



École des Arts | Université Catholique Portugaise | Porto

Luís Teixeira

Digital Trends and the Impact of Emerging Technology On the Arts

13 June 2016





Logo#1

CITAR

Centre de Recherche en Sciences et Technologies de l'Art
École des Arts, Université Catholique Portugaise, Porto



Logo#2

Photo#1





Photo#1



Photo#2



45 integrated researchers

CITAR

Centre de Recherche en Sciences et Technologies de l'Art
École des Arts, Université Catholique Portugaise, Porto





Photo#1



Photo#2

Right
→

39 collaborating researchers

CITAR

Centre de Recherche en Sciences et Technologies de l'Art
École des Arts, Université Catholique Portugaise, Porto





Photo#1



Photo#2



Photo#3

Up↑

85 PhD Students

CITAR

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Photo#1



Photo#2



Photo#3



Ligne de **Recherche**
Cultural Heritage and Preservation Studies

(01)

Photo#1



Ligne de **Recherche**
Cultural Heritage and Preservation Studies

(02)

Photo#1



Photo#1



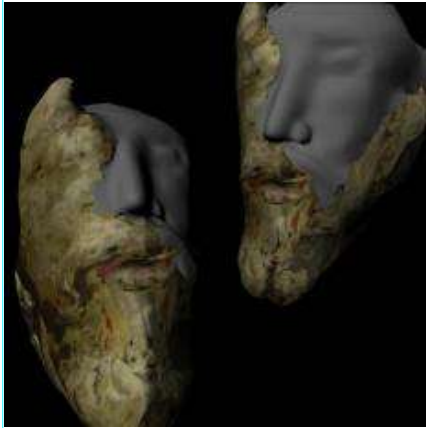
Photo#2



Ligne de Recherche
Cultural Heritage and Preservation Studies

(04)

Photo#1



Photo#1





Photo#1



Ligne de Recherche
Digital Creativity (Computer Music) (01)



Photo#2



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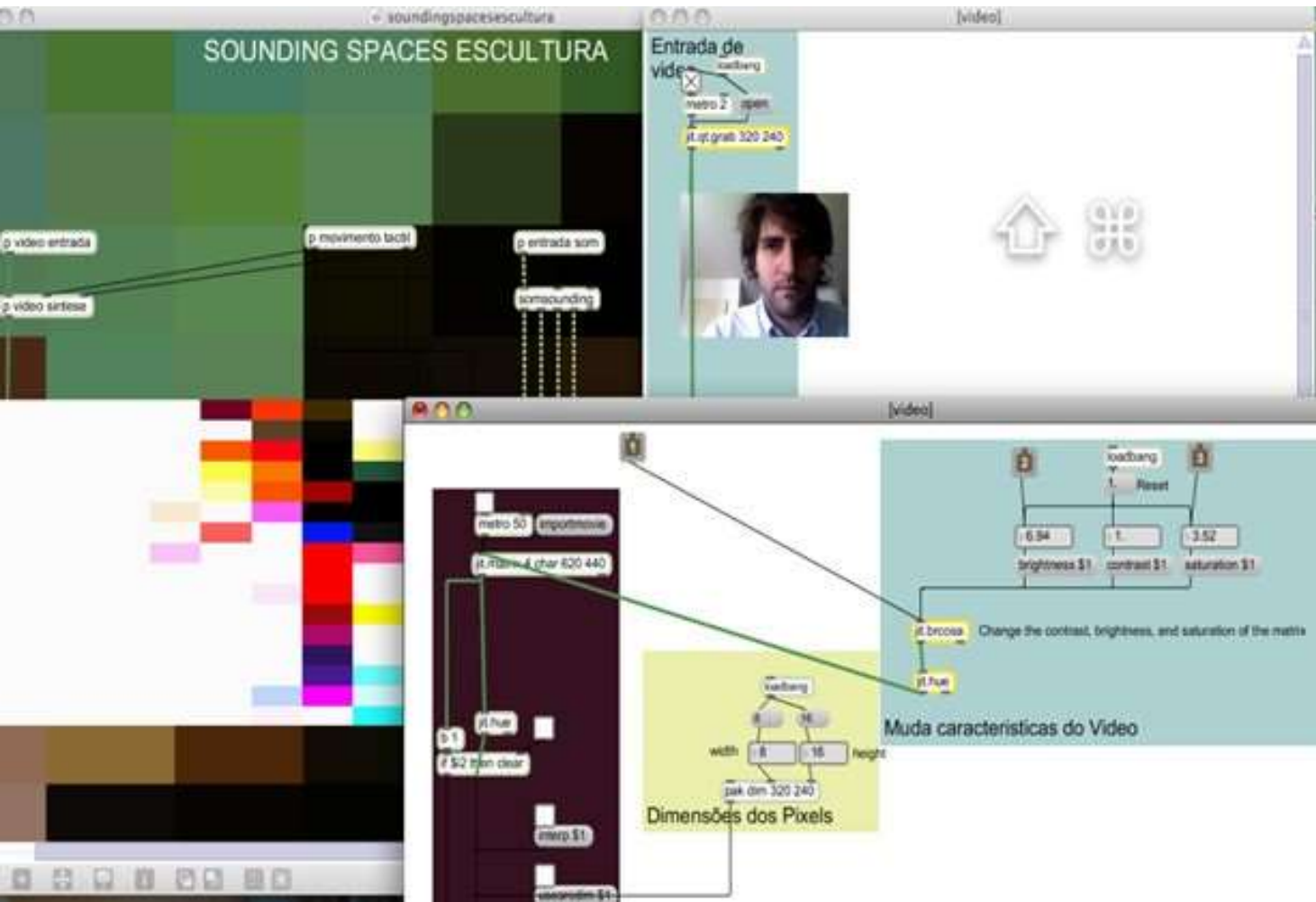
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Ligne de **Recherche**
Digital Creativity (Computer Music) (02)



Photo#2

Photo#1



Photo#2





Public Sound Objects



Phot#1



Photo#2

Multiple Location – Same Performance
ARTECH 2008: Rambouillet (FR) / Casa da Música (PT) /
SARC (IR)



CATÓLICA
PORTO

ARTES

“Multimodal Analysis of piano performance”,
and intends to characterize

Phot#1

Multimodal Analysis of piano performance
(Sofia Lourenco)



Logo#2

Photo#1



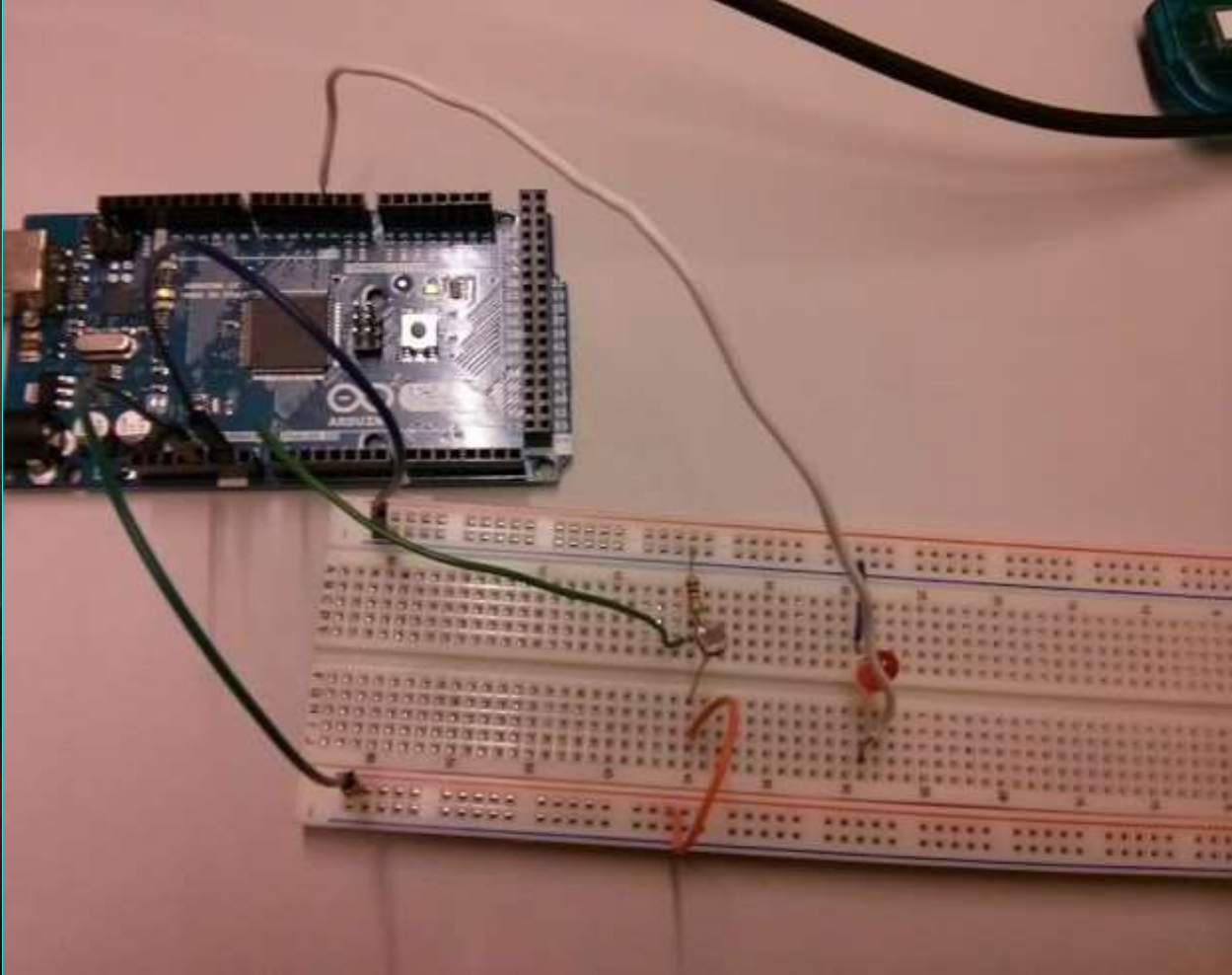
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Photo#1

Photo#2





CRAWLERS

AUDIOVISUAL INSTALLATION

Phot#1

Media, Art and Technology Project
(Peter Beyls)

<https://vimeo.com/128499538>

PORTO ACTORS with EARGRAM

AUDIOVISUAL FRAMEWORK



Phot#1

Media, Art and Technology Project
(Peter Beyls)

<https://vimeo.com/128499538>





Phot#1

Centro de Criatividade Digital (CCD)

OUTDOOR VIDEO PRODUCTION



INTERACTIVE ART LAB

Phot#1

Centro de Criatividade Digital (CCD)

Gestural interaction



"A gesture is a motion of the body that contains information. Waving goodbye is a gesture. Pressing a key on a keyboard is not a gesture because the motion of a finger on its way to hitting a key is neither observed nor significant. All that matters is which key was pressed".

-- Kurtenbach and Hulteen (1990), cited by Billinghamurst & Buxton (2011)

Technologies/Tools

- Touch surfaces, Consoles (Wiimote, Kinect), MoCap
- Computer Vision techniques

Gestural interaction: Touch surfaces

- Mostly planar, rectangular, glass(y) surfaces
- Various technologies for detecting touch
 - which have different limits for the number of simultaneous touches it can detect
- Gestures
 - Fingers only (small devices)
 - Hands/forearms (large(r) devices, depending on technology used)
 - 2d movements only
- Number of users
 - one - personal devices (phones, tablets)
 - few - large surfaces (tables, walls)

Gestural interaction: Touch surfaces

- Tablets/phones
 - Singing fingers
 - Jay Silver
 - <https://vimeo.com/12010952>
 - Single-person interaction, fingers



- Medium/Large surfaces
 - Interactive tables (Reactables)
 - Diffused illumination technique
 - Horizontal orientation
 - Up to four people interacting
 - Fingers, hands shapes
 - Three available @ EArtes



Gestural interaction: computer vision

Computer vision (CV) techniques (non depth- cameras)

- Various kinds of surfaces/scenes
- Gestures
 - Varied, depends on positioning of camera
 - fingers
 - hands
 - whole body
 - mostly 2d, but can also infer distance
 - not very precise
 - can be very precise with controlled conditions



Balance, Jorge Coutinho
<https://vimeo.com/40506946>



Swap (Tiago Dionisio, Rudolfo Quintas)
<http://www.youtube.com/watch?v=OSKpXZjECtY>

Wiimote

- Nintendo game controller
 - Wireless: uses bluetooth to connect to a computer
 - Has various accelerometer sensors to sense movement
 - IR sensor for pointing
- Gestures
 - 3d movement, rotation
 - combined with the sensor bar, allows pointing gestures
- Various wiimotes available @ EArtes



Kinect

- Xbox game controller
 - Depth camera: senses the distance of each pixel to the camera (Borenstein 2012).
- Gestures
 - Detects a "point cloud" - pixels and their distances to the camera
 - With extra software it's possible to detect limbs (skeleton) positioning
 - More accurate than simple cameras
- Two available @ EArtes



YScope medical interface

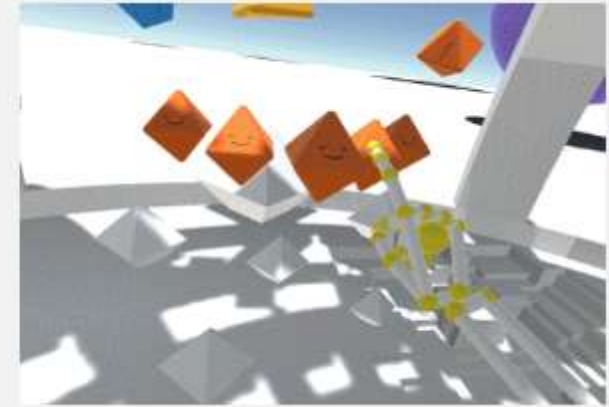
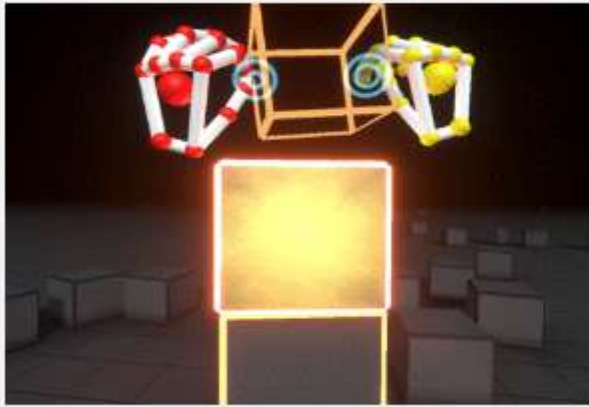
- Ydreams
- Gestural interface for an operating room
- <http://www.youtube.com/watch?v=91F6zErnCrs>

Unnamed soundsculpture

- Daniel Franke & Cedric Kiefer
- Using various Kinect to model a dancer and then process the data into visual effects (honorary mention from the Prix Ars Electronica)
- <https://vimeo.com/38505448>



Gestural interaction: LeapMotion



Leap Motion

New controller for hand interactions

<https://leapmotion.com/>



MoCap - Motion Capture

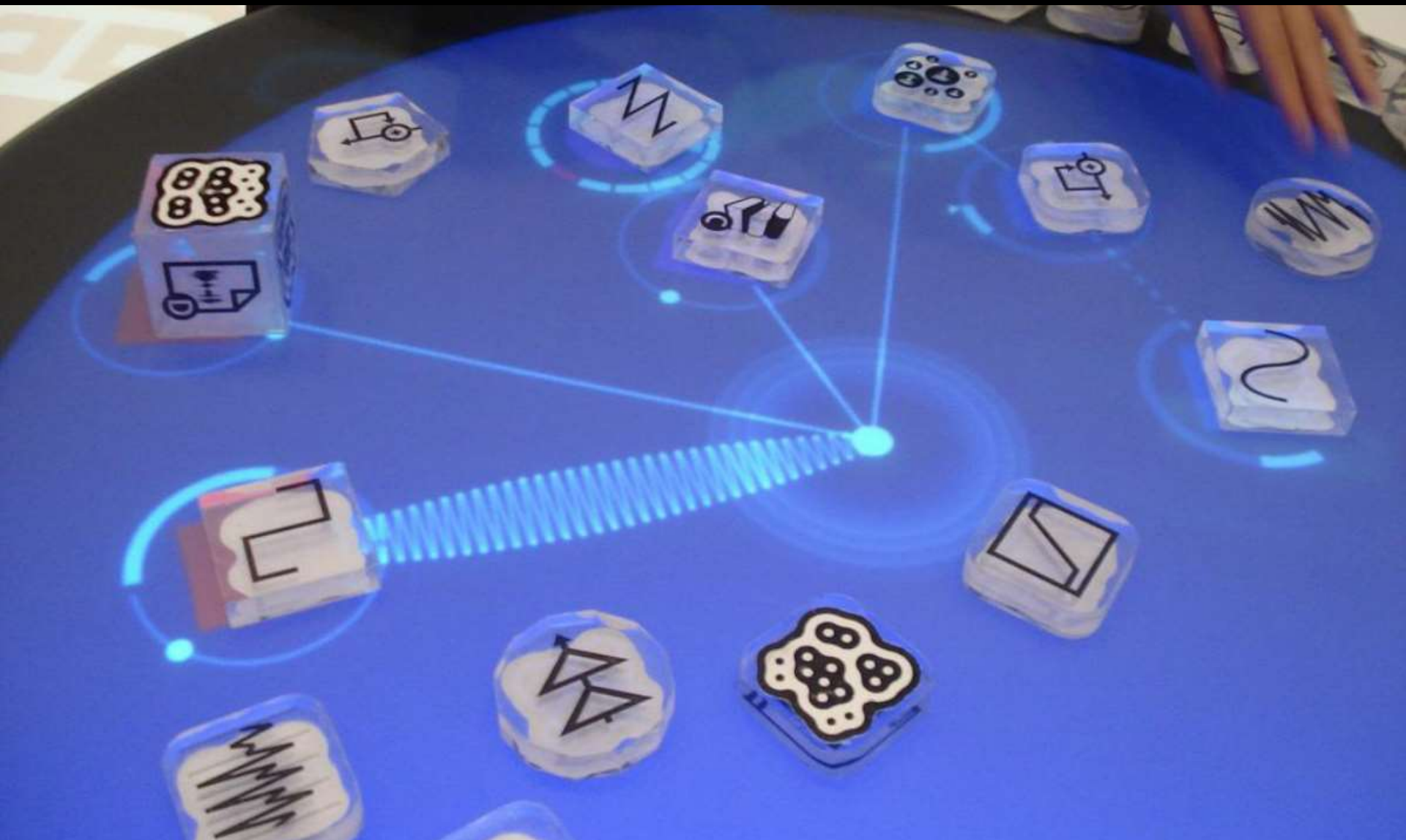
- MoCap Room (Vicon MoCap available @ EArtes)
- High-speed infrared cameras detect markers placed on actor's body
- Gestures
 - Highly accurate gestures
 - <https://www.youtube.com/watch?v=bLi8ci3uQYY>

This is the Pacifica

- Troll (identity project)
- <https://vimeo.com/90280165> (Troll Teaser)
- <https://vimeo.com/90278414> (Troll Brand Development)
- Post-production company based in Berlin
- bronze at Cannes Lions.



Tangible interaction



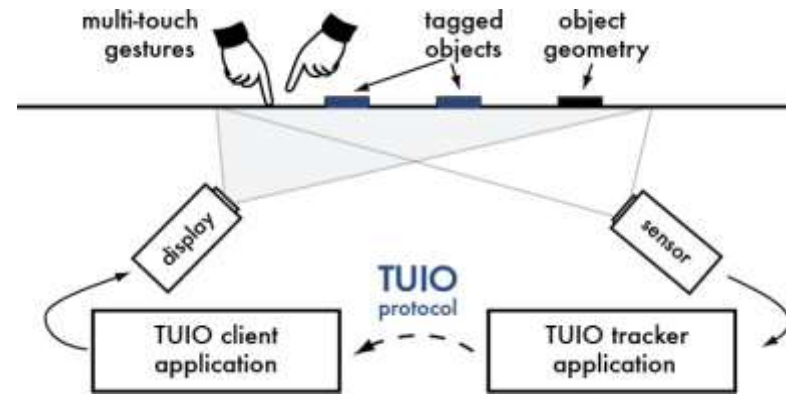
Tangible interaction

"[...] tangible interfaces give **physical form to digital information**, employing **physical artifacts** both as **representations** and **controls** for **computational media**. TUIs couple physical representations (e.g., spatially manipulable physical objects) with digital representations (e.g., graphics and audio), yielding **user interfaces that are computationally mediated**, but generally not identifiable as "computers" per se."

Ullmer & Ishii (2000)

Example: Tangible musical instrument

- Users manipulate physical objects to create and control the sound
- Can be used as a general tangible framework
- <https://www.youtube.com/watch?v=Mgy1S8qymxo>



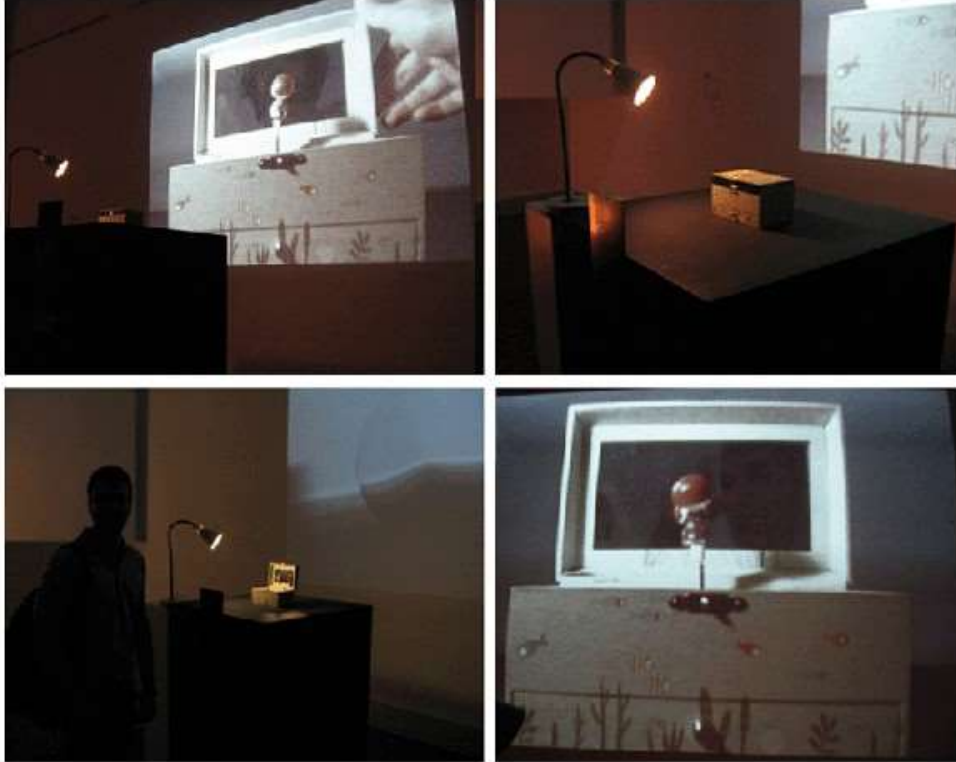
Tangible interaction



THE LITTLE WATER DROP GIRL - A Menina Gotinha de Água multimedia opera by Miguel Azguime

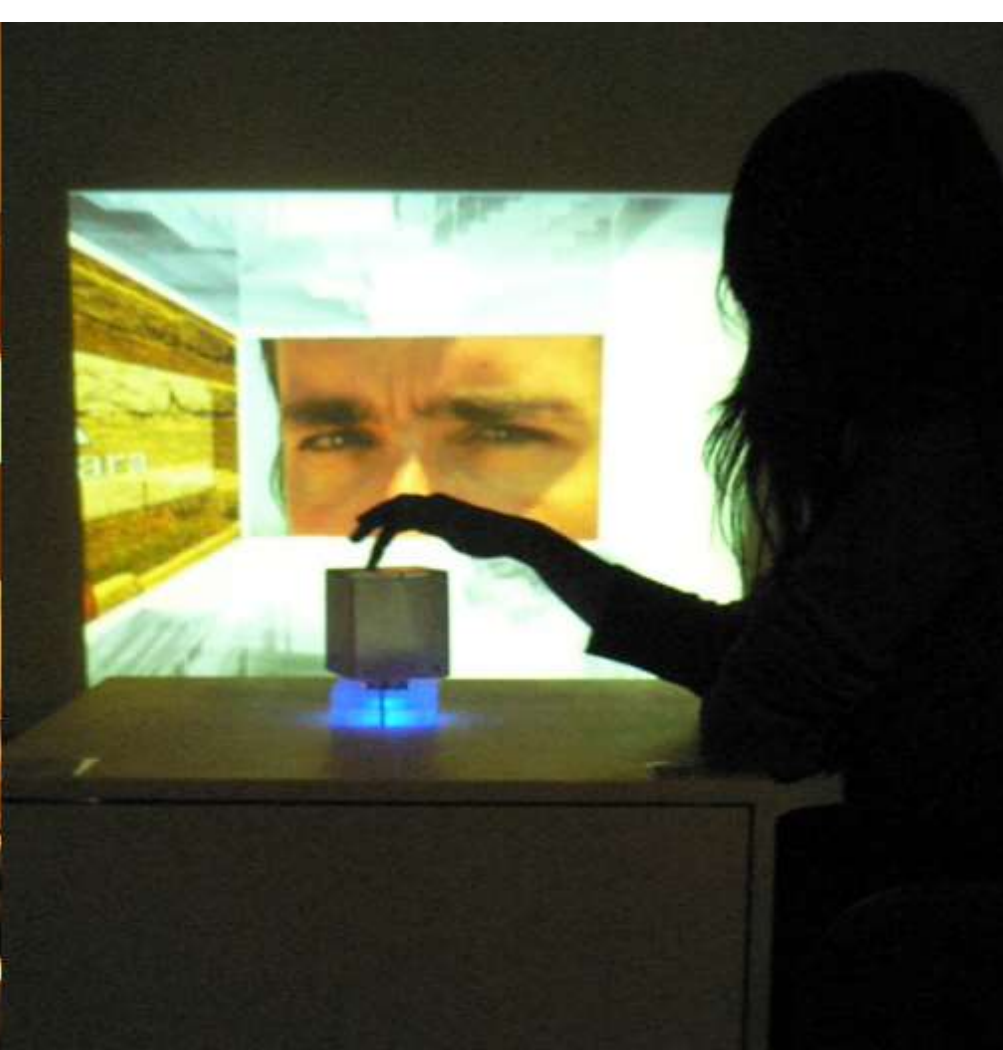
- http://youtube.com/watch?v=TIfSReHo_xM

Tangible interaction



Faustine

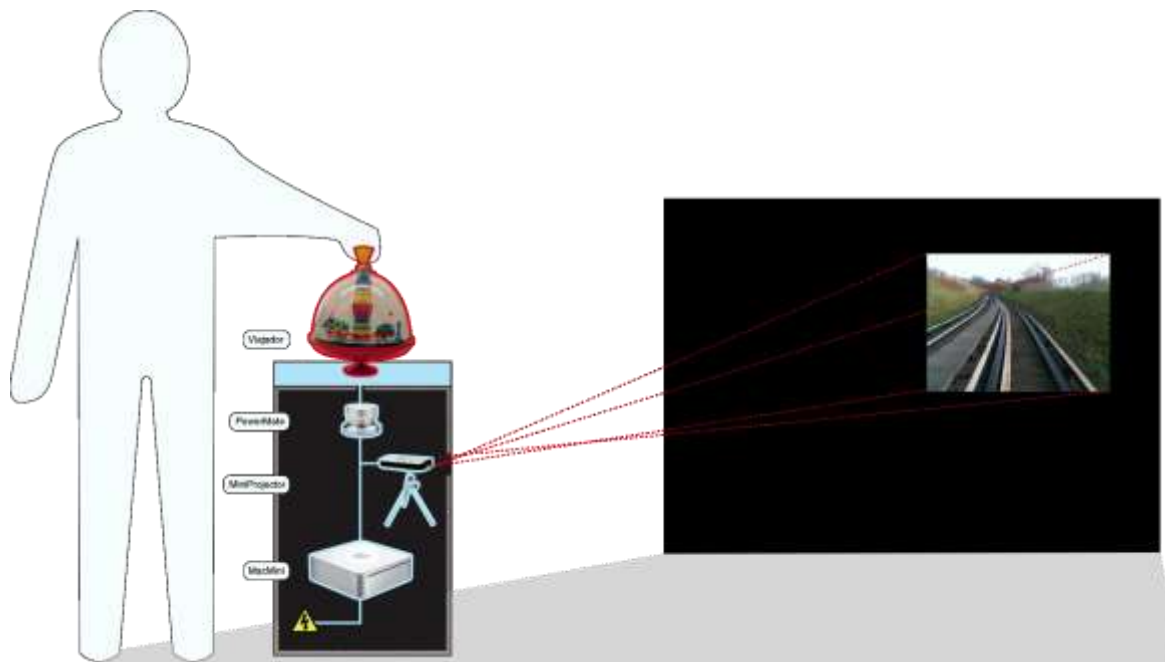
- Carlos Caires & Jorge Cardoso
- Interactive video installation inspired by the short story "Morel's Invention"
- <https://vimeo.com/19043202>



Transparency ©Carlos Sena Caires 2007
<http://www.carloscaires.org/i-Cinema/transparency.html>



Muriel ©Carlos Sena Caires 2007



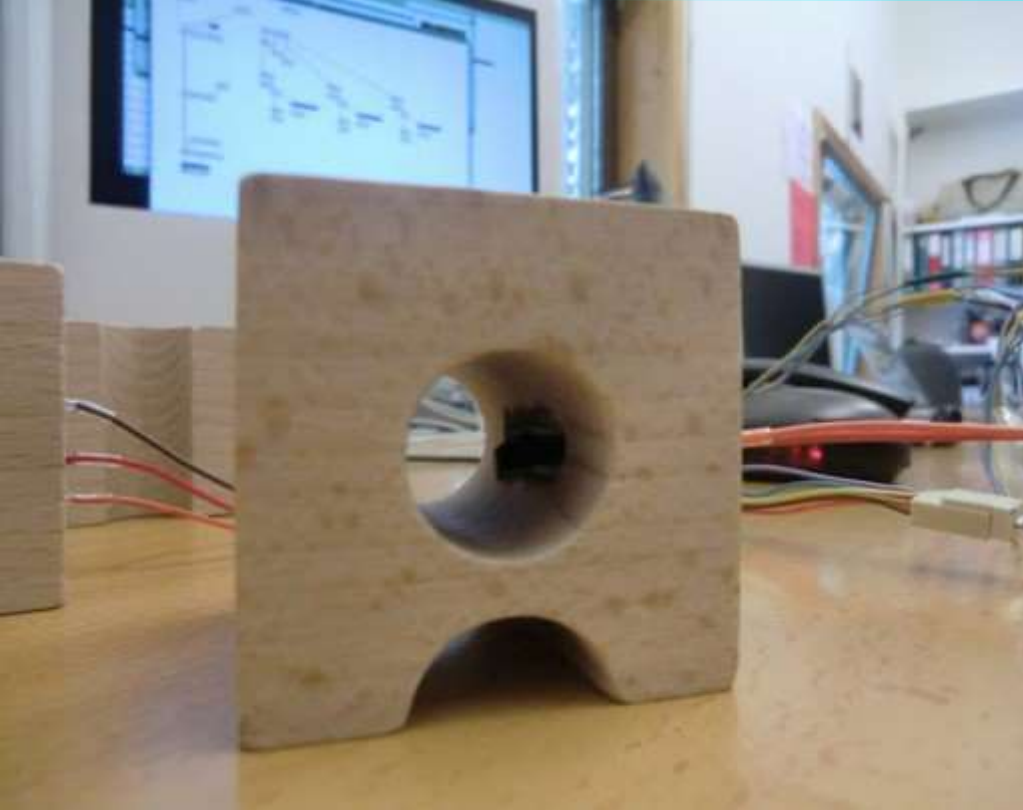
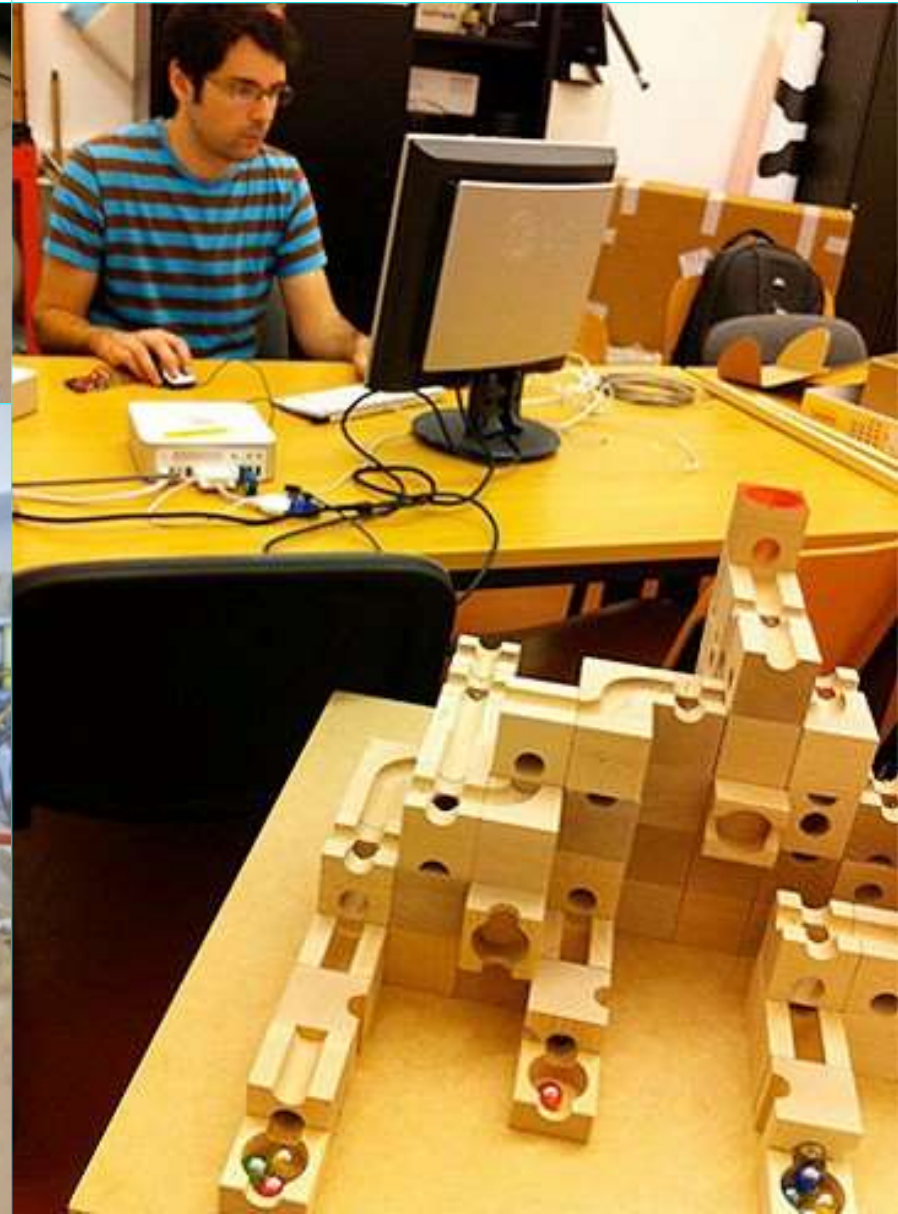
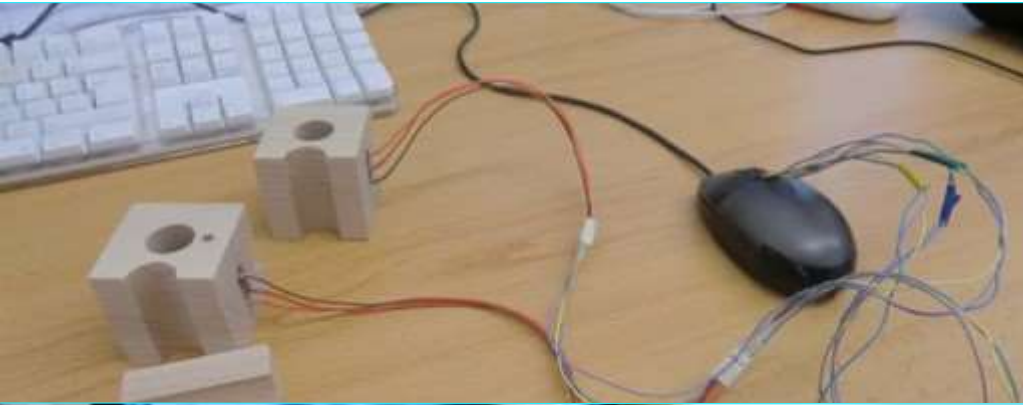
The Train of Love ©Carlos Sena Caires 2010



The Garden of Time ©Carlos Sena Caires 2011

Carlos Caires & Jorge Cardoso
Interactive video installation inspired by the short story "The Garden of Forking Paths"
<https://vimeo.com/24836769>

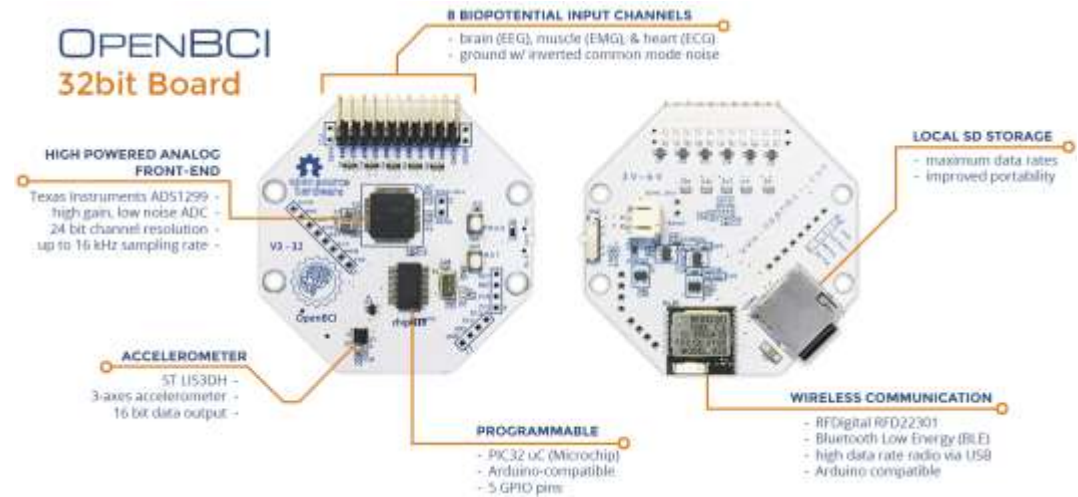
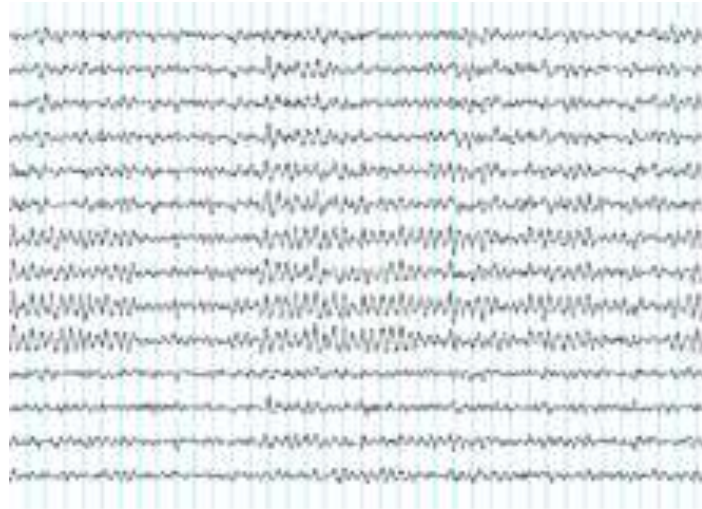
The Garden of Time ©Carlos Sena Caires 2011



Brain interfaces



Brain interfaces

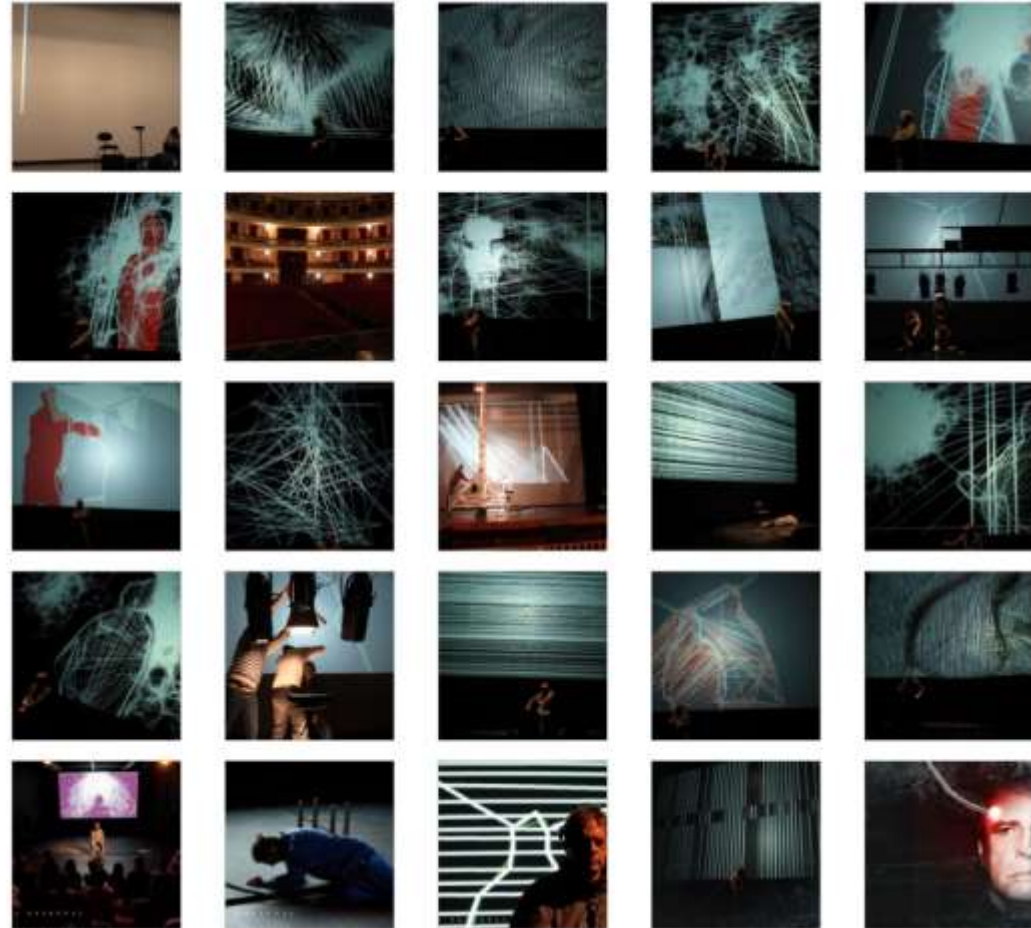


Brain-Computer Interfaces (BCI) or Mind- Machine Interface (MMI)

- Using brain signals to interact with computers.
- Usually based on EEG readings ([Electroencephalography](#))
- Various commercial devices available

Câmara Neuronal

- a neuro-audio-visual performance
- 2012
- <http://jmartinho.net/camara-neuronal/>
- <https://vimeo.com/92256535>



Brain interfaces



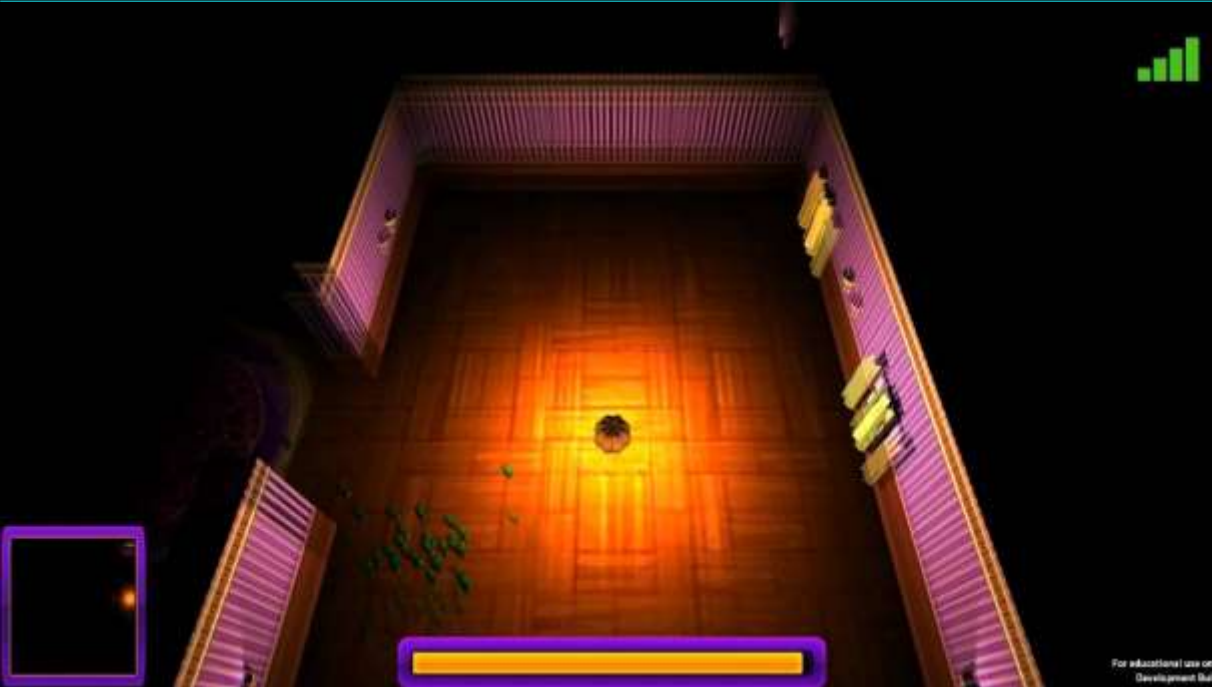
KEPHNOISE

3kta, 2012

<https://vimeo.com/54086998>

<http://s-v-m.tumblr.com/post/98712725039/sensitive-interfaces-iii>

Brain interfaces



Mansion Maze 3 BCI Game Trailer

Eric Rosendale, Ian McCabe, Veronica Cole, Aaron DeChamplain, and Matt Stephan
BCI Game

<http://www.youtube.com/watch?v=sdYAlrr9nDw>

<https://www.youtube.com/user/hcigames>

Tools

Neurosky Mindset (available @ EArtes)

EPOC neuroheadset - <http://emotiv.com/emortal/cart/>

Processing library

Neurosky Mindset Processing

<http://jorgecardoso.eu/processing/MindSetProcessing/>

Wearable computing



Geordi La Forge, Star Trek The Next Generation character wearing the VISOR

Wearable computing

"Wearable computing is the study or practice of inventing, designing, building, or using miniature **body-borne computational and sensory devices**. Wearable computers may be worn under, over, or in clothing, or may also be themselves clothes" (Mann, 2012)

Steve Mann's "wearable computer" and "reality mediator" inventions of the 1970s have evolved into what looks like ordinary eyeglasses.



Image from: <http://www.eyetap.org/research/wearables/wearcomp/wearables.html>

Wearable computing



See U in my Tee

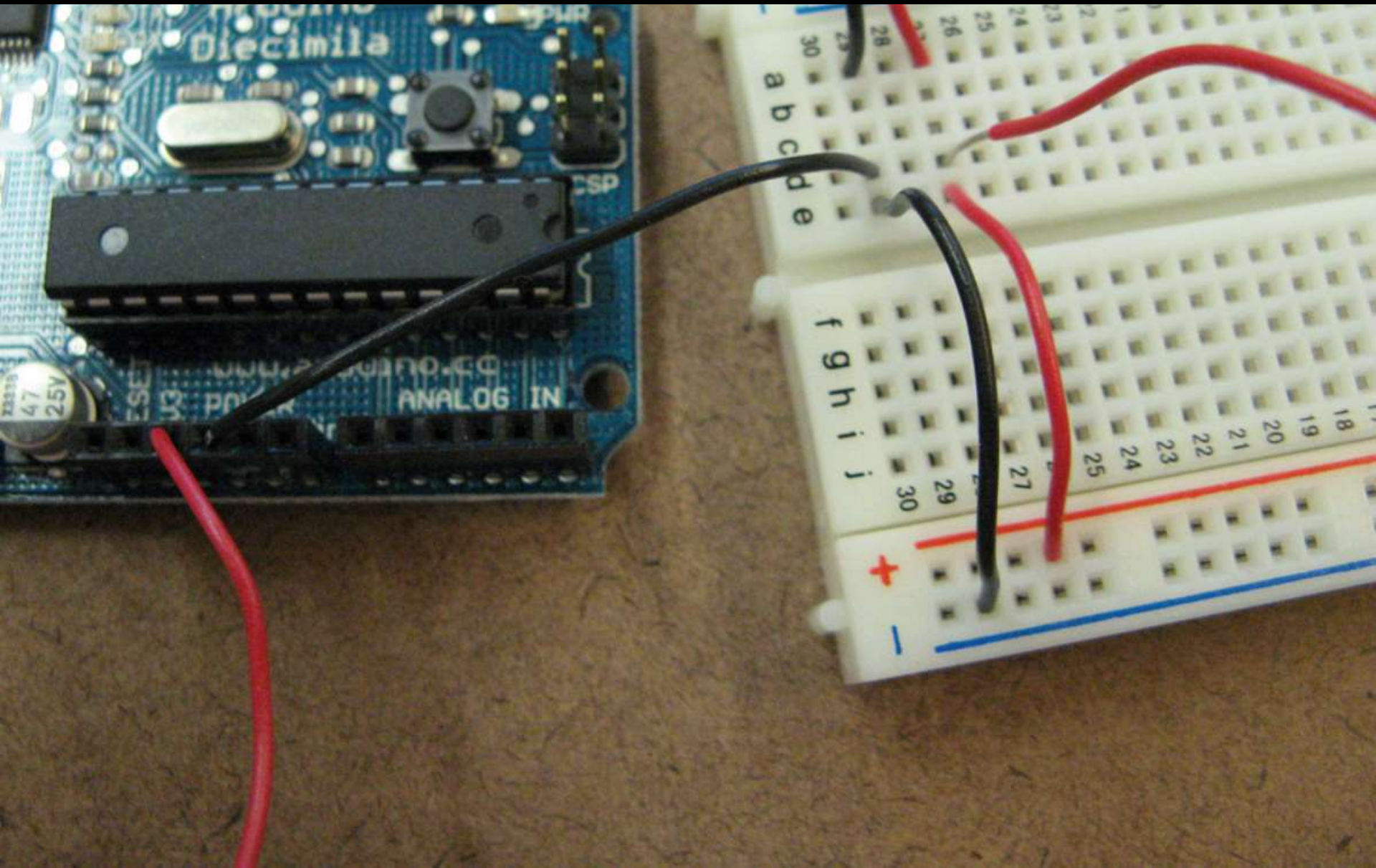
Inês Petiz

T-shirts that react to the presence of other t-shirts

<http://wearable-technology.blogspot.pt/>

<http://www.talk2myshirt.com/blog/archives/3511>

Physical computing



Physical computing

"Physical computing, in the broadest sense, means **building interactive physical systems** by the use of software and hardware that can sense and respond to the analog world. (...)

In the broad sense, physical computing is a **creative framework** for understanding human beings' relationship to the **digital world**.

In practical use, the term most often describes handmade art, design or DIY hobby projects that use sensors and microcontrollers to translate analog input to a software system, and/or control electro-mechanical devices such as motors, servos, lighting or other hardware."

(Physical computing 2012)

Physical computing



Syndyn

- André Rangel and Anne-Kathrin Siegel
- “Concept that merges aesthetics, physical activity and entertainment. Syndyn= syn (syn - from Greek "together") + dyn (dynamic from Greek dynamikos, “powerful”).
- <https://vimeo.com/20859799>
- <http://s-v-m.tumblr.com/post/98712725039/sensitive-interfaces-iii>

Physical computing



Little Bits

- Each littleBit has one unique function (light, sound, sensors, buttons).
- create interactive projects without any background in engineering, programming or wiring, in a few seconds.
- open source
- <https://vimeo.com/45276780>

MakeyMakey

- Circuit board that connects to a computer via USB and allows everyday objects to become controllers
- <http://www.makeymakey.com/>
- <https://vimeo.com/60307041>

Digital public displays



Digital public displays

- Digital displays located in public areas, allowing anyone to see/interact with them
 - Traditionally, public displays have been used to broadcast information from one active source to millions of passive receivers
 - Digital public displays can change this
 - Turning receivers into active receivers
 - Supporting dynamic locally relevant information
 - Supporting user-generated content (many to many content distribution)
 - Everyone can interact
 - Everyone can see you interacting
 - Everyone sees the results from the interaction

Digital public displays



Honda Interactive Billboard using SMS and Bluetooth

- Users can "start" the car via SMS
- <https://www.youtube.com/watch?v=36ZBtCXIQ70>

Mini Billboard Interactive

- The billboard displays the names of the Mini car owners passing by
- http://www.nytimes.com/2007/01/29/business/media/29cooper.html?_r=0
- <https://www.youtube.com/watch?v=e5bEBotmMQI>

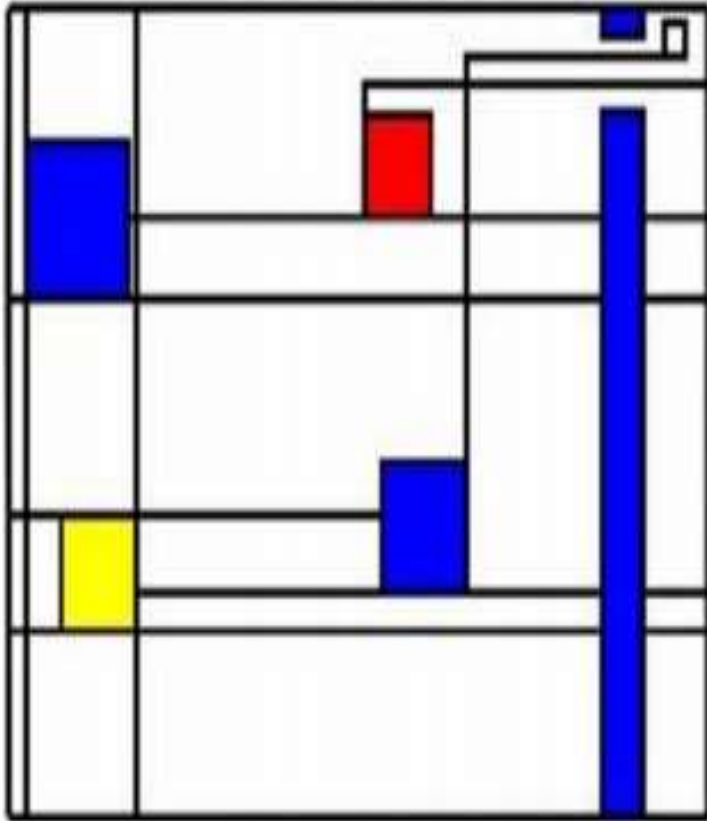
Digital public displays



Nikon D700

- The billboard plays flashing cameras as people pass by.
- <http://www.thecoolhunter.net/article/detail/1570/nikon-d700-guerrilla-style-billboard>

Digital public displays



Informative Art ambient display

- Skog et al. 2003
- Display bus information (only the bus number 16 - two in each direction)
- Size of square: amount of time before bus leaves
- Color: Time to leave to the bus stop
- Position: right - buses to the city center; left - buses from the city center

Mobile computing



Mobile computing

- Mobile computing is human–computer interaction by which a computer is expected to be transported during normal usage, which allows for transmission of data, voice and video.
 - Mobile computing involves mobile communication, mobile hardware, and mobile software.
- (Mobile computing 2016)

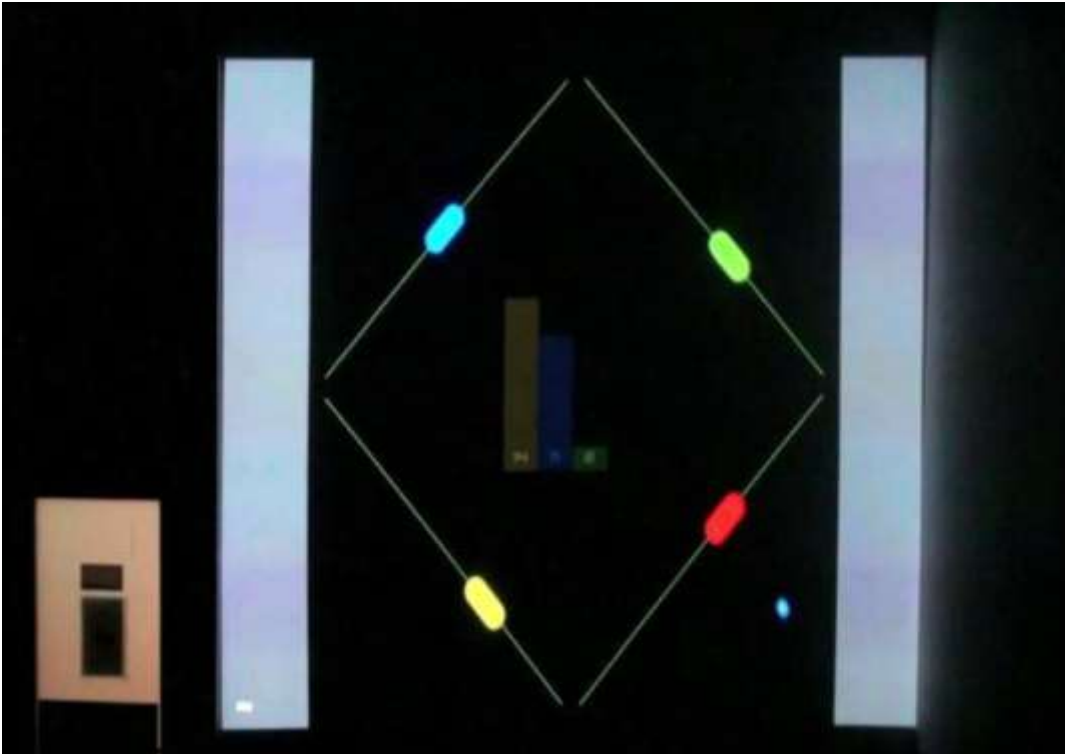
Mobile computing



X-Fetch

- Daniel Santos, João Rema
- City-wide game, peddy paper like
- Players have to discover a set of clues spread across the city (Porto) using a mobile device that plays videos pointing to next clues and that tracks players GPS locations
- <https://jpn.up.pt/2005/10/29/x-fetch-quando-o-real-e-o-virtual-se-confundem>

Mobile computing



Pom

- Jorge Coutinho
- Jogo Pong estendido a seis jogadores
- <https://vimeo.com/18579379>

