# Validation of a virtual framework for public speaking training

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LIÈGE université
Psychologie, Logopédie & Sciences de l'Éducation

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# Our lab

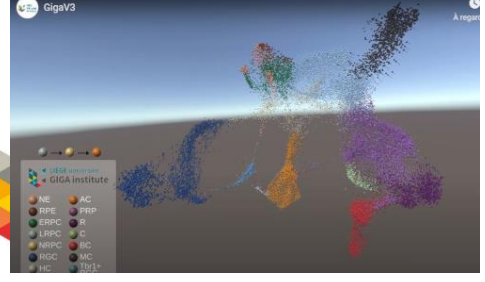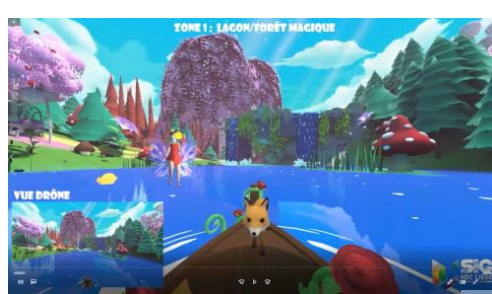# SIG AR/VR Lab (Digital Business)
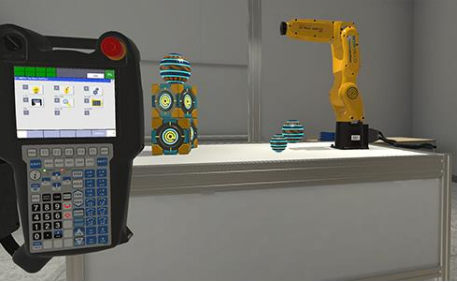


- Researchers.
    - XR
    - AI (optimization)
    - New technologies (Digital Twins)
- 3D Artists
- Tech Art
- Animators

# Serious games : training, research, society services

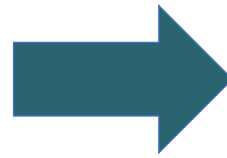http://www.sig.hec.uliege.be/

# Introduction

# From Metaverse to Eduverse



**XR**



**XR**

- Imaginary world
- Multi-users
- Public

- Imaginary world for education : Lectures rooms, training rooms, meeting rooms, **simulations** rooms, …
- Multi-users (teachers, students, experts, **AI helpers**…)
- « Controlled access »
- (No NFT at this stage)

How to improve feeling of presence and social interactions in VR?

# How to improve presence and interactions?

*« Metaverse opportunities: Enhance social experiences and interactions »*
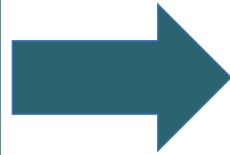
*T. Jung*

## Definitions

**Valence:** corresponds to how positively or negatively the attendee (avatar in our context) feels toward the speaker (with VR headset) or the presentation

**Arousal:** audience member's level of alertness
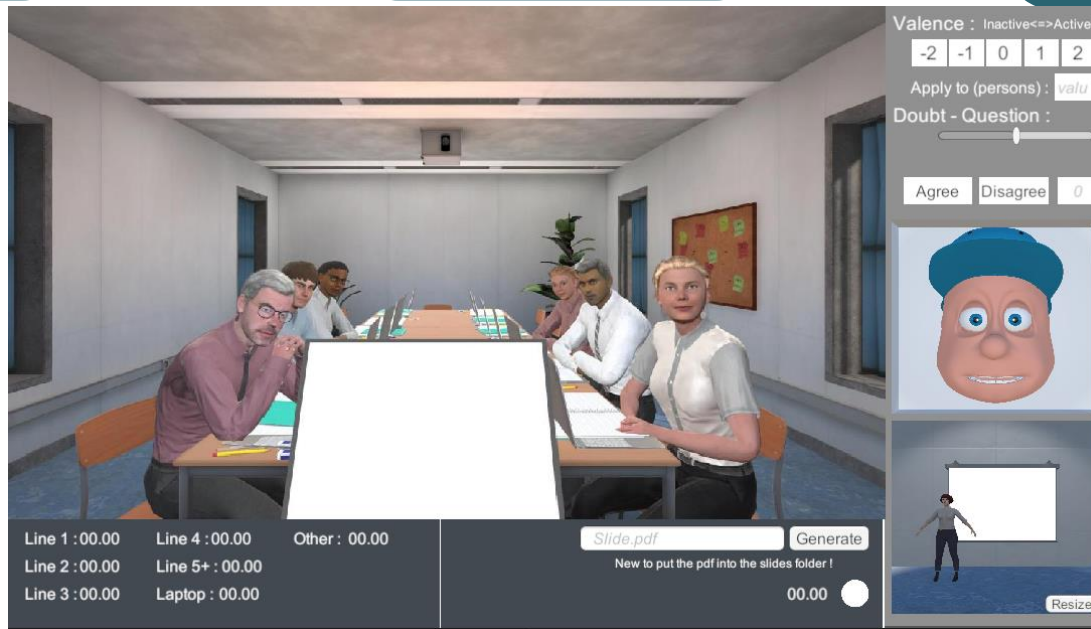
# Project: 3-step process

Creation of an interactive audience

Voice and Speech analysis with Statistics, NLP, ML and DL approaches

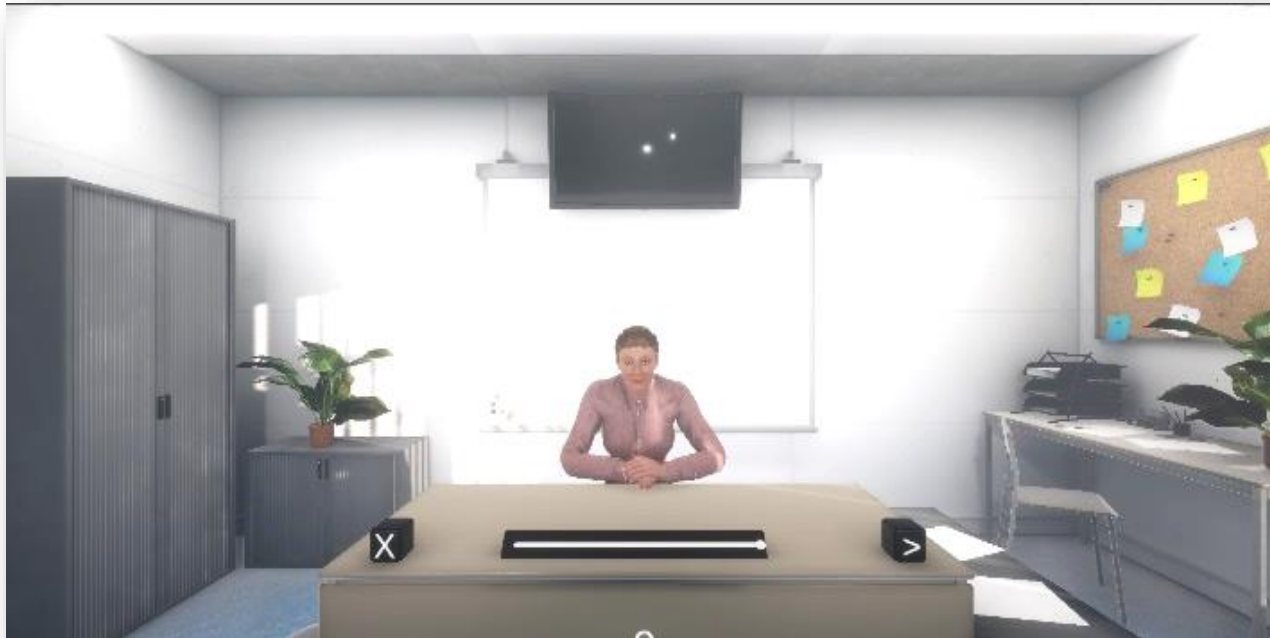Public speaking training in virtual reality

# Aims

- Avatars must react appropriatively to what the speaker says
- The speaker must perceived the reaction properly

# Creation of a library of (AI) animated avatars

Virtual environment for public speaking training with an interactive and challenging audience

- **To understand how some attitudes of a virtual audience are perceived in <u>Virtual Reality</u> (valence – arousal)**
- To study quality of graphism used
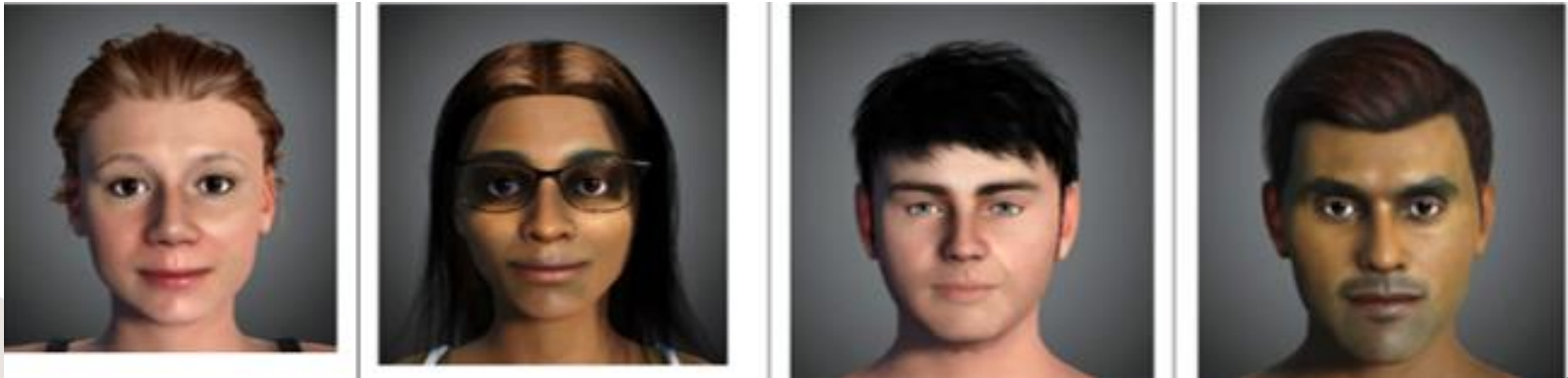- To study quality of headset used

# Experiment

# Avatars used

**Sketched models**



**Photorealistic models**

# Headsets used

## Low-end headset



- Basic quality
- Affordable
- Portability (smartphone and headset)
- No knowledge needed

## High-end headset



- High quality
- Expensive (headset, computer)
- Heavy material

- Technical knowledge needed

# Attitudes :

**Postures and hands:**
- P1: Backward posture – Arms crossed
- P2: Backward posture –Arms stand (elbows on the table with hands crossed)
- P3: Backward posture – Arms behind the head
- P4: Upright posture – Hand on hand (hands on the table, one on top of the other)
- P5: Upright posture – Hands together (hands crossed on the table)
- P6: Upright posture – Hands separated in front
- P7: Forward posture – Hands together
- P8: Forward posture – Arms stand (elbows on the table with hands crossed)
- P9: Froward posture – Arms crossed

**Facial expressions:**
- F1: None
- F2: Smiling
- F3: Frowning
- F4: Eyebrows raised

**Head movements:**
H1: None
H2: Nod
H3: Shake
H4: Questioning (head tilted at 45 degrees)

144 possible combinations

**40 attitudes**

| Seq. 1 | Seq. 2 | Seq. 3 | Seq. 4 | Seq. 5 | Seq. 6 | Seq. 7 | Seq. 8 | Seq. 9 | Seq. 10 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| P1F3H4 | P3F4H2 | P7F2H2 | P7F2H4 | P7F3H3 | P7F4H3 | P7F4H4 | P9F1H2 | P9F2H3 | P9F3H3 |
| Seq. 11 | Seq. 12 | Seq. 13 | Seq. 14 | Seq. 15 | Seq. 16 | Seq. 17 | Seq. 18 | Seq. 19 | Seq. 20 |
| P2F2H3 | P2F4H2 | P3F3H3 | P3F4H3 | P4F4H1 | P4F4H3 | P5F3H1 | P7F3H1 | P8F4H1 | P9F1H3 |
| Seq. 21 | Seq. 22 | Seq. 23 | Seq. 24 | Seq. 25 | Seq. 26 | Seq. 27 | Seq. 28 | Seq. 29 | Seq. 30 |
| P2F1H2 | P2F4H4 | P3F1H2 | P3F3H2 | P3F4H4 | P4F1H2 | P5F1H4 | P6F3H4 | P7F1H1 | P7F1H2 |
| Seq. 31 | Seq. 32 | Seq. 33 | Seq. 34 | Seq. 35 | Seq. 36 | Seq. 37 | Seq. 38 | Seq. 39 | Seq. 40 |
| P1F3H1 | P2F4H3 | P3F2H3 | P3F4H1 | P4F1H3 | P4F2H2 | P6F3H3 | P7F1H4 | P7F4H3 | P8F3H4 |

# Emotional valence and the level of arousal in VR

- 125 participants
- 40 sequences of attitudes were tested
- 7-point Likert scale
- Gatineau Presence Questionnaire

**GPQ**
- Feeling of presence
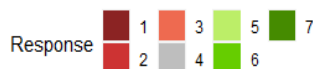- Level of realism
- Level of artificiality
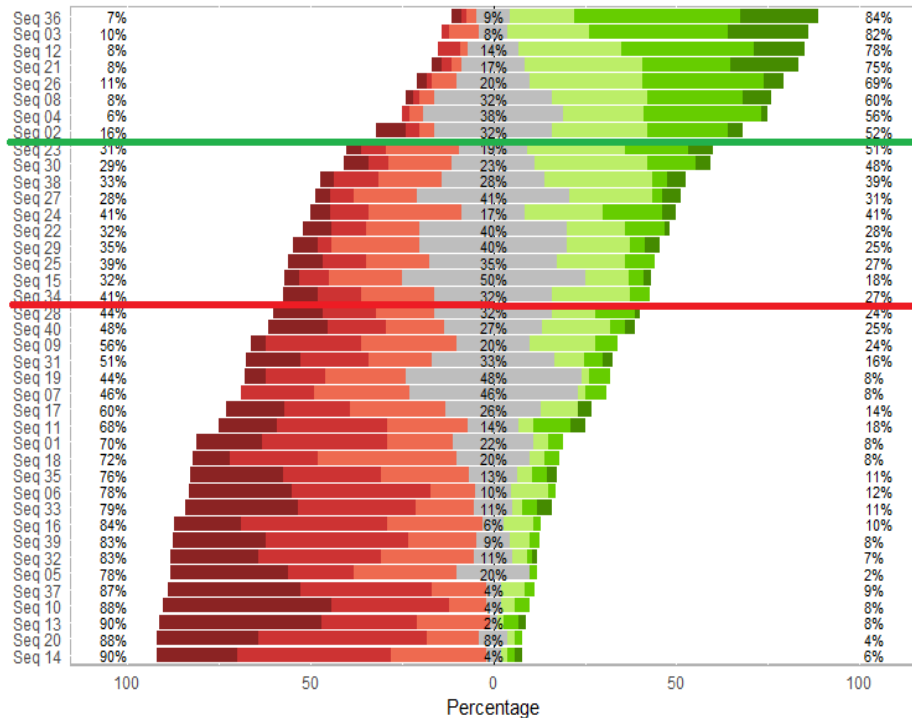- Spatial awareness
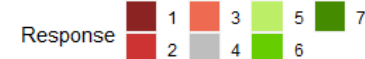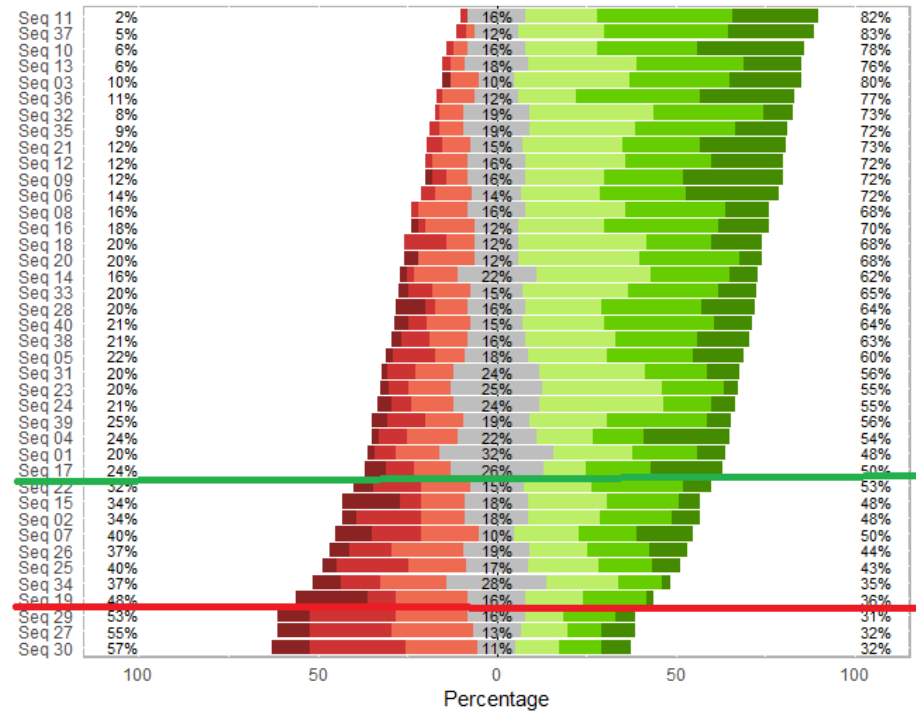
# Results

# Results for the sequences :
## Check how the attitudes are perceived in VR

- Analysis of the level of arousal and valence at a gesture level
- Analysis of the level of arousal and valence for the combinations

**Valence per sequence**

**Arousal per sequence**

# Library of animated avatars correspoding to some level of valence and arousal

Table 7: Sequences per level of valence and arousal

| | Negative valence | Neutral valence | Positive valence |
|---|---|---|---|
| Low level of arousal | ∅ | Seq. 27: P5F1H4<br>Seq. 29: P7F1H1<br>Seq. 30: P7F1H2 | ∅ |
| Neutral arousal | Seq. 07: P7H4H4<br>Seq. 19: P8F4H1 | Seq. 15: P4F4H1<br>Seq. 22: P2F4H4<br>Seq. 25: P3F4H4<br>Seq. 34: P3F4H1 | Seq. 02: P3F4H2<br>Seq. 26: P4F1H2 |
| High level of arousal | Seq. 01: P1F3H4<br>Seq. 05: P7F3H3<br>Seq. 06: P7F4H3<br>Seq. 09: P9F2H3<br>Seq. 10: P9F3H3<br>Seq. 11: P2F2H3<br>Seq. 13: P3F3H3<br>Seq. 14: P3F4H3<br>Seq. 16: P4F4H3<br>Seq. 17: P5F3H1<br>Seq. 18: P7F3H1<br>Seq. 20: P9F1H3<br>Seq. 28: P6F3H4<br>Seq. 31: P1F3H1<br>Seq. 32: P2F4H3<br>Seq. 33: P2F2H3<br>Seq. 35: P4F1H3<br>Seq. 37: P6F3H3<br>Seq. 39: P7F4H3<br>Seq. 40: P8F3H4 | Seq. 23: P3F1H2<br>Seq. 24: P3F3H2<br>Seq. 38: P7F1H4 | Seq. 03: P7F2H2<br>Seq. 04: P7F2H4<br>Seq. 08: P9F1H2<br>Seq. 12: P2F4H2<br>Seq. 21: P2F1H2<br>Seq. 36: P4F2H2 |

# Conclusions

- **Creation of a library of animated avatars associated with some levels of arousal and valence to be used in a VR training environment.**
- **Photorealistic avatars improved the confidence level**
- **High-end headset improved the quality of immersion but low-end headset can be used for this purpose (similar results)**

Next steps:

- Detection of emotions
- Autonomous audience
- Training environment

# Thank you !



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