October 6th 2015

Physical Computing

In the Real World

Who Is This Person

Meanderer

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🌏 Google Creative Lab

👍 Interactive Installations & Hackathons

🎓 Design Computing Graduate, Exchanged in San Diego

Meanderer

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Contents

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History

A little bit of evolutionary history

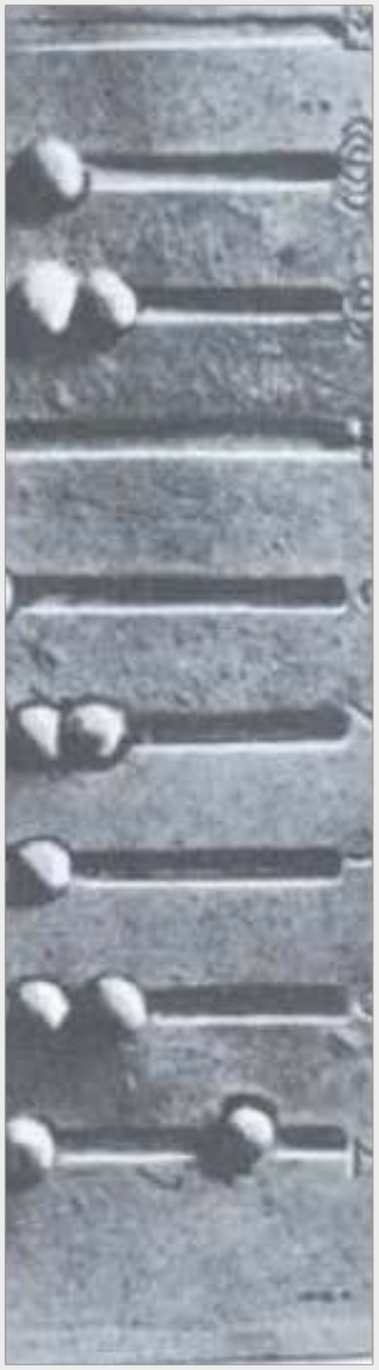
History

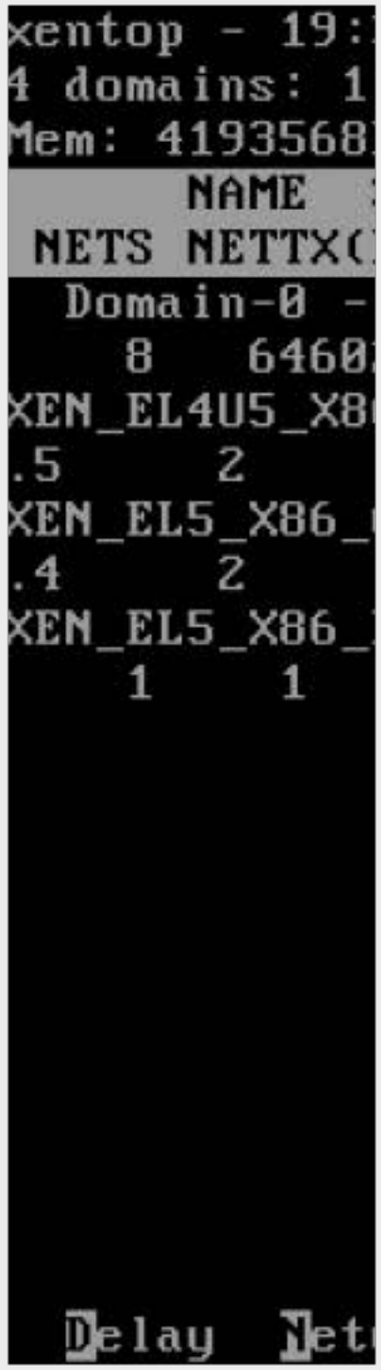
Lights : Evolution

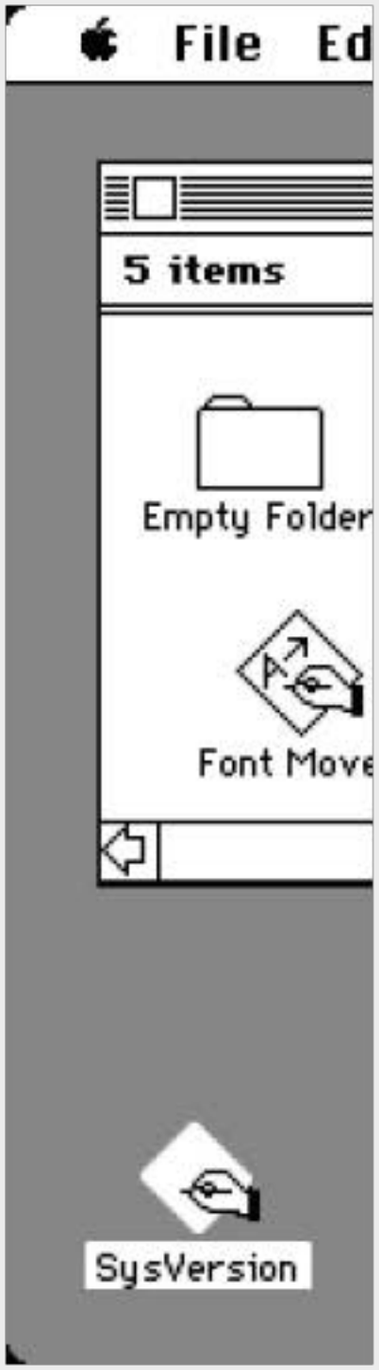
Sun – Fire – Candle – Oil Lamp – Gas Lamp – Electric – LEDs – Automated – IOT Lights

History

Computers : Evolution



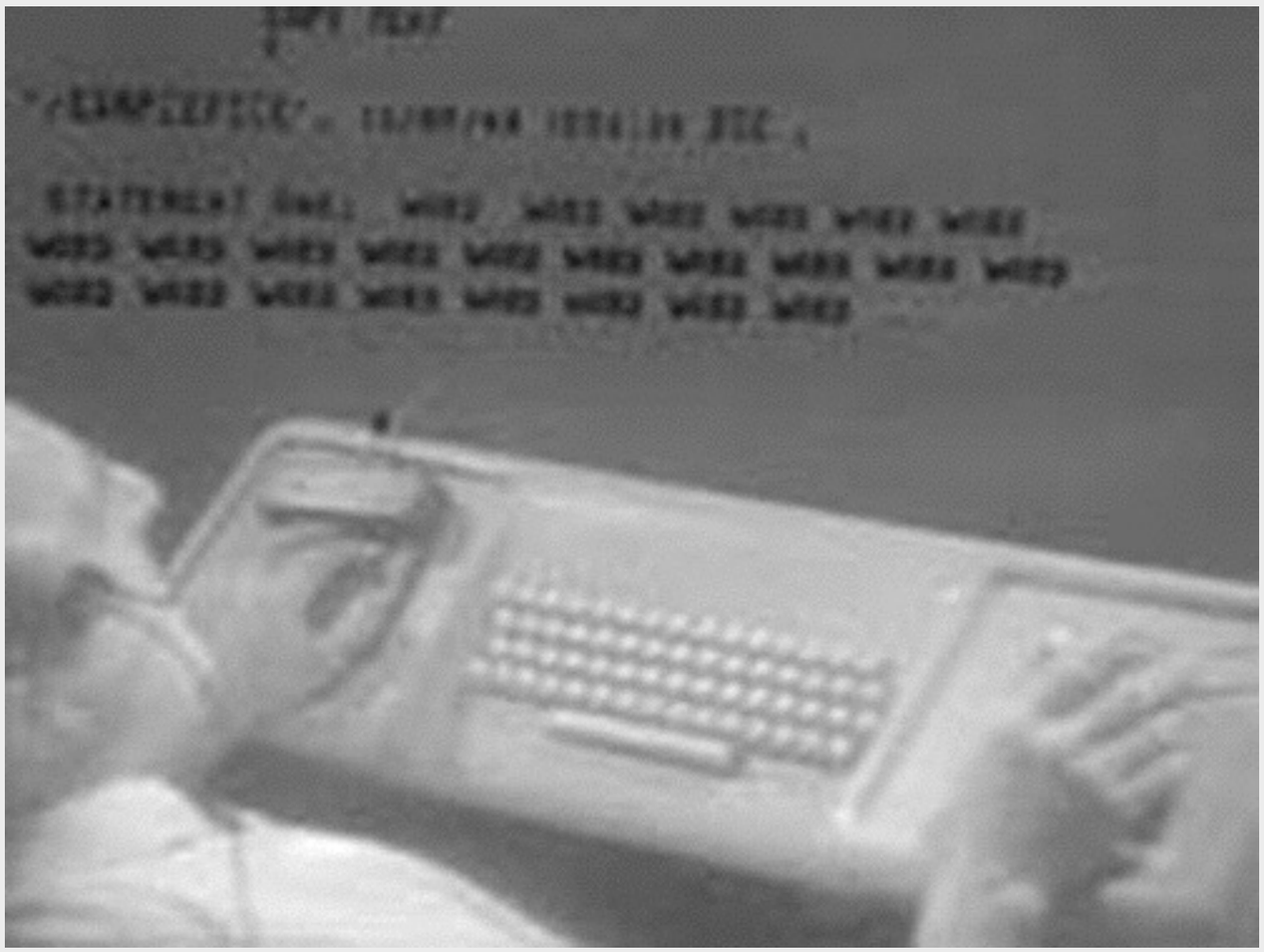





Abacus - Mechanical Computing Machine - Punch Cards - CLI - GUI - Touch

History

Computers : Mother of all Demos



December 9, 1968, Douglas Engelbart’s mind blowing “Mother of All Demos”

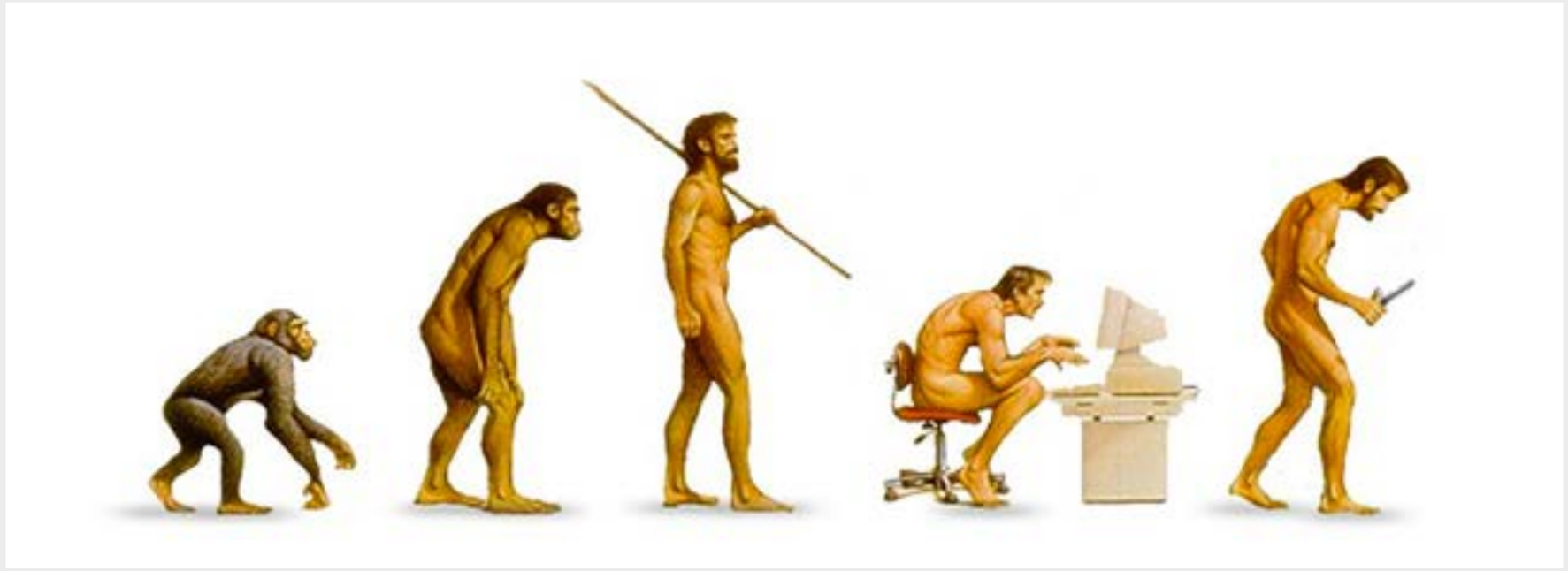
History

Computers : Touch User Interface

Jeff Han’s Ted Talk - 2:31-3:32

History

Computers : Smartphone Parodies



Human Evolution Comic – Windows Phone Really? (Commercial Series) – Phone Sidewalk

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Physical Computing

A broad generalisation

When I started in this industry, the challenge was whether we could make these things work, but now we can do anything, the question becomes should we do it?

Bill Buxton

Physical Computing

For humans

Physical Computing commonly describes the building of interactive physical systems that begins and ends with how humans express themselves physically.

- *Commonly tied to Natural User Interfaces.*
- *Computers are tiny now and can be everywhere.*

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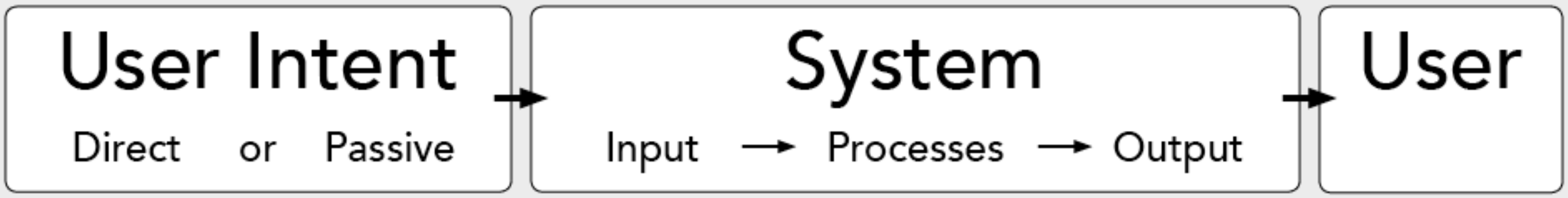
Interactive Physical System Structure

From user, to system, to user

Interactive Physical System Structure

The skeleton



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User Intent

Direct or passive

User Intent

From user intention to system input

Systems Empowering Direct Control & Passive Systems

User Intent

Direct Control - 1/3

Harry Potter: Magic Wand – Dr Who: Sonic Screwdriver – Futurama: Holohponor

User Intent

Direct Control - 2/3 (& Prosthetics)

Avatar Mech Suit – Military Exoskeleton – Honda's Walk Assistant – 17yo Easton Lachappelle EEG prosthetic – Neil Harrison's Eyeborg – Phantom Terrains

User Intent

Direct Control - 3/3

Volkswagen Commercial “The Force” – Minority Report

User Intent

Passive Systems

Her: Samantha – Legend of Zelda: Navi – The Hobbit: Sting

Good design is actually a lot harder to notice than poor design, in part because good designs fit our needs so well that the design is invisible

Donald A. Norman – The Design of Everyday Things

User Intent

Passive Systems

Invisible

User Intent

Passive Systems

- Automated Lifts & Car lights.
- Proactive Suggestions (e.g. Oral-B Toothbrush, Google Now Cards, Siri Proactive)
- Heartbeat and Emotion monitoring.

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System Input

What goes into the system

System Input

Traditional Sensors

Little Bits – Arduino Starter Kit

System Input

The Smartphone is chock full of sensors

Everything Machine

System Input

Other Sensors - Kinect

Sculpture Lens: Strike a Pose

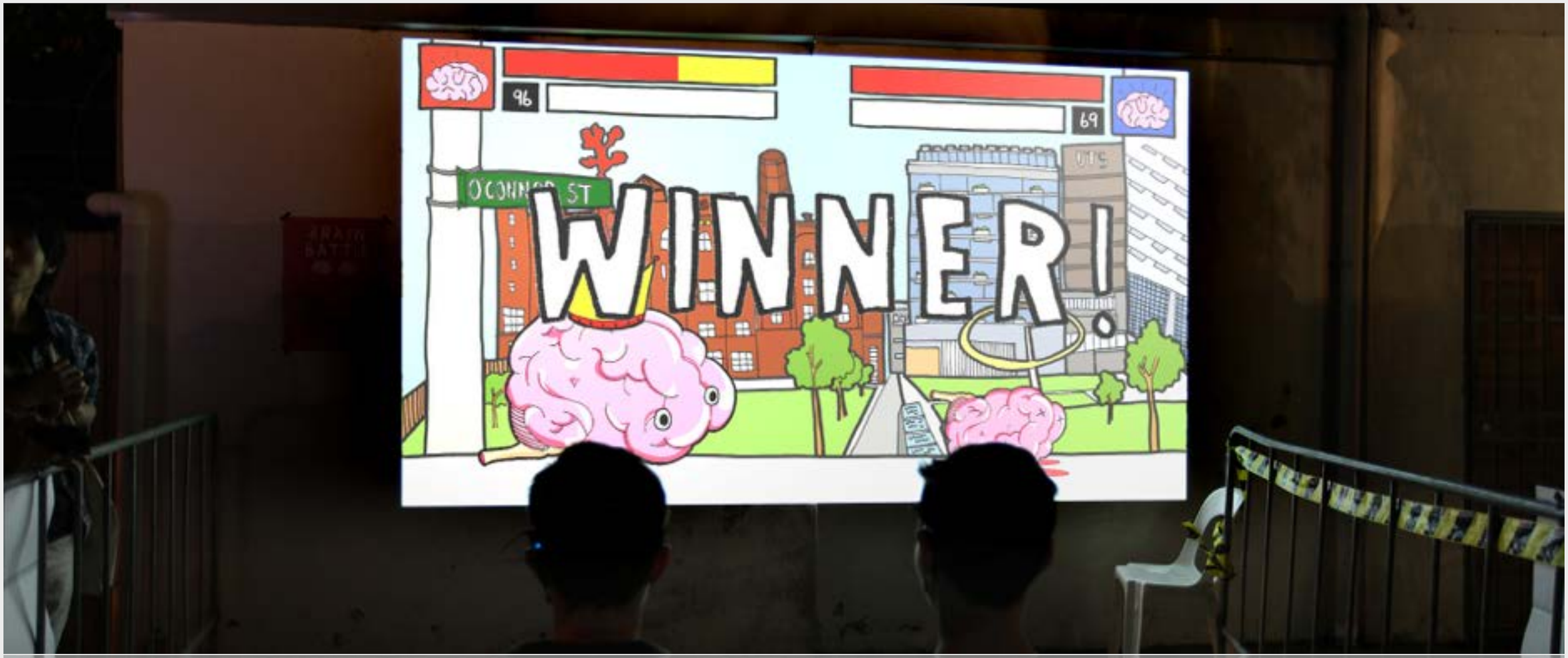
System Input

Other Sensors - Wii

Controlling a crane with a wiimote

System Input

Other Sensors - Brain Waves



Lightwell's Brain Battle at Beams

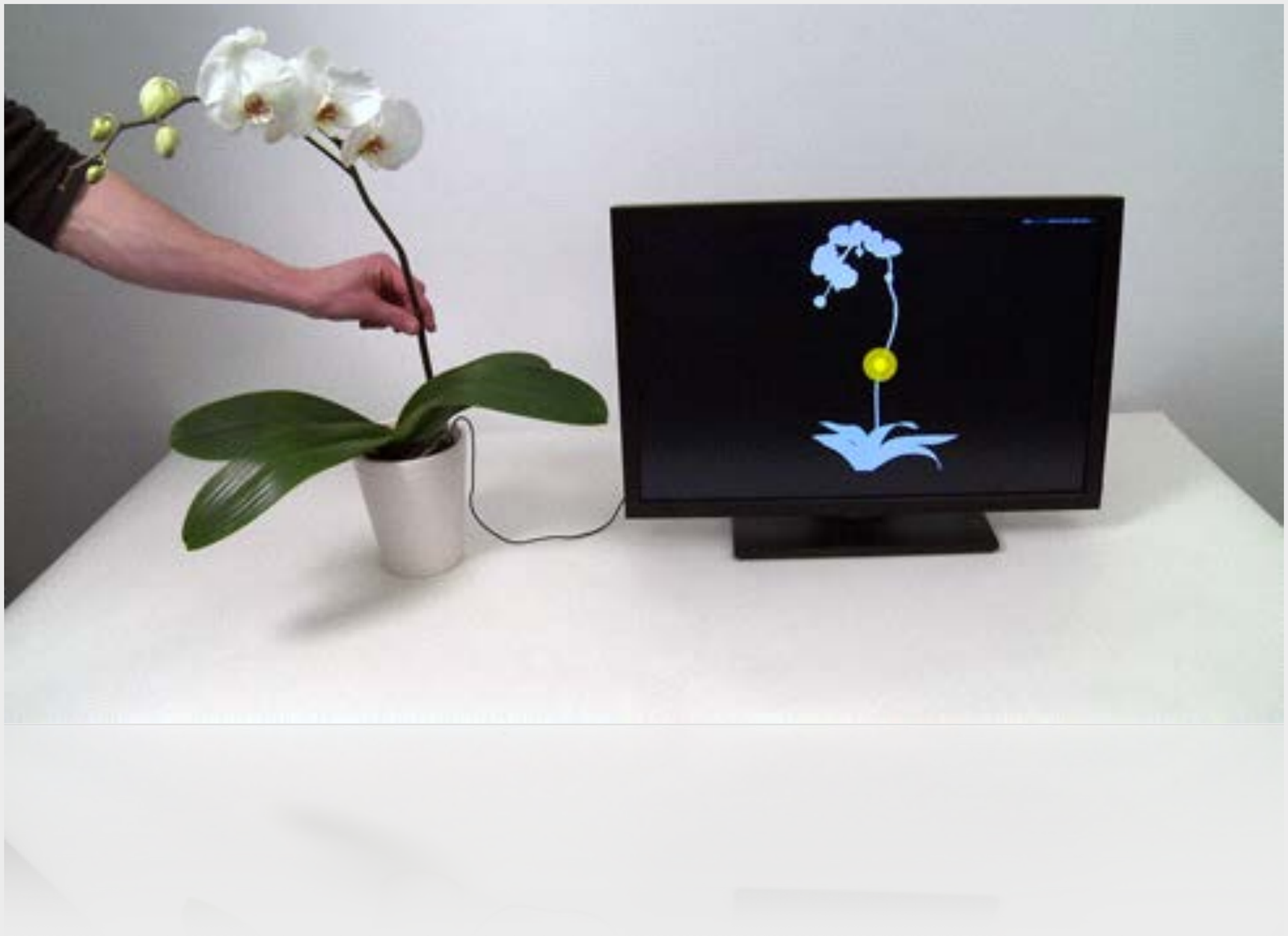
System Input

Other Sensors - Eye Tracking

Eyewriter

System Input

Other Sensors - Electricity



Disney Research: Botanicus Interacticus: Interactive Plant Technology

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System Processes

What the system thinks about

System Processes

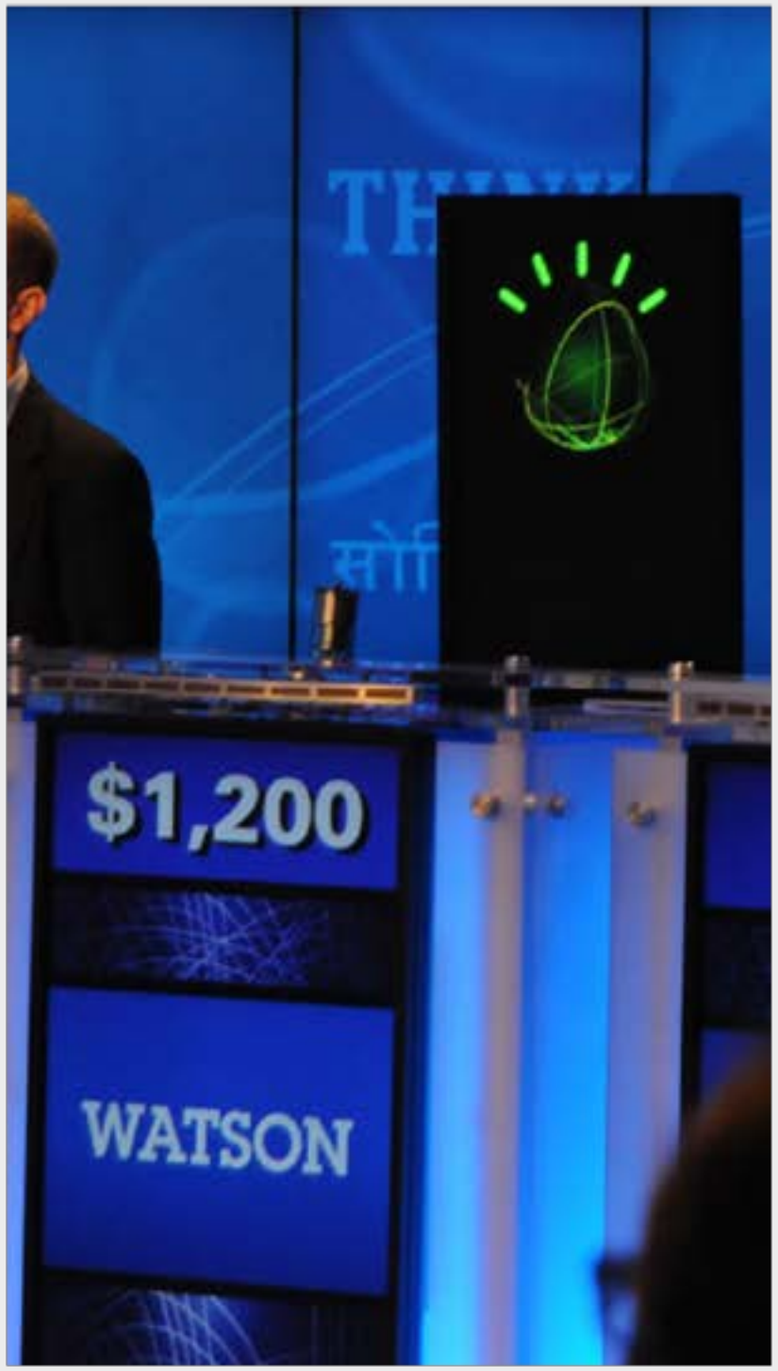
External Resources

Helpful External System Resources

☀️ electricity (e.g. Solar, Electric Grid, Human Generated)
ℹ️ information (e.g. via the internet)
🎓 computational power (e.g. via the internet)

System Processes

External Resources - examples



Metronome-Inspired Spotify Interface – IBM Watson on Jeopardy – IFTT

The cultural definition of artificial intelligence — or A.I., as it is known — goes something like this: **~~"A.I. is the science of how to get machines to do the things they do in the movies."~~** No wonder the subject makes some people nervous.

...

Building intelligent machines can teach us about our minds — about who we are — and those lessons will make our world a better place. To win that knowledge, though, our species will have to trade in another piece of its vanity.

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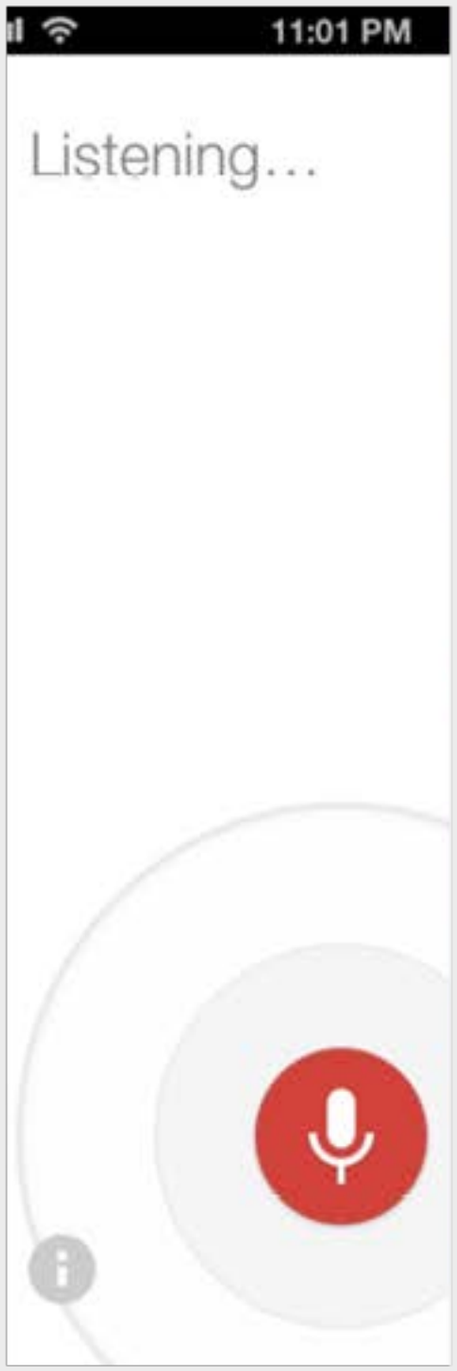
Astro Teller - on "Smart Machines and Why We Fear Them"

System Processes

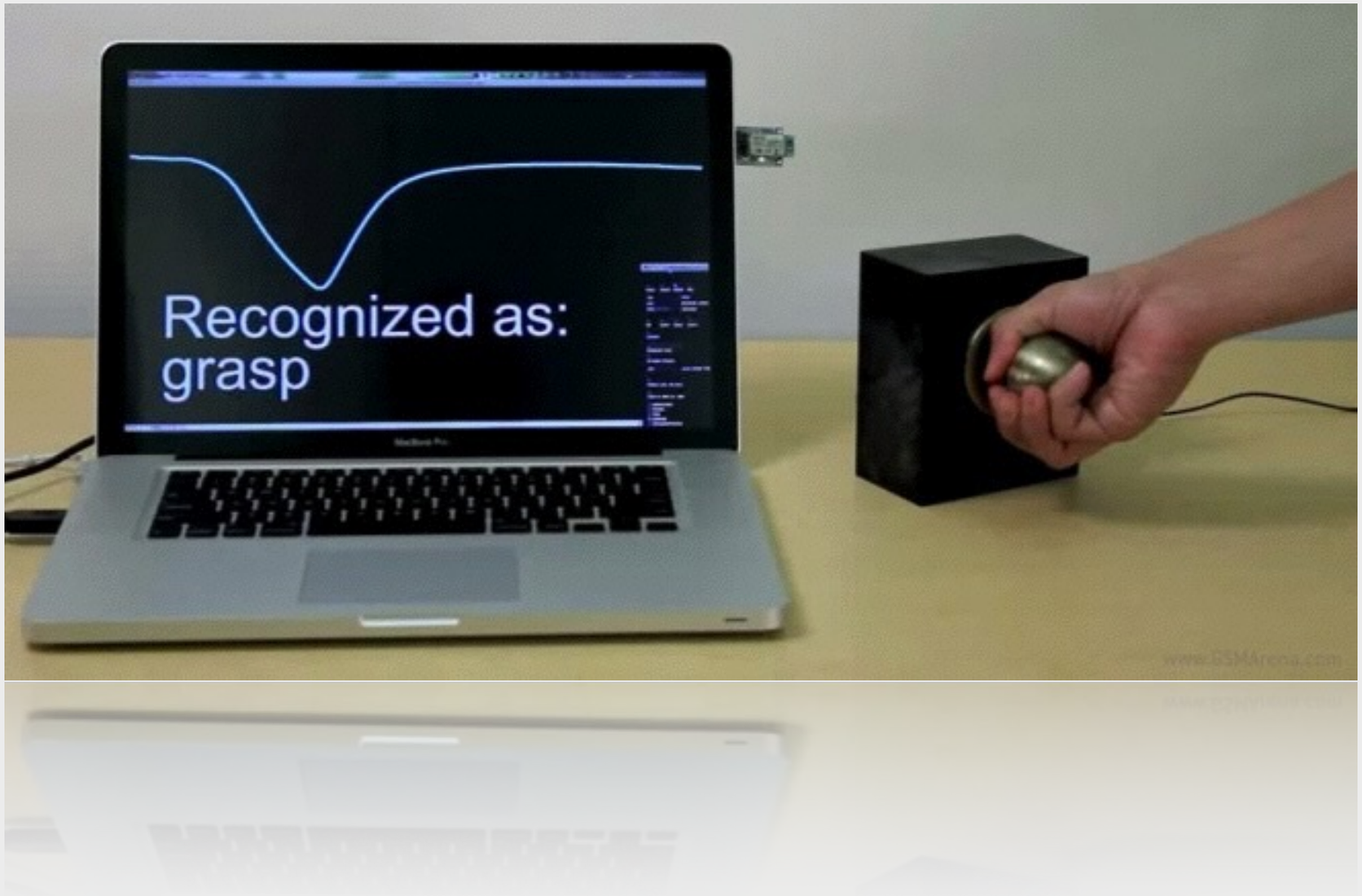
Machine Learning Possibilities



Computer Vision – Voice Transcription (Google Now) – Thought controlled bots (Honda) – Contextual Assistance (Siri) – Project Soli [0-1:40]
Others: Japanese Demographic-sensitive vending machines, Vehicle-determined McDonalds Orders, G.Now Nudge to catch your last train.

System Processes

Machine Learning Possibilities - example - Disney Touche



Disney Touche - Video

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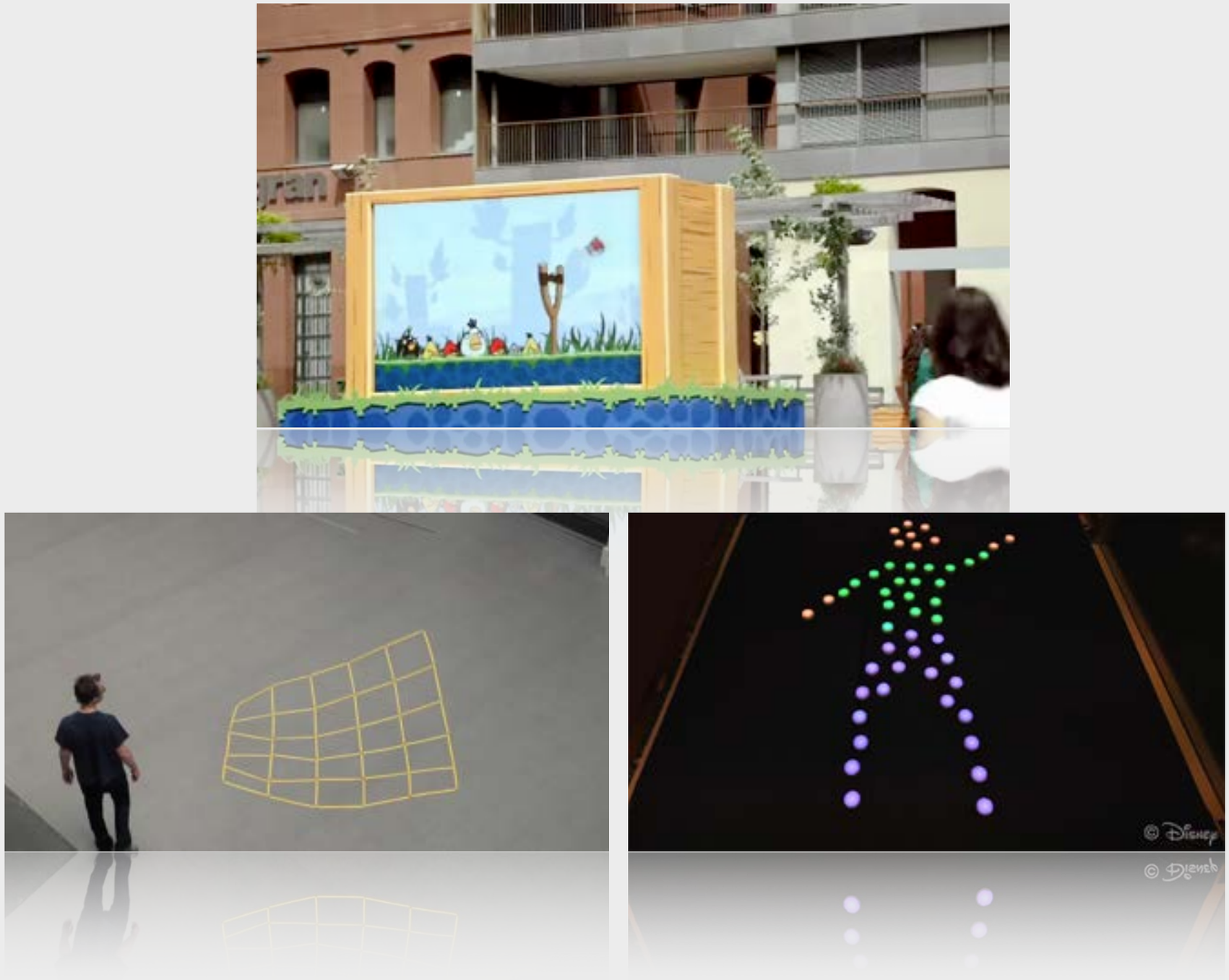
System Output

What the system does as a result of its input and thinking

System Output

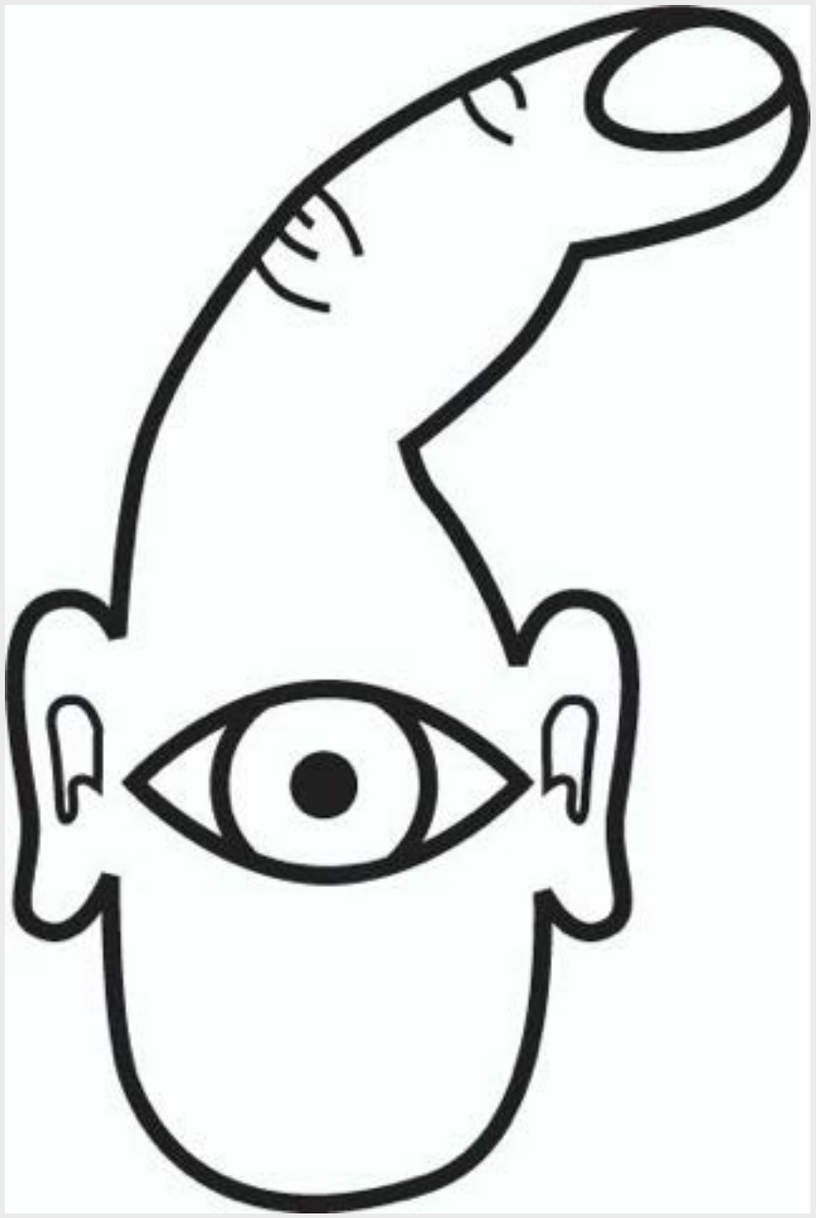
Moving Objects and Environments



Greg Brunkalla (Legs) > Rokkit > Saatchi & Saatchi > TMobile's: Angry Birds Live – Tele-Present Water – Disney Research: Pixelbots

System Output

Human Sensors (Not System Sensors!)



How Computers see us now – from ‘Physical Computing’ by Dan O’Sullivan and Tom Igoe (2004)

Basic Human Senses

(Commonly Utilised in Computing)

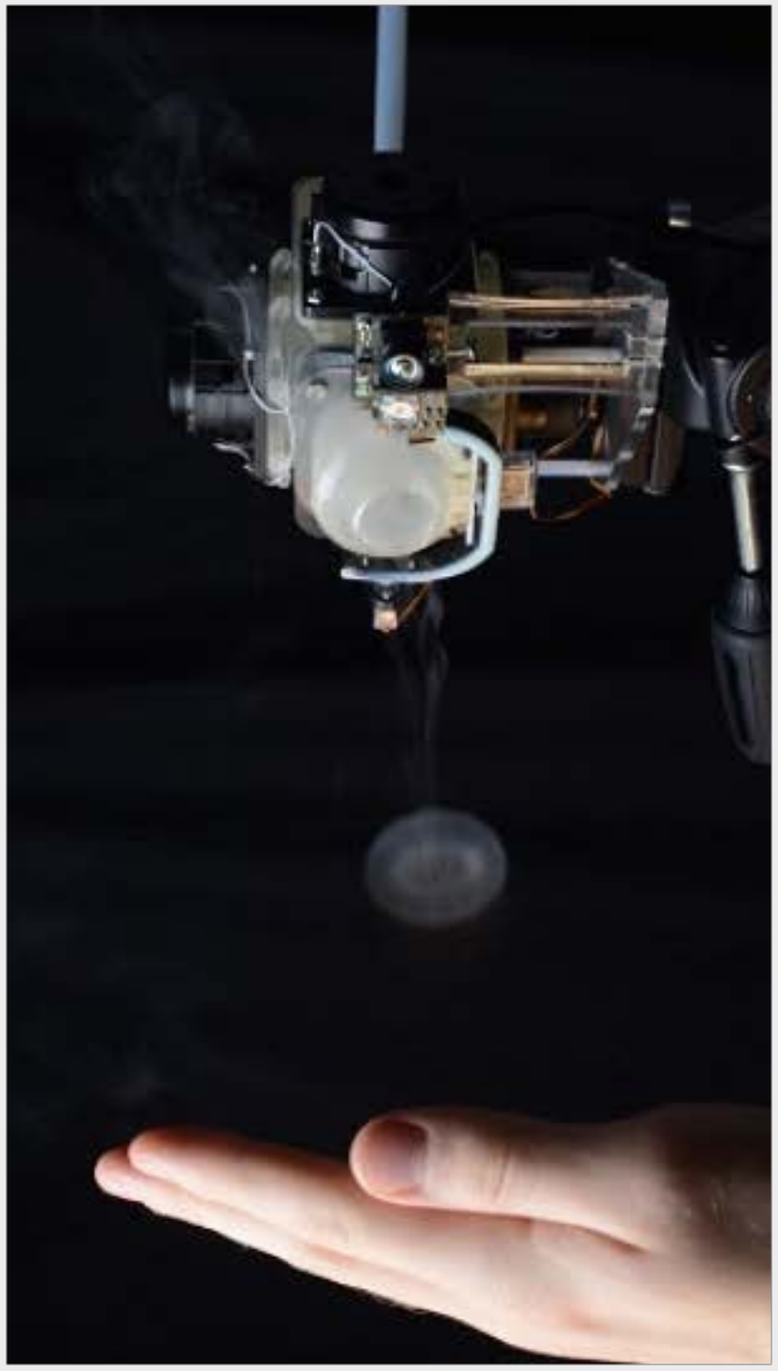
Visual
Auditory

(Uncommon)

Gustatory
Olfactory
Haptic (Changing)

System Output

Haptics



Cyroscope: Feel the Weather – Disney: Aireal – smrtGrips (bike handlebar wayfinder)

System Output

Haptics

electrical/physical oscillating surfaces for texture (eg Revel) – and movement (eg Surround Haptics)

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New Mediums

A few examples of fun & inspirational new tech

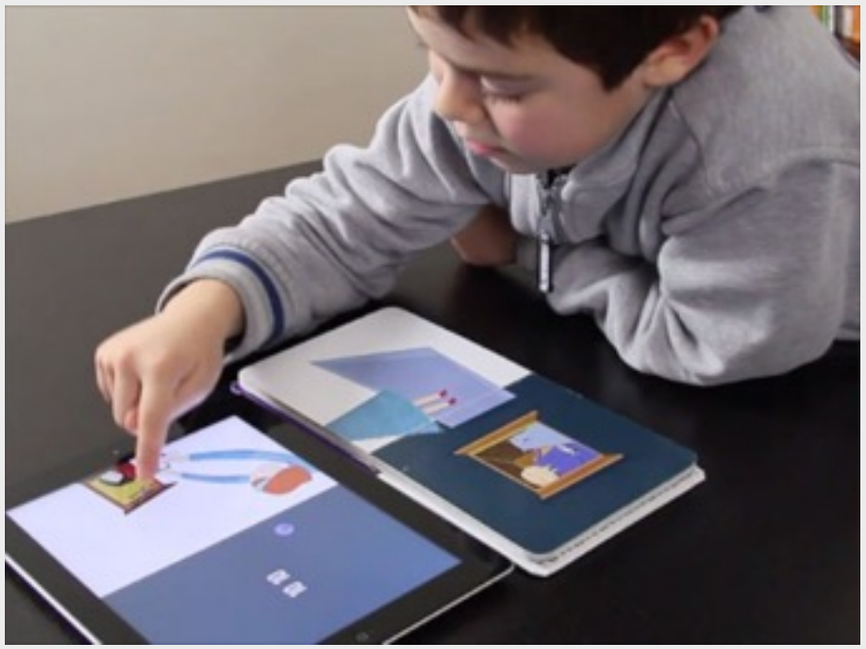
New Mediums

Projection

Pranav Mistry, MIT's Sixth Sense – *Disney MotionBeam*

New Mediums

Book Pages and Food



Drawdio – Electric Vegemite – Paper Generators – Bridging Book

New Mediums

Ecosystems

Visible Light Communication – *Constellaction*

New Mediums

The Third Dimension

Pepsi Drone Friend Finder – Crocs Drone – Printed 3D Optics

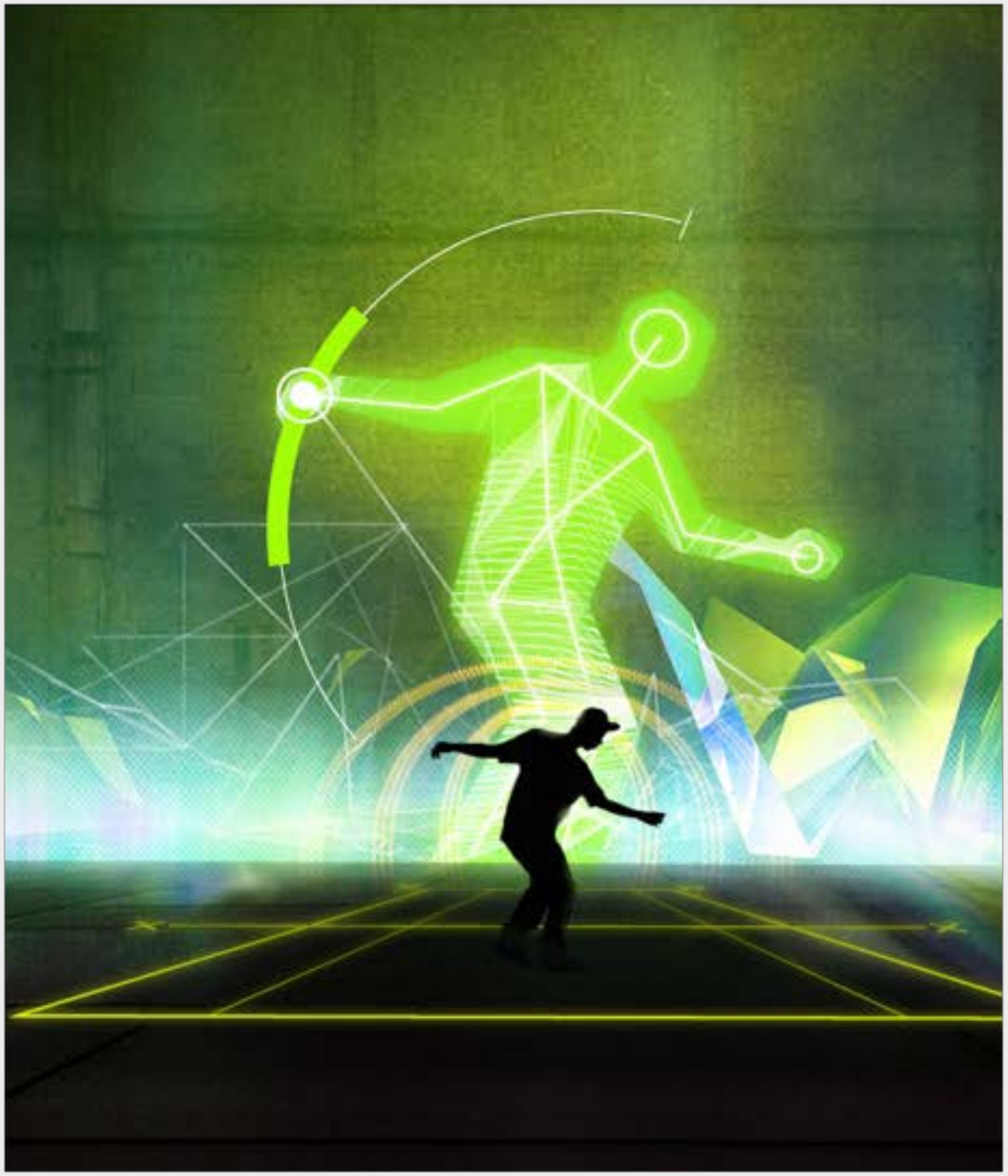
New Mediums

The Third Dimension

MIT inForm – Jinha Lee: Grab a Pixel – Common Sand/Foam Table

New Mediums

The Third Dimension



V Motion Project – *Connected Worlds: Interactive Ecosystems*

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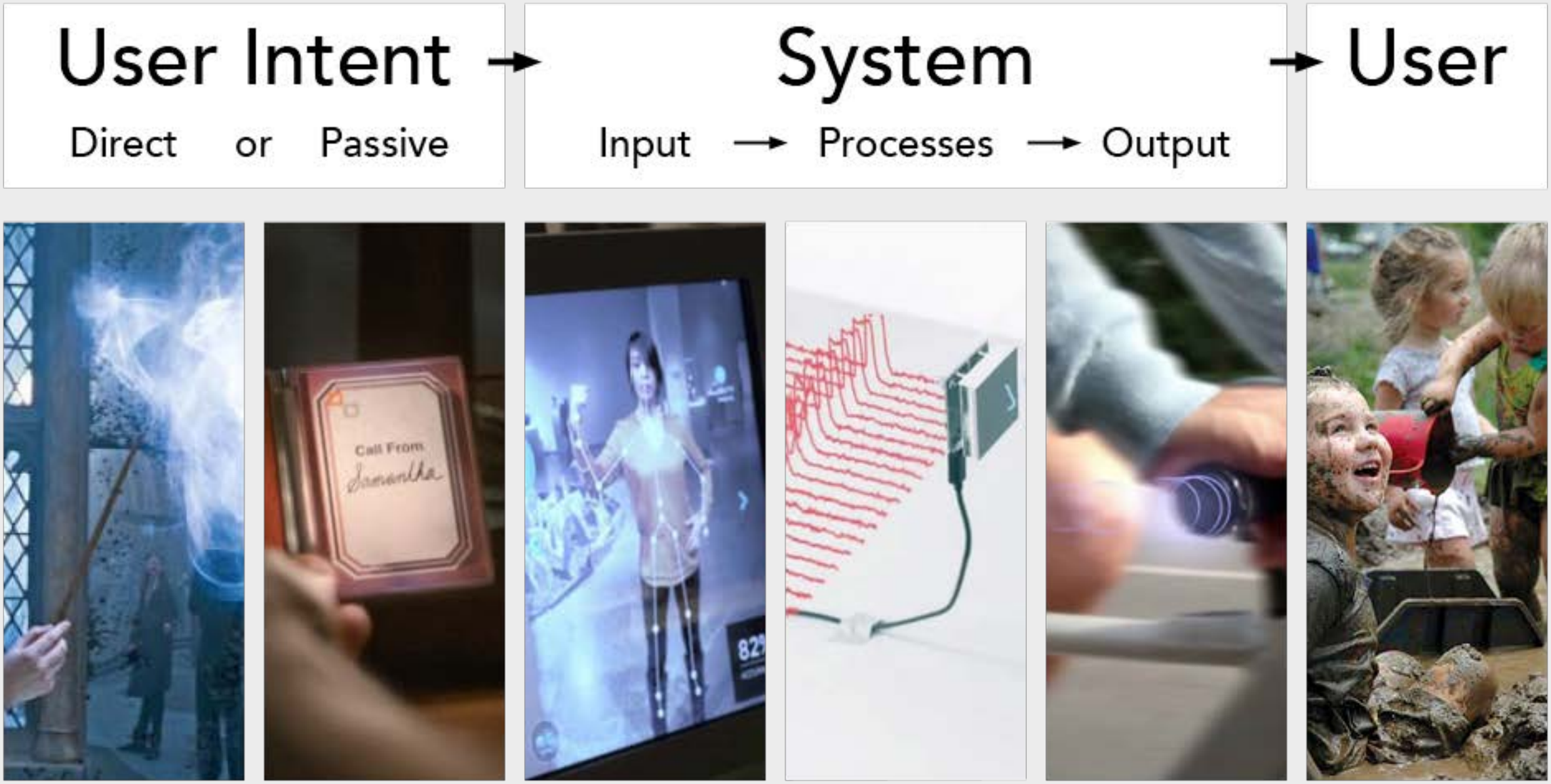
Summary

From user, to system, to user

Summary

Physical Computing - User from Beginning to End



Summary

Living

Computing is not about computers any more. It is about living.

Nicholas Negroponte

Questions