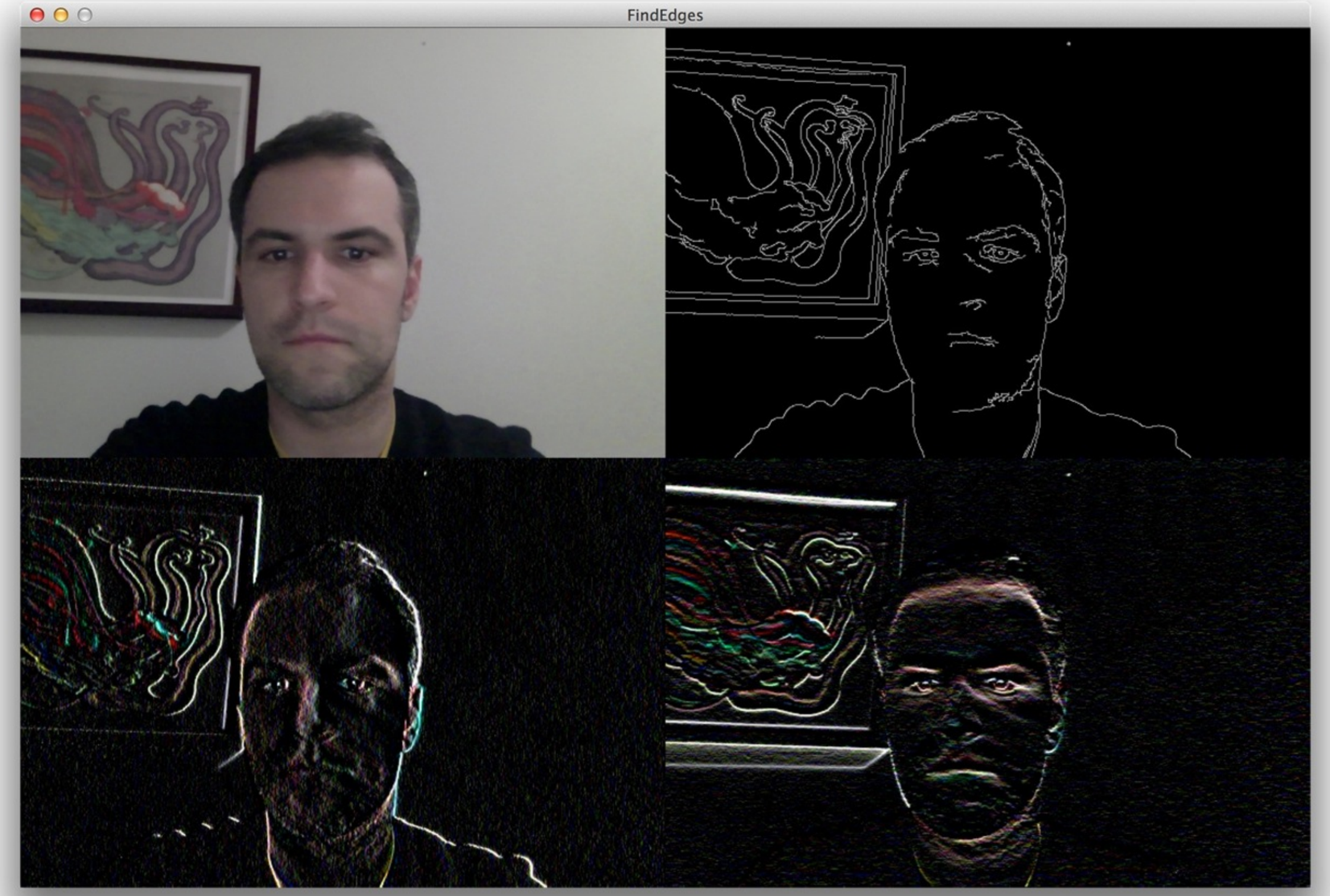

BrightnessTracking


brightness_tracking
Hue
range: 59 – 81
Saturation
Value

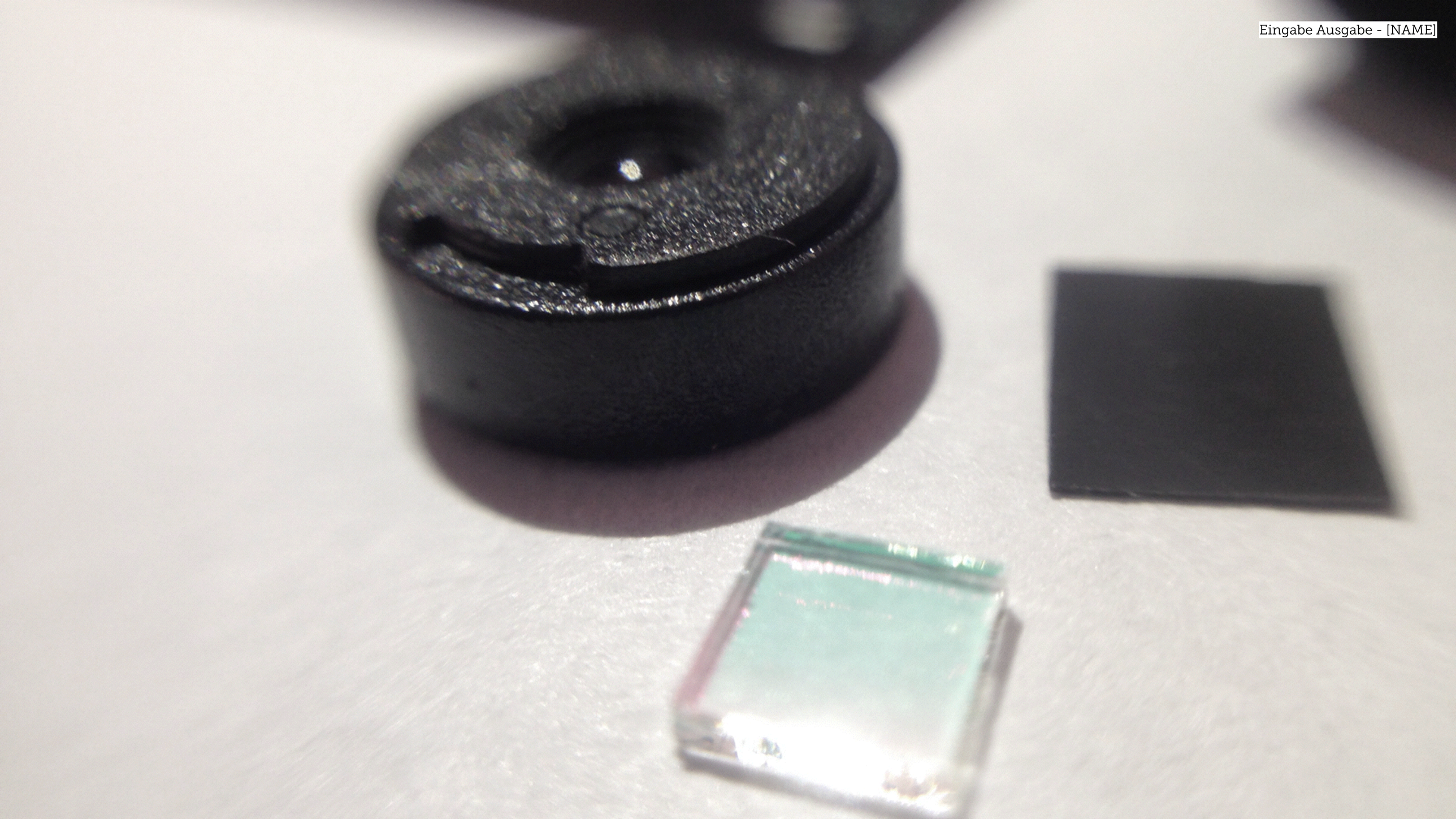

FindHistogram

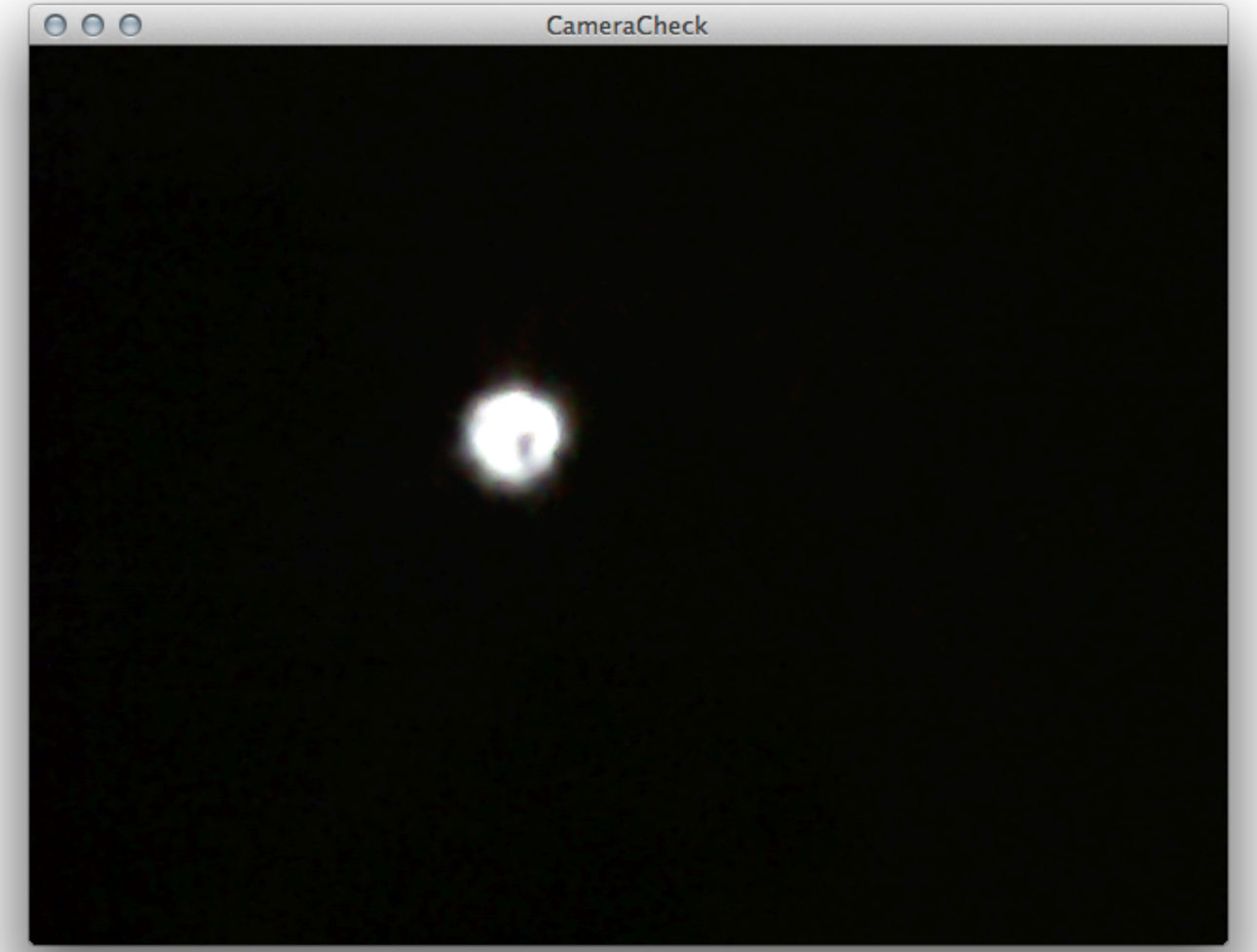

skin_detection


MarkerDetection

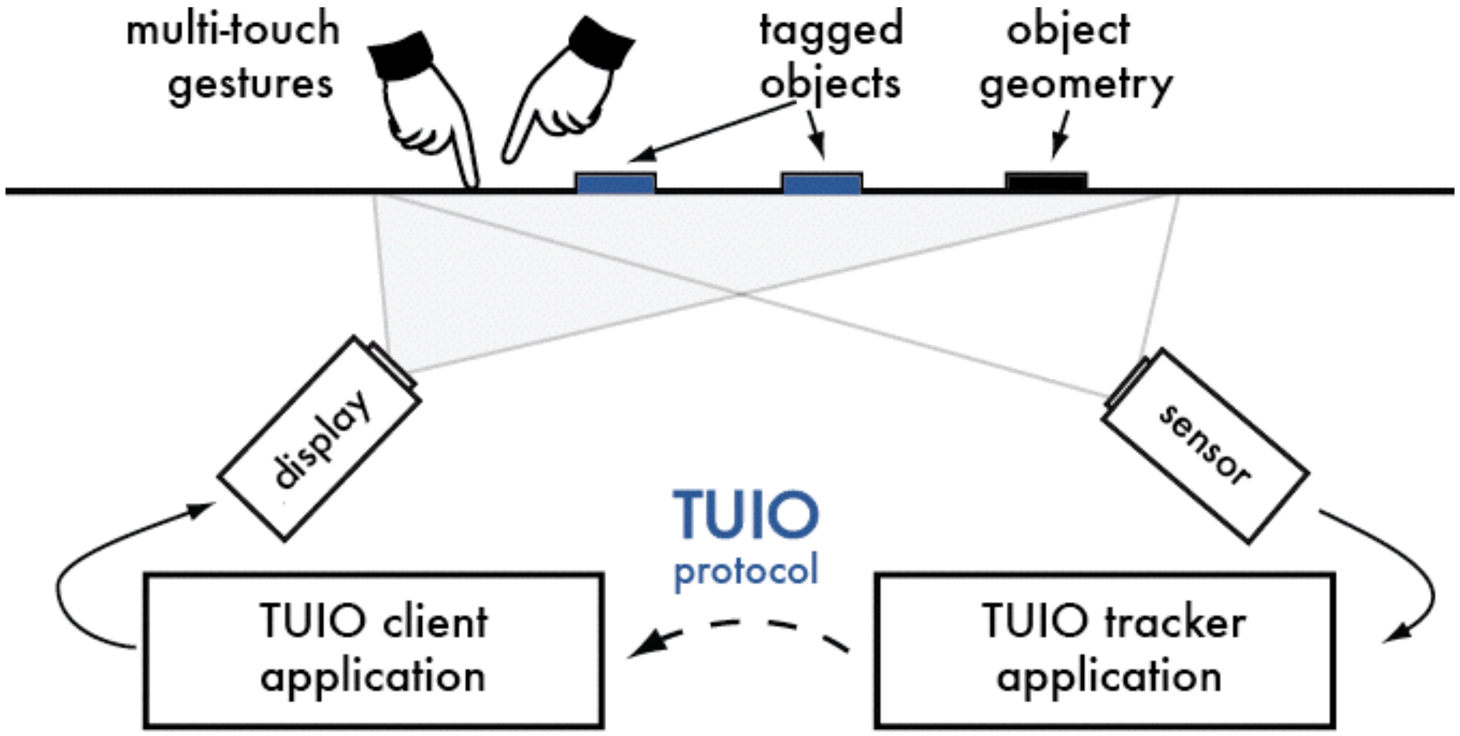

FindEdges

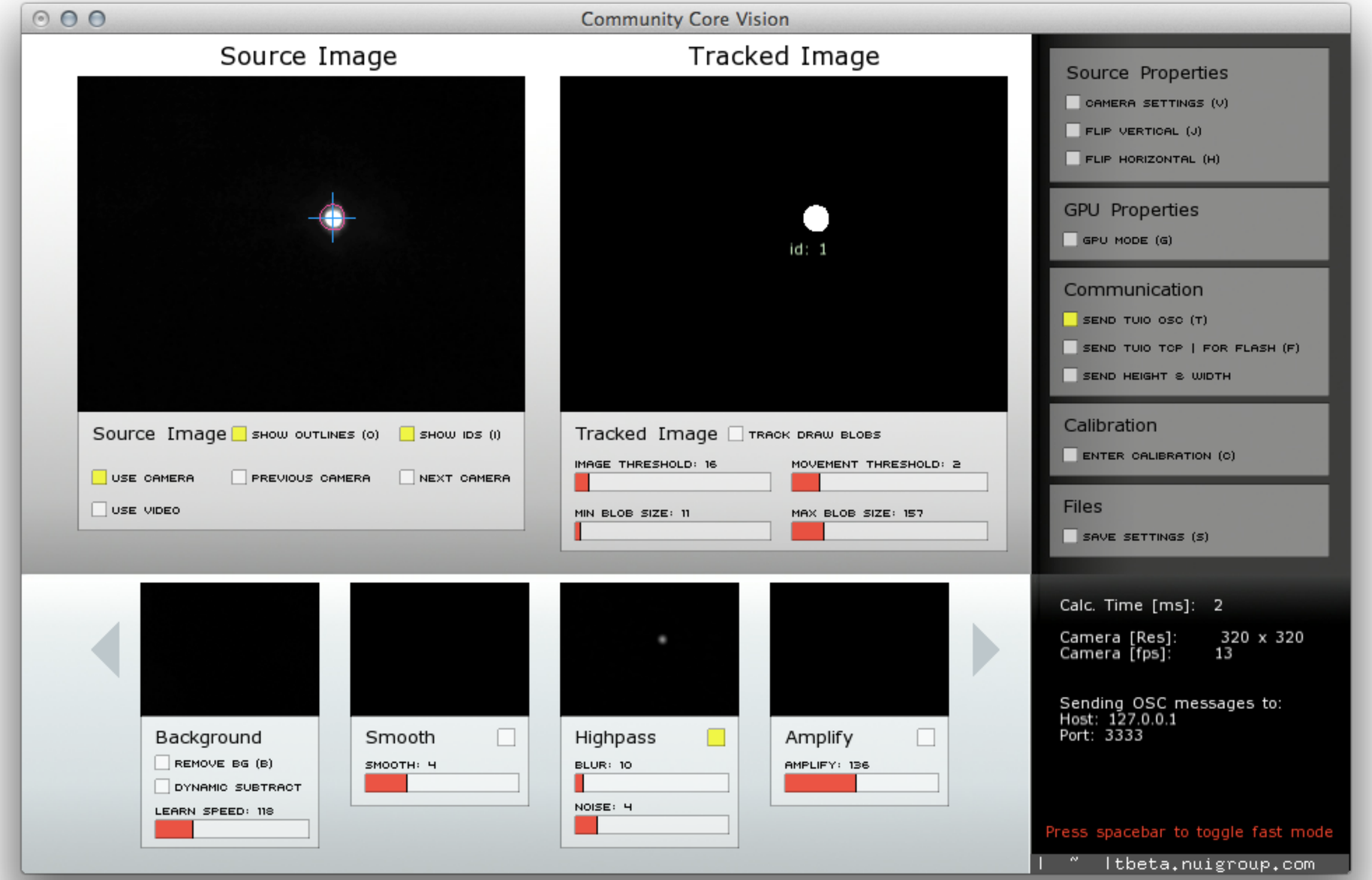
DIY IR CAMERA

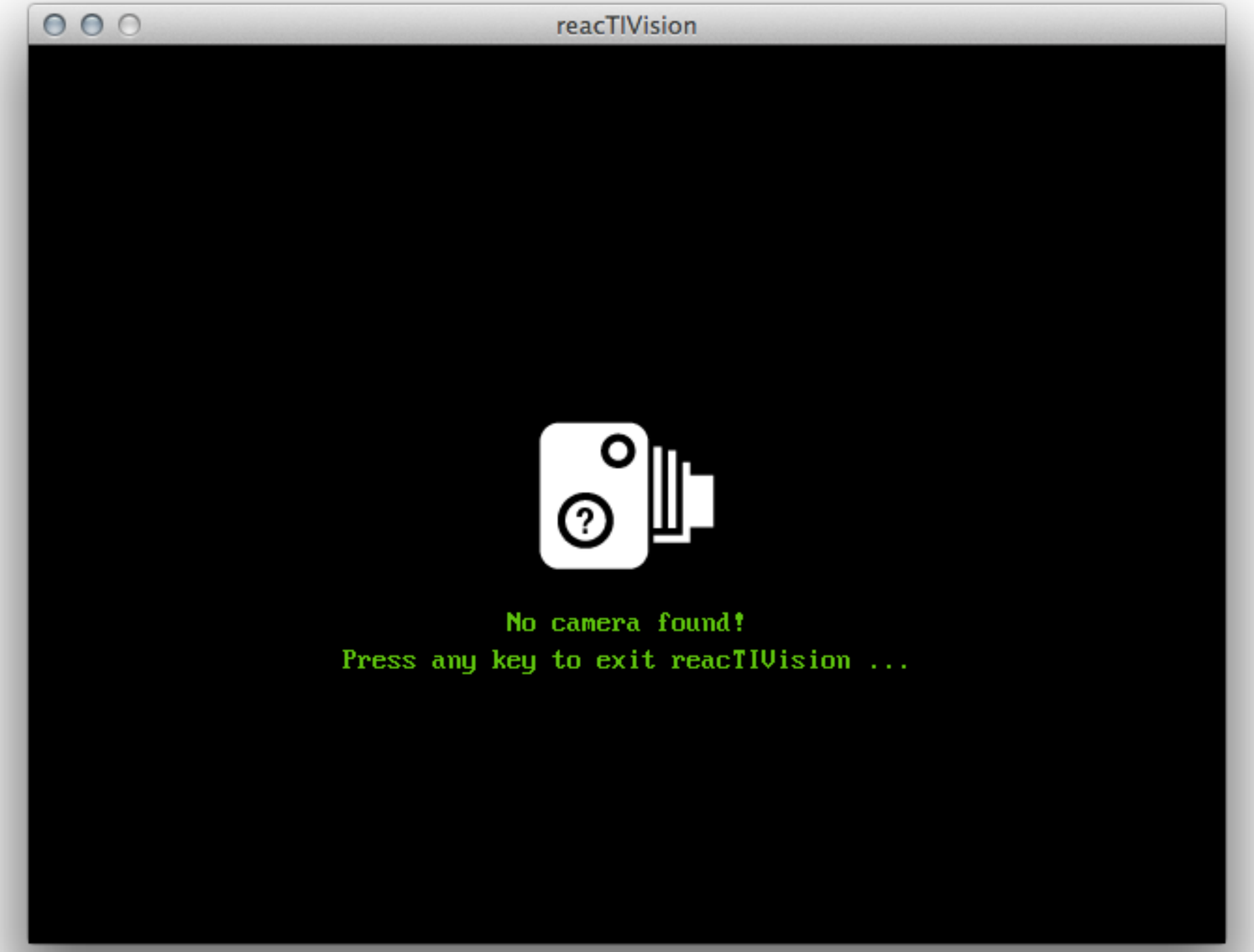



CameraCheck

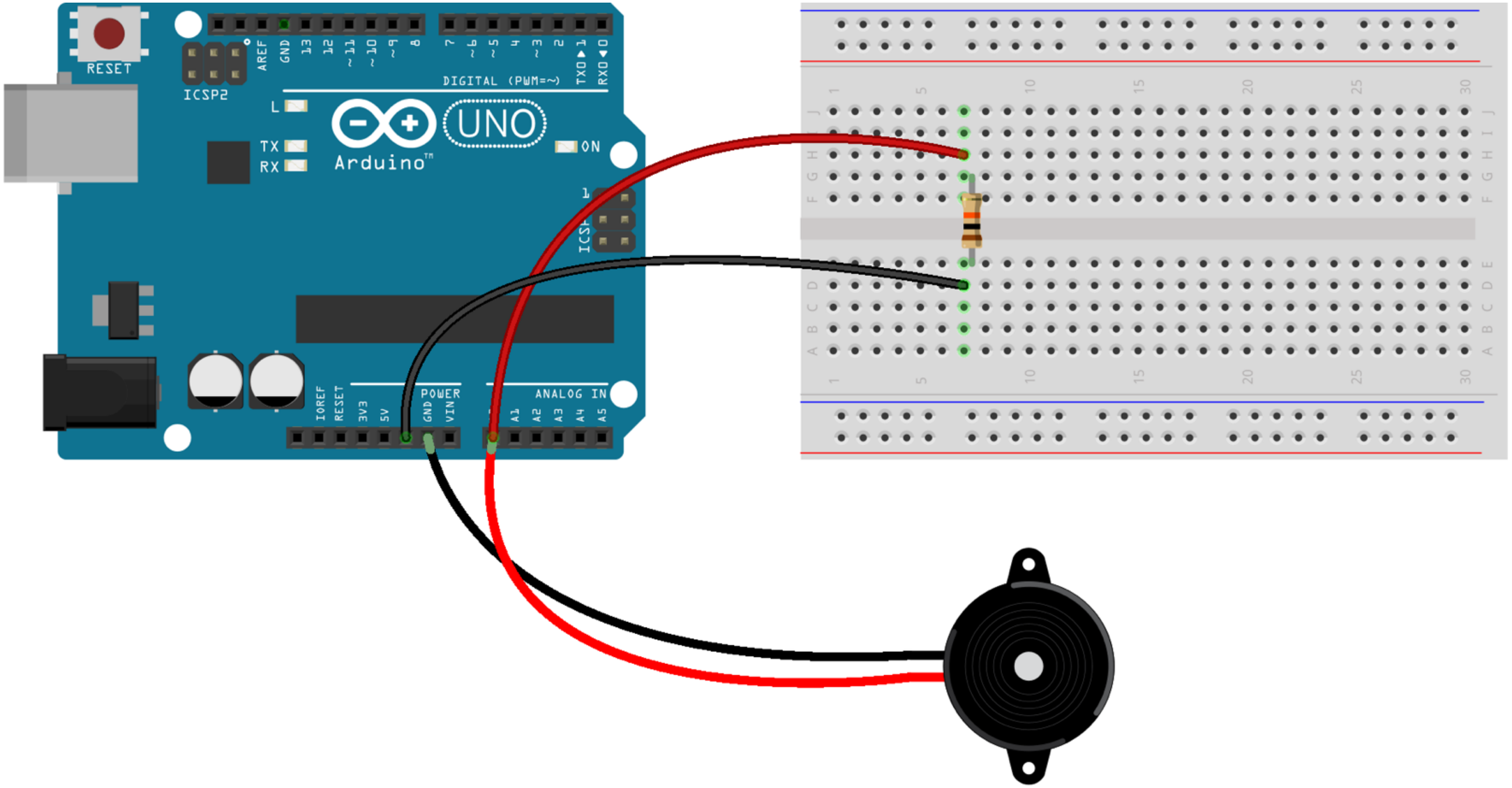
TUIO

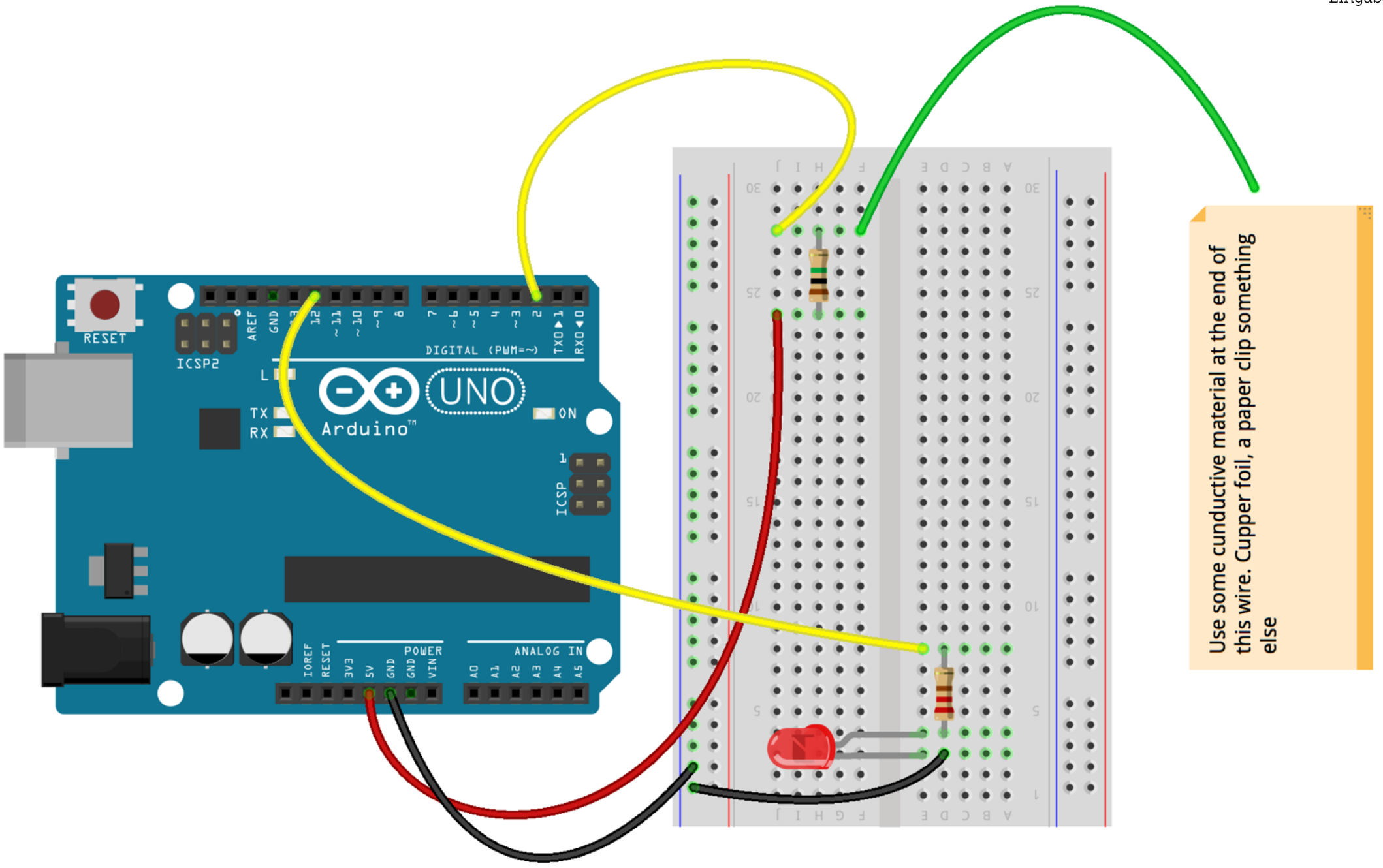

multi-touch
gestures
tagged
objects
object
geometry
display
sensor
TUIO
protocol
TUIO client
application
TUIO tracker
application

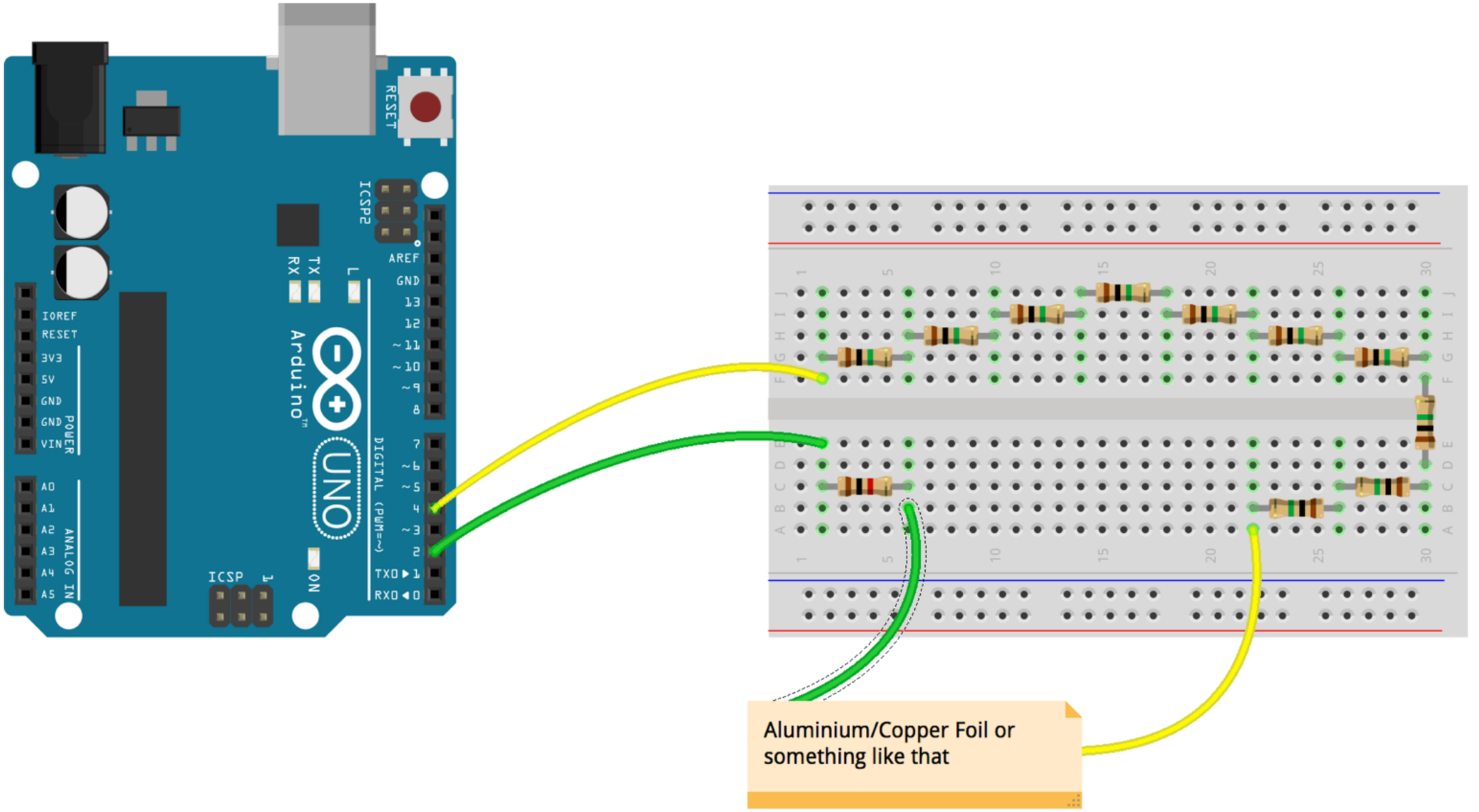

Community Core Vision
Source Image
Tracked Image
id: 1
Source Image
SHOW OUTLINES (O)
SHOW IDS (I)
USE CAMERA
PREVIOUS CAMERA
NEXT CAMERA
USE VIDEO
Tracked Image
TRACK DRAW BLOBS
IMAGE THRESHOLD: 16
MOVEMENT THRESHOLD: 2
MIN BLOB SIZE: 11
MAX BLOB SIZE: 157
Source Properties
CAMERA SETTINGS (V)
FLIP VERTICAL (J)
FLIP HORIZONTAL (H)
GPU Properties
GPU MODE (G)
Communication
SEND TUIO OSC (T)
SEND TUIO TCP | FOR FLASH (F)
SEND HEIGHT & WIDTH
Calibration
ENTER CALIBRATION (C)
Files
SAVE SETTINGS (S)
Background
REMOVE BG (B)
DYNAMIC SUBTRACT
LEARN SPEED: 118
Smooth
SMOOTH: 4
Highpass
BLUR: 10
NOISE: 4
Amplify
AMPLIFY: 136
Calc. Time [ms]: 2
Camera [Res]: 320 x 320
Camera [fps]: 13
Sending OSC messages to:
Host: 127.0.0.1
Port: 3333
Press spacebar to toggle fast mode
tbeta.nuigroup.com


reacTIVision
No camera found!
Press any key to exit reacTIVision ...

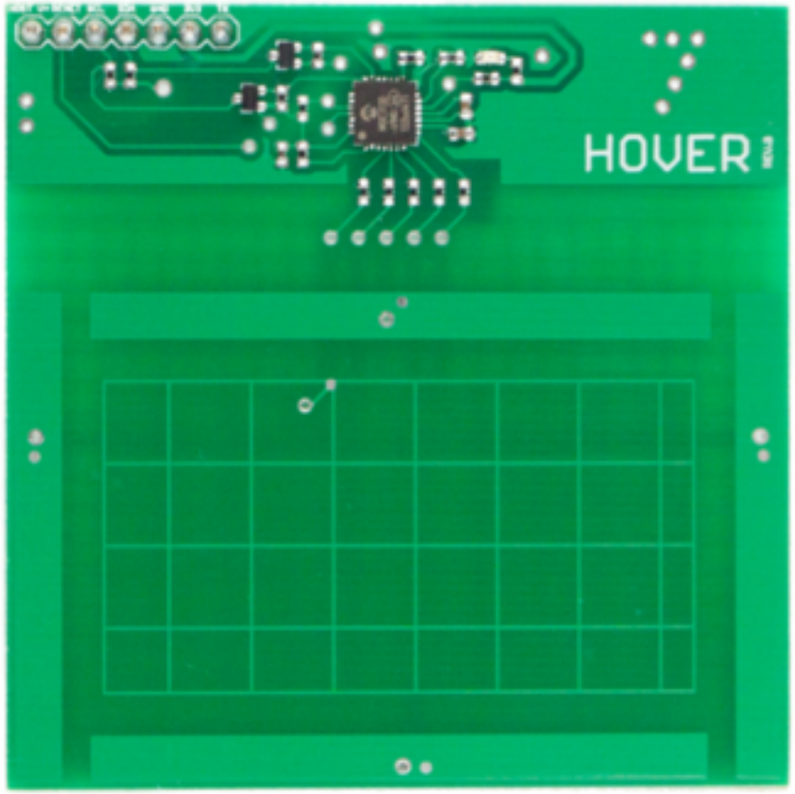
PHYSICAL COMPUTING


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TXD▲1
RXD◀0
DIGITAL (PWM=~)
L
TX
RX
UNO
Arduino™
ON
ICSP
IOREF
RESET
3V3
5V
GND
VIN
POWER
A1
A2
A3
A4
A5
ANALOG IN

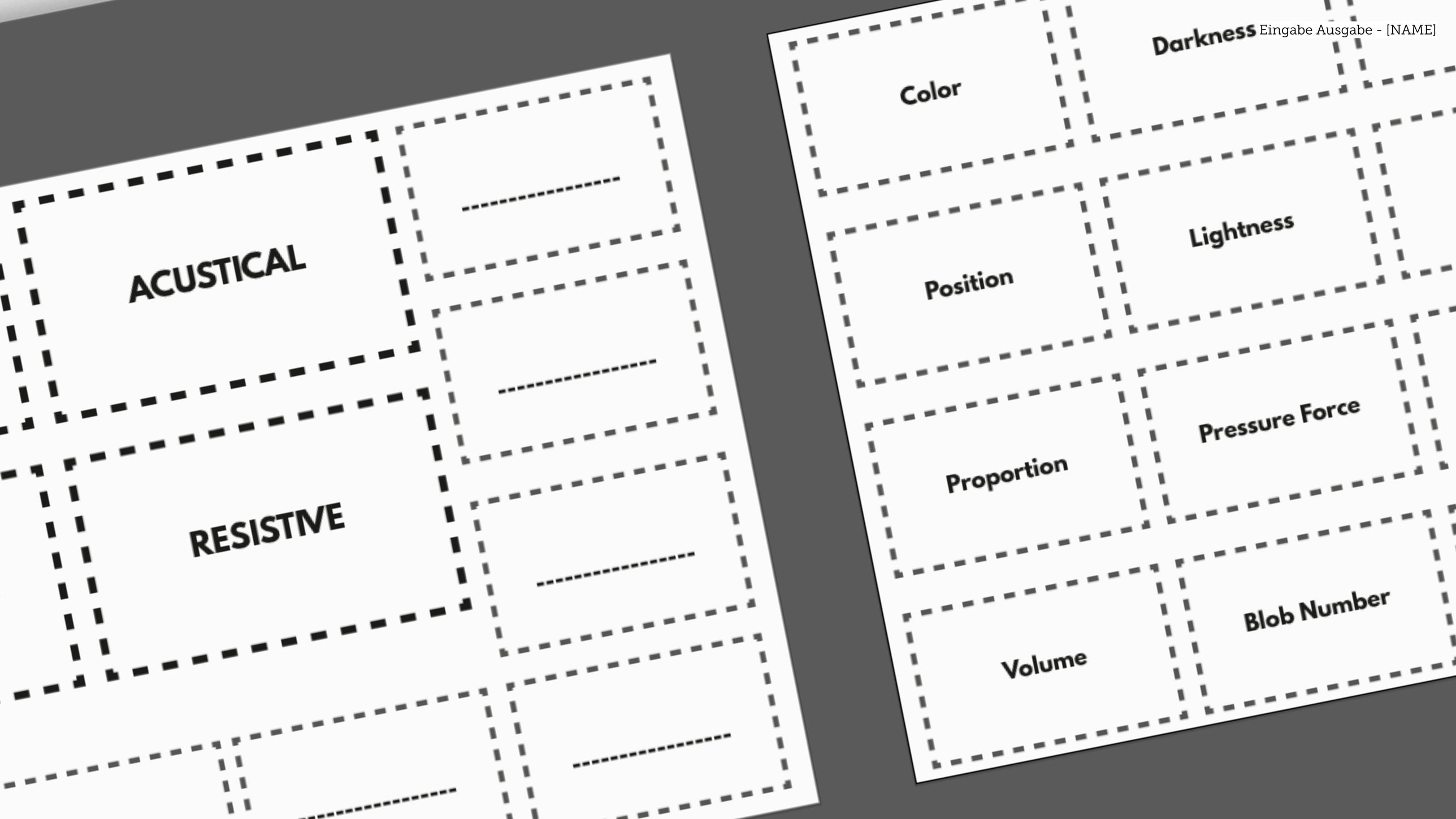

RESET
ICSP2
AREF
GND
DIGITAL (PWM=~)
TX→1
RX←0
L
TX
RX
UNO
Arduino™
ON
ICSP
POWER
ANALOG IN
IOREF
RESET
3V3
5V
GND
GND
VIN
A0
A1
A2
A3
A4
A5
Use some cunductive material at the end of this wire. Cupper foil, a paper clip something else


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM=~)
TX
RX
L
Arduino™
UNO
ON
ICSP
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
Aluminium/Copper Foil or
something like that


START
RST
USB


HOVER

IDEA GENERATOR


ACUSTICAL
RESISTIVE
Color
Darkness
Position
Lightness
Proportion
Pressure Force
Volume
Blob Number

GROUPS

EXERCISE

Connect || Think || Present