College of
Computer Studies

DEPARTMENT OF
SOFTWARE TECHNOLOGY

Introduction to Empathic Computing

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Empathy

Empathy

"Seeing with the Eyes of another,

Listening with the Ears of another,

and Feeling with the Heart of another.."

Alfred Adler

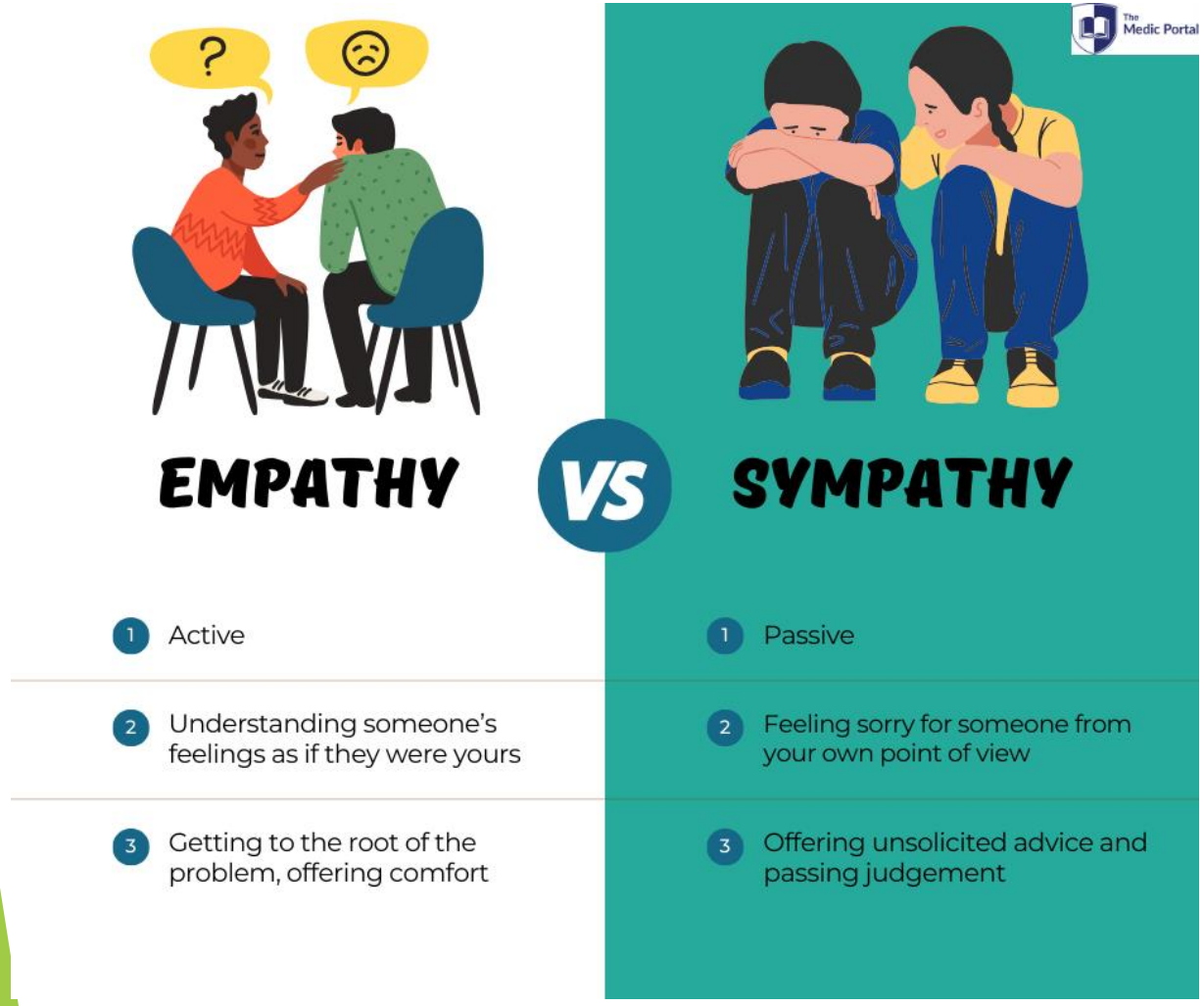
empathy noun

em·pa·thy | \ˈem-pə-thē\

Definition of *empathy*

1 : the action of understanding, being aware of, being sensitive to, and vicariously experiencing the feelings, thoughts, and experience of another of either the past or present without having the feelings, thoughts, and experience fully communicated in an objectively explicit manner

Empathy vs Sympathy



- Empathy is shown in how much compassion and understanding we can give to another.
- Sympathy is more of a feeling of pity for another.
- Empathy is our ability to understand how someone feels.
- Sympathy is our relief in not having the same problems.

Empathic Computing

1. *Understanding:* Systems that can understand feelings and emotions.
2. *Experiencing:* Systems that put people into the recorded world of others.
3. *Sharing:* Systems that share the real time experience of others.

Aim of empathic computing is to develop software systems that allow people to share with others what they're seeing, hearing and feeling.

Empathic computing research uses technology to create deeper shared understanding or empathy between people.

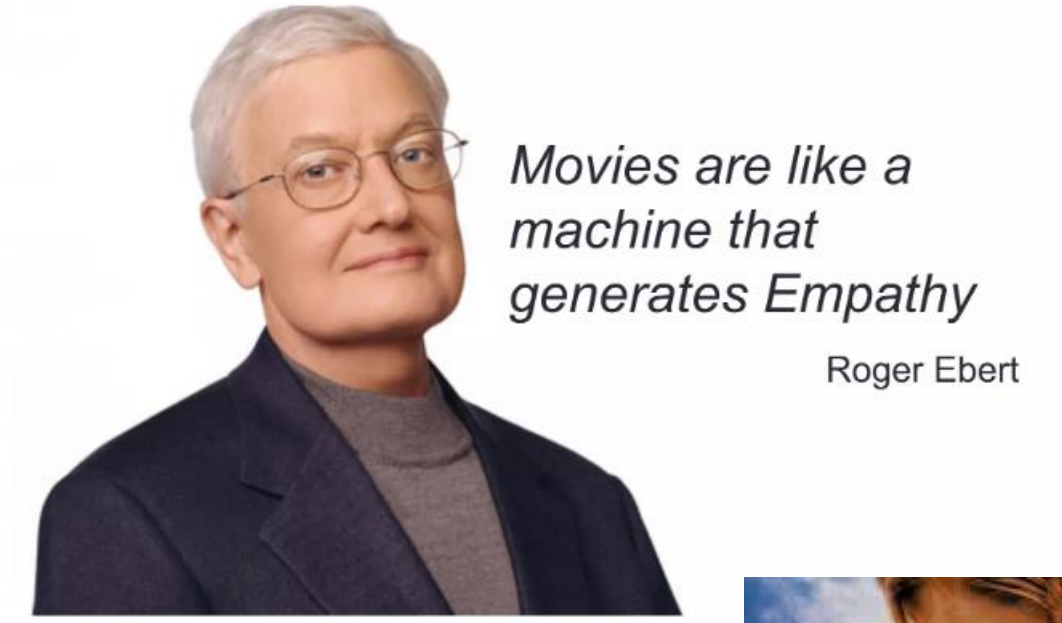
Empathic Computing

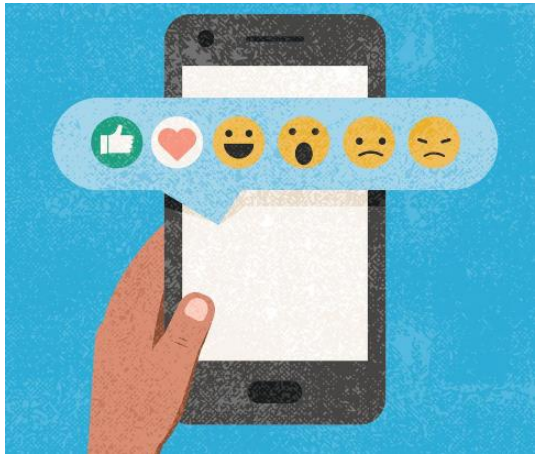
Appliances That Make You Happy

- Jun Rekimoto – University of Tokyo/Sony CSL
- Smile detection + smart appliances

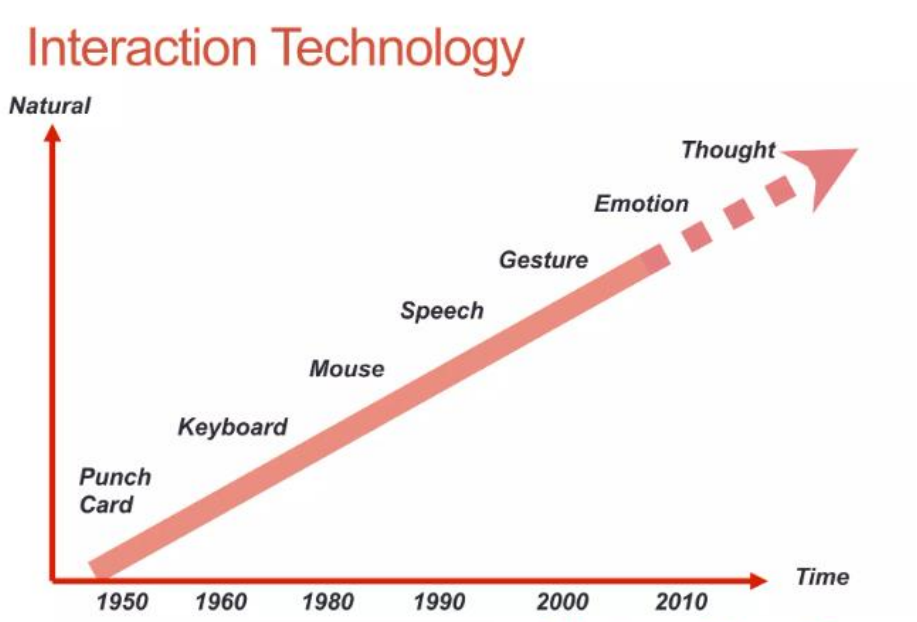
Can we develop systems that allow us to share what we are seeing, hearing and feeling with others?

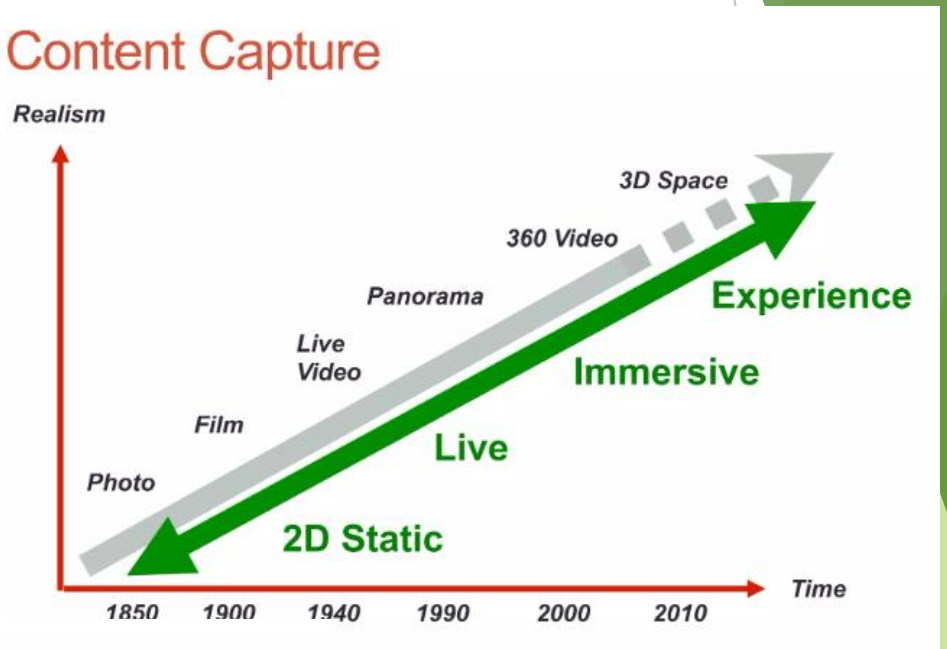
Empathic Computing

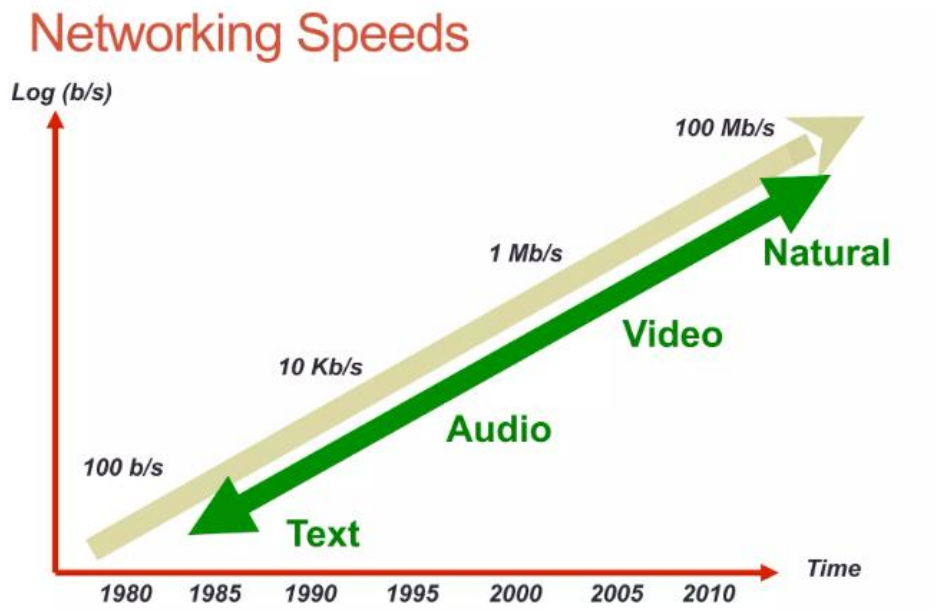




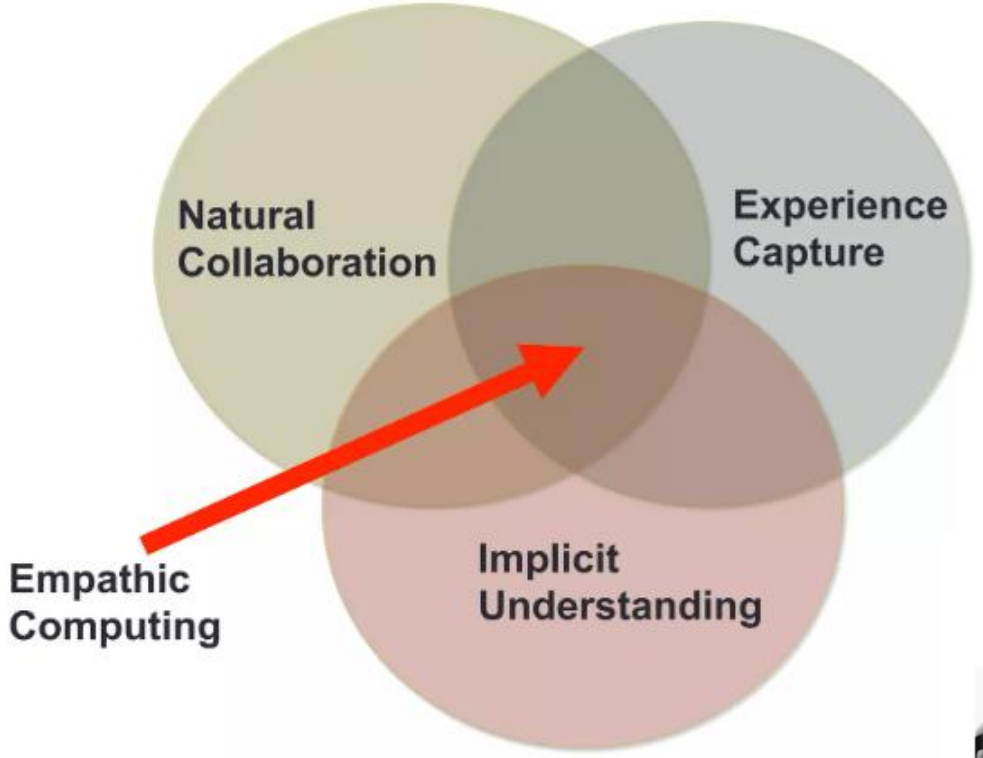
Evolution of Interaction Technology







Evolution of Interaction Technology



Physiological Sensing

Emotiv

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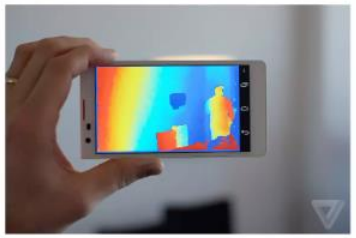
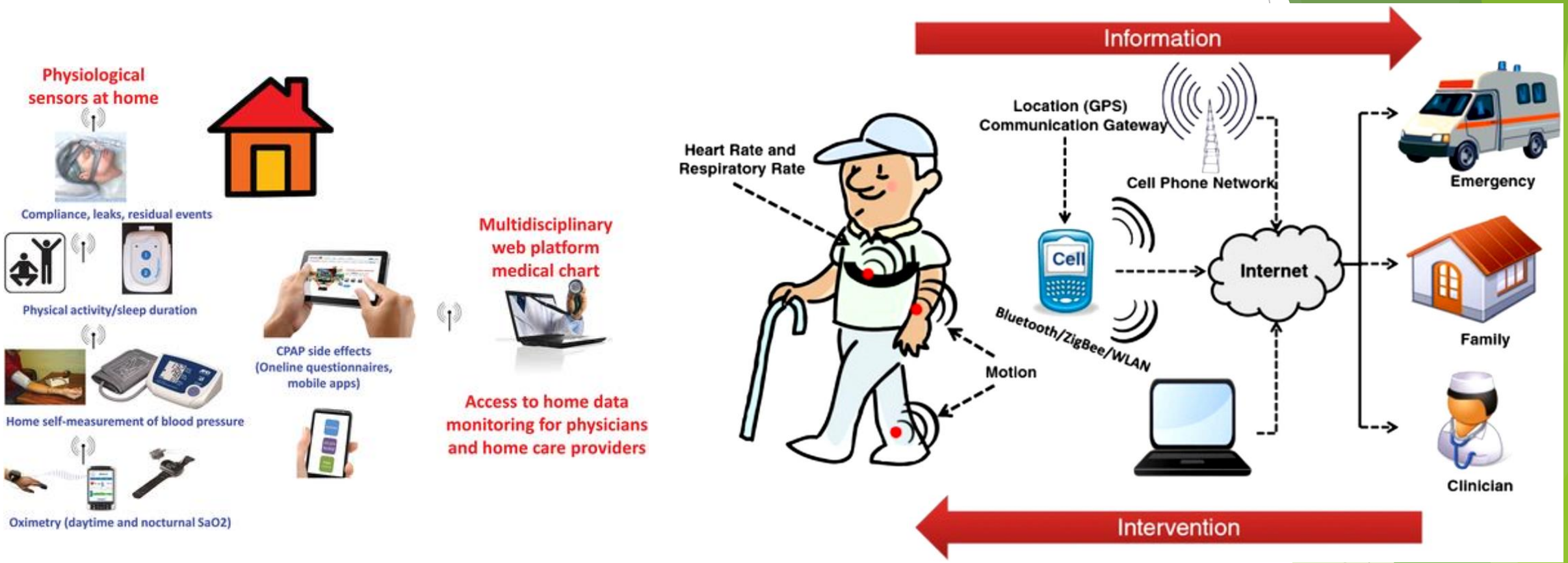
3D Image/Space Capture

Samsung Project Beyond



Google Project Tango

Evolution of Interaction Technology



Remote patient monitoring system using physiological sensors

Empathic Computing Technology

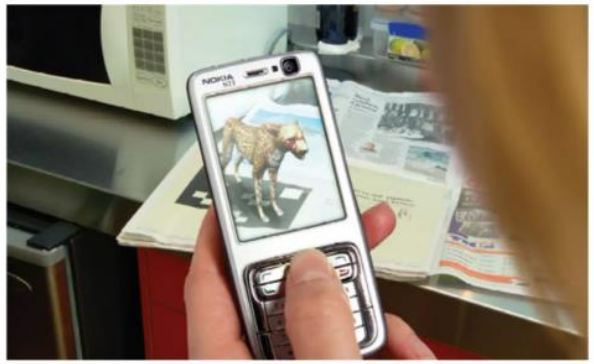
MagicBook (2001)

- First AR story book
- Transitional AR to VR experience

AR Tennis (2005)

- First collaborative AR game on a mobile phone

Mobile AR Advertising (2007)



- First mobile AR ad campaign (Saatchi & Saatchi)

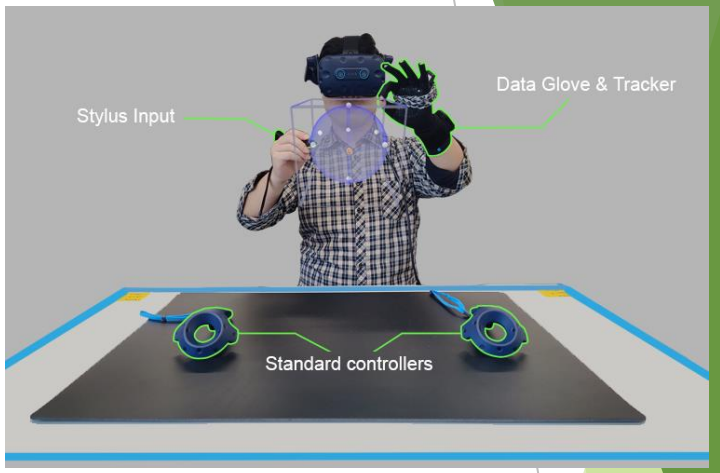
AR Business Today

- Around $600 Million USD in 2014 (>$2B 2015)
- > 80% Games and Marketing applications

Empathic Computing Technology

Wearable AR for Empathic Interfaces

- Wearable AR can:
  - Be unobtrusive
  - Capture emotion
  - Share sights, and sounds
  - Support remote collaboration
  - Enhance interaction in the real world



http://empathiccomputing.org/projects/

Empathic Computing Technology

Augmented Reality is the overlaying of digital objects (animals, products, maps, information bubbles, people…) into your real world.

Virtual Reality is an immersive viewing of a digital world that you can move through.

Mixed Reality is just Augmented Reality that you can interact with.

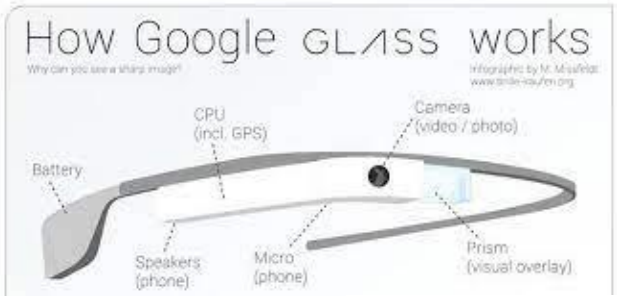
Microsoft Mesh is a new infrastructure that allows developers to make Mixed Reality work on most platforms and with more than just one person.

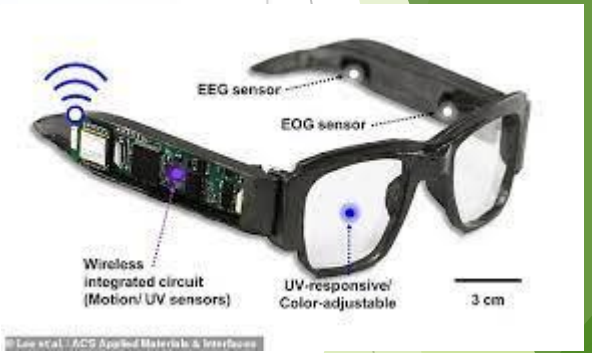
Holoportation puts a digital avatar of you in a space with others that you can fulling interact with (using the Microsoft Mesh technology)

Empathic Computing Technology

Example: Google Glass

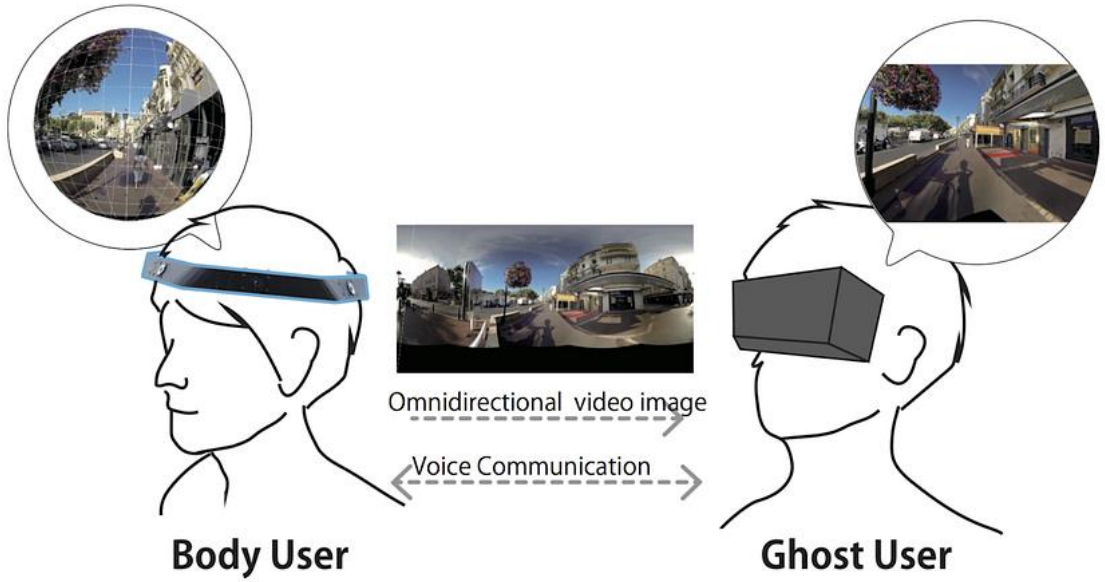
- Camera + Processing + Display + Connectivity
- Ego-Vision Collaboration (But with Fixed View)





https://katieraspberry.wordpress.com/2013/08/23/google-glass-what-do-they-do/

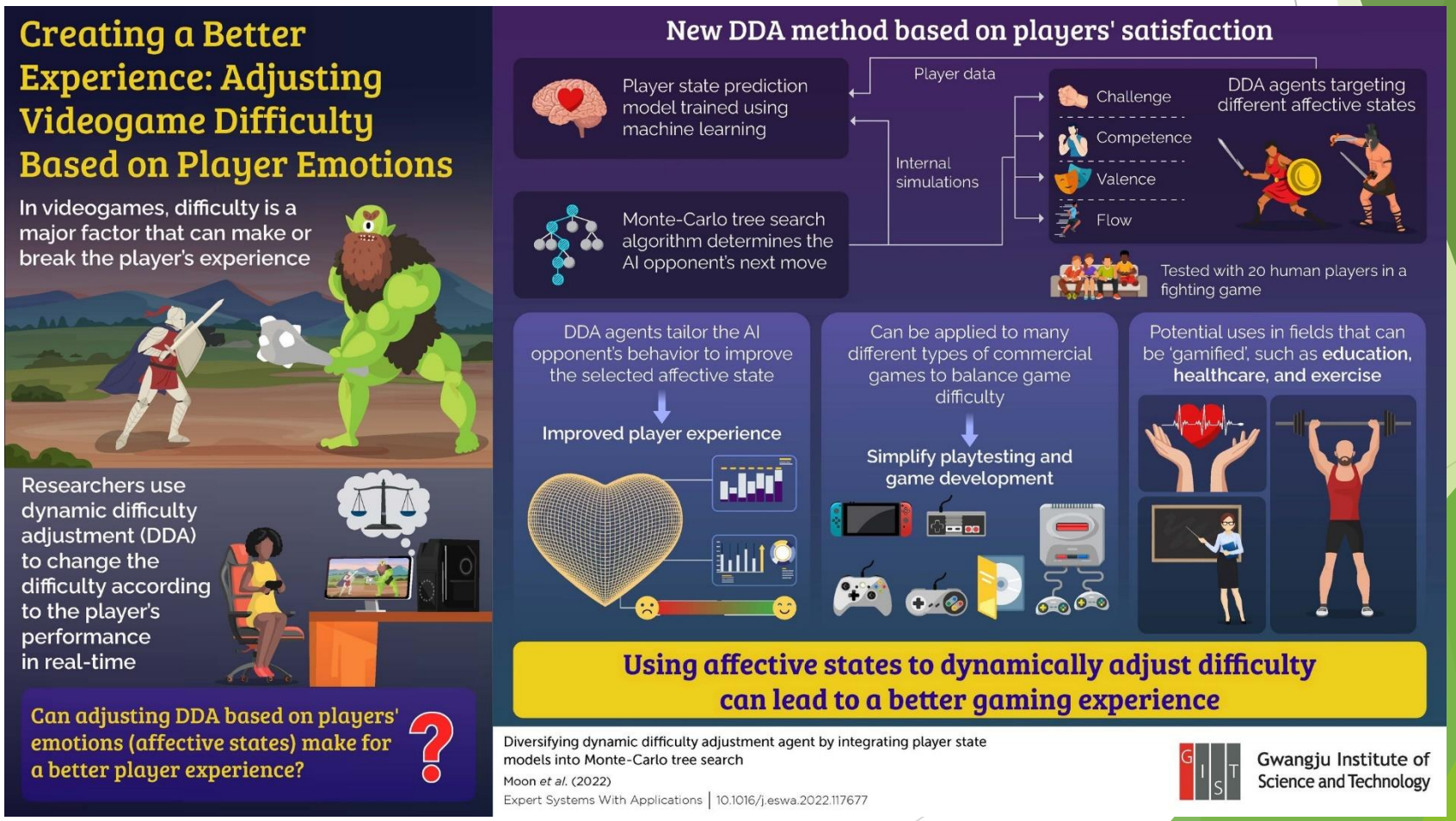
Empathic Computing Technology



Two way video sharing to enable two people to feel like they are inside each other's bodies. In this case people wear head mounted displays with cameras on them and the video feed from each person's cameras are swapped and shown in the other person's HMD. This allows the user to explore places in real-time without being presence. This is also known as Surrogate Tourism.

Empathic Computing Technology

Appropriately balancing a videogame's difficulty is essential to provide players with a pleasant experience. In 2022, Korean scientists developed a novel approach for dynamic difficulty adjustment where the players' emotions are estimated using in-game data, and the difficulty level is tweaked accordingly to maximize player satisfaction. Their efforts could contribute to balancing the difficulty of games and making them more appealing to all types of players.

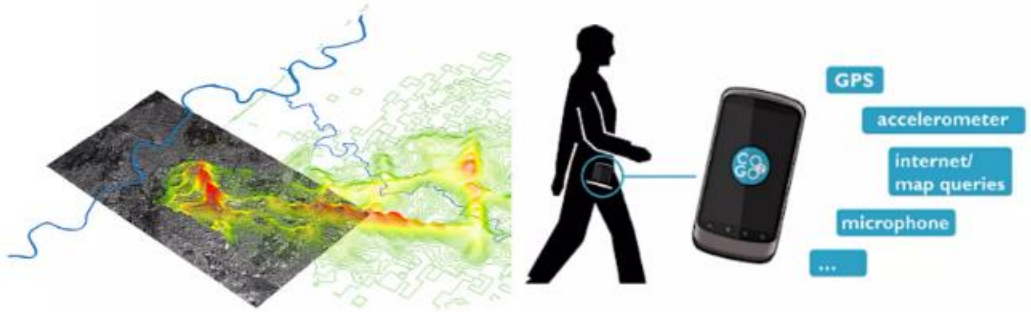


Empathic Computing Technology

Example: MIT SENSEable City Lab

http://senseable.mit.edu/wikicity/rome/

AR + Smart Sensors + Social Networks

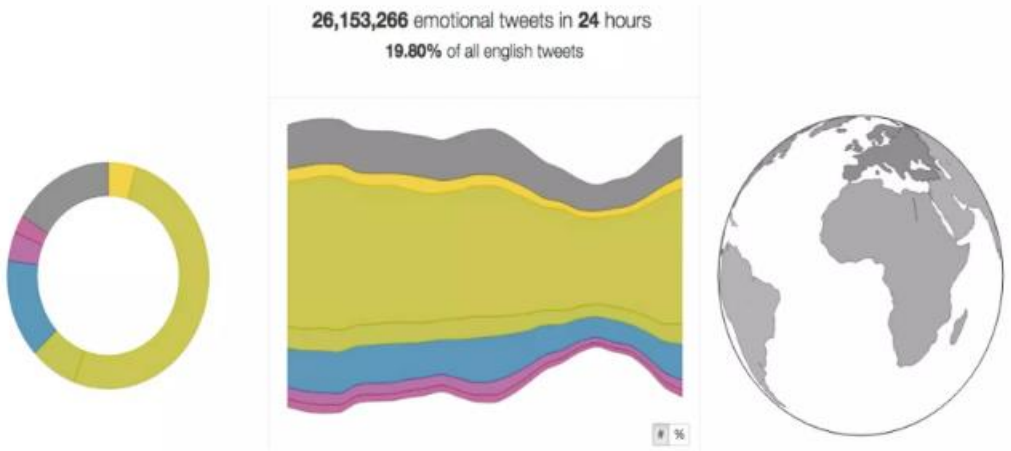


- Track population at city scale (mobile networks)
- Match population data to external sensor data
- Mine data for applications

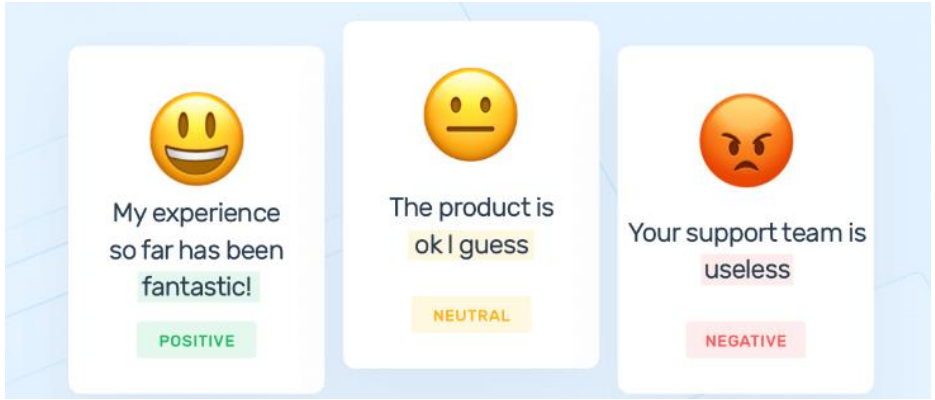
- Seeing actions of millions of users in the world
- Augmentation on city/country level

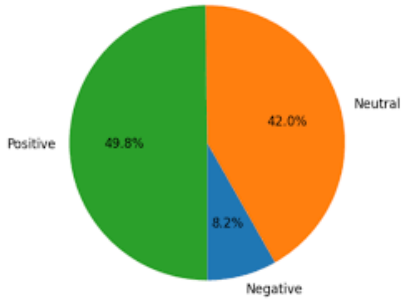
Empathic Computing Technology

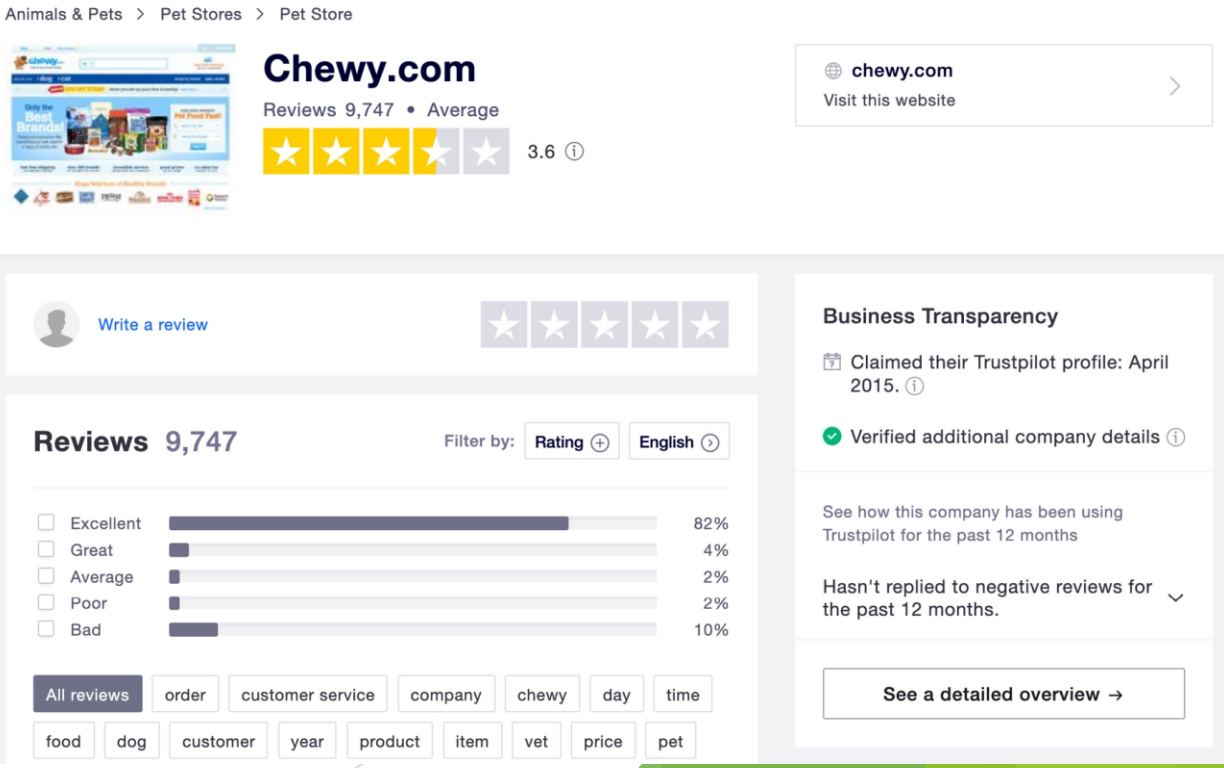
Example: CSIRO WeFeel Tool



- Emotionally mining global Twitter feeds
- http://wefeel.csiro.au



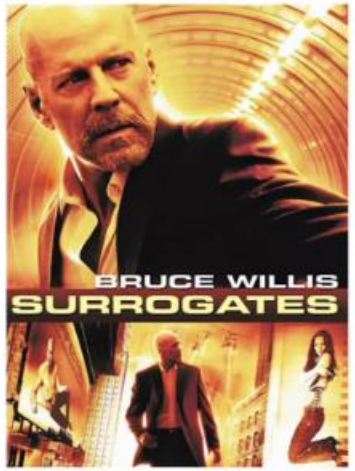


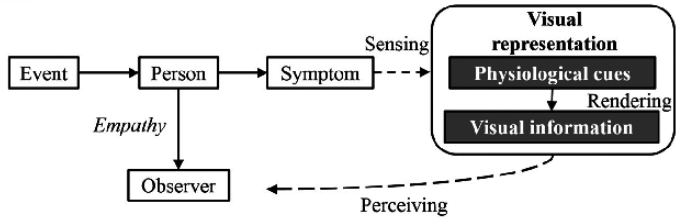


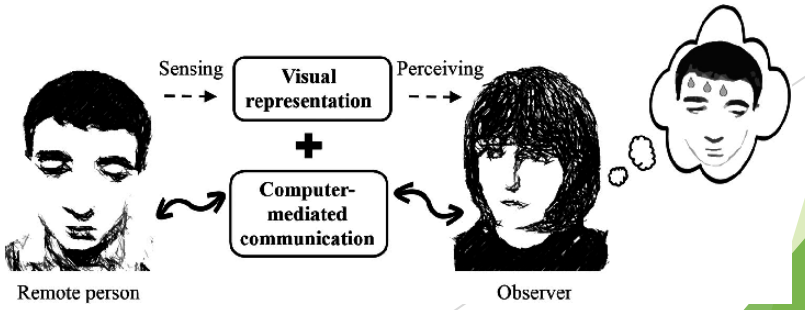
Potential Applications

Potential Applications

- Education
- Sports training
- Rich life logging
- Remote meeting support
- Psychological treatments
- Virtual Travel/Entertainment
- Surrogate Adventure Tourism
- First responders (stress, team cohesion)

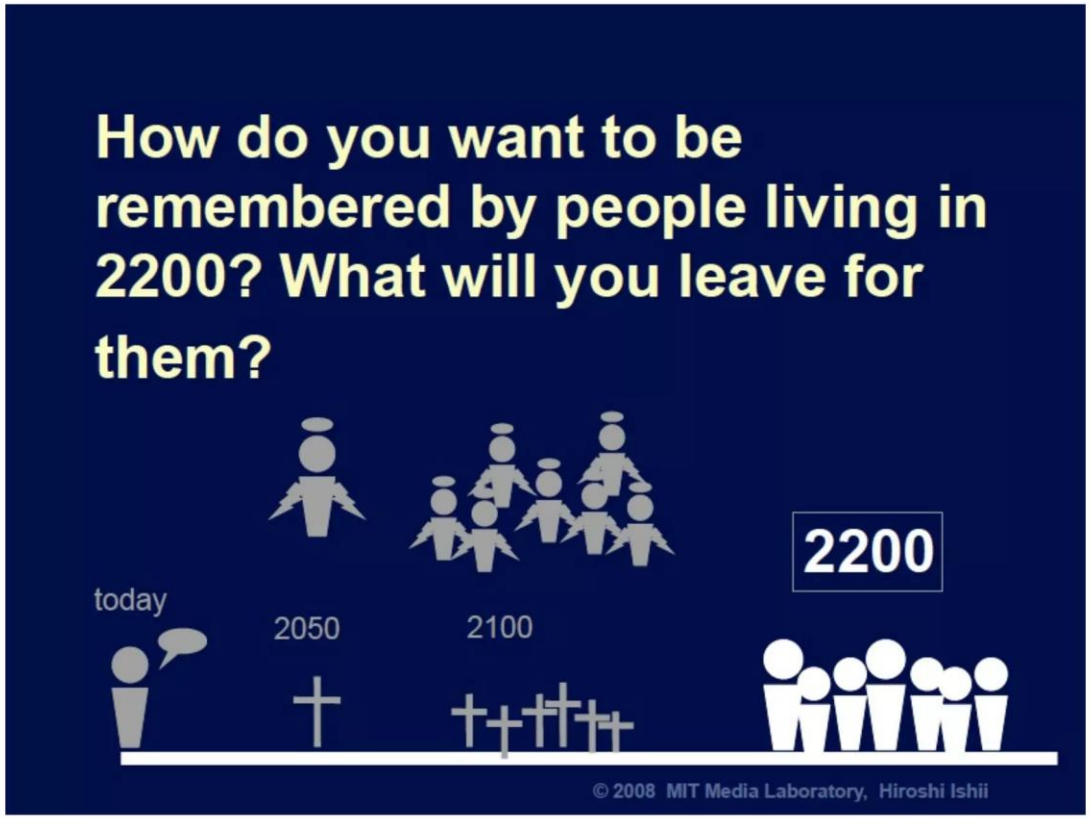






Research Challenges

- How to capture emotion?
- How to measure empathy?
- Interface/interaction models?
- How to communicate emotion?
- How to create strong empathic bonds?
- How to scaling up to city/country scale?


How do you want to be remembered by people living in 2200? What will you leave for them?
today
2050
2100
2200
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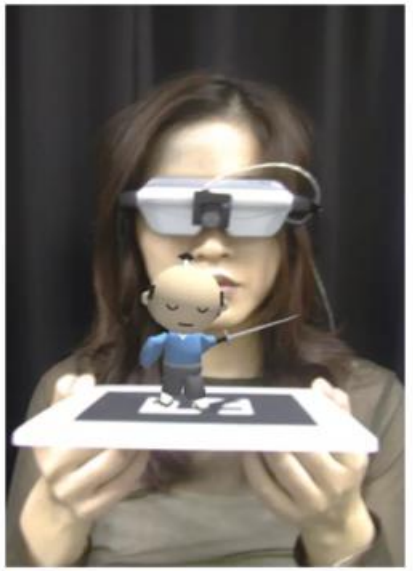


How VR technology
can connect with human

Readings

- https://www.cmu.edu/vis/NEW%20WEBSITE/images/publications/empathetic.pdf
- https://medium.com/super-ventures-blog/the-coming-age-of-empathic-computing-617caefc7016
- https://online-journals.org/index.php/i-jim/article/download/6385/4385/22144
- https://computethought.blog/2018/11/02/the-era-of-empathic-computing/