

thoughts on virtual and augmented reality

David Chalmers

apple vision pro



meta quest 3

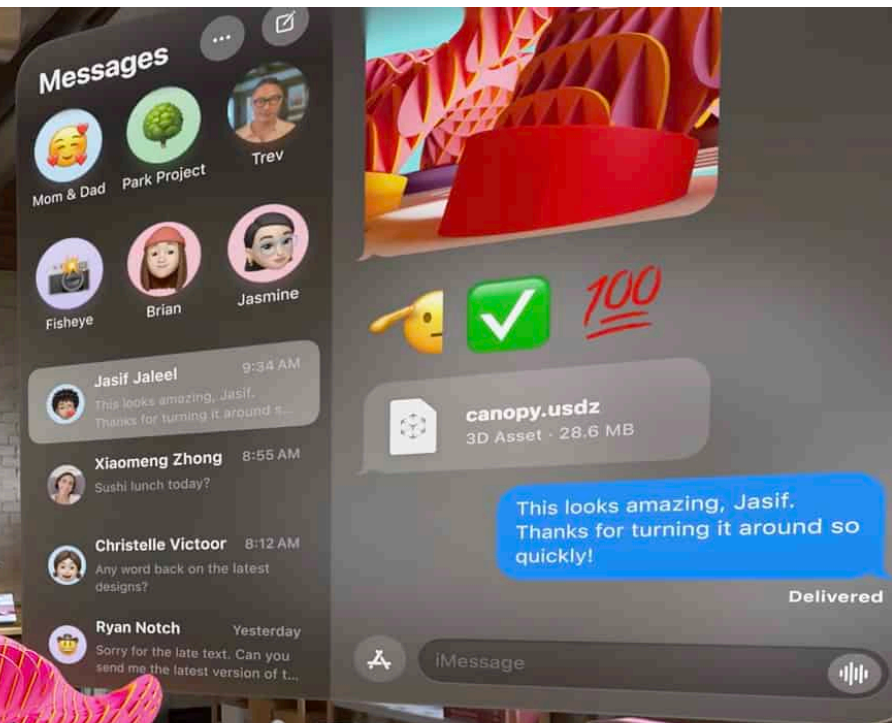
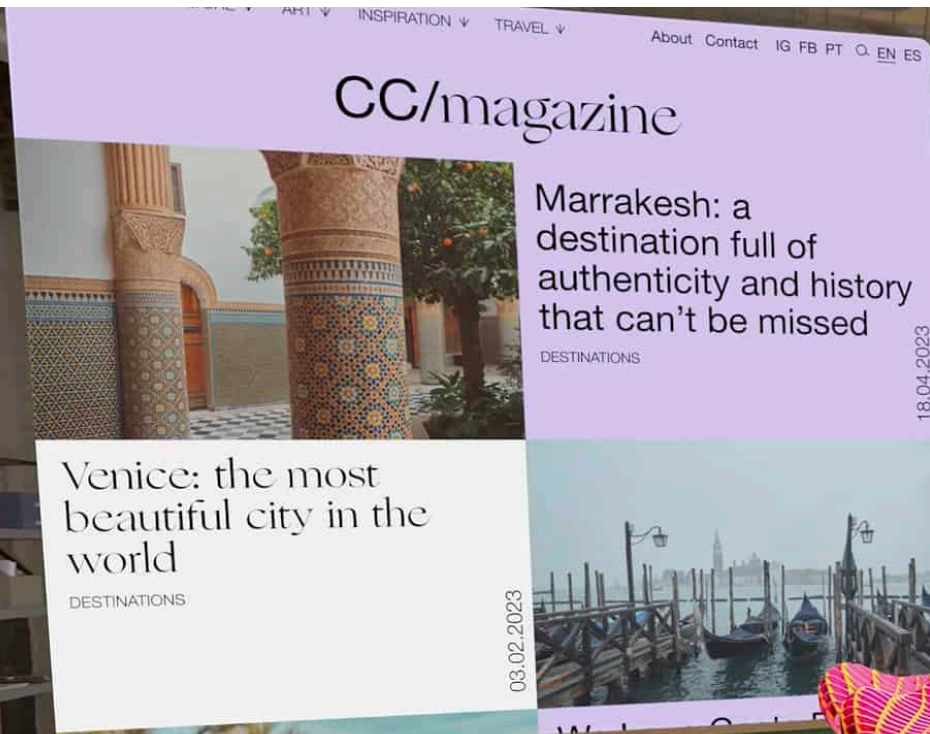


thoughts on mixed reality with passthrough

David Chalmers

passthrough: cameras directed at external world send (digital) signal to headset screens, yielding immersive experience as of external world.

mixed reality with passthrough: passthrough images of external world are combined with VR-generated images, yielding immersive experience of mixed reality (physical and virtual)



questions

what does one perceive when using MR-P?

is MR-P veridical, illusory, hallucinatory?

what is the content of one's perception in MR-P?

passthrough cases

nonimmersive passthrough (live video)

immersive passthrough (telepresence)

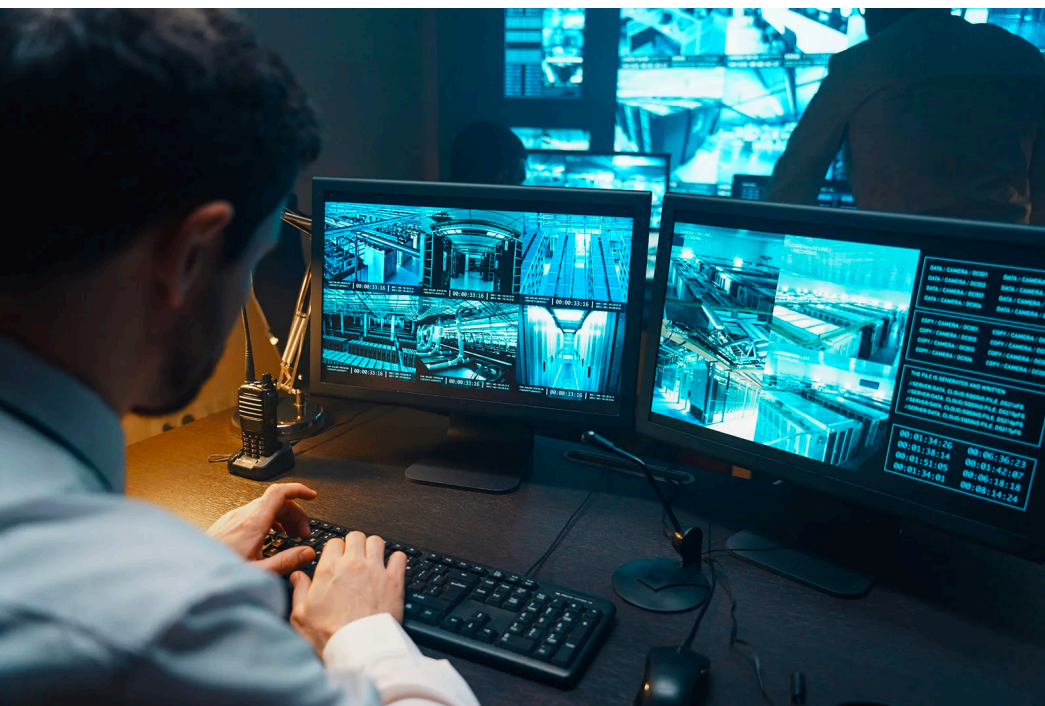
immersive mixed reality with passthrough

nonimmersive passthrough

live video: camera -> 2D screen -> viewer

remote passthrough: TV news, closed circuit cameras, videoconferencing

local passthrough: tank, submarine, video mirror...





what does one see in nonimmersive
passthrough?

my view: one sees the filmed objects, via
seeing a screen. usually nonillusory.

alternative view: one merely sees a screen with various colored patterns on it, and (visually, imaginatively, cognitively?) interprets it as about the filmed objects

(you never see people on video?)

what is the content in non-immersive
passthrough?

objects with shapes, color, relative locations

remote passthrough: nonstandard location
content, e.g. “somewhere” or “there”

local passthrough: typically “here”.

immersive passthrough?

camera → headset screen → viewer

remote: telepresence surgery?

local: military bodysuit? night vision? MR
headset without VR?



what does one see in immersive passthrough?

screen? this is less well-motivated than with non-immersive passthrough: one doesn't have any experience as of a screen (no "seeing-in").

external objects: this is all one seems to see, and (I'd argue) all one sees.

one sees external objects with the causal mediation of a screen, but not by seeing it.

alternative views

one sees screen and objects (OK).

one sees parts of screen and has the illusion that they are external objects

one sees nothing but has experience as of external objects (veridical hallucination)?

digital vs analog vs optical

Q: does it make any difference whether the transmission from camera to screen is “digital”, “analog”, “optical”, ...?

what's the content of immersive passthrough?

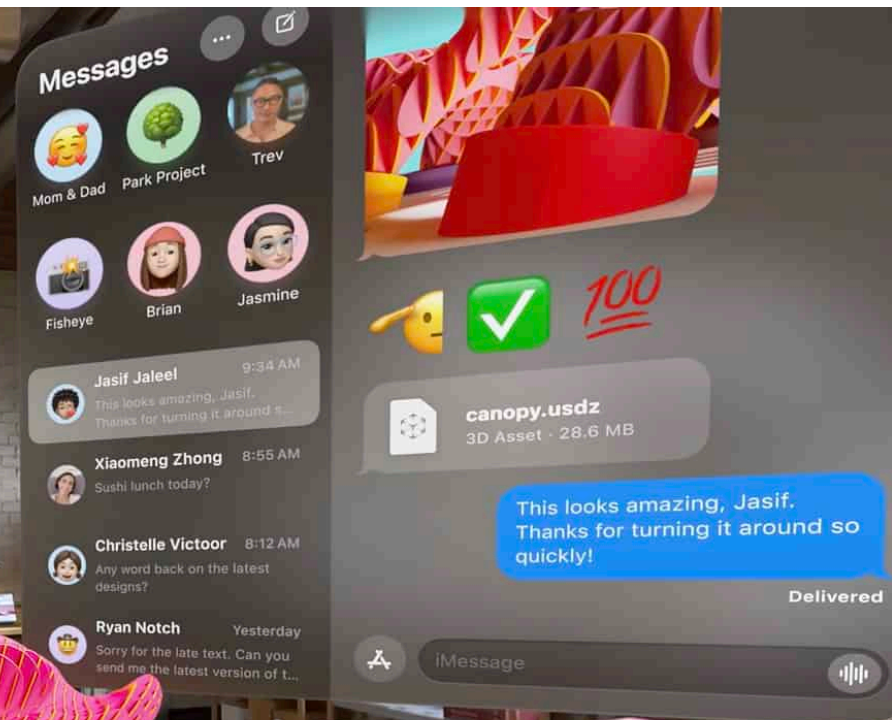
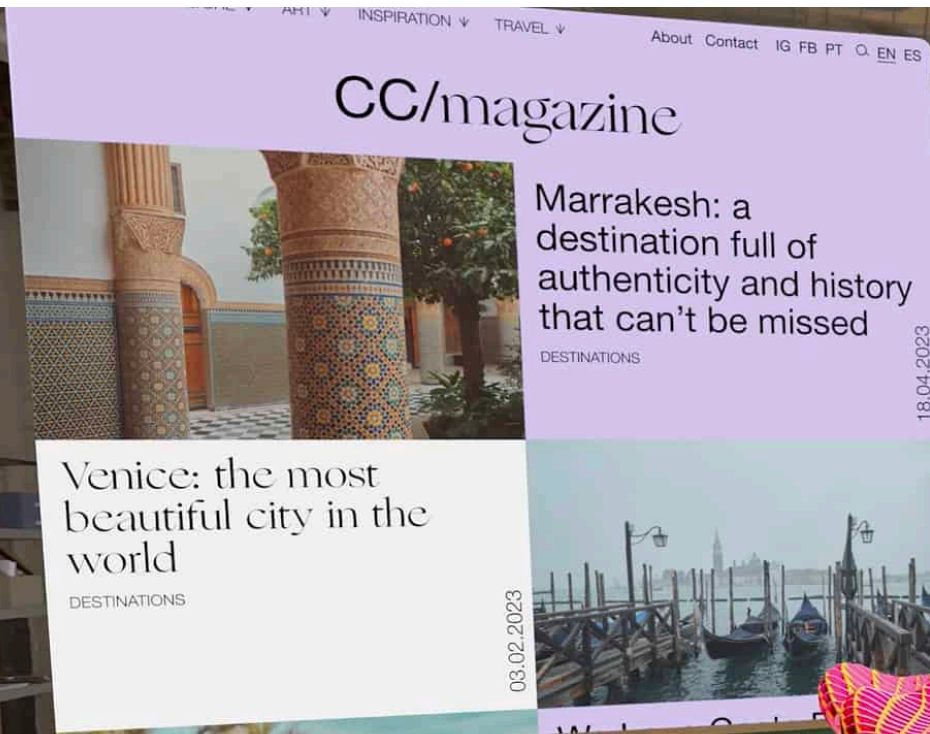
experience can be indistinguishable from ordinary visual perception — same content?

for remote immersive passthrough, location content may be different (depending on cognitive orientation)

for local immersive passthrough, location content may be “here”, as usual.

mixed reality with immersive passthrough?

immersive experience via headset screens
sensitive to physical reality and virtual reality



my view of seeing virtual objects in VR

one sees digital objects

if you don't know you're in VR, you can misperceive these as physical objects in physical space — illusion.

when you (an expert) know you're in VR, you perceive these as virtual objects in virtual space — no illusion.

mixed reality with passthrough

one sees both physical objects and digital objects, depending on the source of one's experience.

is one's experience veridical or illusory?

there are many different cases

case 1: physical and virtual objects are distinguishable

one sees virtual objects as virtual, physical objects as physical (distinct affordances)

no interaction: one can perceive both virtual and physical spaces (no illusion)

interaction: they're perceived as in a common space. AR: digital objects perceived as virtually located in physical space (no illusion?)

case 2: physical and virtual objects are indistinguishable

for naive user: one may have illusion that physical objects are present

for expert user: one perceives them as neutral (physical-or-virtual), located (physically or virtually) in a common space: this needn't be an illusion.

policy recommendation: virtual objects should always be distinguishable from physical objects

likewise, one should always know whether one is in virtual reality, physical reality, or mixed reality.

(cf: one should always know whether one is talking to a human or an AI system?)

fin