



Human Spatial Computing

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What is Spatial Computing?

It's one name related set of technologies that are changing the way we interact with the world and with each other: Virtual Reality, Augmented Reality, and Mixed Reality.



Augmented Reality

Digital overlay of a physical space



Virtual Reality

Simulated immersive environment



Mixed Reality

A blend of augmented and virtual realities



Have you tried VR?



97.81% of
the world
hasn't tried
VR yet"

Pablo Cardenas

The virtual reality revolution **is coming**

Our relationship with technology
has changed

We don't go a day without using
technology to connect with one
another.



Apple Vision Pro

A spatial computing headset which allows for use of voice, eyes and hands to navigate.





Have you tried AR?



Where is Spatial Computing being used?

- Artificial Intelligence
- Assistive Technology
- Business/Retail
- Communications
- Education
- Empathy
- Entertainment/Recreation
- Events
- Gaming
- Health/Rehabilitation
- Meetings
- Navigation
- Therapy
- Training
- Video Programming
- Virtual Assistants
- Wayfinding

My Research

At first, my research delved into spatial computing and XR tools, before shifting towards VR design patterns and exploring accessibility challenges such as physical and psychological reactions, barriers to entry, and inclusion.



XR Development tools and SDK's

Name	Last Visited	Cost	Enterprise	Purposes/category (e.g., modeling, animation, game)	Accessibility Features	Programming Language (back-end)	Scripting Language
Unity 3D	April 14, 2021	Free / Paid options available	YES	Game engine, industry design, animation, architecture, AR	Plugins available for UI accessibility. not accessible features for	C++	C#
Unreal	April 14, 2021	Free to use / costs for profits	YES	Game engine, industry design, animation, architecture, AR	Color Deficiency Correction	C++	C++, Blueprint
CryEngine	April 14, 2021	Free	YES	Game engine, animation, modeling	N/A	C++	C++, C#
Godot	April 14, 2021	Free	NO	Game engine, animation, modeling, AR	Accessibility addon available (for UI Accessibility)	C++	GScript, C#, GDNative

XR City



XR CITY MAP

3.2021



TurboSquid
Textures
Quixel
Sketchfab
Unity Assets Store

3DS Max
Cinema 4D
Maya
Autodesk
Modo
Houdini
Clara.io

G Game	3 3D framework	M Modeling	AR AR	A Animation	P Prototyping	VPAT available	Paid only
D Drawing	C Character	VPAT available	Paid and free	Enterprise plan available	Free	VR	

C, O, M, I, N, G,

S, O, O, N,

Keep an eye out for our forthcoming book, "Human Spatial Computing," which I co-authored with Doug North Cook. It will be published by Oxford University Press in 2024.

Spatial Computing + Culture

Designers in spatial computing must understand that cultural norms regarding privacy, safety, and data protection can differ from one another.



With great power comes great responsibility...

We are creating technologies very quickly in the 21st Century at what cost?



Privacy



Security



Safety



Harm vs.
Benefit

Cultural Relativism



A square sign with a black background and white text, framed by a light-colored wooden border. The sign is centered within a red rounded square background. The text on the sign reads: "RIGHT IS RIGHT EVEN IF NO ONE IS DOING IT".

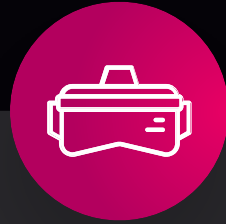
RIGHT
IS RIGHT
EVEN IF
NO ONE
IS DOING IT

Emerging technologies require careful consideration of cultural ethics. This is particularly important in shaping intercultural communication and interactions within spatial computing.

Things to consider...



What does the world really look like?



How are we making sure we get represented?

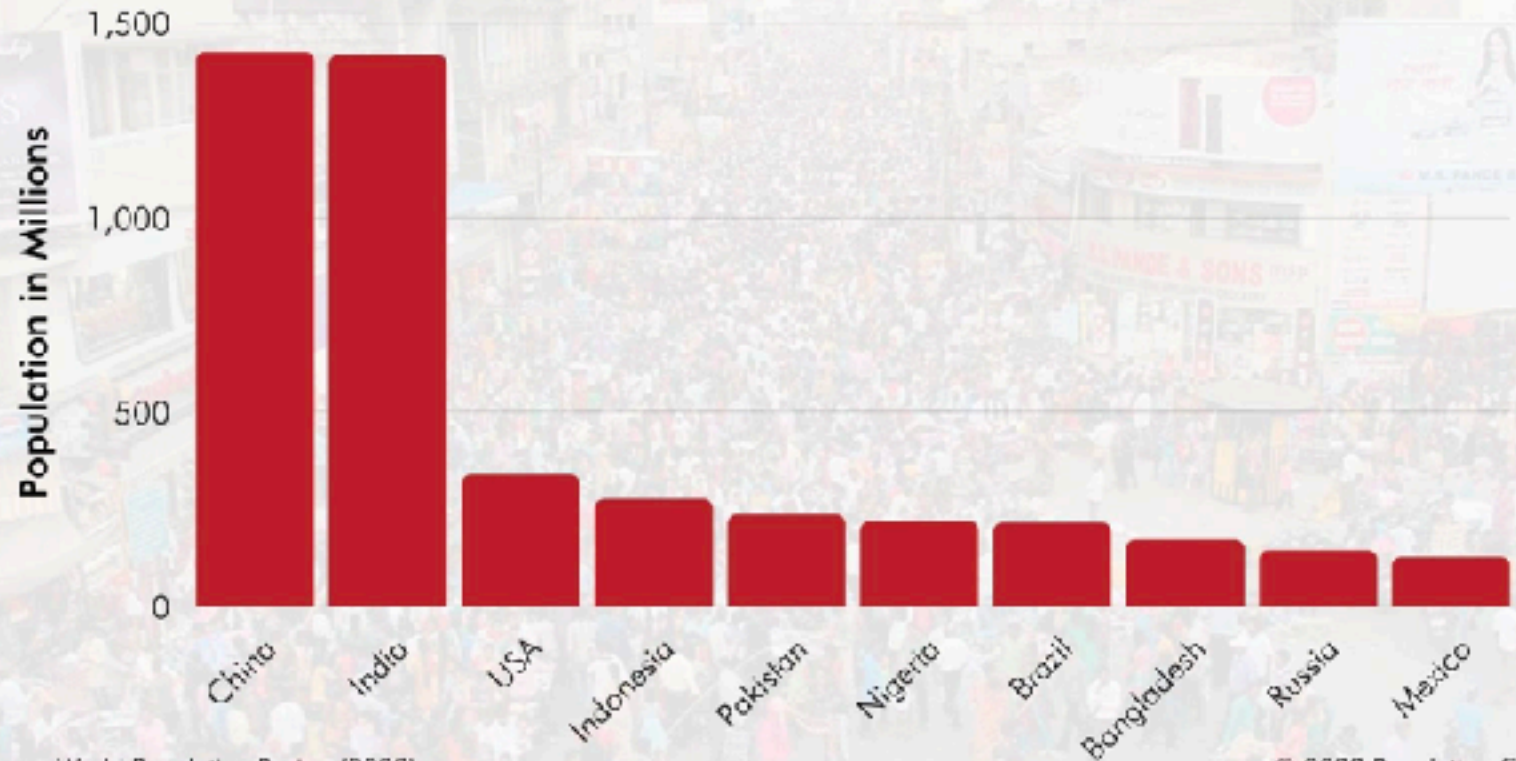


Nothing about us without us?



What does the world really look like?

Top 10 Most Populous Countries



Source: World Population Review (2022)

© 2022 Population Connection



How are we making
sure we get
represented?





Nothing about us
without us?





“Technology is neither good nor bad; nor is it neutral.” —Melvin Kranzberg

Human Computer Interaction

The field of human-computer interaction focuses on how we interact with computers and other devices. Its main objective is to make the interaction with these devices easy and enjoyable.



Human Computer Interaction in Spatial Computing



Spatial Awareness



Natural User Interfaces



User Centered Design

Storytelling

In the realm of storytelling within spatial computing, the argument that technology and gaming often prioritize a specific demographic, primarily white men from Western cultures, carries significant implications.



Universal Design

Originally created for architecture, Universal Design is an approach to make things for a wider audience.



Flexibility

Universal design in spatial computing should allow users to customize their experiences to suit their individual preferences and needs.

Intuitive

This is essential for users with varying levels of familiarity with technology and those who may have cognitive or sensory impairments.

Accessibility

Incorporate accessibility features to ensure that spatial computing experiences are usable by individuals with disabilities.

WalkinVR

WalkinVR is an innovative software designed to enable people with motor disabilities to enjoy Virtual Reality (VR) gaming to the fullest. While the VR gaming market is vast and expanding, people with disabilities have traditionally faced physical limitations in participating.



Bodies in Spatial Computing


How can we use our entire body as a way of experiencing spatial computing?



Multi-Sensory Integration

Combining sensory inputs, including visual, auditory, tactile, and proprioceptive feedback, creates a holistic spatial computing experience. By engaging multiple senses simultaneously, users can better perceive and interact with digital content using their entire body.



A person is holding a white rectangular sign in front of their face. The sign is divided into three horizontal sections by thin black lines. The top section contains the word 'KNOWLEDGE', the middle section contains the word 'IS', and the bottom section contains the word 'POWER'. The person is wearing a dark grey long-sleeved shirt. The background is a plain, light grey wall.

KNOWLEDGE

IS

POWER

A magnifying glass with a black handle and a circular lens is positioned over the word "BIAS". The word is written in black, uppercase letters on four separate white rectangular tiles. The entire scene is set against a plain white background.

B I A S

How can we make sure that our design is inclusive of different perspectives and experiences?

Neurological Understanding



1. Having a foundational understanding of neuroscience and how the human brain functions is helpful for designers. This knowledge can help create spatial computing experiences that align with cognitive processes and sensory perceptions.

Key Nerves in our Body



1. The vagus nerve plays a critical role in regulating emotional responses and stress. Designers should consider the potential impact of spatial computing experiences on users' emotional states and well-being.

2.

Human Spatial Computing



What does the future of Spatial Computing look like? And are you part of it?



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SCAN ME

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Thank You

