

**CAstelet in Virtual reality for  
shadOw AVatar  
(CAVOAV) [slides]**

by Georges Gagneré and Anastasiia Ternova  
Paris 8 University

# Overview

- Shadows in arts and sciences
- Virtual theaters
- Virtual shadow theater setup
- Nature of the ShadOw AVatar (OAV)
- Directing an avatar : 2 approaches
- Two use cases : *The Shadow* performance and pedagogical master classes

# Shadow influences



- Art of painting

# Shadow influences



- Art of painting

- Philosophy

Maxima pars hominum caeca immerga tenebris  
Voluntur assidue, et s' fultis letantur mari:  
Alypie ut obici. Tis obtutus in bereat umbras,  
Vt VERI simulacra omnes muerantur anony,

Et s' folati dandi ludantur imagine rerum.  
Quam pauci meliore luto, qui in lumine puro  
Secreta à s' folata turbâ, lualbria cernunt.  
Rerum umbras rectas, expendant omnia luce:

Hi posita erroris nebula dignoscere possunt.  
Vera bona, atque alios caeci sub noi se latentes  
Extrahere in clarâ lucem conantur, ut illis  
Nullus amor lucis, tanta est s' rationis egestas.

CC. Harlemensi Juv.  
Sacerdoti Scripsit,  
Henr. Hondius excudit.  
1604.

H. L. SPIEGEL FIGVRARI ET SCYLPY CVRAVIT AC DOCTISS. ORNATISS. D. PET. PAW IN LVGDVN. ACAD. PROFESSORI MEDICO DD.

# Shadow influences



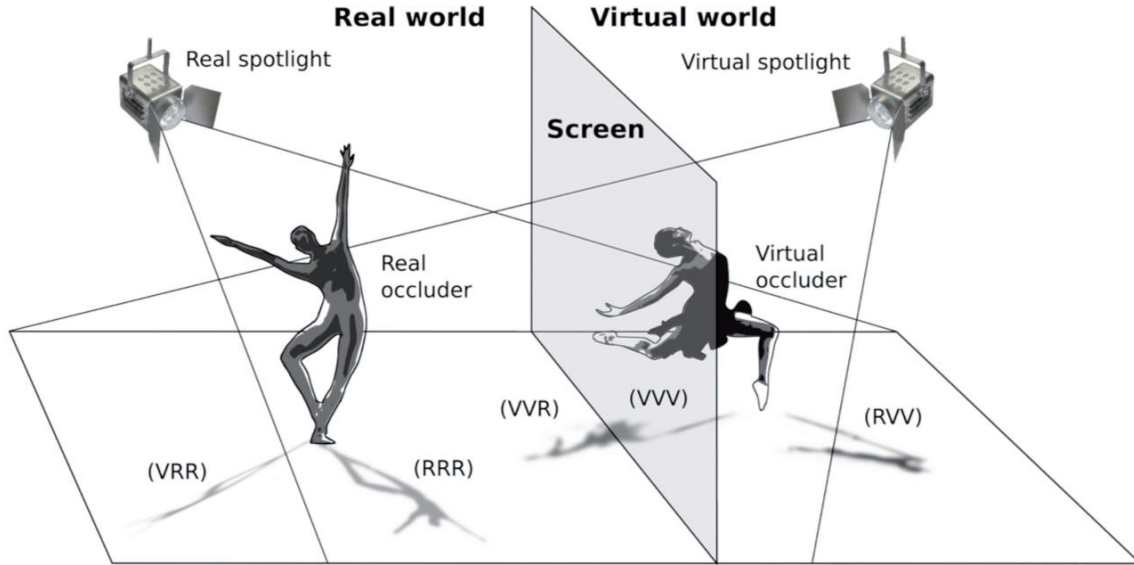
- Art of painting
- Philosophy
- Sciences

# Shadows in digital art - Videoplace/Myron Krueger



- Digital silhouette
- Interaction
- “Distributed theater”

# Virtual theater - Inhabiting the 3D scenography



- Coexistence between physical and digital
- Connexion with physical audience
- Towards immersion

# Virtual theater - *Trickster at the intersection*



- By Q. Wu, P. Boulanger, M. Kazakevich and R. Taylor
- Low cost motion capture device
- Inhabiting an avatar in real time



# Virtual theater - *The Tempest*



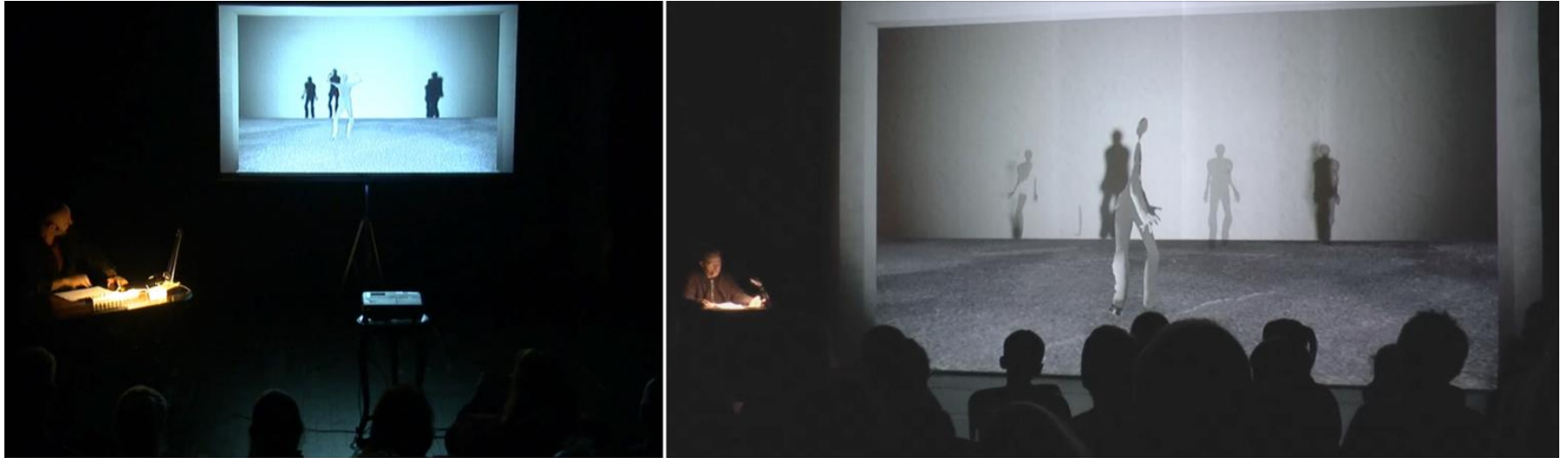
- Royal Shakespeare Company with INTEL

# Shadow theater



- Acting style
- Specific architecture
- “CAstelet Virtuel d’OmbrAVatar”

# CAVOAV set up



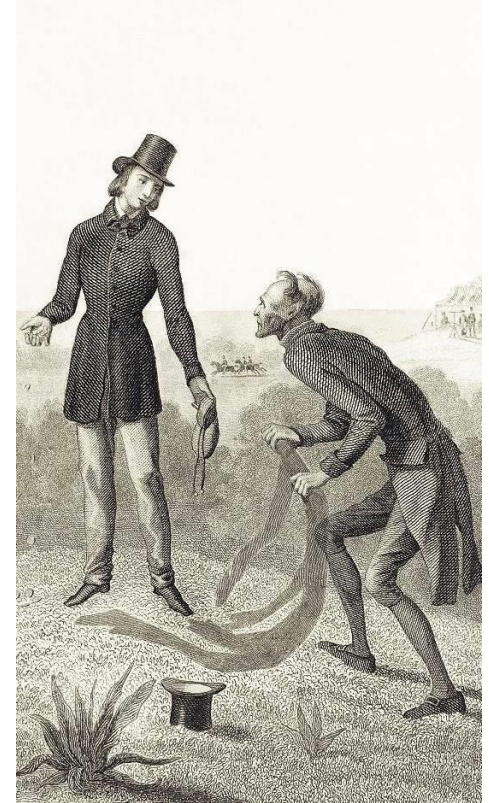
- A frame opening to a virtual plays-in-plays
- **1)** Only shadows   **2)** Shadows and virtual puppets   **3)** Only virtual puppets

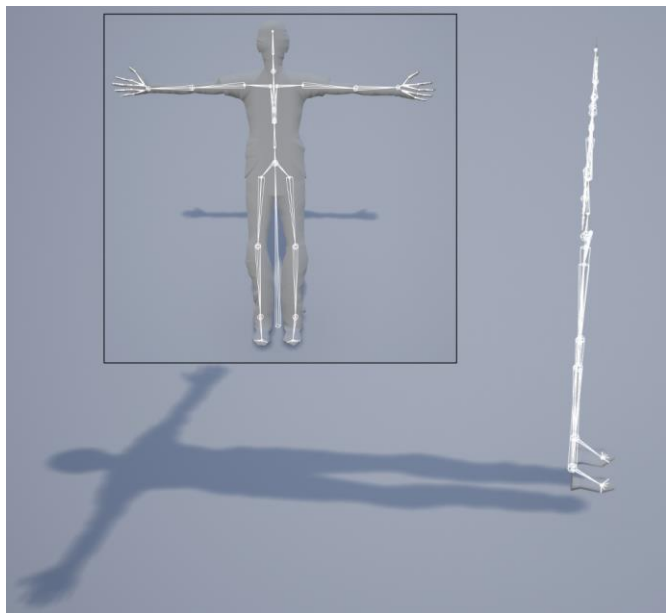
# CAVOAV set up

Two principal goals :

- Eliciting mixed theatrical situations based on duplication by shadows
- Enriching the art of directing actors, shadows and puppets

# *Peter Schlemihl's Miraculous Story*, by Chamisso





- Flat human silhouette
- Rigged on a plan

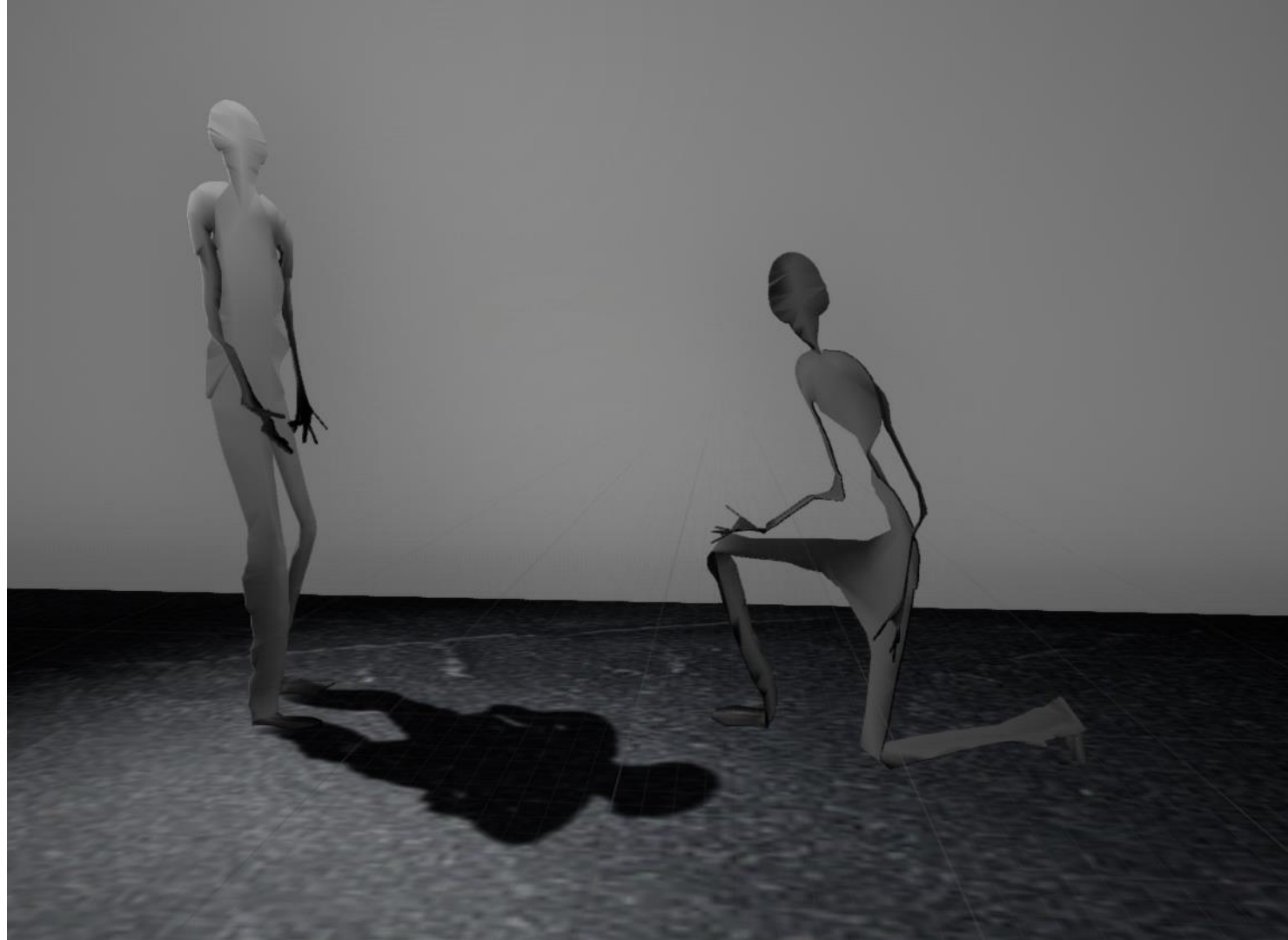
- Transition from 2D to 3D
- Casting a shadow or not
- Visible or invisible



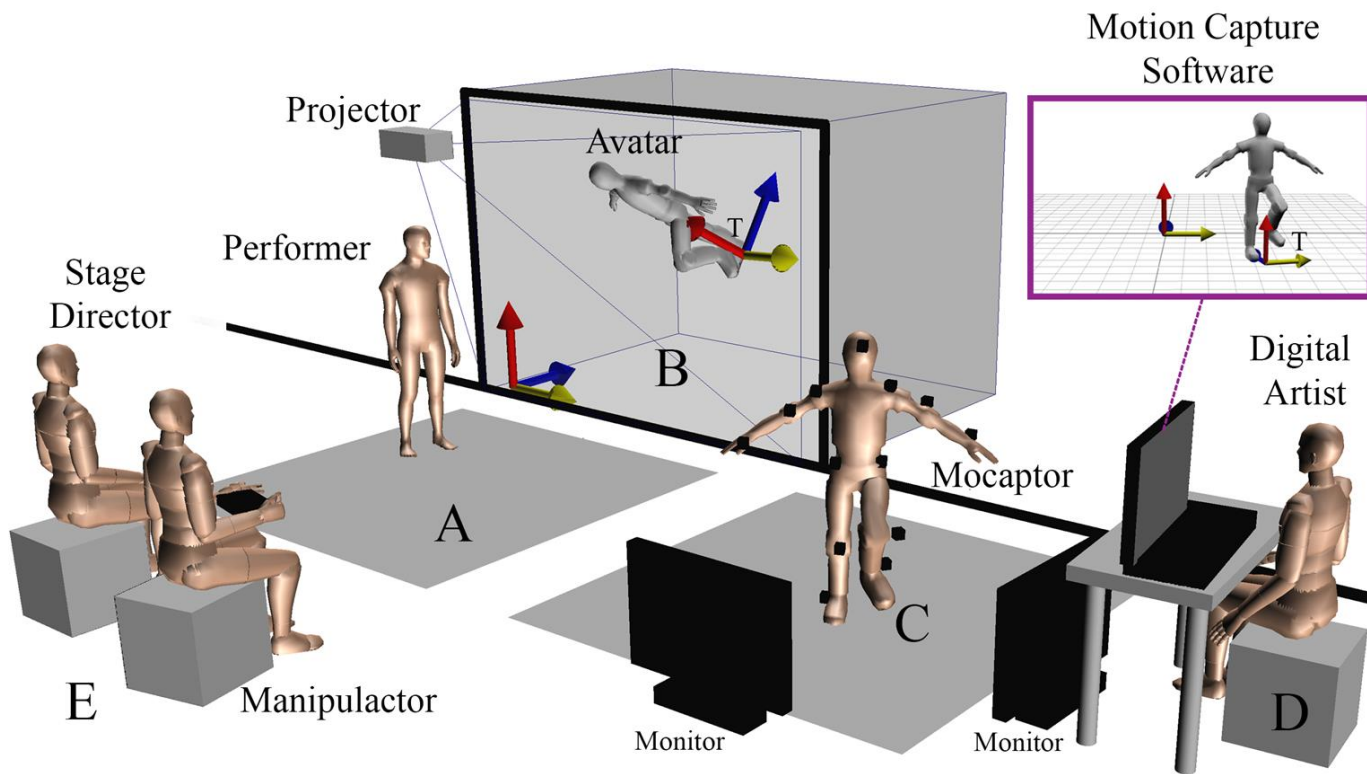




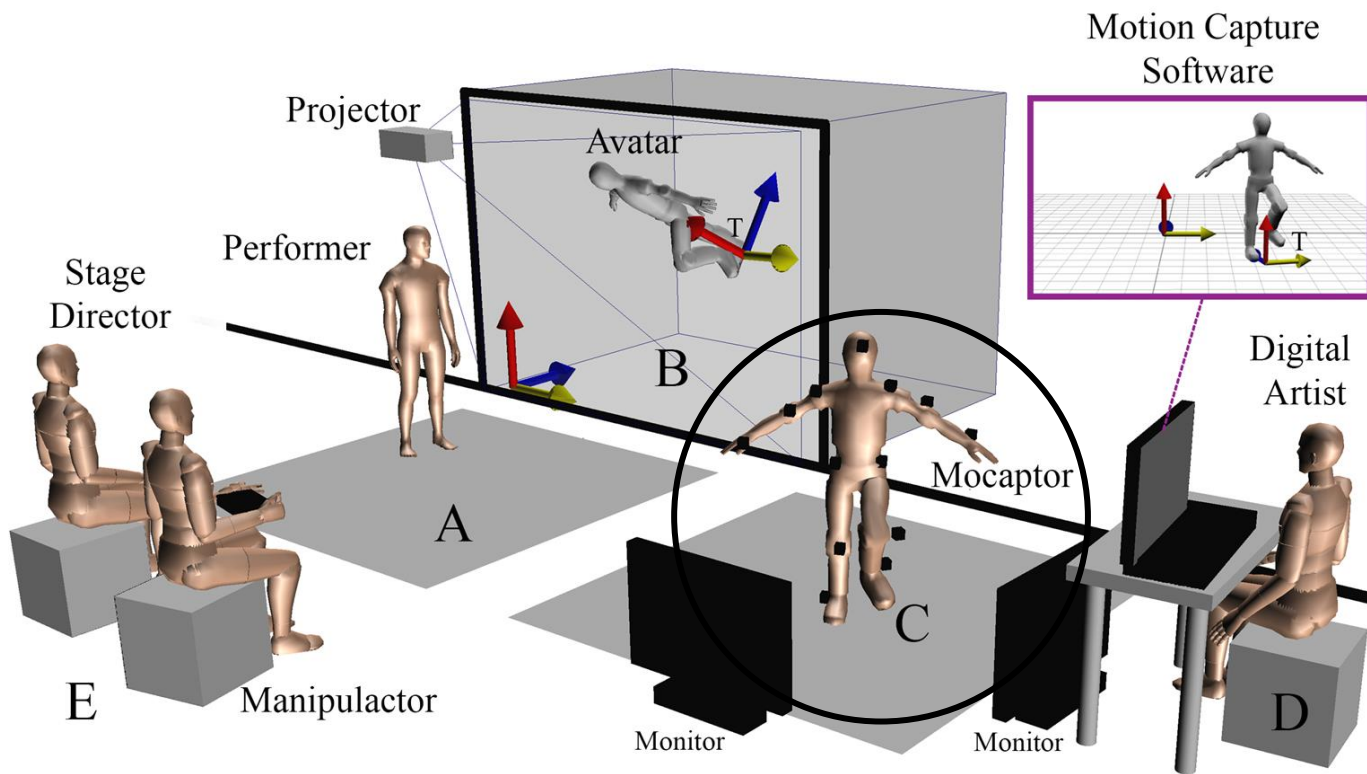




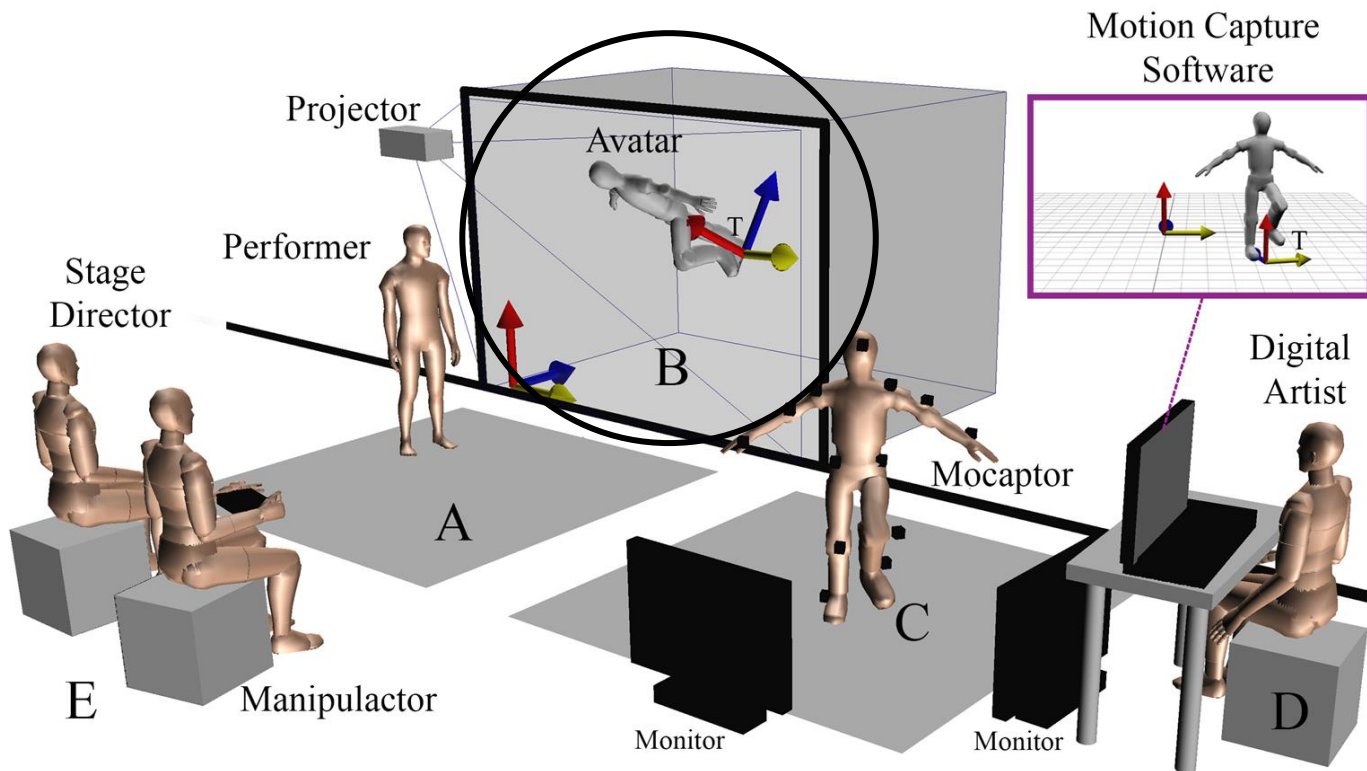
# AvatarStaging



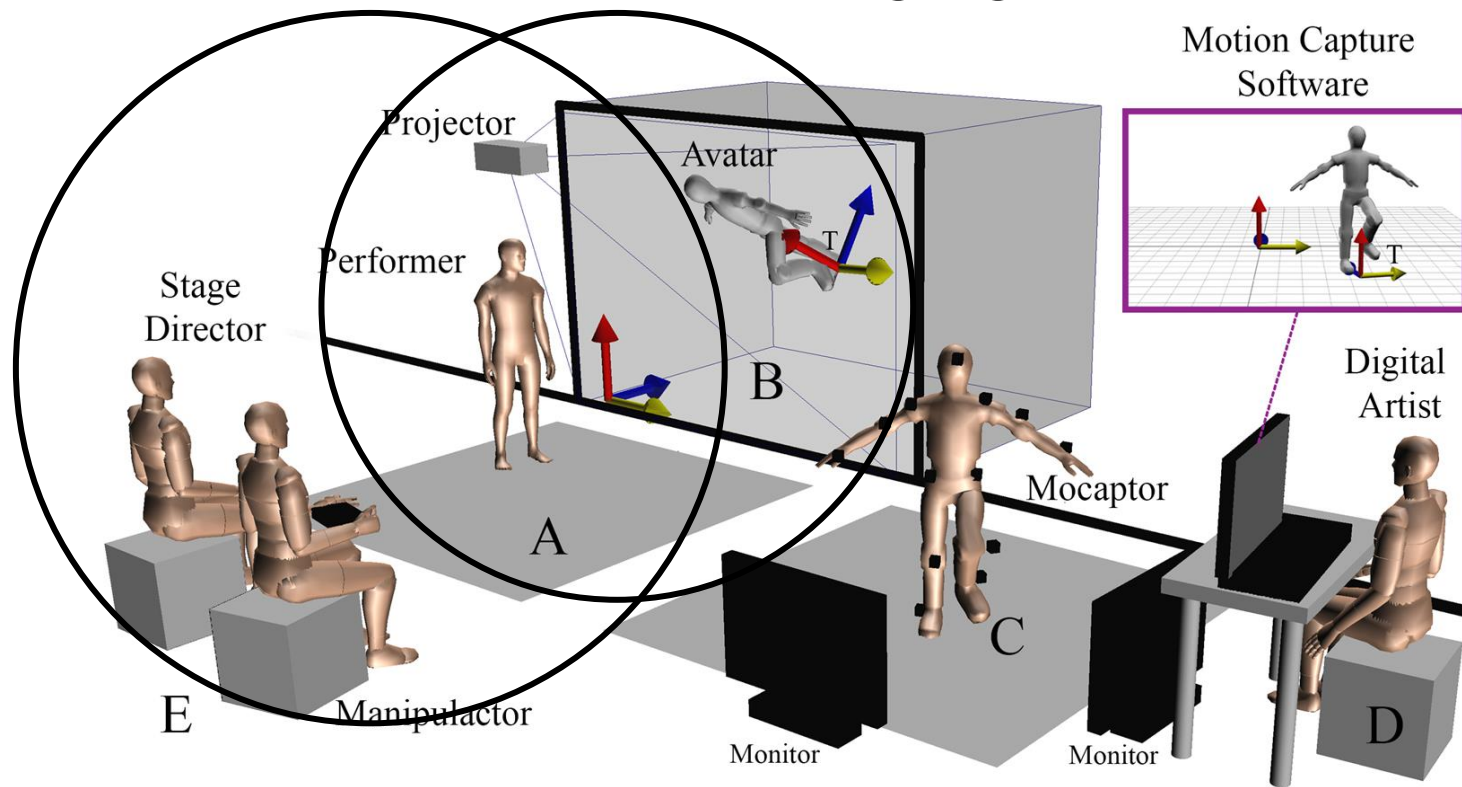
# AvatarStaging



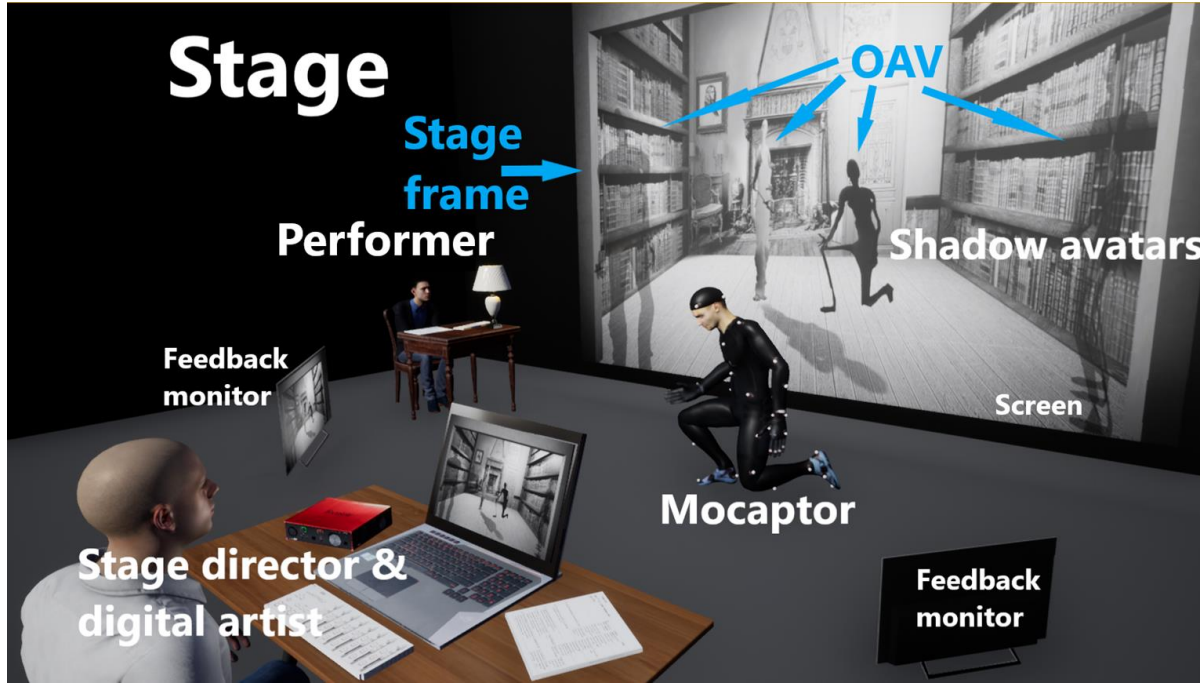
# AvatarStaging



# AvatarStaging



# CAVOAV as a variation of AvatarStaging

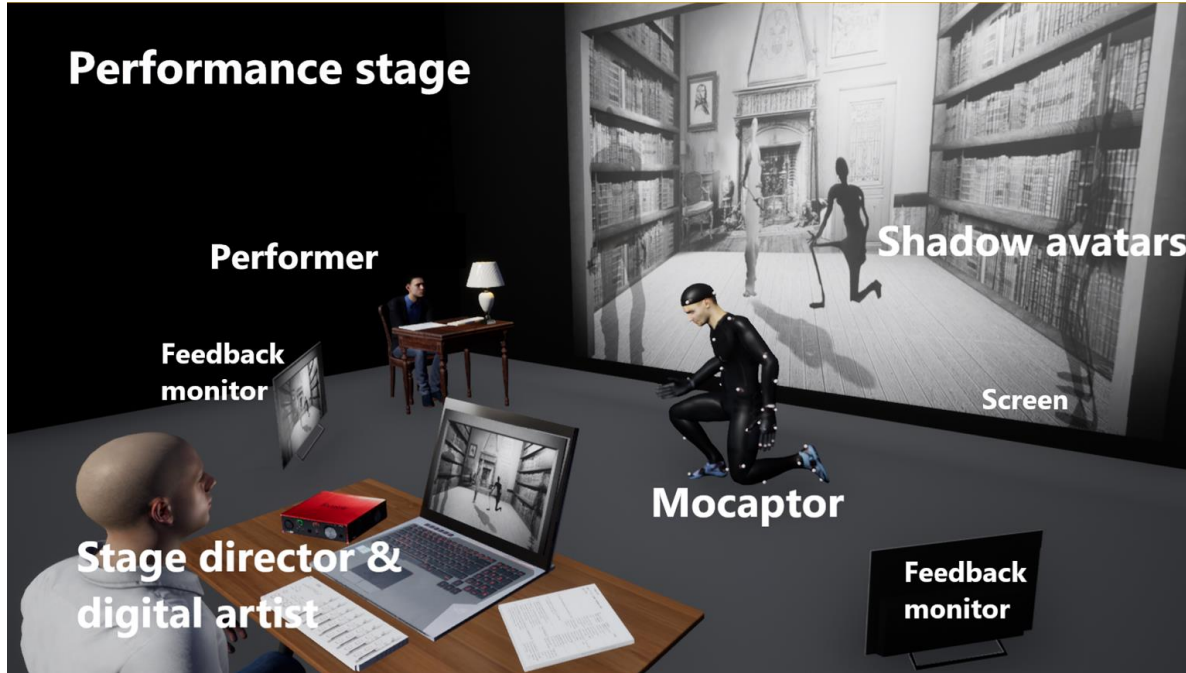


- Virtual Space B = Theatrical space behind a **stage frame**
- Avatar = **OAV**

# Direction of avatars : 1st approach

- OAV controlled in real time by the mocaptor
- Close collaboration between the mocaptor and the manipulator
- Presence effect : acceptance that the virtual bodies share the same space and time as the human actors
- Suspension of disbelief

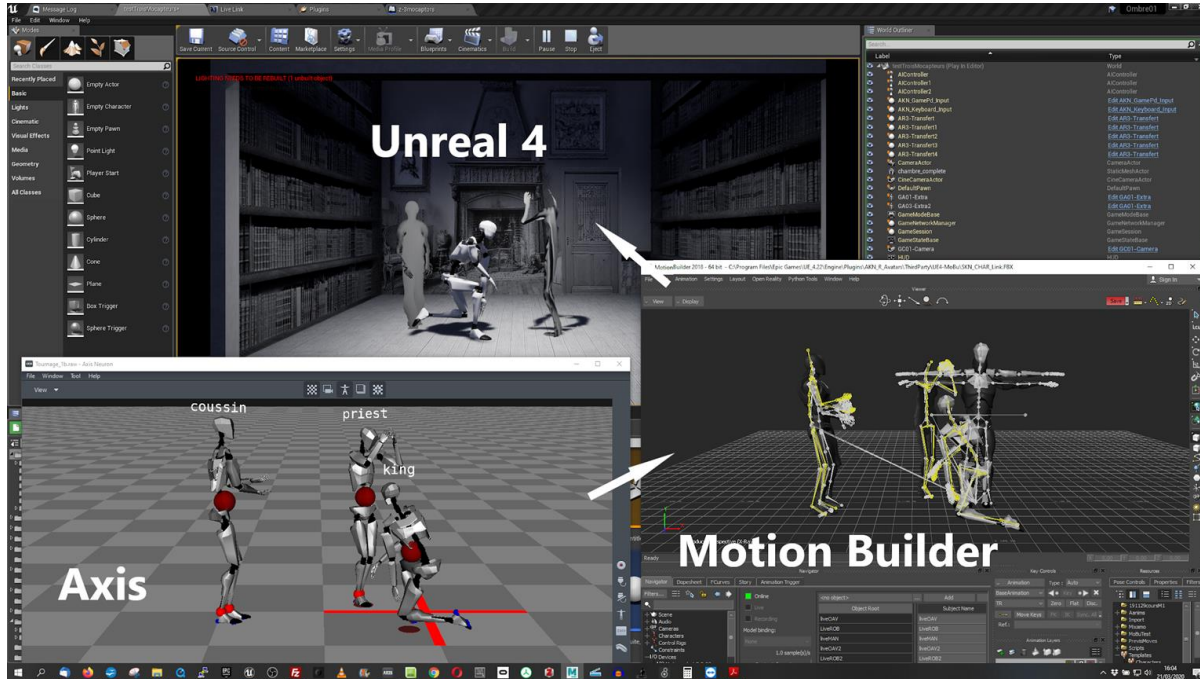
# Direction of avatars : 2nd approach



- Recorded animations
- On set previsualization
- Having the best conditions to inhabit the avatar



# Direction of avatars : 2nd approach

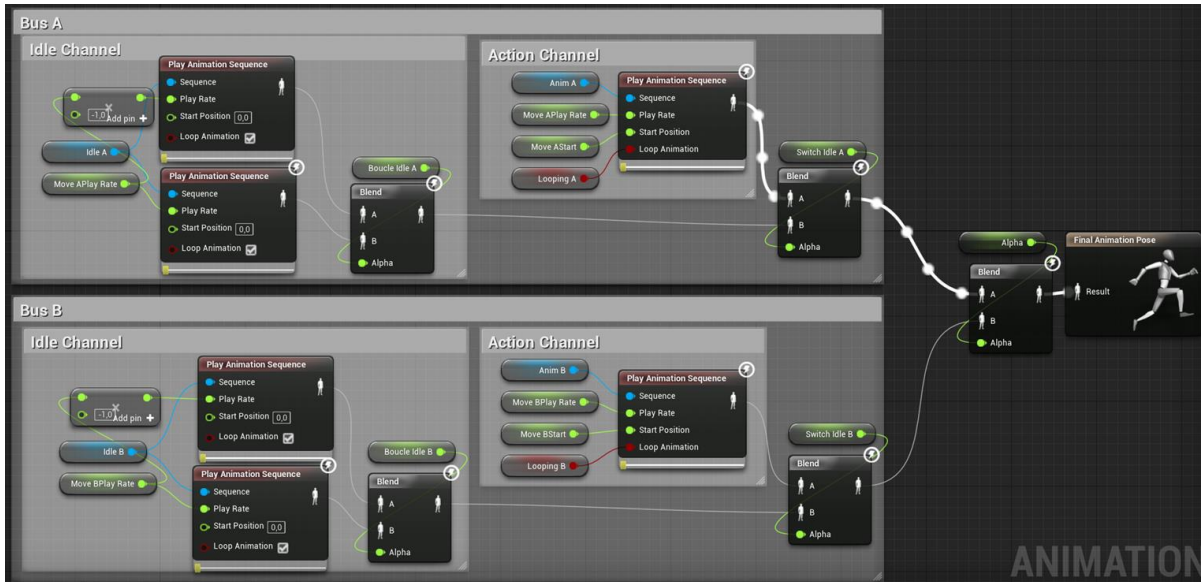


- Axis Neuron  
=>
- Motion Builder (with MotionRobot plugin)  
=>
- Unreal Engine 4 (with LiveLink plugin)

# Direction of avatars : 2nd approach

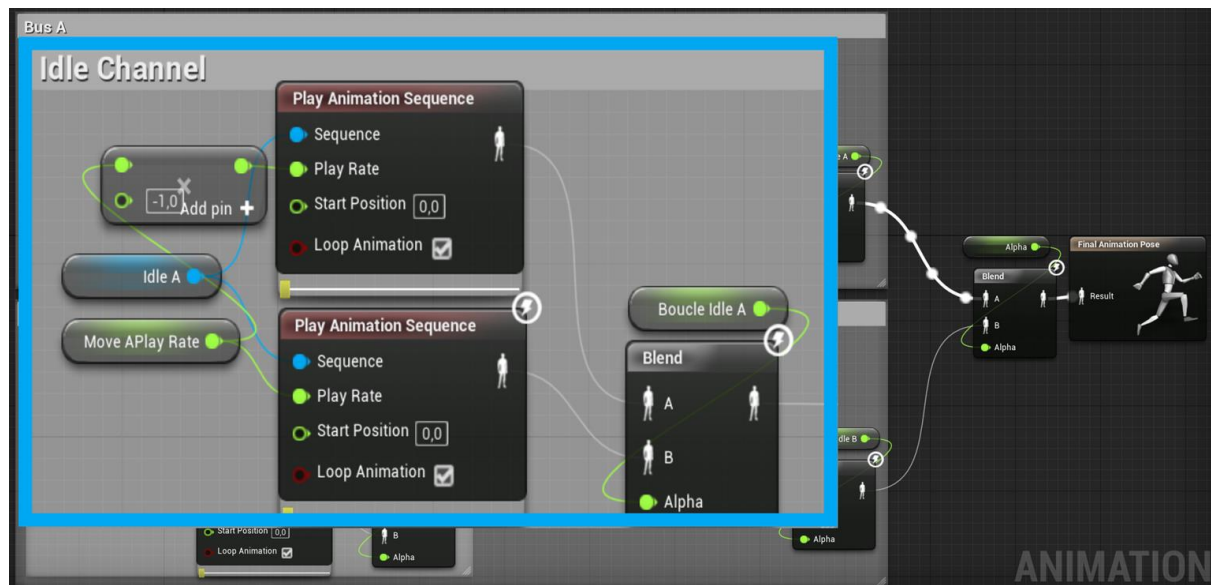
- Presence effect + SYNCHRONIZATION
- Theater = living process
- Programming of an acting OAV able to follow a performer

# Direction of avatars : 2nd approach



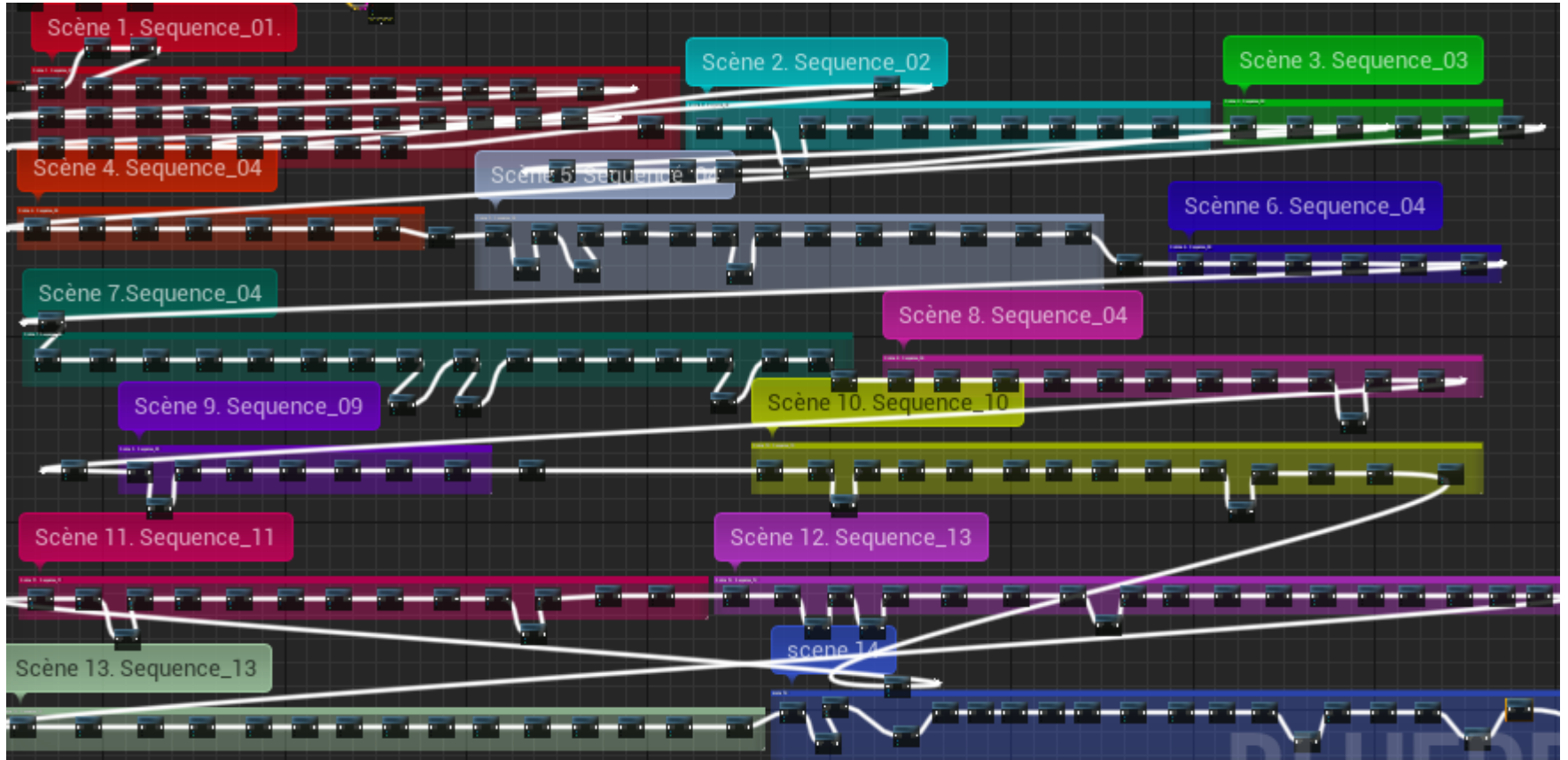
- Finite State Machine
- 2 buses
- mix of **action** channel and **idle** channel

# Direction of avatars : 2nd approach



- Idle channel sub-system
- Mixing normal and reverse mode
- Suspension of action

# Direction of avatars : 2nd approach



# Use case N°1 : *The Shadow*



- After Andersen
- Directed by G. Gagneré
- Created in 2019
- Produced by [didascalie.net](http://didascalie.net)

More information on the performance : <http://didascalie.net>



More information on the performance : <http://didascalie.net>



More information on the performance : <http://didascalie.net>





More information on the performance : <http://didascale.net>



More information on the performance : <http://didascalie.net>

# Use case N°2 : Pedagogical masterclasses



- Inhabiting a virtual body

- moving properly in a virtual set





More information on the master classes : <http://didascalie.net>

# Perspectives

- Exploring bricks of autonomy for the OAV's behavior
- Testing the setup in immersive reality both for the performer and the audience

**THANK YOU FOR YOUR ATTENTION**



**[georges.gagnere@univ-paris8.fr](mailto:georges.gagnere@univ-paris8.fr)**

## Bibliographie

- Casati R., *La Découverte de l'ombre*, Albin Michel, 2002
- Casati R. & Cavanagh P., *The Visual World of Shadows*, MIT Press, 2019 <https://doi.org/10.7551/mitpress/11007.001.0001>
- Gagneré G., « *The Shadow* », in *Proceedings of the 7th International Conference on Movement and Computing (MOCO '20)*, Association for Computing Machinery, New York, NY, USA, 2020, Article 31, 1–2 <https://doi.org/10.1145/3401956.3404250>
- Gagneré G., Mays T., Ternova A., « How a Hyper-actor directs Avatars in Virtual Shadow Theater », in *Proceedings of the 7th International Conference on Movement and Computing (MOCO '20)*, Association for Computing Machinery, New York, NY, USA, 2020, Article 15, 1–9 <https://doi.org/10.1145/3401956.3404234>
- Gagneré G., Plessiet C., « Experiencing avatar direction in low cost theatrical mixed reality setup », in *Proceedings of the 5th International Conference on Movement and Computing (MOCO '18)*, Association for Computing Machinery, New York, NY, USA, 2018, Article 55, 1–6, <https://doi.org/10.1145/3212721.3212892>
- Jacquemin C., Gagneré G., Lahoz B., « Shedding light on shadow: real-time interactive artworks based on cast shadows or silhouettes », in *Proceedings of the 19th ACM international conference on Multimedia (MM '11)*, ACM, New York, NY, USA, 173–182, 2011 <https://doi.org/10.1145/2072298.2072322>
- Jacquemin C., Rami A., Planes B., « Alice on both sides of the looking glass: Performance, installations, and the real/virtual continuity », in *Comput. Entertain.* 9, 3, 2011 <https://doi.org/10.1145/2027456.2027458>
- Krueger M. W. & al., « VIDEOPLACE—an artificial reality », *SIGCHI Bull.* 16, 4 (April 1985), 35–40, <https://doi.org/10.1145/1165385.317463>
- Wu Q., Boulanger P., Kazakevich M., & Taylor R., « A real-time performance system for virtual theater », in *Proceedings of the 2010 ACM workshop on Surreal media and virtual cloning (SMVC '10)*. Association for Computing Machinery, New York, NY, USA, 3–8, 2010 <https://doi.org/10.1145/1878083.1878087>