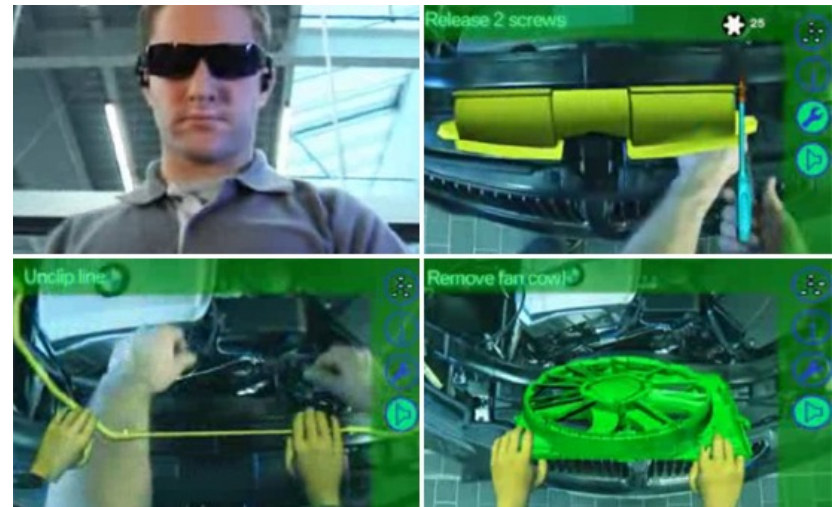


Augmented reality

Éric Marchand



The application: augmented reality

Definition : [Azuma 97]

- Add virtual object in the video stream
- In real-time

Theoretical problem to be solved

- Find the camera position

Extensions

- post-production



Virtual continuum

Virtual Continuum [Milgram 1995]

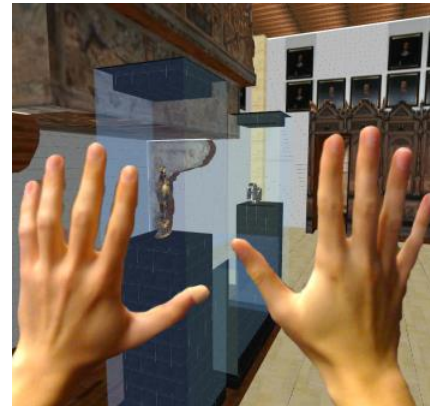
Real
Environment



Augmented
Reality



Augmented
Virtuality



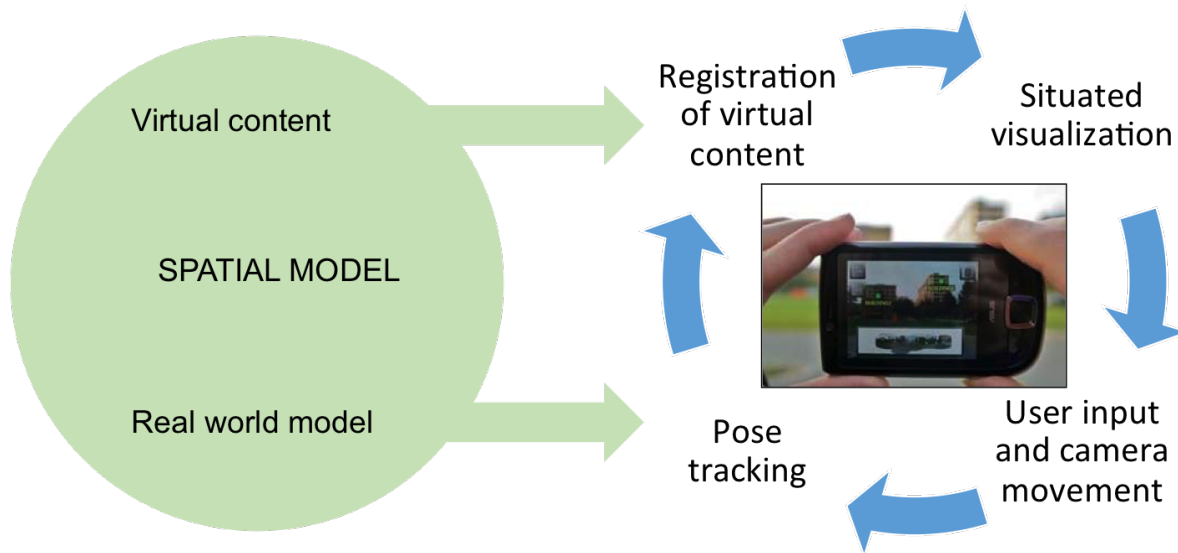
Virtual
Environment



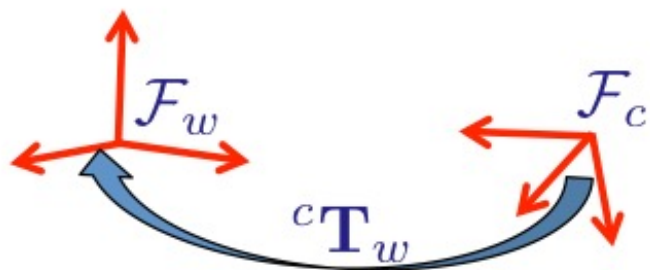
AR = “Human-in-the-loop” User-Interface

Augmented Reality is but a retro-action loop between the computer system and the user:

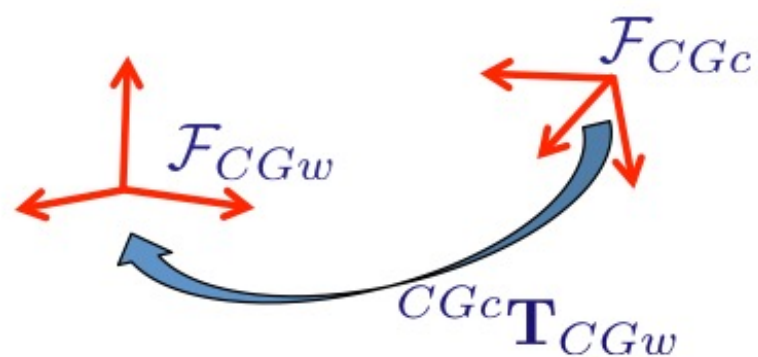
1. The user **observes** the scene to be augmented and **controls the viewpoint** of this scene;
2. The computer system (i) “tracks” the user’s viewpoint, (ii) computes the 3D positions and orientations of the virtual objects with respect to this viewpoint and (iii) displays the virtual objects.



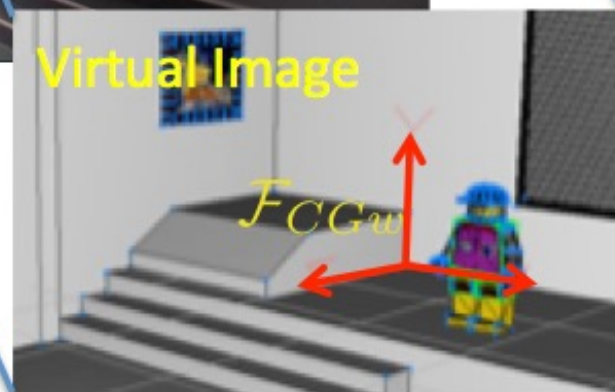
Source JM Normand



Align CG camera
with real camera



Compositing



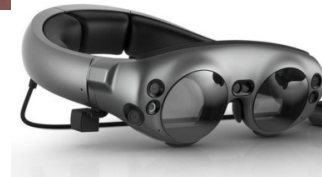
1. Visualization



Visualization

2D visualization

- LCD
- HMD
- Screen
- Projection on a transparent screen



Casque de réalité mixte

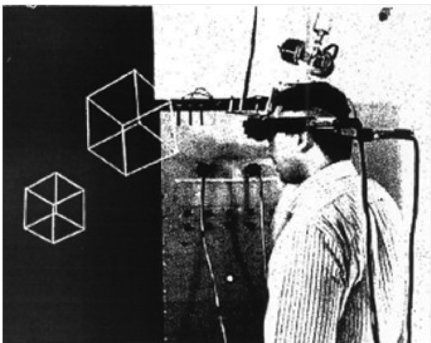
1966 Ivan Sutherland : mélange réalité et image de synthèse



2012 google glass



Hololens 2016



Casque de pilotage

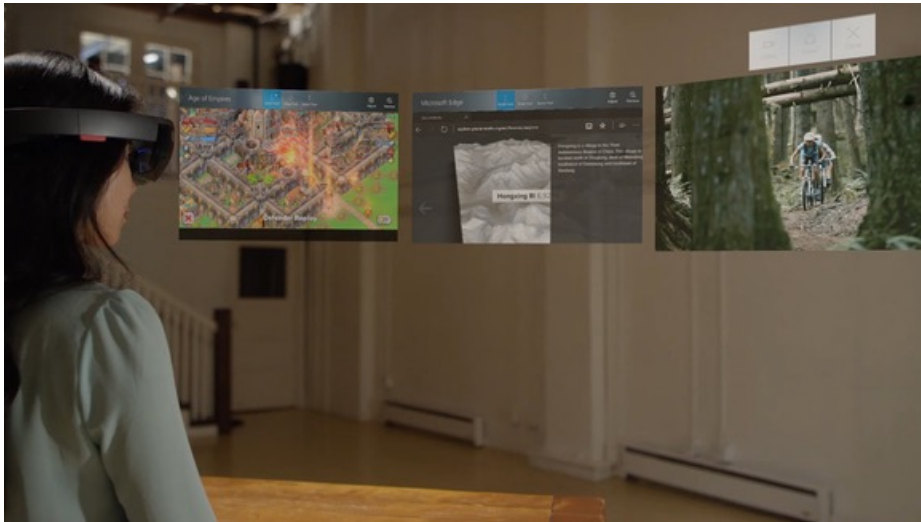
1979: McDonnell Douglas développe un casque projetant des informations utiles pour les pilotes de chasse directement sur leur visière



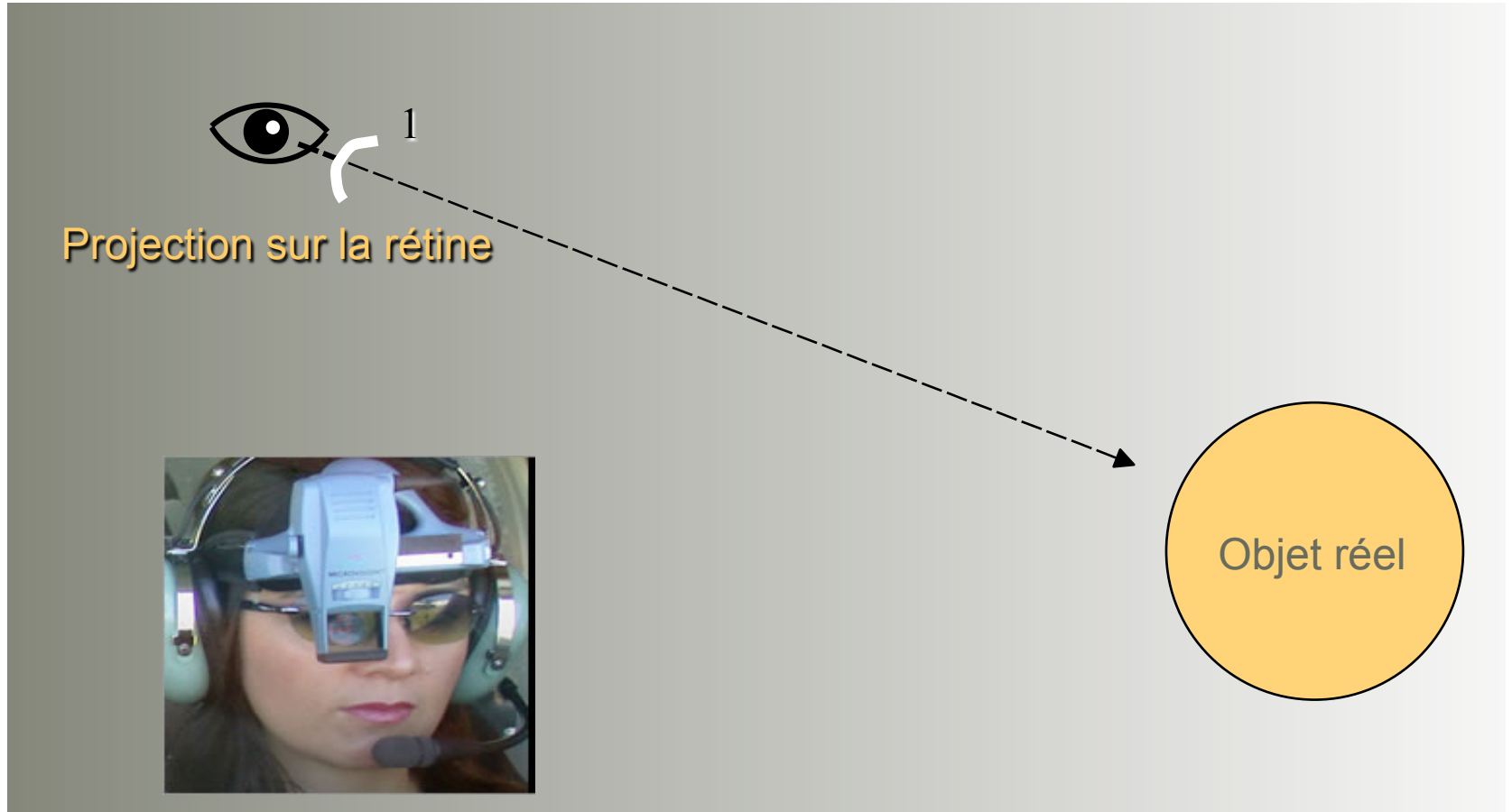
2013 TopOwl Thalès



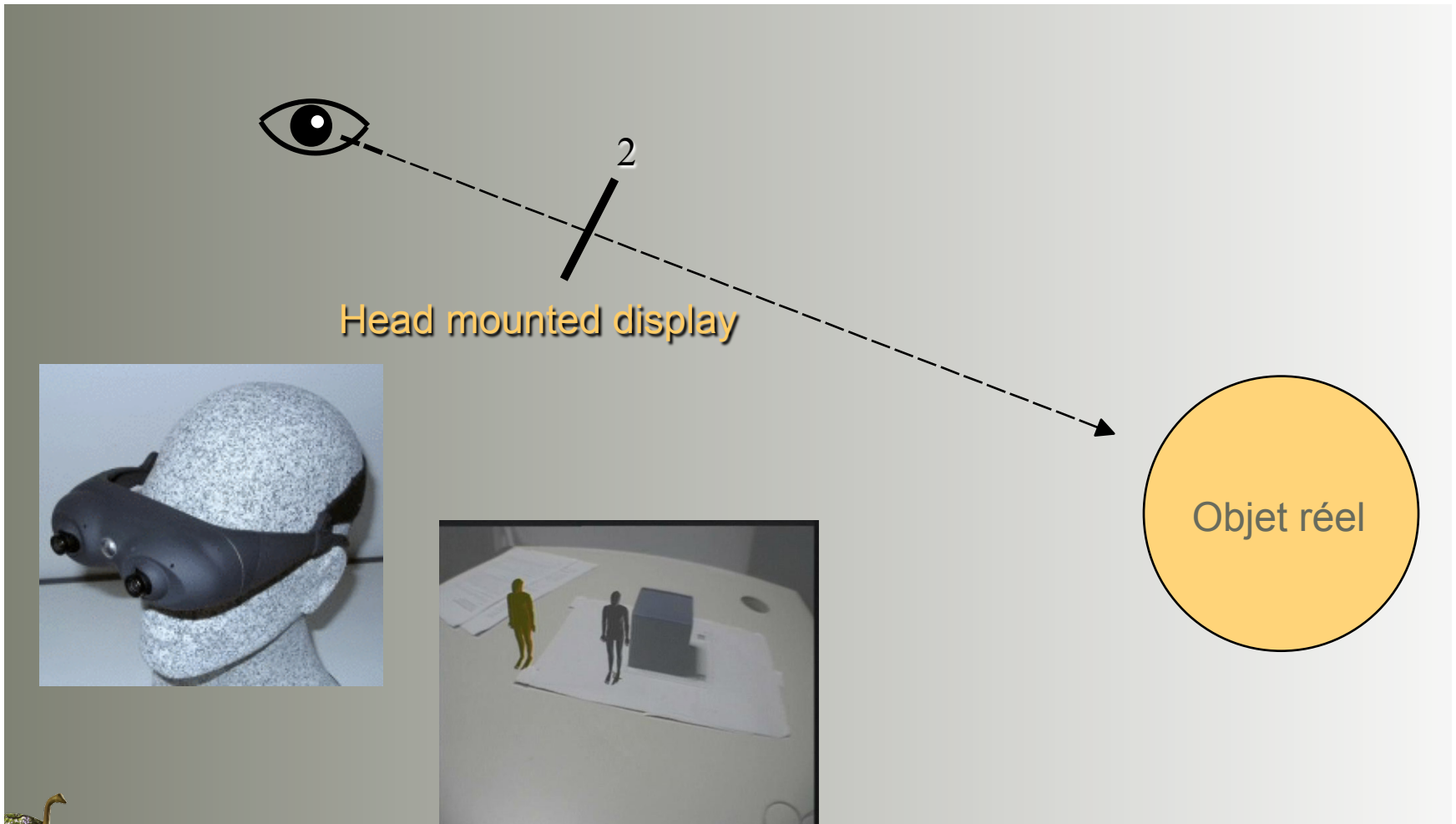
Hololens



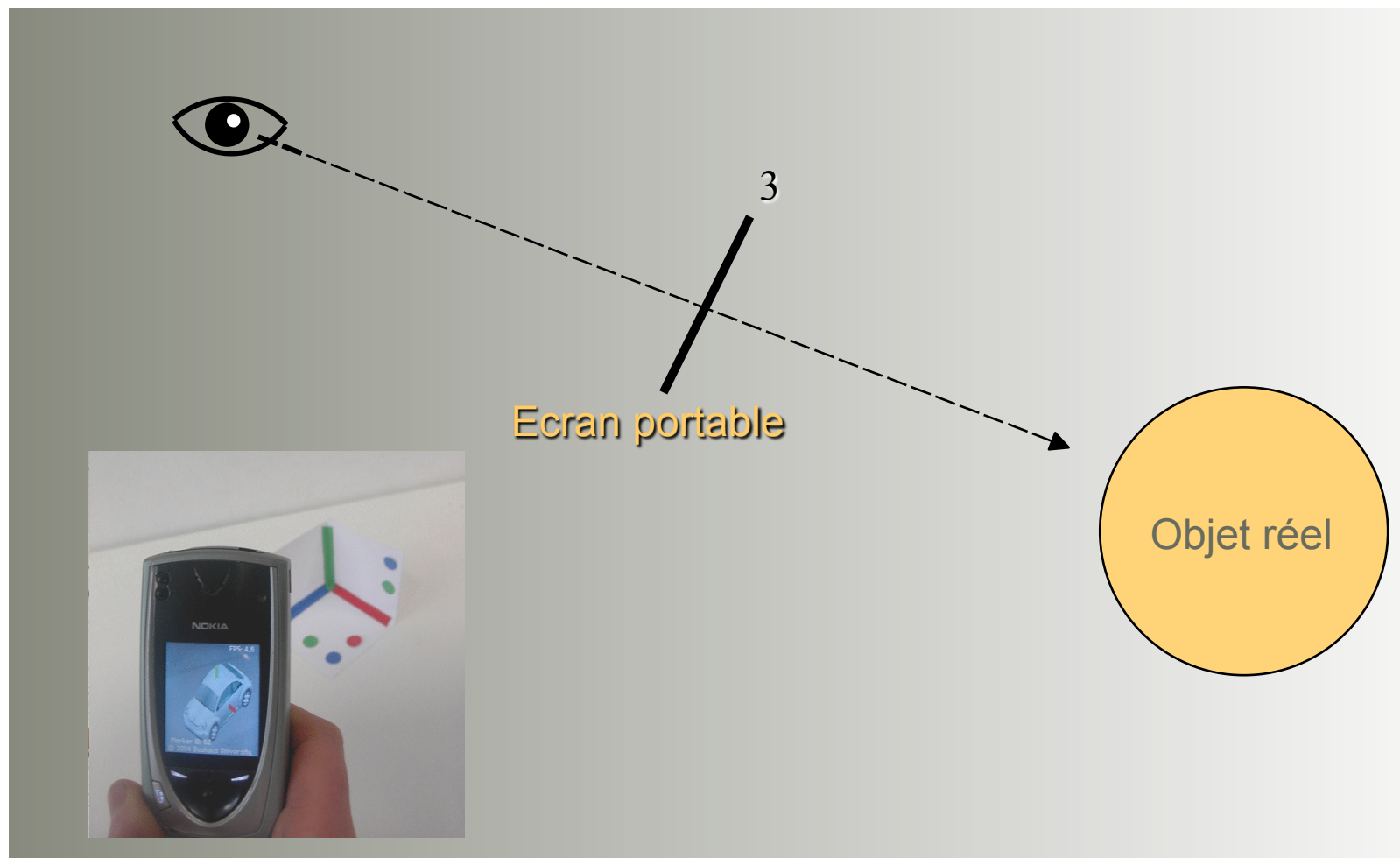
Visualisation



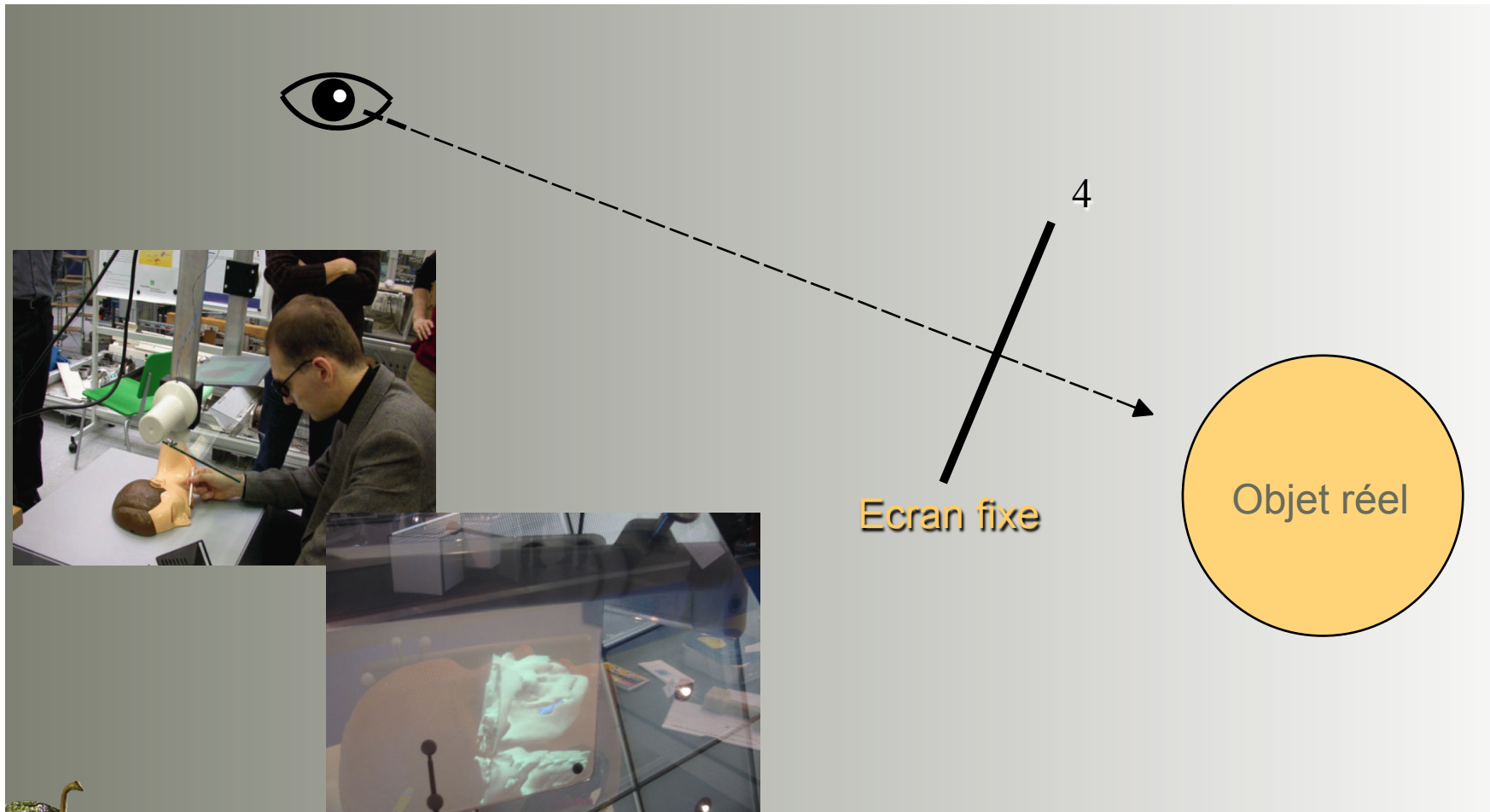
Visualisation



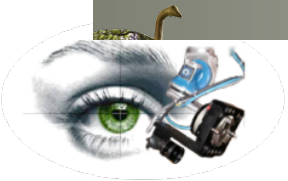
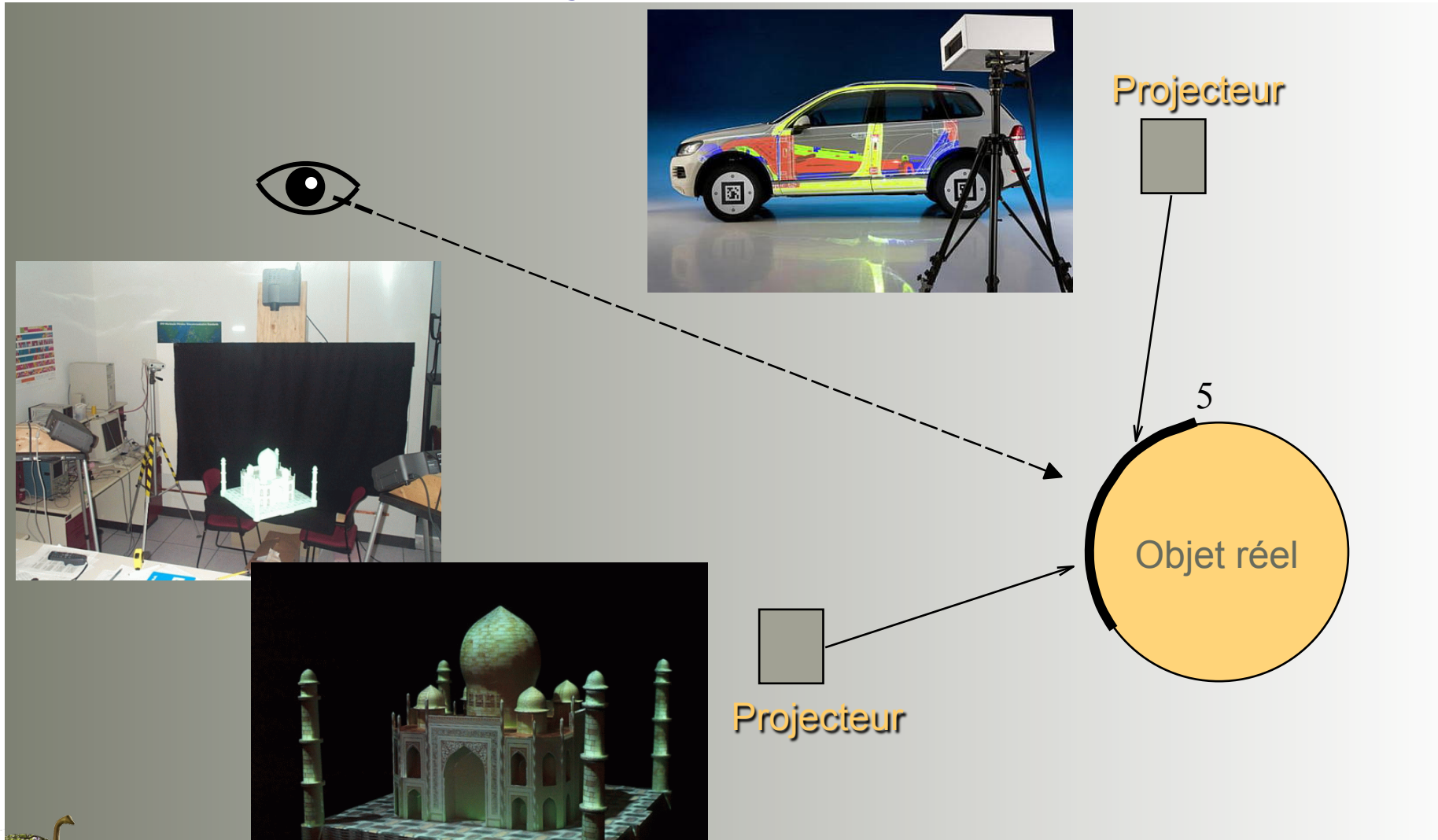
Visualisation



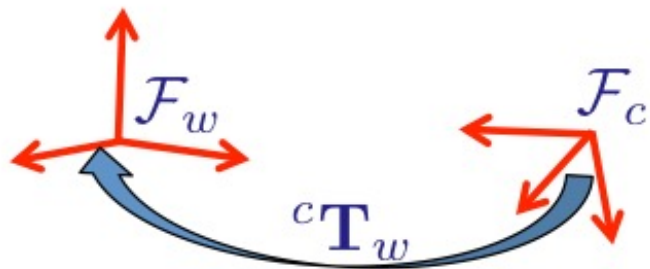
Visualisation



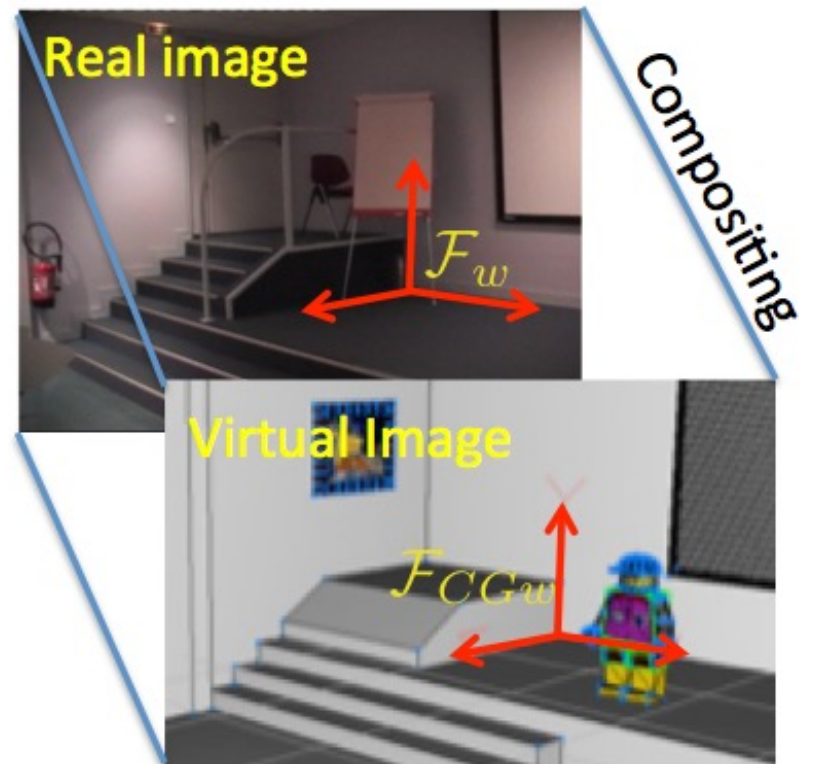
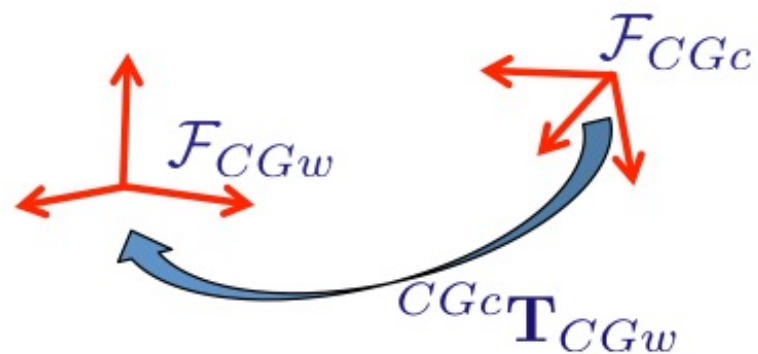
Visualisation: projecteur



2. Sensors



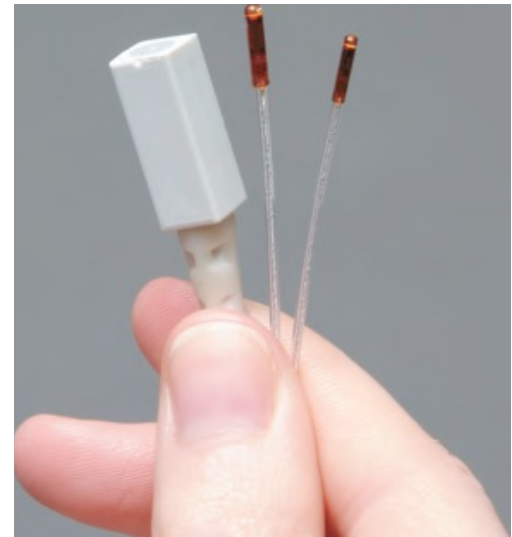
Align CG camera
with real camera



Capteur

Capteurs magnétiques, acoustiques, optiques, ..

- robustes et rapides
- portée limitée (de l'ordre d'un cube de 3mx3mx3m)



Capteurs d'extérieur

GPS, boussole, gyroscope, capteurs inertiels



Capteurs d'extérieur

Suffisant pour de nombreuses applications ne nécessitant pas une grande précision

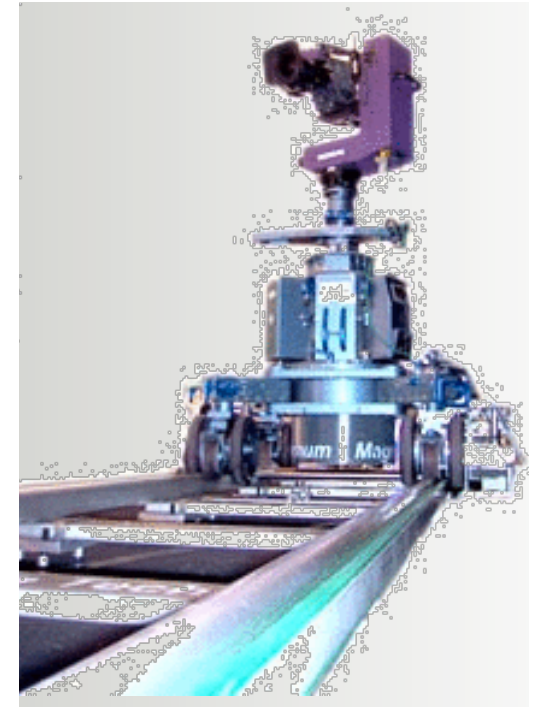


Capteurs d'extérieur



Mechanical solutions

- very precise and fast (virtual studios)
- expensive, not versatile



Applications

Diffusion d'événements sportifs

Effets spéciaux

Étude d'impact

Tourisme interactif

Applications militaires

Design intérieur

Aide à la maintenance, assemblage

Médecine

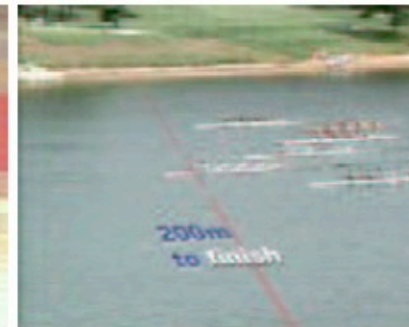
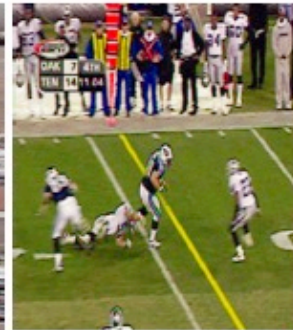
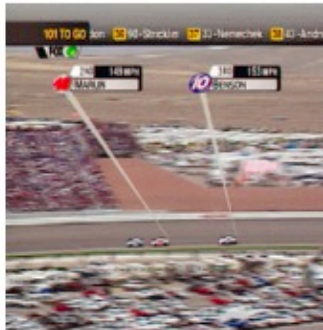
Jeux



Sport

Symah Vision (early 2000's)

Hawkeyes innovation



Sports



FX



FX



ouest
france  .fr

L'info en direct et en continu



Logiciels de Matchmoving Historique

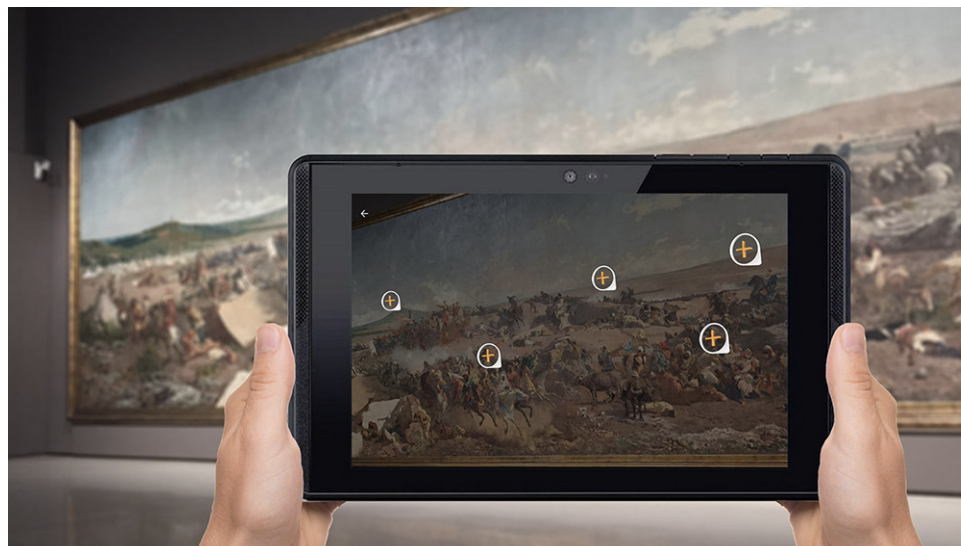
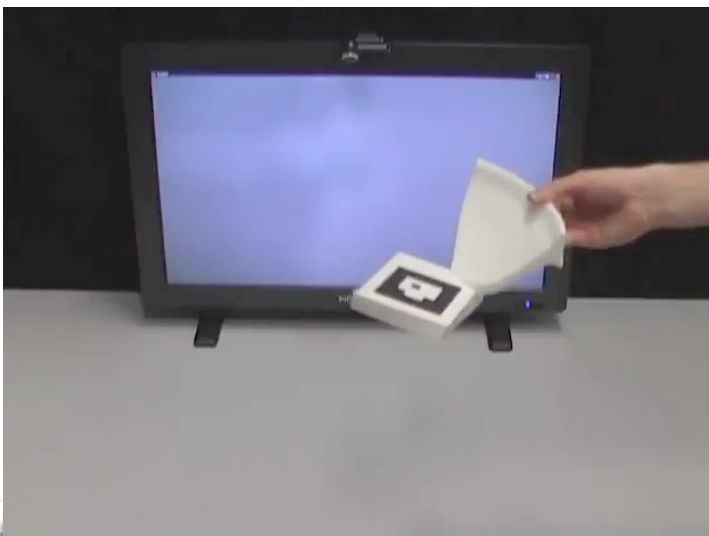
- Milieu des années 90 : Maya Live (Alias/Wavefront)
- 1998 : Realviz (start-up INRIA) : MatchMover
- 2000 : 2d3 (start-up université d'Oxford / Vicon) : Boujou
- 2003 : Pixel Farm (start-up université de Manchester) : PFTrack
- 2007 : Maya racheté par Autodesk, live toujours présent
- 2008 : Realviz racheté par Autodesk



Impact study / architecture / archeology



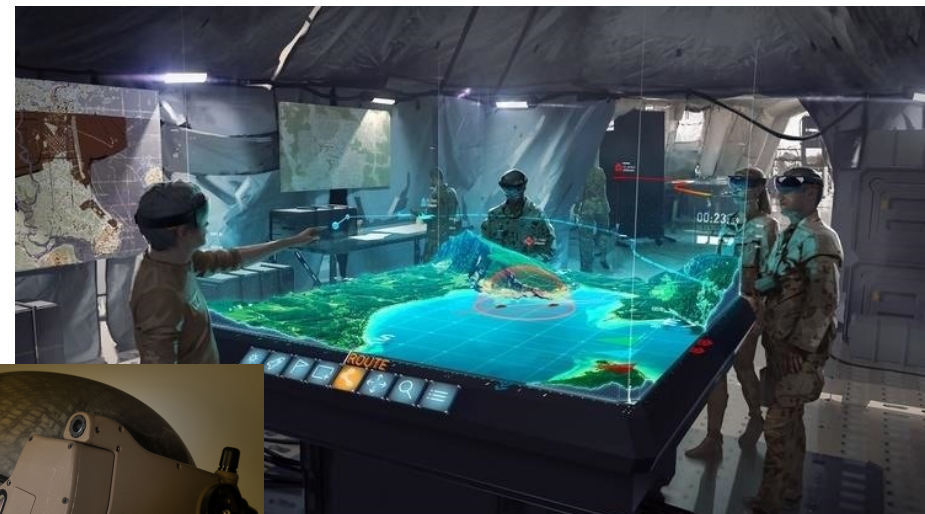
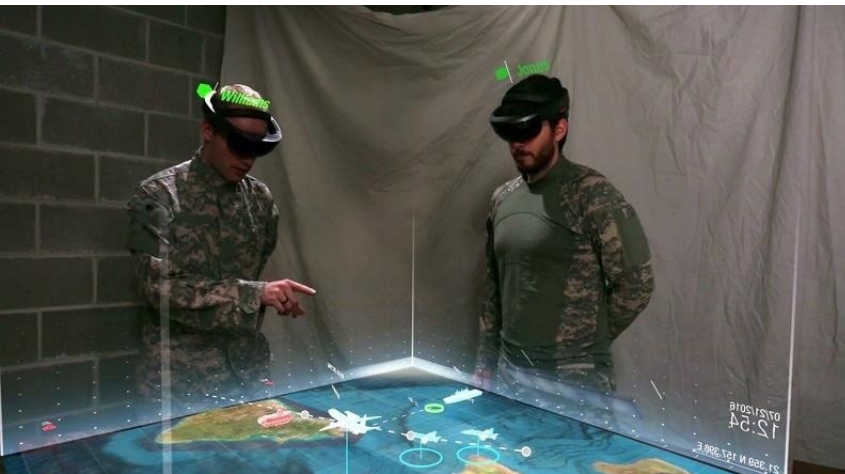
Cultural heritage



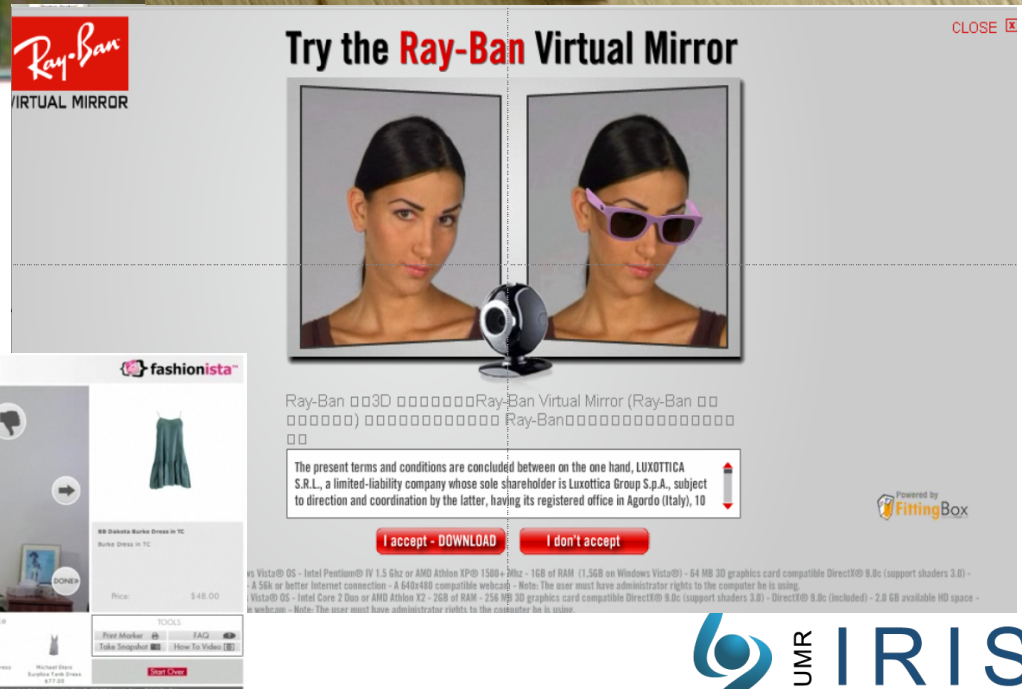
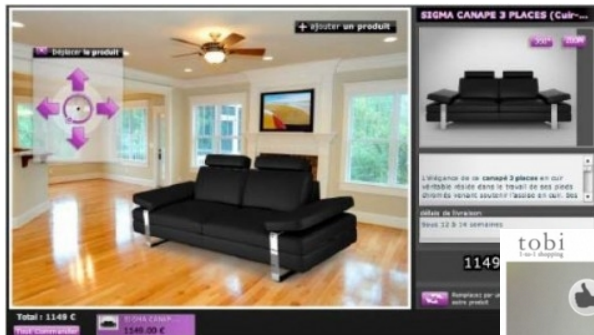
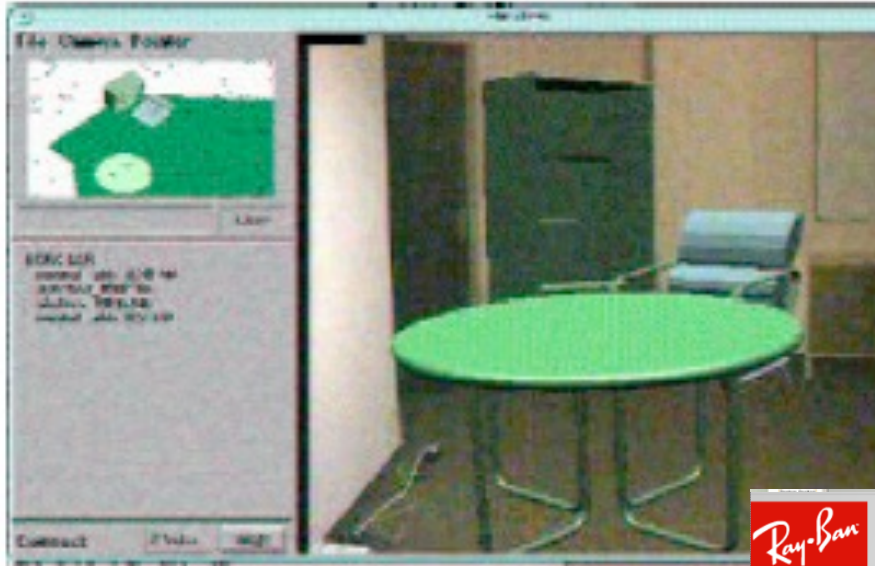
Military applications



Military applications



Marketing



Divertissement



Divertissement

Les ANIMAUX du FUTUR





- ▶ L'ATTRACTION
- ▶ VOTRE SAFARI DANS LE FUTUR
- ▶ LES ANIMAUX DU FUTUR
- ▶ LA RÉALITÉ AUGMENTÉE
- ▶ ALLER PLUS LOIN

expérience n°20 : vivre un safari dans le futur

[Le guide](#)[L'équipement](#)[Le parcours](#)





Votre équipement

Equipé d'une paire de jumelles immersives constituée de 2 écrans OLED et d'une caméra, vous voyez les Animaux du Futur prendre vie devant vous. Un bracelet capteur fixé à votre poignet vous permet d'interagir avec eux.

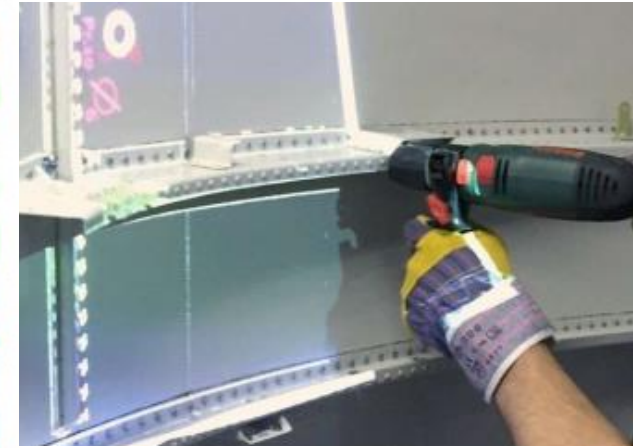
Votre véhicule

Empruntez un train et traversez successivement les 4 scènes reconstituant les habitats des Animaux du futur. Votre wagon est équipé d'un dispositif informatique de réalité augmentée, relié à vos jumelles et à votre capteur...

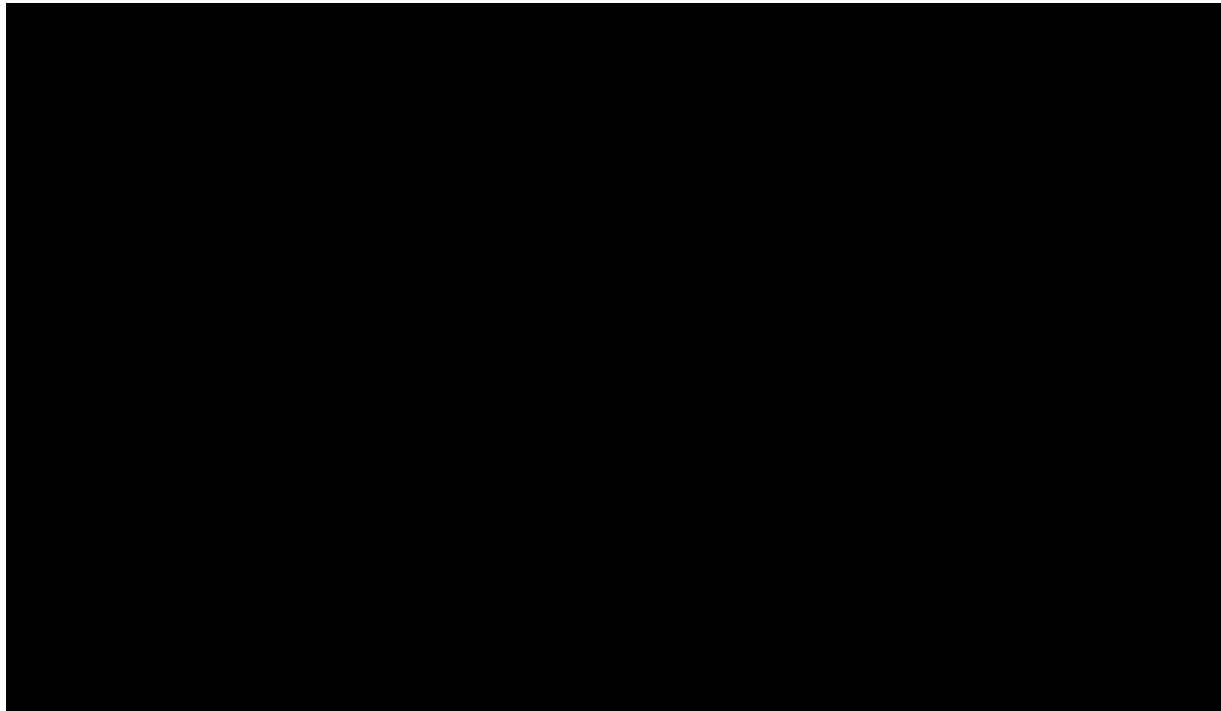
[LE JEU](#)[L'EXPÉRIENCE](#)[L'ATTRACTION](#)[LE BLOG](#)[LES GOODIES](#)[VU À LA TÉLÉ](#)[offres et réservation](#)



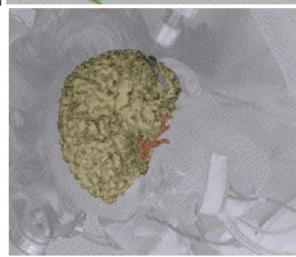
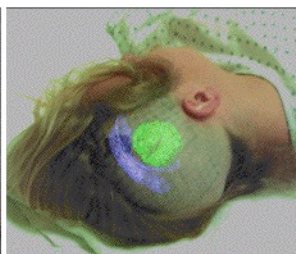
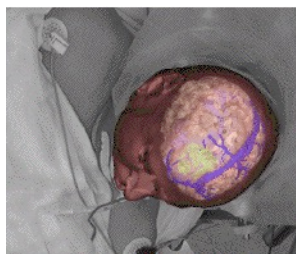
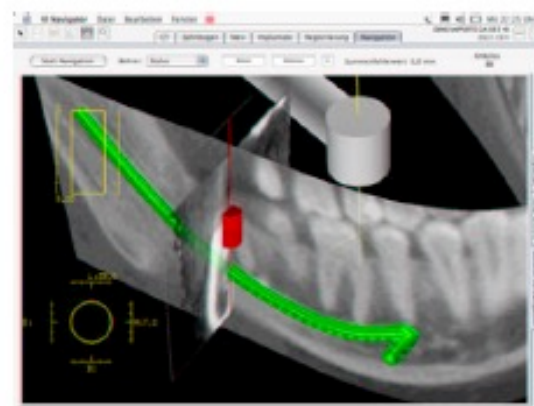
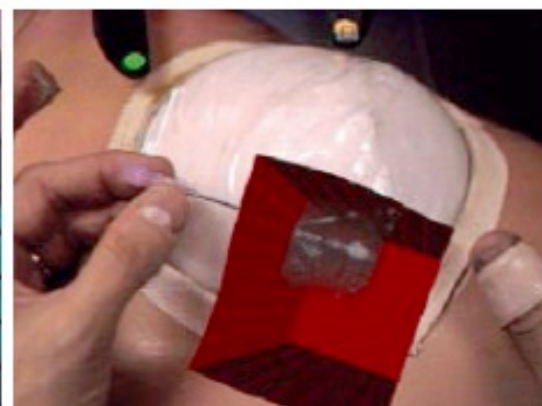
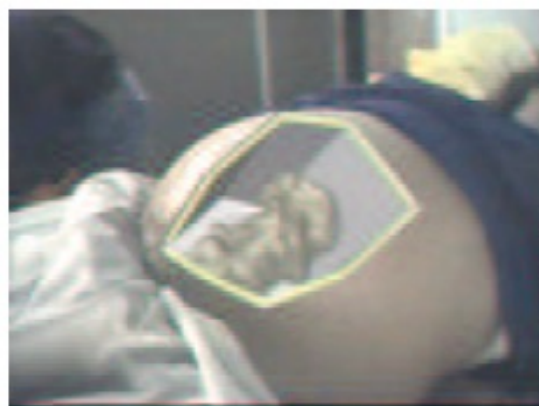
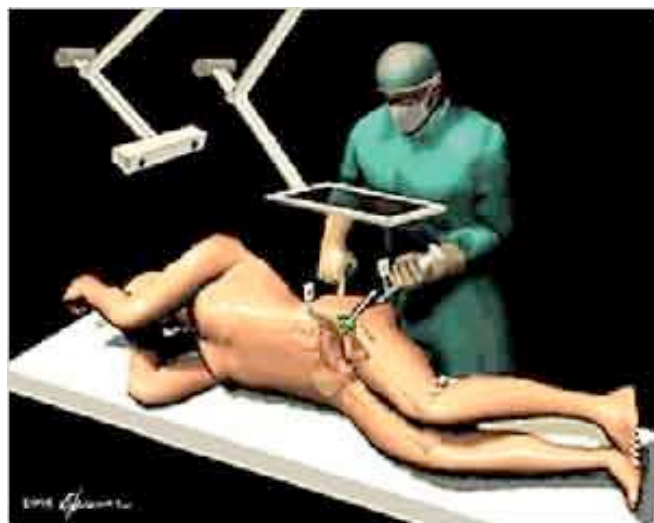
Industrial application, assembly



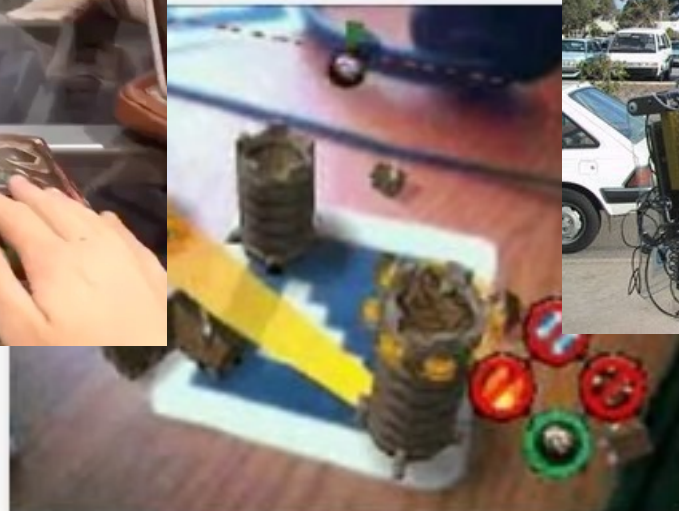
BMW



AR in medecine



Game



ARQuake

Outdoor Augmented Reality Gaming

Wearable Computer Lab
University of South Australia
<http://wearables.unisa.edu.au>
August 2002



Game from outer space...



AR Book Application



No comments...

