

# The World as a Browser

Antonio Câmara

NOVA SST

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# The forthcoming revolution



[16 augmented reality glasses of 2022](#)

# The forthcoming revolution

“AR glasses only need 4 apps to become massively successful:

- + AR map directions
- + Real-time translation with subtitles
- + Digital replacement for monitors/TVs
- + A CV app that can tell you what you are looking at & teach you about it.

A human with these 4 apps is a superhuman”

@\_LucasRizzotto

# The forthcoming revolution

“Augmented Reality only needs to perfect one use case to go mainstream: infinite screens. Why would anyone spend thousands of dollars on monitors & TVs when they can just purchase a \$1k-3k headset that lets them have as many as they want in their house? If Apple is doing anything, it's this @\_LucasRizzotto

# The forthcoming revolution

Apple forthcoming glasses will not enable us just to "super human capabilities", have infinite (2D) screens and virtual post-its overlaying everything (and the capability of buying it). They will become premier media consumption devices, introducing new 3D interactive experiences

# The forthcoming revolution



VR portals

One can enter Virtual Worlds through a [virtual Portal in the Real World](#)

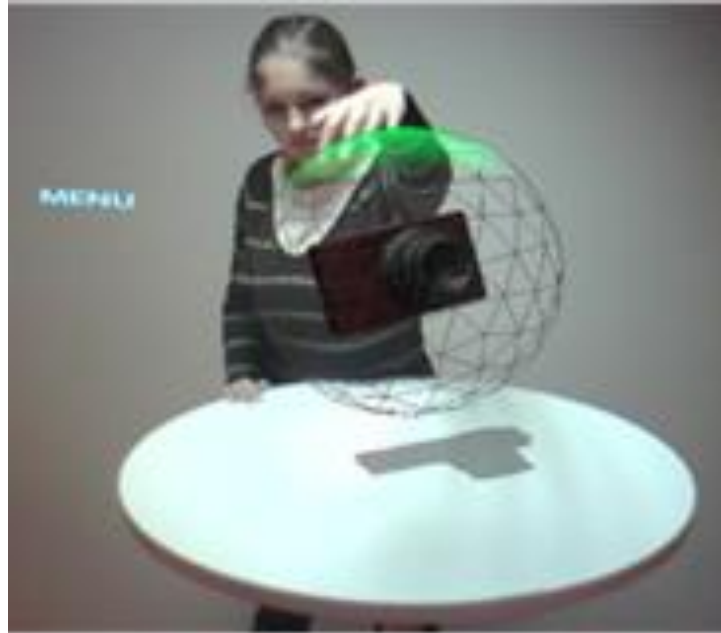
# The forthcoming revolution



NeRFs

3D environments created by stitching videos and 2D images using [Neural Radiance Fields \(NeRFs\)](#)

# The forthcoming revolution



3D canvas

Transforming your field of view in a 3D canvas, where you can interact by gestures using depth perception sensors. You will also be able to introduce and interact with virtual characters in real scenes



# Download

TUGA promotional app

<https://drive.google.com/file/d/1T9heLxazENF1mLVusF0ViU6ny0RoPnEK/view?usp=sharing>

Merlin ID app

<https://play.google.com/store/apps/details?id=com.labs.merlinbirdid.app&hl=en&gl=US&pli=1>

# Key actors

## Individuals

Ken Pimentel. VR Pioneer, Epic Games Head for AEC

Ori Inbar. AR Pioneer, AWE organizer

Kris Kolo. Executive Director, VRAR Association

## Companies

Apple, Google, Facebook, Microsoft, Amazon, Niantic,  
Adobe

EPIC, Roblox

The ETH, DeFi and NFT ecosystem

# Initial Augmented Reality (AR) efforts

## Traditional AR

Marker based AR

Markerless AR

Additive AR

## The World as a Browser

AR Cloud

Natural Interfaces

Multi-sensorial World

A new atomic unit

# Initial AR efforts



Teresa Romão et al., ANTS- Augmented Environments, Computers & Graphics, 28, 5, 623, 2004

# Traditional AR



“Reality only better”, Economist and Wired, 2007

# Marker based AR



<https://www.youtube.com/watch?v=jmrLAaF2DgA>

# Markerless AR



<https://www.youtube.com/watch?v=qXclZ1R68SQ>

Auggies 2010, non-official Oscar for AR

# Additive AR





# The World as a Browser



Antonio Camara, Environmental Systems, Oxford University Press, 2002

# AR Cloud

A 3D canvas to enrich the Real World

clockwise: 3D virtual drawing and sculpting; large scale projections; inserting and controlling virtual elements in real scenes; Cloud Atlas' special effects



# Natural interfaces



<https://vimeo.com/6734803>



<https://www.youtube.com/watch?v=AmlKYMD08x8>

Antonio Camara, Natural User Interfaces, Human Computer Interaction, Springer, 2011

# The World as a Browser



“Touch “ the World

Ynvisible vision for “like buttons”

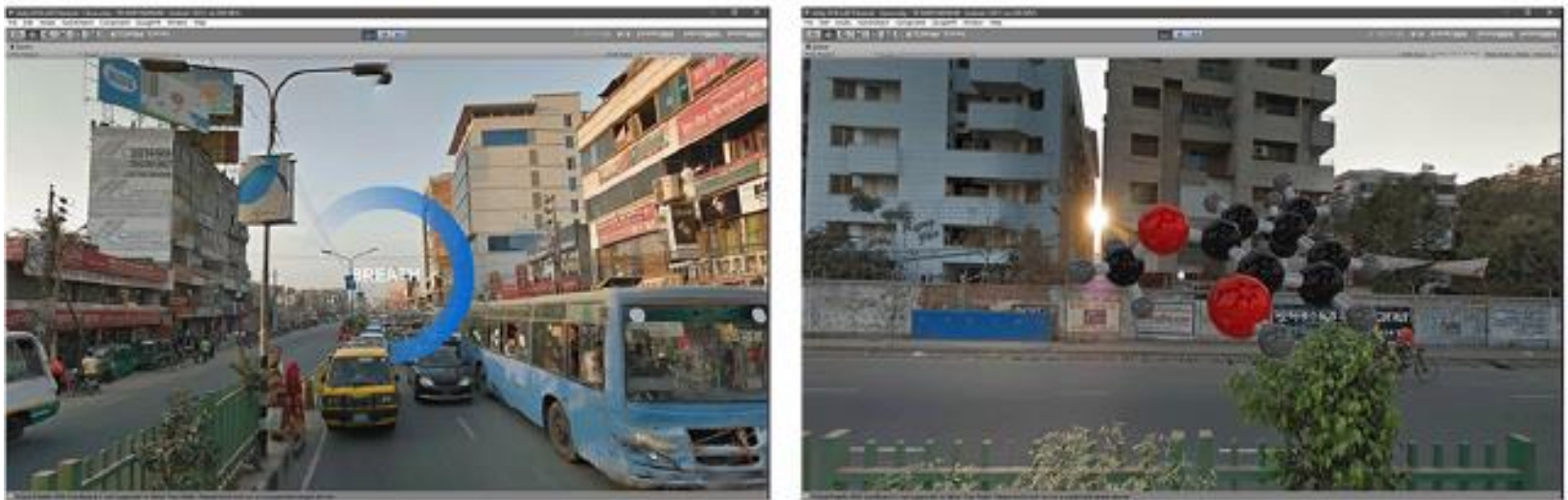
# The World as a Browser



“Listen” to the World

<https://www.youtube.com/watch?v=0qhyjnD0R4Y>

# The World as a Browser



“Smell (and taste) the World”

Paula Neves and António Câmara, “Multisensory HCI Design with Smell and Taste for Environmental Health Communication”, Human Computer Interaction, Springer 2020



# The World as a Browser



Telepresence via audio

<https://youtu.be/n98tmCh-EU0>

# The World as a Browser



Telepresence using holographic  
projections and 5 G

<https://youtu.be/GWB0MIUGfhE>



# A new atomic unit for a Real World browser



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# Smart tags

## SMART TAGS IN USE

### USE CASE ①

#### GEOGRAPHICALLY DISTRIBUTED THROUGHOUT A TERRITORY

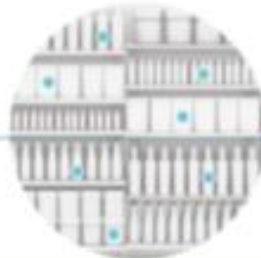
Smart tags are fixed to GPS coordinates. Flexible usage including identification of restaurants and stores, or providing tourist information about places and monuments.



### USE CASE ②

#### RELATIVE TO A STORE SHELF

Smart tags are assigned positions relative to a store shelf. Since the tags also know their location relative to one another, they can be used to identify where a user is in the store and orient them to other products they are looking for.



### USE CASE ③

#### BRAND EXPLORATION

Smart tags can be assigned to a particular brand and organized around it to allow the user to explore the brand's world. A variety of content from the brand may be included and the tags can act as a hierarchical menu system.



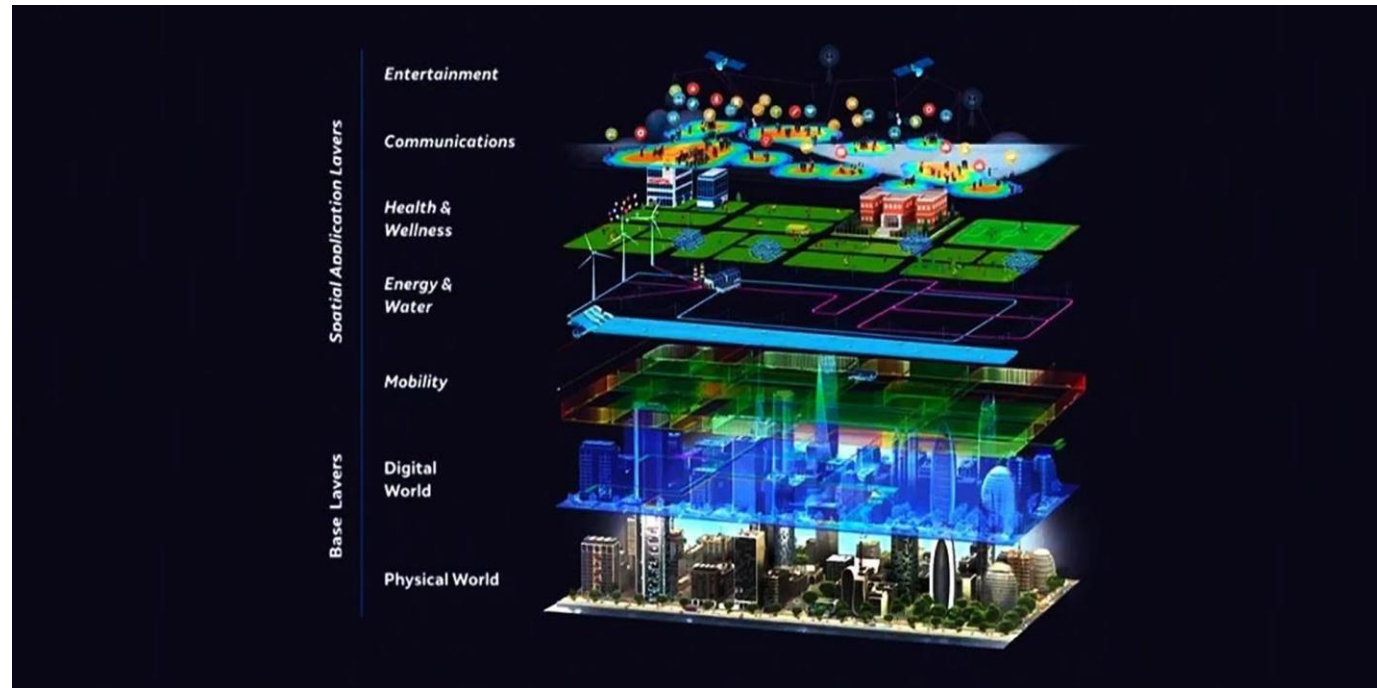
# “The World as a browser: the challenges”

Hyperlocal and  
global/broadcasted  
versus distributed



<https://youtu.be/9Soso9273r0>

# AR Cloud, Multiverse, Omniverse, MirrorWorld (AR+VR)



<https://next.reality.news/news/future-ar-cloud-thousand-walled-gardens-bloom-0196249>

# Follow up: references

## The early foundations

Antonio Camara, Environmental Systems, Oxford University Press, 2002

Antonio Camara and Jonathan Raper, Spatial Multimedia and Virtual Reality, Taylor & Francis, 1999 and 2021 (digital version)

## Three forthcoming books

Antonio Camara, Innovation without a Valley, to be available in 2023

Antonio Camara et al. Spatial Computing, to be available in 2024

Antonio Camara et al. Internet of Nature, to be available in 2024

# Follow up: tools

## Open source augmented reality SDKs

### **10 Best SDK Available for Developing Augmented Reality Application**



vuforia



ARKit



ARCore



Wikitude



AR.js



ARToolKit

# Follow up: tools

## Tracking Specialties

There are four main tracking specialties — plane tracking, SLAM/Markerless tracking, face tracking, and object recognition.

Plane tracking



SLAM aka markerless tracking



Face tracking



Object recognition



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[Augmented reality SDKs comprehensive guide](#)

# Follow up: tools

## Augmented Reality SDKs Reviewed

There are dozens of Augmented Reality SDKs, but that doesn't mean they all solve every problem. To help you find the one that is right for you, we have put together an overview of the best, most mature AR SDKs currently on the market. They are listed in alphabetical order.

Amazon Sumerian	➔
ARCore	➔
ARKit	➔
ARToolKit and artoolkitX	➔
DeepAR	➔
EasyAR	➔
Lumin SDK (for Magic Leap)	➔
MAXST AR SDK	➔
Marxent AR SDK with MxT Tracking	➔
Visual Studio	➔
Vuforia	➔
Wikitude	➔

[Augmented reality SDKs comprehensive guide](#)



Antonio Camara

[asc@fct.unl.pt](mailto:asc@fct.unl.pt)

<https://www.cense.fct.unl.pt/>

Explora group

<https://www.facebook.com/groups/183536175571026/>